LET'S MEET @

ACADEMIA-INDUSTRY INTERFACE MEET

March 04, 2024 Gandhi Park, Pantnagar

About the MEET

The Academia-Industry-Interface Meet is a dynamic platform designed to foster collaboration between academia and industry, driving the commercialization of groundbreaking technologies and crop varieties developed by the University.

What to Expect

- Engaging panel discussions with leading experts in agriculture and industry.
- Presentations showcasing cutting-edge technologies and crop varieties developed by the University.
- Networking opportunities with stakeholders from academia, industry, and government.
- Insights into the latest trends and developments in agricultural research and commercialization.

Key Features

- Single window system for commercialization
- Quick Decision: then and there.
- Reasonable cost of commercialization
- Development of understanding for tailor made technology as per the industry need.
- Interaction with best scientist in the field.

Key Technologies

- Agriculture Engineering
- Post-Harvest Practices
- Food Science
- Animal Science
- Textiles
- Varieties: Field Crops, Fruits & Vegetables
- Animal breeds

WHY TO ATTEND

- EXPLORE INNOVATIVE SOLUTIONS TO AGRICULTURAL CHALLENGES.
- DISCOVER OPPORTUNITIES FOR COLLABORATION AND PARTNERSHIP.
- CONTRIBUTE TO THE ADVANCEMENT OF AGRICULTURAL INNOVATION AND SUSTAINABILITY.
- CONNECT WITH LIKE-MINDED PROFESSIONALS AND EXPERTS IN THE FIELD.
- GAIN VALUABLE INSIGHTS INTO THE COMMERCIALIZATION OF TECHNOLOGIES AND CROP VARIETIES.

Register Today! Don't miss this opportunity to be part of a transformative event in agricultural innovation.

THERE IS NO FEE OF REGISTRATION.

For registration and enquiries, please contact:

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DIRECTORATE OF RESEARCH

G.B. PANT UNIVERSITY OF AGRICULTURE & TECHNOLOGY

PANTNAGAR-263 145

Expression of Interest

University has developed more than 135 technologies and 350 varieties of Field and Horticultural crops. University is willing to commercialize these technologies and varieties. Those interested in acquiring these technologies and varieties may contact to Joint Director, Research (IPMC) on the following email and contact number.

Email: padesgbpuat@gmail.com

Phone: 9897865329/9690012757

The MoU signing ceremony will be executed on March 04, 2024 at Pantnagar during Academia-Industry-Interface Meet. Therefore, all interested may apply before March 02, 2024. The flyer and Compendium of Promising Technologies of Pantvarsity are also attached for ready references.

Director Research
GBPUA&T, Pantnagar

DIRECTORATE OF RESEARCH

A COMPENDIUM OF PROMISING TECHNOLOGIES OF PANTVARSITY

Editors

PK SINGH
AJAY KUMAR
DHIRENDRA SINGH
AS NAIN

A COMPENDIUM OF PROMISING TECHNOLOGIES OF PANTVARSITY

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A COMPENDIUM OF PROMISING TECHNOLOGIES OF PANTVARSITY

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G.B. Pant University of Agriculture and Technology, Pantnagar

Foreward

G.B. PANT UNIVERSITY OF AGRICULTURE & TECHNOLOGY,
PANTNAGAR-263145, DISTT. U.S. NAGAR,
(UTTARAKHAND), INDIA

Dr. M.S. Chauhan
FNA, FNASc, FNAAS, FNADS
Vice-Chancellor

India is home to more than 1.3 billion people, and globally ranks second in terms of the agricultural output, known as a global agricultural powerhouse. It is the world's largest producer of milk, pulses, and spices, and has the world's largest cattle herd, as well as the largest area under wheat, rice and cotton. It is the second largest producer of rice, wheat, cotton, sugarcane, farmed fish, sheep & goat meat, fruit, vegetables and tea. Agriculture sector in India is a primary source of livelihood for a majority of the population Agriculture sector also proved a silver lining in the pandemic period registering a positive growth in the covid times. Yet it faces various structural challenges to be addressed to make it profitable. For, the majority of the population is still dependent on the sector. Low and stagnant income in the sector remains a focal point of policy debate in India. The most prominent pathways to enhance farmers' income is the adoption of improved agricultural technologies and varieties.

Increasing agricultural production requires continuous development of new and improved varieties/ planting material along with seed production and efficient distribution to farmers. In this endeavor, University has accepted the challenge since its inception and has contributed many and mark varieties such as Kalyansona, UP 2338, UP 262 (wheat), Pant Dhan 4 (rice), and UPAS 120 (Pegionpea). So far, this University has developed more than 330 improved varieties for all most the important crops of the state including the hilly terrains. G.B. Pant University of Agriculture & Technology, Pantnagar has played a pivotal role in production and supply of quality seeds of improved varieties in brining Green Revolution in the country. Beside, crop improvement, the university has also developed numerous technologies in the area of plant protection, farm mechanization and bio fuel, livestock improvement and management, LPT, nano-technology, post harvest process and food technology, food nutrition, textile and clothing etc. I congratulate all the scientists involved in development of varieties and technologies.

This publication is an excellent compilation of varietal and technological development research of this University. The need of hour is to commercialize and transfer this technology to leading

Foreward

agricultural industries of the country for the broader benefit of the society. This is possible through the efforts of the scientists and also through the platform of GBPUAT-Industry Meet. I congratulate all the scientists, Director Research and his team for bringing out this important document.

(M.S. Chauhan)
Vice-Chancellor

Preface

G.B. PANT UNIVERSITY OF AGRICULTURE & TECHNOLOGY,
PANTNAGAR-263145, DISTT. U.S. NAGAR,
(UTTARAKHAND), INDIA

Dr A.S. Nain
FAAM, DAAD Fellow
Director Research

In the realm of agriculture, where science and nature converge to address the fundamental challenge of feeding a growing global population, the role of universities as catalysts for innovation cannot be overstated. Agricultural Universities are dedicated to developing technologies that aims at providing quality food to everyone, while preserving and conserving natural resources. GB Pant University of Agriculture and Technology, the first agricultural university of nation has developed thousands of technologies and improved varieties of numerous crops. Some of its technologies have set the trend and changed the lives of millions of the people like Technology of Quality Seed Production, Remedy to one of the most dreaded diseases of rice: Khaira Diseases, Zero-Ferti-Seed Drill, etc. However, for long a need was being felt to compile all the present and relevant technologies developed by university so that everybody know what university has done and the technologies could be commercialized. The present book, "Technologies of Pantnagar University," explores the intricate journey of transforming cutting-edge agricultural research into tangible solutions that enhance productivity, sustainability, and the overall resilience of the food system.

The world is at a critical juncture where the demands on agriculture are escalating, driven by population growth, climate change, and evolving consumer preferences. Agricultural universities, at the forefront of scientific discovery and applied research, find themselves uniquely positioned to address these challenges through the commercialization of innovative technologies. This book serves as a guide to understand the technologies developed by Pantnagar University, which are meant to bring the changes in the lives of farmers and a common man.

In these pages, we navigate the diverse landscape of agricultural technology commercialization, delving into the processes of technology transfer, intellectual property management, and collaborative ventures between academia and the private sector. Through real-world examples and case studies, we aim to illuminate the success stories and lessons learned from bringing laboratory innovations to the fields and markets where they can make a meaningful impact.

The book is designed to be a valuable resource for a broad audience, including researchers, educators, policymakers, farmers, and industry professionals. By providing insights into the complexities of commercializing agricultural technologies, we hope to empower

Preface

readers to contribute actively to the transformation of the global food and agriculture sector.

As we embark on this exploration, we consider not only the economic implications of technology commercialization but also the profound social and environmental dimensions. We be the believe that responsible commercialization of agricultural technologies can contribute to sustainable practices, equitable access to innovations, and the resilience of rural communities.

"Technologies of Pantnagar University" is an invitation to engage with the multifaceted aspects of agricultural innovation. Through this journey, readers will gain a deeper appreciation for the pivotal role that agricultural universities play in addressing the challenges of the 21st century. We believe that through this book the broader implications of technology commercialization in agriculture and its potential to shape a more sustainable and resilient future for our global food systems, will be realized.

(A.S. Nain)
Director Research

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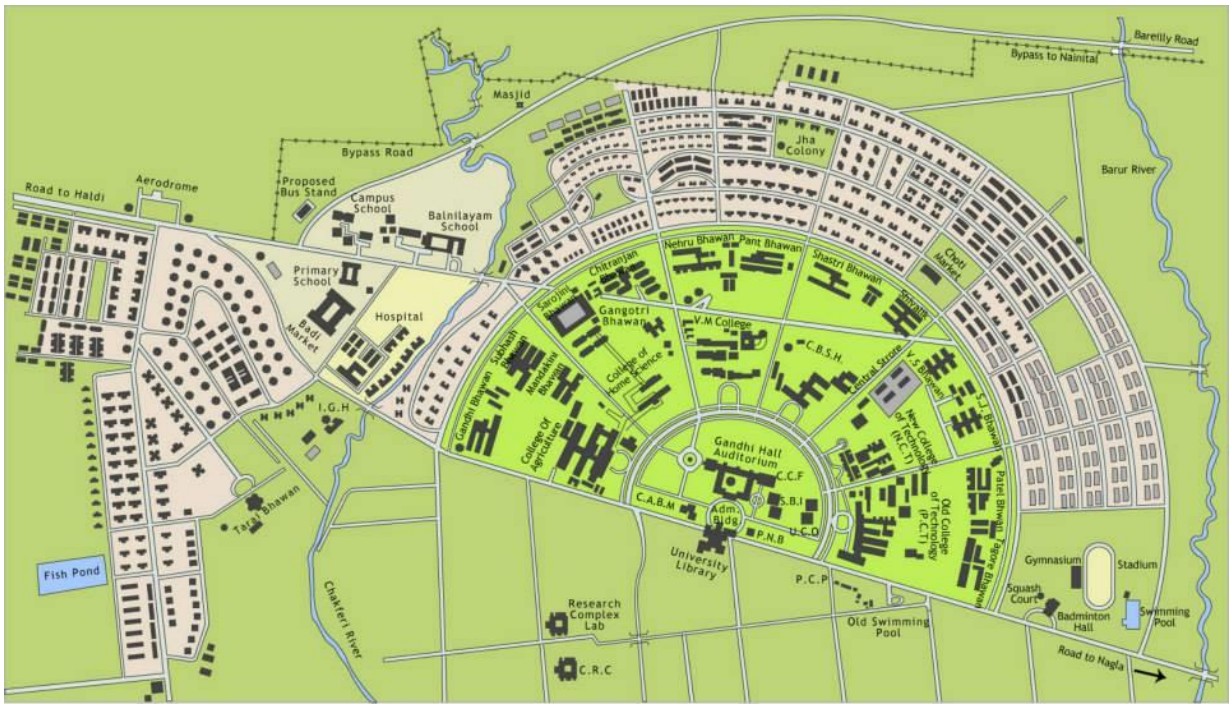
UNIVERSITY AT A GLANCE



The G.B. Pant University has a gross area of approximately 11,000 acres. The campus is surrounded with a lush green plantation in the foothills of the Himalayas in the district of Udham Singh Nagar, Uttarakhand state on the Delhi-Nainital and Lucknow-Nainital routes. Less than 62 years ago it was a thick forest in habited by wild beasts. Fear of mosquitoes and leeches, remoteness of the site, and high humidity were some of the hardships to be faced at the initial stage together with reclamation of the land and its rehabilitation. As a result of

unabated cleaning and development work on this vast area it was converted into an impressive and pollution free campus with an elegant network of farm land, research stations, roads, residences, colleges, hostels and schools.Now, with the formation Uttarakhand state the area of responsibility of the University has been limited to the 11 districts of the Hill sand 2 districts of the plains comprising Tarai Bhabhar and the adjacent area of the hills. The University is committed to the al round agricultural development of these areas through its concerted efforts and innovative education, research and extension programmes. The University has now grown up with a full range of activities, infrastructures and facilities along with supporting units to attain envisaged goals through the last 40 years. The University was established with the following mandate:

- Making provision for the education of the rural people of U.P. (now Uttaranchal) in different branches of study particularly agriculture, rural industry and business and other allied subjects;
- Furthering the prosecution of research, particularly in agriculture and other allied sciences; and
- Undertaking field and extension programmes.

COLLEGES

The College of Agriculture is one of the prestigious constituent colleges of G. B. Pant University of Agriculture and Technology, Pantnagar. It came into being on 17th November 1960 when Pandit Jawahar Lal Nehru, the first Prime Minister of India, inaugurated the university. It is the first and amongst the largest academic units of the university engaged in teaching, research and extension activities in an integrated manner. It performs a dynamic and innovative education program to meet the modern challenges of scientific manpower, vital and relevant research and effective extension services. It has completed 58 years of successful service to the nation. In addition to B.Sc. (Agriculture), its flagship program, the

College also offers undergraduate programme in Food Technology, 12 Masters and 12 Ph.D. programs in various branches of agricultural sciences through its 11 departments.

The college has the mandate to facilitate quality education in agriculture and allied sciences, strengthen and improve the infrastructure for providing quality education by constantly improving the syllabi of undergraduate (UG) and post-graduate (PG) courses, generate knowledge based and farmer centric technology for improving the production and productivity of crops, provide assistance in planning and development of technology and dissemination of the technology to farmers and to coordinate and integrate the efforts for achieving excellence in Agriculture.

The four-year Under-graduate programme of B.Sc. (Ag.) is known for its strong practical focus and professionalism. The college has been pioneer in starting 'Practical Crop Production' course and 'Earn While You Learn' programme that have been adopted by almost all the SAUs in the country. A well-equipped 'Plant Clinic' has been established to expose students to various plant health and soil problems. B.Sc. (Food Technology) programme has also been started from the session 2006-07. The college made a humble beginning in 1960 with only two departments – Crop Scienceand the Animal Science. At present, the college entails 11 departments viz.; Agronomy, Agricultural Economics, Horticulture, Genetics & Plant Breeding, Soil Science, Plant Pathology, Entomology, Food Science & Technology, Agricultural Communication, Vegetable Science and Agrometeorology.

The College of Community Science (Ealrlier College of Home Science) was established at G.B. Pant University, Pantnagar in the year 1971 with two-year diploma and four-year degree program. Since then the College has gone through many changes and syllabus was upgraded accordingly.

From the year 2017-18, B.Sc. Home Science degree program has been renamed as B.Sc. (Hons.) Community Science with the aim of reaching the communities through families. It comprises of RAWE and In-Plant Training along with the core courses of Community Science, basic supporting courses and one year Student Ready Programme with five modules in Diet and Nutrition Counseling, Designing and Production in Textiles and Apparel, Event and Decor Management, Management of Early Childhood Care and Education Centers; and Print & Electronic Media Production.

College of Community Science has five departments viz., Clothing and Textiles, Family Resource Management, Foods and Nutrition, Human Development & Family Studies and Home Science Extension. The objective of Community Science Education is to inculcate the concept of national development through family structures. For this, industrial linkages and linkages with government and non-governmental organizations to work with service industry are given priority. Teaching, research and extension are integrated for the learning of students and well being of communities.

Established in 1960 as the College of Veterinary Medicine, it had four departments viz., Anatomy and Histology, Physiology and Pharmacology, Pathology and Hygiene, and Medicine and Surgery. The post-graduate degree programmes in these departments were started in 1964. In 1976 the College was renamed as the College of Veterinary Sciences with 9 departments namely Anatomy and Histology, Physiology, Pharmacology and Toxicology, Parasitology, Pathology, Microbiology and Hygiene, Medicine, Gynaecology and Obstetrics, Surgery and Radiology and an independent unit of Veterinary Clinic. Later a department of Public Health was added in 1994. The duration of B.V.Sc. and A.H. degree programme was increased from 4 years to 5 years in 1980 so as to impart internship training and also to improve the standard of education.

In 1996, 7 new departments viz., Veterinary Biochemistry, Animal Nutrition, Animal Genetics and Breeding, Livestock Production and Management, Livestock Products Technology, Veterinary Epidemiology and Preventive Medicine, and Veterinary and Animal Husbandry Extension were added besides 3 independent units of Veterinary Clinic (Veterinary Teaching Hospital) and Centre of Animal Biotechnology and Animal Disease Diagnostic Centre to comprehend the disciplines of Veterinary and Animal Husbandry under one umbrella for integrated education, research and extension programmes as recommended by the Veterinary Council of India (VCI). Thus, presently the College has 17 departments, besides three independent units. These 17 departments and Veterinary Teaching Hospital are engaged in teaching of 84 courses offered to the undergraduate students of B.V.Sc. and A.H. degree programme. In all 195 credit hours are offered to the undergraduate students excluding the compulsory internship training of180 days.

In addition to the undergraduate degree programme, the College offers 20 Masters and 16 Ph.D. degree programmes. Generally 75% of the total students registered in the post-graduate programmes get financial assistance from one or the other sources.

The College of Basic Sciences and Humanities is one of the constituent Colleges of the University and was established in the year 1963. The College has a mandate to provide teaching support to various degree programs of the University in subjects of Basic Sciences, Social Sciences and Humanities. Over the period, College has developed 23 post-graduate programs and undertakes research projects in the cutting-edge research areas. The College also offers one under-graduate program in B. Tech. (Biotechnology).

The College of Technology came in to existence in 1966 with the establishment of disciplines of Civil Engineering, Electrical Engineering and Mechanical Engineering.The College of Agricultural Engineering was established in this prestigious university in 1962. The College of Technology is privileged to have a well qualified and experienced faculty with judicious mix of

creative, talented and committed academicians. A large number of faculty members hold Ph.D. degree in their respective fields from national and international institutions of repute.

The College of Technology has also been at the forefront of various prestigious initiatives. It was chosen as the lead institute in Uttarakhand for the World Bank's Technical Education Quality Improvement Program (TEQIP-I, II, and III), highlighting its commitment to enhancing the quality of technical education. Additionally, the college serves as the Regional Academy Centre of CISCO, which includes a CISCO networking lab. This recognition further underscores the college's dedication to staying at the forefront of technological advancements and providing its students with the best possible education. In terms of infrastructure, the college takes great pride in providing state-of-the-art facilities that cater to the modern technological needs of its students. These facilities are designed to enhance the learning experience and provide a conducive environment for academic and research activities. In conclusion, the establishment of the College of Agricultural Engineering and the subsequent addition of the College of Technology have played a crucial role in the growth and development of this prestigious university. With its exceptional faculty, wide range of degree programs, and top-notch infrastructure, the college offers students a comprehensive and enriching educational experience. Its involvement in important initiatives further solidifies its position as a leading institution in the field of technical education. Recognizing the importance of quality education, the college ensures that all B. Tech. and M. Tech. programs are approved by the All India Council for Technical Education (AICTE). Additionally, the B. Tech. programs in Agricultural Engineering, Civil Engineering, Electrical Engineering, and Mechanical Engineering have received accreditation from the National Board of Accreditation. Admissions to the B. Tech. programs are done through the Joint Entrance Examination (JEE), while admissions to the M. Tech. programs are based on GATE scores and merit. For Ph.D. and MCA programs,

students are admitted through the university entrance exam. The College of Agricultural Engineering was established in this prestigious university in 1962, marking a significant milestone in its history. Four years later, in 1966, the College of Technology was established, offering disciplines such as Civil Engineering, Electrical Engineering, and Mechanical Engineering. One of the College of Technology's greatest assets is its highly qualified and experienced faculty, consisting of a diverse group of creative, talented, and dedicated academicians. Many of these faculty members hold Ph.D. degrees from renowned national and international institutions in their respective fields. The college is proud to offer a wide range of degree programs, catering to the educational needs and aspirations of its students. At the undergraduate level, there are eight degree programs available, providing a solid foundation for further specialization. The college also offers an impressive array of 14 programs at the master's level, including the self-financed MCA program. Furthermore, there are eight programs available at the doctoral level, allowing students to delve deeper into their chosen fields of study. Prestigious university in 1962, marking a significant milestone in its history. Four years later, in 1966, the College of Technology was established, offering disciplines such as Civil Engineering, Electrical Engineering, and Mechanical Engineering. One of the College of Technology's greatest assets is its highly qualified and experienced faculty, consisting of a diverse group of creative, talented, and dedicated academicians. Many of these faculty members hold Ph.D. degrees from renowned national and international institutions in their respective fields. The college is proud to offer a wide range of degree programs, catering to the educational needs and aspirations of its students. At the undergraduate level, there are eight degree programs available, providing a solid foundation for further specialization. The college also offers an impressive array of 14 programs at the master's level, including the self-financed MCA program. Furthermore, there are eight programs available at the doctoral level, allowing students to delve deeper into their chosen fields of study.

The College of Fisheries, established in the year 1985, executes UG (B. F. Sc.), PG (M. F. Sc. in Aquaculture, Fisheries Resource Management, Aquatic Environment Management, Fish Processing Technology) and Ph.D. (Fishery Resource Management and Aquaculture) degree programmes in fishery sciences to develop professionally trained manpower for the development and management of aquaculture and fisheries sectors. The beginning of fisheries activities at Pantnagar was started dates back to the 1970s with the construction of some fish ponds at Nagla. The establishment of Fisheries Research and Training Centre (FRTC) in 1982 with the financial assistance of World Bank was the basis of the integrated development in teaching, training, research and extension of fisheries at the University. The Centre was entrusted with the responsibility of providing training to the personnel of State Fisheries Department/FFDA/Fisheries Development Corporation, Fish Farmers and others; to conduct productive and adoptive research work, and to start fishery education at the undergraduate level. The College especially caters to the need of research and extension in the inland fisheries sector in the states of North India.

College of Agri Business Management, a chapter in the history of Govind Ballabh Pant University, was established in 1996. It focuses on using agribusiness to improve the agriculture system in the country and develop skilled professionals. Over the years, CABM has achieved significant growth and success, setting its own standards in the field of agribusiness. It constantly monitors the market and adapts its programs and students accordingly. Additionally, CABM offers new programs such as an MBA for Engineers and a Ph.D. in Management. The college is also involved in research, consultancy, and management development programs.

DIRECTORATE OF RESEARCH

The vision is to motivate primary stakeholders and to create an enabling and interactive coupling between industry, economy, environment and society for sustainable development of human resources with a strong emphasis on excellence in academics, research & extension to realize direct benefits of growing domestic and global employment market and to ensure adequate availability of competent professionals and para-professionals to occupy a relevant niche To organize research at the university, Directorate of Experiment station was established in the year 1960. Being an Agriculture and Technology university, the focus of research is on agriculture and engineering. Research is coordinated by Directorate of Research and carried out through 70 subject-matter departments spread across colleges, 10 specialised research centres located in the campus, 9 dedicated off-campus research stations. So far, the university has released more than 353 high yielding varieties of different crops, many of which played important role in Green Revolution. The work of the university in introducing soybean as a crop in India is well known. The soybean is playing significant role in the economy of many states like Madhya Pradesh, Chhattisgarh, Maharastra, Rajasthan etc. As Uttarakhand has been declared an 'Organic state', the present thrust of research is on Organic farming and Biological pest control. The university has developed a pregnancy diagnostic kit for cattle and its Salmonellosis vaccine for poultry is in advanced trials. In 1991, engineers of the university developed a 'Zero-till Ferti seed drill' for No-till farming along with National Agro-industries Ludhiana Punjab, which has been immensely popular in Haryana, Punjab and other areas of Indo-Gangetic plains. CIMMYT/CGIAR (2007) has described zero tillage technology based on the Pantnagar seed drill as the most widely adopted resource conserving technology in the Indo-Gangetic Plains, till date. Approximately 100 scientists (including AICRP and General budget) and 90 technical staff members are working directly under Directorate of Research, while other faculty members of the University are also mandated to carryout research through projects, grants, and student's research. Currently, 1300 PG students are enrolled in the University, who are also engaged in research on the different issues of agriculture in state. The mandates of directorate are as follows:

- To promote and conduct fundamental and applied research in agriculture and allied fields to support farm and farmers.
- To seek and manage funds and managing projects (research, testing, consultancy etc.) in the University.
- To manage specialized research centers for facilitating academic and project-based research.

N.E.B. Crop Research Centre established in 1962, Norman E. Borlaug Crop Research Centre is the oldest research centre of University. NEBCRC covers 140 ha area with an objective to create an ambient environment for innovative research activities in different field crops to cater the needs of farming community. The centre has well equipped field laboratories for different crops, Seed Processing Plant

for processing of breeder seeds of different crops, well-equipped workshop for maintenance of tractors and other farm implements, Modern Agrometeorological Observatory for daily recording of meteorological data.

Breeder Seed Production Centre: The centre was established in the year 1992 over an area of 105 ha. Mandate of the center is to produce breeder seed of field crops as per the rquiement. At present the total area of the centre is 280.80 hectares (702 Acres) covering the breeder seed production of sugarcane in addition to other crops. In addition to this, centre is also involved in the capacity building through organization of trainings/field visits/kisan gosties etc. Centre was awarded Best Breeder Seed Production Centre underAICRP-NSP Aw*ard during* 2016-17.

Vegetable Research Centre: The center was established in the year 1999 after carving out from HRC, Patharchatta. The VRC has about 100 acre (40 hectare) land exclusively for seed production and to conduct research trials on different vegetable crops. The vision and mandate of the center are to improve in socioeconomic condition of farmers by enhancing the productivity of vegetable crops on sustainable basis. The major activities are collection, evaluation and maintenance of vegetable germplasm, standardization of production and protection techniques including off season cultivation of vegetables and organic farming of vegetable crops and breeder seed production of vegetable crops. Forty twovarieties including 6 hybrids and 7 spices have been developed.

Medicinal Plants Research & Development Centre: The Centre was established at Haldi in the year 2003 over an area of 40 ha for conducting research and generation of elite planting material for the farmers to promote the cultivation of medicinal and aromatic plants in the state. The centre has a collection of 250 different species of medicinal and aromatic plants like geranium, safedmusli, latakasturi, kalmegh, bach, brahmi etc. and is in the process of developing improved varieties suitable for tarai, bhabhar and hill areas of the state. One large scale distillation unit has been established for the demonstration and extraction of aromatic oils from various aromatic plants. Popularizing medicinal and aromatic plants by developing and strengthening the research and development activities in propagation agro-techniques, post harvest processing and product development.

Agroforestry Research Centre: Agroforestry research & development was started at GBPUA&T, Pantnagar under All India Coordinated Research Programmeof ICAR in 1983.Recognizing the importance, a separate Agroforestry Research Centre was established in the year 2003.Four Agroforestry technologies developed and recommended for the indo-

gangetic region of the country. Poplar germplsam PP-5 straight bole and borer resistant clone - registered with NBPGR (INGR11053). Clone released for farmers' field. This clones is being planted as check in agroforestry trials and commercial plantation in U.P. and Uttarakhand.Establishment of arboretum with collection of 110 tree species for awareness generation and growth behavior study.Standardization of nursery and plantation techniques for important Agroforestry trees species (Poplar, Eucalyptus, bamboo, Shisham, Kadamb and Willow).Registration and release of "Pant Poplar-5" clone having higher productivity and tolerance to blight and stem borer as compared to national checks (G-3, G-48 and D-121)

Model Floriculture Centre: The Model Floriculture Centre was established in the year 2004 over an area of 12.0 ha by carving out from garden section of the university with mandate to support education and training in floriculture and landscaping for development of human resource, mass multiplication and distribution of quality planting material of floriculture crops and to generate new knowledge in area of floriculture and landscaping. More than 08 research projects including AICRP on floriculture of different funding agencies are being conducted at the centre. The centre provides all field facilities for the PG research of the students from different departments of college of Agriculture.

Horticulture Research Centre: This center was established in 1968. The centreis spread in an area of about 176 hectare, exclusively for research and commercial aspects of fruits. The centre is enriched with a wide wealth of fruit crops like, mango, guava, litchi, citrus, papaya, peach, plum, pear, aonla, ber, bael, karonda, custard apple, sapota, jackfruit, jamun, banana etc. The centre has its own state of the art fruit nursery to nourish its own as well as of the farmer's requirement by providing authentic plant material of fruit crops.The mission of center is to enhance productivity of fruit crops on sustainable basis.

Mushroom Research & Training Centre: AICRP on Mushroom was sanctioned in 1983 started functioning from 1984. Mushroom Research Laboratory (MRL) was inaugurated on 26th Jan. 1989. MRL was strengthened and renamed as Mushroom Research and Production Centre on January 26th1998 followed by Mushroom Research and Training Centre (MRTC) on 5th April 2003 with the facilities of Training, Composting and spawn unit, research lab, class room, museum etc. The centre hasfocused on development of high yielding strains, improvement in the production technology of edible and medicinal mushrooms, development and validation of technology for newer specialty mushrooms, management of mushroom diseases using bio-

agents, botanicals and chemicals, post-harvest technology and training to the mushroom trainers and growers to promote mushroom in the State/Nation.

Honey Bee Research and Training Centre: The Centre was established on 80 acres land having more than 15000 trees which are providing pollen and nectar for bees round the year. Establishment of bee research and training centre was aimed at to provide technical and scientific knowledge on beekeeping, bee products, quality bee stock and quality control of honey, value addition in bee products and processing and role of insect pollinators for the sake of the additional income generation to the farmers and to enhance the biodiversity in the state to improve the agricultural yield. Presently centre has three honey bee species Italian honey bee (Apis mellifera), Indian honey bee (A. cerana indica) and one stingless bee.

BIO-PESTICIDE

Technology-01

MICROBIAL BIOCONTROL AGENT *"TRICHODERMA HARZIANUM"* FOR PLANT DISEASE CONTROL AND GROWTH PROMOTION

1.	Name of technology	Microbial Biocontrol agent *trichoderma harzianum* for plant Disease control and Growth promotion
2.	Name of inventors	Dr. Roopali Sharma, Dr. Bhupesh Chandra Kabdwal, Dr. Nandani Shukla and Dr. J. Kumar
3.	Area/field applicability	Applicable for the disease management in different crops and plant health.
4.	Description of technology	The fungus *Trichoderma* have long been recognized as agents for the control of plant disease and for their ability to increase plant growth and development, high reproductive capacity, ability to survive under very unfavorable conditions, efficiency in the utilization of nutrients, capacity to modify the rhizosphere, strong aggressiveness against phytopathogens and efficacy in promoting plant growth and defense mechanism. At the Biocontrol Laboratory of Department of Plant Pathology, G. B. Pant University of Agriculture and Technology, Pantnagar, has isolated and screened new potential isolate of *Trichoderma harzianum* for plant disease control and growth promotion is available for commercialization.

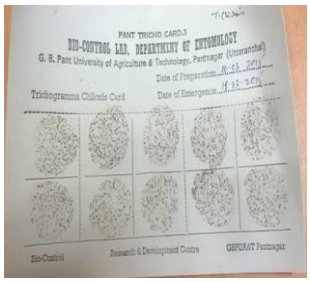
Trichoderma harzianum (Th)

5.	Patent Filed :	Yes

Technology-02

MASS PRODUCTION TECHNOLOGY OF EGG PARASITOID

1.	Name of technology	Mass Production Technology of Egg parasitoid
2.	Name of inventors	Dr. M.A. Khan and Dr. R.P. Maurya
3.	Area/field applicability	Applicable for the insect pest management in different crops through biological control methods.
4.	Description of technology	Insect pests inflict enormous losses to the potential agricultural production. Evidences also indicate rise in the losses, despite increasing use of chemical pesticides. At the same time, there is a rising public concern about the potential adverse effects of chemical pesticides on the human health, environment and biodiversity. These negative impacts can be minimized through development, dissemination and promotion of alternative technologies such as biopesticides and bioagents. The Biological Control Laboratory at G. B. Pant University is successfully mass producing native strains of Trichogramma sp. bioagents, which have shown promising results for controlling lepidopteran insect pests. They are producing Pantgramma I and Pantgramma II in large quantities for Trichogramma japonicum and T. chilonis, respectively. These bioagents are being widely used in the field to manage tissue borers in paddy-sugarcane ecosystems.



Trichogramma sp.

Trichocards for field release

5. Patent Filed : Yes

Technology-03

COLD ADAPTIVE BIOAGENTS FOR IMPROVING RAJMASH NUTRITIONAL AND YIELD STATUS IN INDIAN CENTRAL HIMALAYA OF UTTARAKHAND

1.	Name of technology	Cold adaptive bioagents for improving rajmash nutritional and yield status in Indian Central Himalaya of Uttarakhand
2.	Name of inventors	1. Dr. Reeta Goel and Dr. Ajay Veer Singh
3.	Area field of applicability	Agriculture fields
4.	Description of technology	Elite cold adaptive bioinoculants i.e. *Pseudomonas jesseni* MP1, and *Pseudomonas palleroniana* N26 are diazotrophic phosphate solubilizers under low temperature conditions. Over the years, these bacterial isolates have demonstrated their yield improving potential through various crop trials at GBPUAT, Pantnagar. In addition, bioinoculants demonstrations through application with rajmash seeds for three years have been laid down at farmer's fields of Chakrata, Harsil, Lata, Triyuginarayan villages, results were found to be increase the rajmash nutrient content and yield from 5 -30%. (Due to the difference in weather conditions over the years the percent yield got fluctuated year to year.)
5.	Patent Filed :	Yes

INDUSTRIAL PRODUCTS

Technology-04

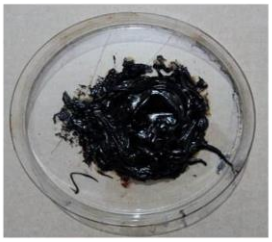
A PROCESS FOR PINE NEEDLE PYROLYSIS OIL BASED RESIN PREPARATION FOR WOOD ADHESIVE

Name of technology	Dr. Ashok Kumar Verma, Dr. Tarranum Jahan, Dr. Brijesh, Dr. Ashutosh Dubey and Dr. T. K. Bhattacharya
Area/field applicability	Pyrolysis pine needle oil can be used to partially replace phenol in the synthesis of resin for employ as a wood adhesive which will be useful in ply wood industries.
Description of technology	The resins were made in a round-bottomed glass flask equipped with a thermometer, a stirrer, and a condenser (Fig 1a.) The BOPF resin samples were made by phenol in certain amount of formaldehyde in a three-necked flask and heating to dissolve. A certain amount of NaOH solution was added and the mixture was heated for some time. The bio-oil was added to replace the mass of synthetic phenol in the following proportions: 10%, 20%, 30% and 40% (Fig.1b).

Pure PF resin

10% BPF resin

20% BPF resin



30% BPF resin

40 % BPF resin

a. b.

Figure 1. a. Round-bottomed glass flask equipped with a thermometer, b. Different formulation of resin (pure PF, 10%, 20%, 30% and 40% BOPF resinstated that the shear strength should be 6.0 MPa. Hence, 10 and 20% BOPF resin are good for wood adhesive.

Description of technology: The resins were made in a round-bottomed glass flask equipped with a thermometer, a stirrer, and a condenser (Fig 1a.) The BOPF resin samples were made by phenol in certain amount of formaldehyde in a three-necked flask and heating to dissolve. A certain amount of NaOH solution was added and the mixture was heated for some time. The bio-oil was added to replace the mass of synthetic phenol in the following proportions: 10%, 20%, 30% and 40% (Fig.1b).

Pure PF resin

10% BOPF resin

20% BOPF resin

30% BOPF resin

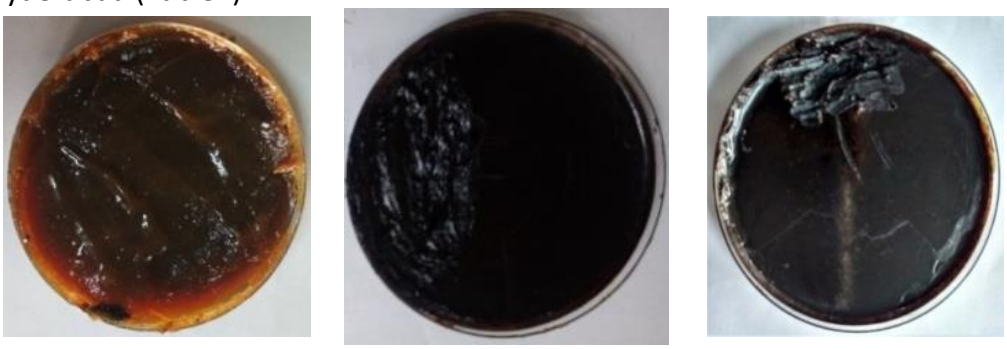
40 % BOPF resin

Patent Filed: Yes

Technology-05

A PROCESS FOR LUBRICANT (GREASE) PREPARATION FROM PINE NEEDLE PYROLYSIS OIL

Name of technology	Dr. Tarranum Jahan, Dr. Ashok Kumar Verma and Dr. T. K. Bhattacharya
Area/field applicability	A process of grease preparation from pine needle pyrolysis oil has been developed with the objective to prepare grease using pine needle pyrolysis oil as base oil other than mineral oil and animal fat (goat) as thickener other than vegetable oil. The produce grease has good quality, eco-friendly, biodegradable, non-toxic in nature and low cost. This grease could be suitable for applications in areas of normal working temperatures such as roll bearings, gears including other industrial applications.
Description of technology	A biogrease has prepared from pine needle pyrolysis oil by addition of a basic solution of sodium hydroxide in water and heated for 30 minutes to function as a thickening to produce soap. When bubbles appeared, appropriate amount of bio-oil was applied as base oil and cooked for an hour with continuous stirring. The mixture was cooled to room temperature. Similarly, Li-based grease was made by substituting LiOH for NaOH in the mixture. Instead of bio-oil, gear-oil (mineral-oil) was used as a base oil for the control, and the same process was performed (Fig 1.). The Mechanical and physicochemical properties of grease were analysed in NABL accredited Patrolab, India Pvt. Ltd. Hyderabad (Table1).



(a) (b) (c)

Fig 1. Different formulation of grease with animal fat (a, b and c) (a) Na-based grease with gear-oil, (b) Na-based grease with bio-oil (c) Li-based grease with bio-oil

Table.1. Properties of Grease

Properties	**Sodium Based Bio-grease**	**Lithium Based Bio-grease**
Colour	Dark brown	Dark brown
Texture	Homogeneous, No fibred	Homogeneous, No-fibred
Service Temperature range*, °C, approx.	10 to 100	10 to 100
Drop point, ASTM D 2265, °C	189	190
Worked penetration, ASTM D 3441	479	486
Copper corrosion, corrosion rating ASTM D 130	1A	1A
Base oil Kinematic viscosity, ASTM D 2761	7.84	7.84
Speed factor** (n x d_m), mm x min^{-1}, approx.	100000	100000
Oxidation Stability	132 min	136 min
Wear severity	<10	<10
Wear Particle Concentration	<100 (82)	<100 (72)
Approximate Cost per Kg (Rs)	87.5	120

FARM MECHANIZATION

Technology-06

TRACTOR OPERATED SIX ROW GLADIOLUS PLANTER

1.	Name of Technology	Tractor operated Six Row Gladiolus Planter
2.	Name of Inventor(s)	Dr. T.P. Singh, Dr. Vijay Gautam and Dr. Zoltan Sangma
3.	Area / Field of applicability	Agriculture/ Horticulture
4.	Description of technology	Traditionally the Gladiolus corms are planted manually using Khurpi, which demands more time and labor. The planter, tractor operated, has been developed for planting of Gladiolus corms at required spacing with less time, reduced drudgery and lesser cost of planting per hectare compared to manual method. Performance has been observed better for higher corm to corm spacing.

Specification:

1. Number of rows: 6 rows
2. Row to row spacing: 30 cm (adjustable)
3. Type of metering device: Chain-cup type
4. Suitable for corm-to-corm spacing: 15, 20 and 25 cm as desired
5. Field capacity: 0.125 ha/h
6. Field efficiency: 72.93%.
7. Cost saving over manual method: about 85 percent

Technology-07

PANT WHEAT THRESHER FOR HILLY REGION

1.	Name of Technology	Pant Wheat Thresher for Hilly Region
2.	Name of Inventor(s)	Dr. T.P. Singh
3.	Area / Field of applicability	Agriculture/ Wheat Threshing
4.	Description of technology	Harvesting and threshing of wheat, one of the energy intensive operations, is still being performed with the help of animate power i.e., either manually and/or trampling under the feet of animals which is a time taking process besides drudgery. In order to reduce drudgery of hill farmers, a small wheat thresher was developed suitable for hilly region of Uttarakhand for wheat threshing. The thresher weighs approximately 130 kg with output capacity as 100-130 kg/h. The thresher is operated by single phase 2 hp electric motor.

Technology-08

WILD APRICOT PIT DECORTICATOR

1.	Name of technology	Wild Apricot Pit Decorticator
2.	Name of inventor	Dr. U.C. Lohani and Dr. N.C. Shahi
3.	Area/field of applicability	Hilly area farmers and oil industry/ entrepreneurs/ startups of Uttarakhand
4.	Description of Technology	1. Machine is very easy to operate and reduce drudgery of the people during manual decortication operation. 2. Percentage of whole kernels is maximum hence separation operation could be improved. 3. It will replace traditional laborious, tedious and unhygienic operation to improved higher capacity with huge demand for commercialization. 4. Efficient decortication with lowest amount of broken kernels and higher output of whole kernels. 5. The machine decortication will increase the availability of whole kernel in the market which will attract the entrepreneurs, oil extractors, confectionery and dry fruit processor to utilize this important fruit part for commercial purposes. 6. Same machine can be used for decortication of pits of any temperate fruit just by adjusting some machine parameters. *7.* The increased commercial demand will fetch the farmer's good price for their produce and having potential to generate rural employment 
5.	Patent	Granted

Technology-09

PID CONTROLLED SOLAR DRYER

1.	Name of technology	*PID Controlled Solar Dryer*
2.	Name of inventor	Dr. N.C. Shahi and Dr. U.C. Lohani
3.	Area/field of applicability	Hilly area farmers and herbs/spice industry/entrepreneurs/startups of Uttarakhand
4.	Description of Technology	1. Suitable for hilly area of Uttarakhand 2. Control of humidity 30-40% RH less than that of ambient 3. Precise control of temperature up to 65°C using PID 4. Inside temperature obtained 20-25°C more than that of ambient 5. Quality control, i.e. aroma, flavor, color retention 90-95%. 6. Suitable for spices, herbs and medicinal plants of Uttarakhand

Technology-10

PEDAL OPERATED BLACK SOYBEAN DEHULLER

1.	Name of technology	Pedal Operated Black Soybean Dehuller
2.	Name of inventor	Dr Khan Chand, Dr N.C. Shahi, Dr U.C. Lohani
3.	Area/field of applicability	Hilly area farmers and dal industry/entrepreneurs/startups of Uttarakhand
4.	Description of Technology	1. 73% dehulling efficiency 2. Suitable for interior and hilly area of Uttarakhand 3. 300-400% more capacity than tradition method 4. Reducing the drudgery of hilly women 5. Less brokens as compared to that traditional method. 6. Automatic separation of husk and brokens

Technology-11

INTEGRATED POTATO PEELER CUM SLICER

1.	Name of technology	of	Integrated Potato peeler cum slicer
2.	Name of inventor	of	Dr. Khan Chand, Dr. N.C. Shahi and Dr. U.C. Lohani
3.	Area/field applicability	of	Self-help groups and snacks micro industry/entrepreneurs/startups of Uttarakhand
4.	Description Technology	of	1. 88.5% efficiency 2. Suitable for small scale potato growers of Uttarakhand 3. 65 kg/h capacity 4. Reducing the drudgery and manpower 5. Less peel loss as compared to that traditional method. 6. Twin action of peeling and slicing in one mode.

ANIMAL AND VETERINARY SCIENCE

Technology-12

A COMPOSITION AND PROCESS TO DEVELOP A SUBSTITUTE FOR NITRITE IN PROCESSED MEAT FOOD PRODUCTS WITHOUT COMPROMISING FOOD SAFETY

1.	Name of Technology	A Composition and Process to Develop a Substitute for Nitrite in Processed Meat Food Products without Compromising Food Safety
2.	Name of Inventor (s)	Dr. P. Prabhakaran, Dr. Prateek Shukla, Dr. V.K.Tanwar and Dr. Praneeta Singh
3.	Area/Field of applicability	Meat Processing Industry
4.	Description of technology	A unique composition and process was developed to substitute the nitrite in the formulation of processed meat products without compromising the food safety, verified against the germination of Clostridial spores *in- vitro* and in model meat system.

Technology-13

PLANT STARCH BASED FAT REPLACER FOR MEAT PRODUCTS

1.	Name of Technology	Plant starch based fat replacer for meat products
2.	Name of Inventor (s)	Dr. Sudip Kumar Das and Dr. P. Prabhakaran
4.	Area/ Field of applicability	Meat processing industry
5.	Description of technology	Plant starches obtained from finger millet and sorghum were processed and incorporated in the formulation of chicken patty, reduced the fat content significantly without adversely affecting the eating quality characteristics.

Technology-14

A NOVEL PRODUCT 'CHICKEN SKIN PROTEIN CONCENTRATE' (CSPC) AND A METHOD OF ITS PREPARATION AND ITS CO-PRODUCT CHICKEN SKIN OIL (CSO)

1.	Name of Technology	A novel product 'chicken skin protein concentrate' (CSPC) and a method of its preparation and its co-product chicken skin oil (CSO)
2.	Name of Inventor (s)	Dr. P. Prabhakaran, Dr. Praneeta Singh, Dr. Chirag Singh and Dr. Raheel Bashir
4.	Area/Field of applicability	Meat Processing Industry
5.	Description of technology	An innovative method for preparing a novel product named as 'chicken skin protein concentrate (CSPC) with chicken skin oil (CSO) as a co-product/ by product was developed. The method removes majority of fat from chicken skin without use of any chemical solvents and prepare a novel product rich in collagen.

Technology-15

A METHOD FOR PRODUCING COLLAGEN ENRICHED MEAT PRODUCTS USING CHICKEN SKIN OR CHICKEN SKIN DERIVED FRESH PRODUCTS OR OTHER SIMILAR OFFALS

1.	Name of Technology	A method for producing collagen enriched meat products using chicken skin or chicken skin derived fresh products or other similar offals
2.	Name of Inventor (s)	Dr. P. Prabhakaran, Dr. Praneeta Singh, Dr. Chirag Singh, Dr. Raheel Bashir, Dr. Anil Kumar, Dr. A.K. Verma, Dr. Sudhir Kumar and Dr. A.K. Upadhyay
4.	Area/ Field of applicability	Meat Processing Industry
5.	Description of technology	A method for producing collagen enriched meat products by using proteolysed chicken skin protein concentrate was developed. The preblending of chicken skin protein concentrate (CSPC) with natural fruit or vegetable extracts having proteolytic enzymes at optimized conditions was done to enable optimum/ proteolysis of collagen present in CSPC during meat product formulation. The proteolysed chicken skin blend was prepared by mixing proteolysed CSPC with other functional ingredients for incorporation in the chicken patty formulation.

Technology-16

NANO-VACCINE AGAINST *SALMONELLA TYPHI*

1.	Name of Technology	Nano-vaccine against *Salmonella* Typhi
2.	Name of Inventors with photograph	Dr. Yashpal Singh, Dr. Anjani Saxena, Dr. Rajesh Kumar, Dr. Anil Kumar, Dr. Avadhesh Kumar, Dr. S.P. Singh, Dr. G.K. Singh, Dr. Manjul Kandpal, Dr. Amit Kumar, Dr. Meena Mrigesh, Dr. Arun Kumar, Dr. Manish Kumar Verma, Dr. A.K. Upadhyay, Dr. Tanuj Kumar Ambwani and Dr. Mumtesh Kumar Saxena
3.	Area or field of applicability	Health Science
4.	Description of technology	The present invention deals with the development of a novel vaccine against *Salmonella* Typhi which causes Typhoid fever in human beings and results in millions of deaths. The present vaccine is comprised of total outer membrane proteins adjuvanted with Calcium phosphate nanoparticles. The size of the Calcium phosphate nanoparticles-Omp complex was determined by Transmission electron microscopy and DLS. The vaccine was tested in Swiss albino mice for its immune potential. The vaccine produced a strong humoral and cell-mediated immune response. The vaccine also provided protective immunity as bacterial count in the target organ was significantly reduced. The vaccine was tested for toxicity by studying biochemical and hematological parameters and it did cause any toxicity to vital organs like the liver or kidney.

Technology-17

KIDS' BROODING CHAMBER

1.	Name of Technology	Kids' Brooding Chamber
2.	Name of Inventor (s)	Dr. D.V. Singh and Dr. S.K. Singh
4.	Area/ Field of applicability	Goat Farming
5.	Description of technology	To protect goat kids from extreme cold

FOOD PROCESSING AND NUTRITION

Technology-18

SPROUTED FINGER MILLET MIX JAGGERY CHOCOLATE

1.	Name of technology	Sprouted Finger Millet Mix Jaggery Chocolate
2.	Name of inventor	Dr. N.C. Shahi and Dr. U.C. Lohani
3.	Area/field of applicability	Food industry/entrepreneurs/startups of Uttarakhand
4.	Description of Technology	1. The developed chocolate have higher medicinal and nutritional values as compare to other chocolates available in market 2. The millet incorporated is in sprouted form which gives considerable amount of protein, dietary fibers, essential amino acid, vitamins and calcium to chocolate 3. The chocolate will replace refined sugar, and has higher capacity with huge demand for commercialization 4. Jaggery and millet incorporation to develop the value added product will boost up the rural economic system, and will not require the highly technical machinery and labor

Technology-19

ROASTED HORSE GRAM (*MACROTYLOMA UNIFLORUM* L.) INCORPORATED INSTANT

1.	Name of technology	Roasted Horse Gram (*Macrotyloma uniflorum* L.) Incorporated Instant Cake mix.
2.	Name of inventor	Dr. N.C. Shahi, Dr U.C. Lohani
3.	Area/field of applicability	Bakery industry/ Startups
4.	Description of Technology	1. The developed instant mix is healthy and is nutritionally rich. The mix was found to be good for consumption after 80 days storage. 2. Cakes can be prepared easily with Instant mixes, they saves the preparation time. 3. Horse gram is incorporated in roasted from which enhances the overall acceptability with its nutty flavor and shelf life of the product, roasting also reduces anti-nutritional factor with increasing bioavailability of nutrients. 4. Horse gram not only possesses nutritive benefits but therapeutic and medicinal benefits as well and can be consumed by celiac patients. 5. The addition of milk powder enhanced nutritional value and acceptability of the cake.
5.	Patent filed	Yes

Technology-20

TECHNOLOGY FOR EXTENDED SHELF-LIFE PANEER

1.	Name of technology	Technology for extended shelf-life paneer
2.	Name of inventor	Dr. Anil Kumar, Dr. Reeta, Dr. Gurmukh Singh and Dr. B.K. Kumbhar
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Paneer has a good market value, but is limited due to short shelf life of about a week under refrigeration and a day at room temperature. This technology offers opportunity to increase shelf life of paneer without adversely affecting acceptability of the product. The application of this novel technology could extend the shelf life of paneer effectively both at refrigeration and room temperature. As compared to conventional paneer, it could be possible to keep paneer in good condition for longer duration of approximately about 4-times at room temperature (30 ^{o}C) and more than 3-times at refrigeration temperature (50 ^{o}C). The technology for extended shelf-life paneer has been patented by Patent Office, New Delhi, Govt. of India Sufficiently good storage stability with extended shelf-life. 1. Can be kept in good condition for four days at room temperature (30 ^{o}C) and more than 21 days at refrigeration temperature. 2. The product has improved sensory appeal. 3. Offers great profit margins. 4. Considerable scope and potential for adoption by organized dairy plants. 5. Can be scaled up with minor modifications.



Paneer Extended Shelf-Life Paneer

Technology-21

TECHNOLOGY FOR DETOXIFICATION OF WILD APRICOT KERNELST

1.	Name of technology	Technology for Detoxification of Wild Apricot Kernel
2.	Name of inventor	Dr. Satish Kumar Sharma, Dr. Neha Rawat, Dr. Divya Dr. Gaur, Anil Kumar
3.	Area/field of applicability	DetoxificationTechnology
4.	Description of Technology	Wild apricot kernels are toxic in nature and don'ts find application for human consumption. They contain an active principle known as amygdalin, which when hydrolysed forms hydrogen cyanide. HCN is extremely toxic chemical. So far, the use of apricot shell and kernels is limited to oil extraction and is some cosmetic preparation. This technology presents process for detoxification of wild apricot kernels to the extent that it becomes safe for human consumption. Detoxification opens avenues for utilization of this protein rich kernel in preparation of different foods products. Technology highlights: 1. About 92% of the toxic principles were removed, so as to bring them within the safe consumption levels for humans. 2. Value addition to apricot kernels 3. Appreciable cost effectiveness 4. Considerable scope and potential for adaptation by large units/plants

Detoxified Apricot Kernel

Technology-22

FUNCTIONAL WHEY-CHALTA BEVERAGE

1.	Name of technology	Functional Whey-Chalta Beverage
2.	Name of inventor	Dr. Anil Kumar, Dr. Deepika Kathuria, Dr. Garima Gandhi, Dr. Satish Kumar Sharma and Dr. V.K. Sah
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Many dairy industries are finding ways to use whey, a byproduct of dairy production, instead of disposing of it as waste. One way to do this is by creating a whey-based beverage using fruits and herbs, which can increase the antioxidant properties of the beverage. Fruits are a good source of bioactive compounds with high antioxidant rates. The goal of this technology is to create a whey-based beverage that is low in lactose but enriched with bioactive compounds from underutilized fruits like chalta. Adding herbal extracts to the chalta extract can further increase the antioxidant activity of the beverage, making it more beneficial for human health. Using dairy waste and underutilized fruits can also reduce production costs and increase profit margins, which may attract more entrepreneurs and dairy industrialists to produce the whey-based chalta beverage.A good alternative for whey disposal problem. 1. Reduced cost on effluent treatment & less environmental pollution. 2. Health benefits of fruit, herbs and spices with improved sensory appeal. 3. Potential for adoption by organized dairy plants due to great profit margins. 4. Can be scaled up with minor modifications. 

Technology-23

TECHNOLOGY OF VALUE-ADDED PRODUCTS FROM BLACK SOYBEAN GROWN IN HILLS

1.	Name of technology	Technology of value-added products from black Soybean grown in Hills
2.	Name of inventor	Dr. Sweta Rai, Dr. Madhuri Popat Dukare, Dr. Anil Kumar and Dr. C.S. Chopra
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Black soybean commonly known a Bhat mass, Kalabhat or Bhat. It is the one of the important legumes in Uttarakhand. Black soybean is preferred in hills because of its yield and better taste than the yellow soybeans and can grow at high elevations. The products prepared from bhat are less or more similar in appearance like yellow soybean products but nutritional value is much different from that of yellow soybean. Though black soybean is nutritional and health promoting food, it is neglected legume at commercial level. Therefore, for the utilization of black soybean at commercial level the present technology is useful for preparation of value-added products like soymilk and tofu.

1. Unique health benefits like anthocynin content of bhatt as compared to yellow soybean
2. Technology offers great profit margins
3. Considerable scope and potential for small scale industries
4. Can be developed as a commercial product

Black Soybean milk Black Soybean tofu

Technology-24

PROCESS FOR CHALTA (*Dillenia indica L.)* JUICE EXTRACTION

1.	Name of technology	Process for Chalta (*Dillenia indica L.)* Juice Extraction
2.	Name of inventor	Dr. Anil Kumar, Dr. Garima Gandhi Dr. Satish Kumar Sharma, Dr. V.K. Sah and Dr. P.K. Omre
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Extraction of juice is extremely difficult from chalta fruit, and it is not possible to extraction the juice through normal methods of juice expression. An enzymatic extraction process was developed for the preparation of extract/ juice from chalta fruit using food grade enzymes. Highlights 1. Technology offers great profit margins. 2. Considerable scope and potential for adoption by organized beverage plants. 3. Can be scaled up with minor modifications.

Technology-25

MANUFACTURE OF WILD APRICOT SQUASHES AND APPETIZERS

1.	Name of technology	Manufacture of Wild Apricot Squashes And Appetizers
2.	Name of inventor	Dr. Satish Kumar Sharma, Dr. Obur Messar, Dr. MC Nautiyal, Dr. D.C. Dimri, Dr. V.K. Rao and Dr. V.K. Yadav
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Pulp of wild apricot is not good to taste and fruits cannot be used for table purposes. Spices can be a good masking agent for the off-flavor and taste components of wild apricot. Wild apricot fruits were therefore used for the development of appetizer. Product contained fruit, acidity regulators, spices etc. 1. Manufacture of this product shall reduce the losses happening due to improper storage facilities. 2. Appreciable cost effectiveness 3. Value added product with good shelf life 4. Suitable for minor digestive issues 5. Considerable scope and potential for adaptation by organized units and plants.Technology offers great profit margins. 6. Considerable scope and potential for adoption by organized beverage plants. 

Technology-26

TECHNOLOGY FOR MANUFACTURE OF SOYMILK FREE FROM BEANY ODOUR WITH SHELF LIFE UPTO 15 DAYS

1.	Name of technology	Technology for Manufacture of Soymilk Free From Beany Odour With Shelf Life Upto 15 Days
2.	Name of inventor	Dr. Satish Kumar Sharma and Dr. Anil Kumar
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Soymilk is extracted from soybean for the last many years and the product is picking up popularity among children and youth due to the health benefits of soybean. Most of the house hold methods used for preparation of soymilk, lead to development of beany flavor in the milk extract, which has objectionable sensory perception for many people. Moreover, as a common practice the milk is packed in plastic pouches or plastic bottles which have a low shelf life of just 1-3 days even at low temperature. Technology for the manufacture of soymilk almost free from beany flavor is available with the Department of Food Science and Technology. Further, the storage life is about 15 days at los temperature. 1. Negligible beany flavour 2. Shelf life of 15 days at refrigerated conditions 3. Nutritious and tasty beverage 4. Excellent sensory acceptability 

Technology-27

HIGH FIBER EXTRUDED SNACKS USING FOOD PROCESSING BY-PRODUCT

1.	Name of technology	High Fiber Extruded Snacks Using Food Processing By-Products
2.	Name of inventor	Dr. Satish Kumar Sharma and Dr. Anil Kumar
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Food processing industry generates a large number of byproduct i.e. husks, shells, hulls, peels etc. These products are a good source of dietary fibres. With the growing market demand for high fibre foods, there is a good potential for utilization of food processing by-products as a source of fibre in manufacture of extruded snacks. Extruded snacks are extremely popular among children of all age groups. Therefore, for children of age 12 years or more and adults, the extruded snacks may be a good vehicle for dietary fibres. Technology for the manufacture of extruded snacks of variable flavours with enriched fibres obtained from food processing by-products i.e. husks, shells, hulls, peels, okara etc. is available. Highlights 1. Cereals based extruded snacks 2. Utilization of food processing by-products 3. Variable flavours of snacks 4. Variable composition of the product 5. Liked by children and adults 6. No added chemical preservative

Technology-28

TECHNOLOGY OF READY TO COOK INDIGENOUS BLACK SOYBEAN PREMIX

1.	Name of technology	Technology Of Ready To Cook Indigenous Black Soybean Premix
2.	Name of inventor	Dr. Sweta Rai, Dr. Arun Prakash, Dr. Satish Kumar Sharma, Dr. Anil Kumar and Dr. Sabbu Sangeeta
3.	Area/field of applicability	Food Technology
4.	Description of Technology	It is consumed in the form of dal or whole legume by preparing traditional products like Bhat ki Churkani, Bhat ke Dubke etc. apart from this traditional products bhat can be used for the preparation of the various commercial products similar to yellow soybean. Phytochemicals present in black soybean are potentially effective for human health, including treatment of cancer, diabetes, cardiovascular diseases and neurodegenerative diseases. Despite being a good source of numerous health promoting components, not much work has been recorded on black soybean. Though black soybean is nutritional and health promoting food, it is neglected legume at commercial level. Therefore, for the utilization of black soybean at commercial level the present technology is useful for preparation of value-added products. Technology offers great profit margins. 1. Considerable scope and potential for small scale industries 2. Can be developed as a commercial product 3. Reduce preparation time 4. Similar to the Uttarakhand traditional cuisine Bhatt ke Dubke  Black Soybean Dubke Dubke Redimix

Technology-29

LOW-COST STORAGE TECHNOLOGY FOR MALTA

1.	Name of technology	Low-Cost Storage Technology for Malta
2.	Name of inventor	Dr. Satish Kumar Sharma, Dr. V.K. Rao and Dr. V.K. Yadav
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Individual shrink wrapping of malta fruits is highly beneficial for reduction of postharvest losses. The fruits harvested at optimum maturity with pedicel retained, when individually shrink wrapped in polythene sheets, can be stored for a period of about three months, in evaporative cool chamber. Reduced losses due to improper storage facilities. 1. Quality of fruits can be maintained for longer duration. 2. Appreciable cost effectiveness for storage. 3. Considerable scope and potential for adaptation by organized units and plants.

Stored Malta

Technology-30

TECHNOLOGY OF PLANT BASED TURMERIC AND BLACK PEPPER GUMMIES

1.	Name of technology	Technology of Plant Based Turmeric and Black Pepper Gummies
2.	Name of inventor	Dr. Sweta Rai, Dr. Santoshi Rawat, Dr. Satish Kumar Sharma, Dr. Anil Kumar and Dr. Sabbu Sangeeta
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Gummy candy is a very trendy confectionery product that represents approximately 50 % of candy market importance. Gummy is consumed by a large and diverse group of people. Many nutrients and supplements are used to integrate in gummies, because of their palatability, unique chewable texture, that are appropriate carriers of natural ingredients like turmeric and black pepper to develop healthier products and effective supplements.

1. “Anytime-everywhere” consumable
2. Consumable for vegetarians
3. Technology offers great profit margins
4. Considerable scope and potential for small scale industries
5. Immunity-boosting properties

Plant Based Herbal Gummies

Technology-31

TECHNOLOGY FOR REDUCED NON-ENZYMIC BROWNING IN MALTA ORANGE JUICE AND CONCENTRATE

1.	Name of technology	Technology for Reduced Non-Enzymic Browning in Malta Orange Juice And Concentrate
2.	Name of inventor	Dr. Satish Kumar Sharma, Dr. Shashibala Juyal, Dr. M.C. Nautiyal, Dr. D.C. Dimri, Dr. V.K. Rao and Dr. .V.K. Yadav
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Malta juice undergoes nonenzymatic browning during concentration and storage. This decreases its acceptability and also results in development of undesirable flavours. This technology presents a process for reduction of browning by about four folds in malta, orange and other citrus juices during their storage and storage. 1. Solution to browning problem 2. Reduction of furfural, HMF and undesirable flavors 3. The product has improved sensory appeal with soothing effect. 4. Considerable scope and potential for adaptation by organized manufacturing units and plants. 5. Can be commercialized to any scale of production.

Technology-32

TECHNOLOGY FOR MINERAL ENRICHED CHAPATI

1.	Name of technology	Technology for Mineral Enriched Chapati
2.	Name of inventor	Dr. Anil Kumar, Dr. Vijaya Parmar, Dr. C.S. Chopra and Dr. Satish Kumar Sharma
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Micronutrient deficiencies like anaemia, osteoporosis, etc. are more common in developing countries of the world mostly affecting young children and women. To prevent such nutrient deficiencies in a population, food fortification can be used to add key vitamins and minerals in food. *Moringa oleifera* also called "sehjan" is a native Indian tree. It has been reported to have high nutritional content especially protein, calcium, iron and beta carotene. Therefore, to fortify Indian staple food like chapati with the addition of leaf powder of *Moringa oleifera* (MLP) and other green leafy vegetables may help fight nutrient deficiency in Indian rural as well as urban population to some extent. Thus, chapati will be fortified with considerable amount of iron and calcium content without compromising much on the sensory attributes of the product. The developed product (fortified chapati) is having about 3-6 times increase in Fe and Ca content. 1. Goodness of green leafy vegetables are incorporated in fortified chapati. 2. Improved nutritional status of product offers great profit margins. 3. Fortified chapati is rich in minerals viz. Fe and Ca. 4. Considerable scope and potential for scale-up of technology 5. Can be commercialize

Mineral Fortified Chapati

Technology-33

TECHNOLOGY FOR VALUE-ADDED PRODUCTS FROM ROUGH LEMON

1.	Name of technology	Technology for value-added products from Rough Lemon
2.	Name of inventor	Dr. C.S. Chopra and Dr. Nidhi Bharti
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Rough lemon is widely available in the hilly area of Uttarakhand. Rough lemon juice with or without incorporation of ginger juice at the optimum level could be used successfully in the preparation of quality beverages and these value added products might have good marketing potential because of their excellent organoleptic quality and reasonably longer shelf-life. Standardized recipe for making value added products from rough lemon namely ready-toserve beverage (RTS) and squash with and without incorporation of ginger juice. These products can be safely stored upto four months. 1. Reduced losses of fruits due to improper storage 2. Time saving technology 3. Value addition to rough lemon 4. Scope and potential for commercialization

Rough Lemon-ginger squash

Rough Lemon RTS

Technology-34

TECHNOLOGY FOR VALUE-ADDED PRODUCTS FROM MALTA

1.	Name of technology	Technology for Value-Added Products from Malta
2.	Name of inventor	Dr. C.S. Chopra and Dr. Tanu Shree
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Malta oranges can be successfully utilized in the preparation of ready-to serve beverage and squash which may have excellent marketing potential on account of their nutritive, medicinal and organoleptic qualities and reasonable shelf-life. The technology indicated that incorporation of ginger juice at the optimum levels can produce acceptable Malta-ginger blended beverages which may also have great consumer preference because of their better medicinal and sensory characteristics and considerable shelf life.

1. Reduced losses due to improper storage.
2. Shelf life of fruits increased.
3. Value addition of Malta fruit juice.
4. Cost effective and time saving technology.
5. Considerable scope and potential for adaptation by large units/plants

Malta RTS Malta-ginger RTS Malta-ginger squash

Technology-35

VALUE-ADDED PRODUCTS FROM PERSIMMON-A FRUIT OF UTTARAKHAND

1.	Name of technology	Value-added products from Persimmon-a fruit of Uttarakhand
2.	Name of inventor	Dr. C.S. Chopra and Dr. Shalini Yadav
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Persimmon fruits used were astringent and acorn shaped with red-orange coloured skin and flesh. Technology was developed for persimmon products with or without incorporation of other fruits. Persimmon has got high content of antioxidants that may be used to produce chutney and slab which had almost no astringency. The developed products chutney and slab with or without incorporation of mango pulp. Being astringent fruit persimmon may have excellent processing and tremendous market potential on account of its numerous health and medicinal benefits and judicious product formulations.

1. Proper utilization and shelf life improvement of persimmon fruits.
2. Value addition of persimmon fruit.
3. Cost effective technology.
4. Considerable scope and potential for adaptation by large units/plants



Persimmon (*Diospyros kaki L.*) Transverse section of Persimmon fruit Persimmon chutney



Persimmon-mango chutney Persimmon-mango slab Persimmon Slab

Technology-36

TECHNOLOGY FOR OBTAINING BURANSH EXTRACT WITH INCREASED RECOVERY, VITAMIN-C AND ANTHOCYANINS

1.	Name of technology	Technology for Obtaining Buransh Extract with Increased Recovery, Vitamin-c and Anthocyanins
2.	Name of inventor	Dr. C.S. Chopra and Dr. S.N. Sokanki
3.	Area/field of applicability	Food Technology
4.	Description of Technology	This extract could be employed to make value added product i.e. ready-toserve beverage containing petal content, sugar and acidity regulators. 1. Uitilization of hill tree for value addition. 2. Functionality added to beverage. 3. Cost effective technology 4. Scope for upscaling

Buransh Flower Buransh Flower Extract Buransh RTS Beverage

Technology-37

TECHNOLOGY FOR SOY-BASED HERBAL BUTTERMILK

1.	Name of technology	Technology for Soy-Based Herbal Buttermilk
2.	Name of inventor	Dr. Anil Kumar, Dr. Neha Pandey, Dr. Gurmukh Singh and Dr. C.S. Chopra
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Process for soy-based herbal buttermilk is optimized using different levels of soymilk, Aloe vera gel juice and tinospora powder. The flavour of product was further improved by incorporation of black salt, roasted cumin powder and black pepper powder to buttermilk. The buttermilk samples containing Aloe vera gel juice were acceptable for longer period as compared to that without Aloe vera. The soy-based herbal buttermilk developed showed good organoleptic quality, longer shelf life. Highlights 1. Additional nutritional benefits of soybean and aloe-vera in the product. 2. The product has improved sensory appeal with added spices and salts. 3. Cost calculations offer great profit margins. 4. Considerable scope and potential for commercialization. 5. Scale-up of technology is possible

Soy-based herbal buttermilk

Technology-38

TECHNOLOGY FOR LONG SHELF-LIFE JAGGERY

1.	Name of technology	Technology for Long Shelf-Life Jaggery
2.	Name of inventor	Dr. Anil Kumar, Dr. Preeti Shukla, Dr. AK Verma and Dr. Gurmukh Singh
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Jaggery, being a low cost, traditional, eco-friendly and nutritive sweetener, offers a viable alternative to sucrose (crystal sugar) and is a healthier alternative for sweet desserts due to absence of fat and higher mineral content. However, its keeping quality is less due to liquefaction associated with absorption of moisture alon gwith microbial attack and deterioration in color. This situation calls for immediate measures to solve the problems of storage of jaggery so that farmers can store the produce under adverse environmental conditions and sell it in off-season ultimately fetching good prices. Application of the developed technology could help in solving the existing problem to a greater extent, which may be a boon to farmers and traders involved in the business. Highlights 1. Improved colourm, appearance and sensory appeal of jaggery. 2. Extended shelf life of jaggery with no major change in colour specially during rainy season and without liquefaction. 3. Technology offers great profit margins. 4. Considerable scope and potential for adoption by organized/unorganized units. 5. Can be scaled up with minor modifications. 

Technology-39

TECHNOLOGY FOR FIBER-FORTIFIED PANEER

1.	Name of technology	Technology for Fiber-Fortified Paneer
2.	Name of inventor	Dr. Anil Kumar, Dr. Vijay Rawat, Dr. Gurmukh Singh and Dr. B.K. Kumbhar
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Demand of low calorie and high fiber containing products is increasing giving impetus to dairy industry for development of a well palatable low calorie dairy products like low fat paneer. The ingredients were chosen for low-fat fiber fortified paneer to reduce the cost and calorie content besides providing the functional benefits. The fiber fortified low-fat paneer was developed using fat replacer and dietary-fiber mix (comprising of rice bran, wheat bran, oat fiber, etc.). Being low in fat and rich in dietary fiber, the fortified paneer may have tremendous market potential on account of low cost and the numerous health benefits. 1. A good alternative for health-conscious people. 2. On account of low energy and improved nutritional status, it offers great profit margins. 3. Considerable scope and potential for adoption by organized/unorganized units. 4. Can be scaled up with minor modifications.

Low-Fat Fiber-Fortified Paneer

Technology-40

PROCESS FOR EXTENSION OF SHELF LIFE OF VEGETABLES IN A LOW-COST STORAGE SYSTEM

1.	Name of technology	Process for Extension of Shelf Life Of Vegetables in a Low-Cost Storage System
2.	Name of inventor	Dr. Satish Kumar Sharma, Dr. D.C. Dimri and Dr. V.K. Sharma
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Individual shrink wrapping of capsicum, cabbage, cucumber followed by storage in evaporative cool chamber can enhance their shelf life by 2-4 folds. Fruits have better texture and low moisture loss during their storage period. The life could further be enhanced, if stored at their optimum temperatures. ➢ Quality of vegetables can be maintained for longer duration. ➢ Reduced losses due to improper storage facilities. ➢ Appreciable cost effectiveness for storage. ➢ Considerable scope and potential for adaptation by organized units and plants.

Technology-41

WILD APRICOT FRUIT

1.	Name of technology	Wild Apricot Fruit
2.	Name of inventor	Dr. Satish Kumar Sharma, Dr. S.P. Chaudhary, Dr. M.C. Nautiyal, Dr. V.K. Rao and Dr. V.K. Yadav
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Wild apricot fruits are acidic in taste and are not suitable for table use. The pulp of these fruits can be successfully converted into fruit bar, using sugar for sweetening and pectin for setting. These products are similar in taste and texture to mango fruit leather. 1. Reduced losses due to improper storage facilities. 2. Quality of fruits can be maintained for longer duration. 3. Appreciable cost effectiveness for storage. 4. Considerable scope and potential for adaptation by organized units and plants.

Technology-42

TECHNOLOGY OF PROTEIN ENRICHED OKARA COOKIES

1.	Name of technology	Technology of Protein Enriched Okara Cookies
2.	Name of inventor	Dr. Sweta Rai, Dr. Vinay Balodi, Dr. Satish Kumar Sharma, Dr. Anil Kumar and Dr. Sabbu Sangeeta
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Cookies can be produced through various recipes with varied formula's and may be made into various shapes and sizes according to the wish and need of the manufacturer. They have gained great popularity in the snack segment due to their low production cost, convenience, long shelf life, good eating quality and ability to serve as a carrier for essential nutrients due to ease of fortification The protein-enricher cookie is a concept undertaken for the utilization of soybean frag for development of high nutritious bakery products. The product not just offers a higher protein and fiber content, but is also economically more feasible due to lower cost of ingredient. The cookies are made with 50 % substitution of wheat flour by okara, which substantially reduces cost of raw ingredients. Okara is the waste residue that is obtained as the by-product of soy milk manufacturing. It is made up of insoluble components obtained from the extraction of soy milk. Okara contains high content of protein (25%), fiber (10%) and fats (20%). The high nutritional properties of okara along with the lower cost makes it a potential ingredient for bakery industry. 1. Considerable scope and potential for small scale industries 2. Can be developed as a commercial product 3. Reduce preparation time 

Technology-43

OSMO-DRIED WILD APRICOT

1.	Name of technology	Osmo-Dried Wild Apricot
2.	Name of inventor	Dr. Satish Kumar Sharma, Dr. Obur Messar, Dr. M.C. Nautiyal, Dr. D.C. Dimri, Dr. V.K. Rao and Dr. V.K. Yadav
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Wild apricot fruits are highly acidic and mostly bitter in taste and find limited usage as a fresh fruit, therefore need alternative use. Wild apricot fruits after peeling and seed separation are osmotically dried in sugar solution. 1. Reduced losses due to improper storage. 2. Time saving technology. 3. Shelf life of fruits increased. 4. Value addition to plums and pears. 5. Appreciable cost effectiveness. 6. Considerable scope and potential for adaptation by large units/plants.

Technology-44

TECHNOLOGY FOR ENHANCING OIL RECOVERY FROM WILD APRICOT KERNELS

1.	Name of technology	Technology for Enhancing Oil Recovery from Wild Apricot Kernels
2.	Name of inventor	Dr. Satish Kumar Sharma, Dr. Tejpal Bisht, Dr. V.K. Rao, Dr. Shailesh Tripathi and Dr. D.C. Dimri
3.	Area/field of applicability	Food Technology
4.	Description of Technology	About 15-20 % of the oil in cake of wild apricot kernels is wastes during cold pressing extraction. This technology presents process for enhancing wild apricot oil yield by about 8-10 %. 1. Reduced oil losses in press cake 2. Appreciable cost effectiveness 3. Enhanced profits 4. Considerable scope and potential for adaptation by oil expellers/plants.




Technology-45

PLUM, PEAR, APPLE AND APPRICOT BLENDED BEVERAGES

1.	Name of technology	Plum, Pear, Apple and Appricot Blended Beverages
2.	Name of inventor	Dr. Satish Kumar Sharma, Dr. Deepa Saini and Dr. Anil Kumar
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Plum and pear juices and not good to taste. These can be blended with other fruit juices to enhance their palate. Prepared beverages from the blended juices, whether RTS or squashes, could be stored for a period of more than 6 months at ambient conditions. 1. Reduced losses due to improper storage. 2. Time saving technology. 3. Shelf life of fruits increased. 4. Value addition to plums and pears. 5. Appreciable cost effectiveness. 6. Considerable scope and potential for adaptation by large units/plants.

Technology-46

VALUE-ADDED PRODUCTS FROM SEABUCKTHORN

1.	Name of technology	Value-added Products from Seabuckthorn
2.	Name of inventor	Dr. Satish Kumar Sharma, Dr. Rohit Bisht, Dr. V.K. Yadav, Dr. V.K. Rao and Dr. V.K. Sah
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Seabuckthorn RTS beverage, Seabuckthorn Squash, Seabuckthorn–Malta blended beverages were developed. All these beverages were exceptionally rich in nutritional and health promoting constituents as well as shelf stable for a period of six months at ambient conditions. ➢ Reduced losses due to improper storage. ➢ Time saving technology. ➢ Shelf life of fruits increased. ➢ Value addition to plums and pears. ➢ Appreciable cost effectiveness. ➢ Considerable scope and potential for adaptation by large units/plants.

Technology-47

TECHNOLOGY FOR MICROWAVE ROASTED GERMINATED HORSEGRAM SNACK

1.	Name of technology	Technology for Microwave Roasted Germinated Horsegram Snack
2.	Name of inventor	Dr. Sabbu Sangeeta, Dr. Mohd. Nazim, Dr. Anil Kumar, Dr. Satish Kumar Sharma and Dr. Sweta Rai
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Germination is a traditional, non-thermal process that improves the nutritional quality of cereals and pulses by increasing nutrient digestibility, reducing the levels or activities of antinutritional compounds, boosting the contents of free amino acids and available carbohydrates, and improving functionality. Namkeen was prepared from germinated horsegram seeds followed by microwave roasting with high nutritional value and decreased levels of antinutritional factors. 1. Utilized indigenous pulse at the commercial level 2. Provide good nutrition due to germination of horsegram 3. Technology offers great profit margins 4. Considerable scope and potential for adoption by organized snack plants

Microwave roasted germinated horsegram snack

Technology-48

TECHNOLOGY FOR UTILIZATION OF LITCHI FRUIT AFFECTED BY PERICARP BROWNING

1.	Name of technology	Technology for Utilization of Litchi Fruit Affected By Pericarp Browning
2.	Name of inventor	Dr. Sabbu Sangeeta and Dr. C.S. Chopra
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Such litchi fruits may be utilized successfully for the production of value added processed products such as Chutney, Osmo-air dried litchi, Bar and Jelly which have pleasant litchi flavor, desirable taste, and other sensory characteristics. The developed products have appreciable prolonged shelf life of 8 to 10 months when stored at ambient conditions.

1. Reduced losses due to improper storage.
2. Time saving technology.
3. Shelf life of fruits increased.
4. Value addition to rough lemon.
5. Appreciable cost effectiveness.
6. Considerable scope and potential for adaptation by large units/plants.

Products Prepared from Browned Litchi

Technology-49

TECHNOLOGY FOR HERBAL WHEY BEVERAGE

1.	Name of technology	Technology for Herbal Whey Beverage
2.	Name of inventor	Dr. Anil Kumar and Dr. Chittra Pokhriyal
3.	Area/field of applicability	Herbal Whey Beverage Technology
4.	Description of Technology	Whey, a harmful waste product, poses a threat to the environment due to its high pollution levels. Instead of disposing of whey in sewage, it would be beneficial to encourage commercial plants to convert it into useful products. One such product is a soothing and functional beverage made from whey and herbal extracts, which not only harnesses the health benefits of herbs and spices but also improves the taste of the beverage. By using a combination of different herbs such as lemongrass, cardamom, ginger, and mentha, the therapeutic value of the beverage is enhanced. The shelf life of this beverage is over a month when refrigerated and over 15 days at room temperature.Highlights 1. Converting whey into such product would be a good alternative for whey disposal problem. 2. Reduced cost of effluent treatment. 3. Added health benefits of herbs and spices in the product. 4. The product has improved sensory appeal. 5. Fairly long shelf-life of the product. 6. Great profit margins. 7. Considerable scope and potential for commercialization.

Technology-50

TECHNOLOGY FOR PRESERVING MANGO SLICES BY DRY SALTING

1.	Name of technology	Technology for Preserving Mango Slices By Dry Salting
2.	Name of inventor	Dr. C.S. Chopra, Dr. Anil More and Dr. Anil Kumar
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Mango slices of the Ramkela variety that are mature but not fully ripe can be effectively preserved using the dry salting method for duration of eight months at room temperature. These preserved slices can then be used to create delicious pickles. The innovative dry salting technology proves to be a more cost-effective alternative to the commonly used brine preservation method, while also requiring minimal storage space.May help to reduce losses.

1. Shelf life of fruits increased.
2. Cost effectiveness and time saving.
3. Off season availability

Mango Slices Preserved by Dry Preserved Slices

Mango Pickle Prepared from Salting

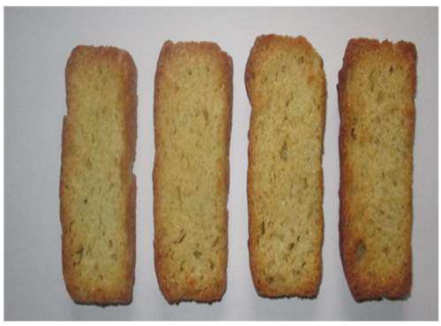
Technology-51

TECHNOLOGY FOR FIBRE-ENRICHED RUSK

1.	Name of technology	Technology for Fibre-Enriched Rusk
2.	Name of inventor	Dr. C.S. Chopra, Dr. Manavi BS Dr. Satish Kumar Sharma and Dr. Anil Kumar
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Fiber enriched rusk technology was optimized using refined wheat flour, oat flour, barley flour and finger millet flour along with sugar, milk powder and other ingredients. The rusk prepared by optimized recipe contained 6.6 times fibre content and 2.7 times calcium when compared with control. Moreover, the experimental developed rusk also recorded higher contents of crude fibre, calcium, iron and crude fat. This rusk if consumed at 100 g per day per person can fulfill 15.5 percent of his daily requirement of calcium.

1. Proper utilization of millets grown in Uttarakhand.
2. Multigrain product will also have certain health benefits.
3. Economically feasible.
4. Considerable scope for upscaling.

Technology product Whole wheat flour rusk



Refined wheat flour rusk

Technology-52

TECHNOLOGY FOR INSTANT CHICKPEA RECIPE MIX

1.	Name of technology	Technology for Instant Chickpea Recipe Mix
2.	Name of inventor	Dr. Sabbu Sangeeta, Dr. Rahul Badola, Dr. C.S. Chopra, and Dr. Anil Kumar
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Whole pulses like chickpea, blackgram and soybean etc. are rich in nutrients, especially protein and iron but they require more time for cooking with difficult preparation procedures which is not possible in modern lifestyle, such pulses when converted into ready-to-cook products and prepared with masala pack (just like maggi pack) can overcome the above-mentioned problems and save our time in the kitchen during busy and fast running life where most of the women in the family are working. Commercialization of such value-added products especially in the case of pulses can not only be helpful in day-to-day life by acting as convenient food but may also be beneficial in providing a nutritive diet to the present generation. The products thus prepared were ready to serve. These products can be safely stored upto six months. 1. Reduce hectic preparatory procedures 2. Reduce cooking time 3. Reduce antinutritional components 4. Time saving 5. Save fuel consumption 6. Considerable scope and potential for adaptation by large units

Technology-53

TECHNOLOGY FOR MANUFACTURE OF INSTANT SOUP MIX FROM WATER CHESTNUT

1.	Name of technology	Technology for Manufacture Of Instant Soup Mix From Water Chestnut
2.	Name of inventor	Dr. Sabbu Sangeeta, Dr. Anjali Pal, Dr. C.S. Chopra, Dr. Anil Kumar, Dr. Sweta Rai, and Dr. Satish Kumar Sharma
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Water-chestnut (*Trapa natans*) is commonly well-known as Singhara in India. The main purpose of this technology is to increase the utilization of water-chestnut at the commercial level because of its high nutritional value by incorporating vegetable waste i.e. leaves and stalk of cauliflower and leaves of radish to develop instant soup. These products can be safely stored upto four months.

1. Reduced losses due to improper storage
2. Utilized vegetable waste
3. Time saving technology
4. Shelf life of fruits increased.
5. Value addition of water-chestnut
6. Appreciable cost-effectiveness
7. Considerable scope and potential for adaptation by large units/plants

Instant soup mix powder

Technology-54

TECHNOLOGY FOR MICROWAVE ROASTED HORSEGRAM SNACK

1.	Name of technology	Technology for Microwave Roasted Horsegram Snack
2.	Name of inventor	Dr. Sabbu Sangeeta, Dr. Mohd. Dr. Nazim, Dr. Anil Kumar, Dr. Satish Kumar Sharma and Dr. Sweta Rai
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Horsegram represents a major source of protein and dietary fibre in many developing countries. These days consumers tend to look for food supplies that are ready to eat due to their modern lifestyle, busy schedules, and require diet food. Convenient food prepared from whole seeds of horsegram was developed with reduced antinutritional factors and high nutritional values. 1. Converting raw horsegram into ready-to-eat snack (namkeen) 2. Utilized indigenous pulse at the commercial level 3. Provide good health due to therapeutic properties of horsegram 4. Technology offers great profit margins 5. Considerable scope and potential for adoption by organized snack plants

Microwave roasted horsegram snack

Technology-55

TECHNOLOGY FOR WHEY-BASED TOMATO SOUP

1.	Name of technology	Technology for Whey-Based Tomato Soup
2.	Name of inventor	Dr. Simran Kaur Arora
3.	Area/field of applicability	Food Technology
4.	Description of Technology	A process has been developed to prepare ready-to-drink whey-based tomato soup. It utilizes whey, a byproduct from paneer/cheese industry. It is developed with the processing of different levels of tomato pulp, garam masala, butter and stabilizers along with whey. The developed soup contains no MSG and has high sensory acceptability value of 7.9 out of 9.0 on hedonic scale. The shelf-life of the developed soup (without any preservative) is 6 days at room temperature (30±1ºC) and 15 days under refrigeration (6±1ºC). 1. The product is having high sensory acceptability value for overall acceptability. 2. It is nutritious than normal tomato soup as also carries the goodness of whey. 3. Solves the problem of disposal of whey. 4. It does not contain any preservative and is free from MSG. 5. Considerable scope and potential for adaptation by small as well as large manufacturing units.

Technology-56

TECHNOLOGY FOR TAMARIND EFFERVESCENT BEVERAGE TABLET

1.	Name of technology	Technology for Tamarind Effervescent Beverage Tablet
2.	Name of inventor	Dr. Sabbu Sangeeta, Dr. Shivani Bisht, Dr. Sweta Rai, Dr. Anil Kumar, and Dr. Satish Kumar Sharma
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Even though the traditional processing of tamarind in India is widespread, its commercial uses are largely unknown and underdeveloped. The exploitation of tamarind at the commercial level can a good source of income for poor rural people thereby improving their well-being. Tamarind has a variety of medical and therapeutic properties, including digestive, carminative, laxative, and hypolipidemic properties, besides being an expectorant and blood tonic. To increase the commercial value of tamarind, the effervescent tablet was developed with a greater nutritional value. The application of the developed technology could help farmers and traders involved in the business. 1. Effervescent tablets also help to increase liquid intake 2. Deliver nutritional benefits of tamarind 3. Better alternative for those who may have difficulty swallowing conventional due to illness or aging. 4. Technology offers great profit margins. 5. Considerable scope and potential for adoption by organized/unorganized units. 6. Can be commercialized to any scale of production by plants manufacturing

Tamarind effervescent beverage tablet

Technology-57

TECHNOLOGY FOR PREPARATION OF CUSTOMIZED INSTANT TEA CONCENTRATE

1.	Name of technology	Technology for Preparation of Customized Instant Tea Concentrate
2.	Name of inventor	Dr. Sabbu Sangeeta, Dr. Shivani Bisht, Dr. Sweta Rai, Dr. Anil Kumar and Dr. Satish Kumar Sharma
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Tea is a beverage which is consumed across the globe in different ways. In India black tea is quite popular, which is prepared by boiling dried tea leaves with or without spices / herbs in water, followed by addition of sugar and milk as per individual choice. Instant teas formulations in powdered form and dip tea are also available, but has the limitation of having insoluble components, waste (tea bag) disposal and no option of customization. Technology for the preparation of tea, all ingredients in soluble forms, in which the colour component, aroma component, and other ingredients are delivered as liquid concentrates, has been developed. This has the advantage of customization as per consumer choice. You need hot water in which few drops of each of the components will give you tea of your choice instantaneously. Highlights 1. Separate colour and aroma concentrates 2. Fully customizable 3. Other ingredients may also be prepared in liquid forms 4. No residues / waste issues 5. No solubility issues 

Technology-58

TECHNOLOGY FOR PREPARATION OF FLAVOURED MILK FROM WILD APRICOT KERNELS

1.	Name of technology	Technology for Preparation of Flavoured Milk from Wild Apricot Kernels
2.	Name of inventor	Dr. Satish Kumar Sharma, Dr. Deepa Saini, Dr. Anil Kumar, Dr. N.C. Shahi and Dr. V.K. Rao
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Wild apricot fruits are found growing in Indian Himalayan states. The fruits are small in size, very acidic in nature and sometimes have slightly bitter taste, with a shelf life of just 2-3 days. The kernels of the fruit are similar in appearance to almond kernels, but many a times they are bitter in taste. These kernels are used in oil extraction for cosmetic industry but find limited food use. Kernels are also toxic in nature due to the presence of amygdalin which upon hydrolysis converts to hydrogen cyanide. Technology for the preparation of flavoured milk from wild apricot fruit kernels has been developed. Product is good to taste and a source of proteins, fats and other bioactive compounds. Highlights 1. Vegan product 2. No chemical preservatives 3. Good shelf life 4. Excellent flavor 5. No inherent toxicity 

Technology-59

PROCESS FOR DETOXICATION AND DEODOURIZATION OF WILD APRICOT KERNEL MILK-EXTRACT

1.	Name of technology	Process For Detoxication and Deodourization Of Wild Apricot Kernel Milk-Extract
2.	Name of inventor	Dr. Satish Kumar Sharma, Dr. Deepa Saini, Dr. Anil Kumar, Dr. N.C. Shahi and Dr. V.K. Rao
3.	Area/field of applicability	Food Tchnology
4.	Description of Technology	Wild apricot fruits are found growing in Indian Himalayan states. The fruits are small in size, very acidic in nature and sometimes have slightly bitter taste, with a shelf life of just 2-3 days. The kernels of the fruit are similar in appearance to almond kernels, but many a times they are bitter in taste. These kernels are used in oil extraction for cosmetic industry but find limited food use. Kernels are also toxic in nature due to the presence of amygdalin which upon hydrolysis converts to hydrogen cyanide. Technology for the detoxification of wild apricot kernels followed by manufacture of wild apricot milk has been developed. The prepared milk extract has an extremely strong flavor which prevents its further utilization. Technology has also been standardized to deodorize apricot milk extract. Highlights 1. Utilization of wild apricot kernels 2. Detoxification of wild apricot kernels 3. Manufacture of wild apricot kernel milk extract 4. Deodorization of wild apricot kernel milk extract 5. Potential to use in manufacture of beverages and dairy analogues 

Technology-60

MANUFACTURING OF SAFE NUTRITIOUS AND REGULATORY COMPLIANT LOW TEMPERATURE GROUND GRAIN FLOURS THROUGH TRADITIONAL WATER MILLS/GHARATS

1.	Name of technology	Manufacturing of safe nutritious and regulatory compliant low temperature ground grain flours through traditional water mills/gharats
2.	Name of inventor	Dr. Satish Kumar Sharma
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Wheat, maize and other grains are ground in traditional mills across the country. These mills are manually driven as well as driven by renewable / green energy sources i.e. water, wind etc. In hill states of Himalayas, water mills are existing since long back and are used for providing grain milling services on barter basis. Largely, these water mills, also called gharat or pan chakki are not commercialized. Technology for the manufacture of safe nutritious and regulatory compliant low temperature ground grain flours through traditional water mills/ gharats, is available. This gharat flour is ground and manufactured at temperature less than 20 ^{o}C, thus retains most of the functional and nutritional characteristics. Due to their larger particle size these flours are considered superior for digestion. Highlights 1. Green energy 2. Traditional technology with modern compliances of food regulations 3. Better product w.r.t. functional characteristics needed for health promotion 4. Diversity of handling raw materials 5. Rural employment 6. Good potential for sale in supermarkets and online retail stores 7. Technology is already commercialized to one of the companies in Uttarakhand

Technology-61

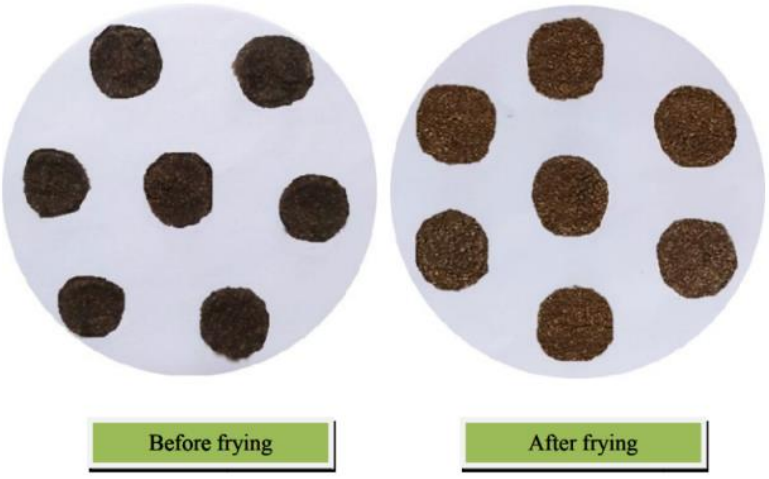
MANUFACTURE OF WILD APRICOT RTS BEVERAGE

1.	Name of technology	Manufacture of Wild Apricot Rts Beverage
2.	Name of inventor	Dr. Satish Kumar Sharma, Dr. Obur Messar, Dr. M.C. Nautiyal, Dr. D.C. Dimri, Dr. V.K. Rao and Dr. V.K. Yadav
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Growing in Indian Himalayan states. The fruits are small in size, very acidic in nature and sometimes have slightly bitter taste, with a shelf life of just 2-3 days. As a result, there is a limited, scope of utilization of these fruits. Technology for the manufacture of wild apricot pulp based ready-to-serve beverages, without any added chemical preservatives, with acceptable quality has been developed. Technology involves, fruit ripening, pulp extraction, pasteurization, blending, sterilization etc. Highlights 1. Utilization of a fruit which otherwise, largely, goes waste. 2. Pulp storage technology. 3. Product can be prepared at any time during the year. 4. No added chemical preservatives 5. Product has a TSS of about 12 to 14 % and acidity of about 0.2-0.3 %. 6. One pack of the 200 mL of the product may fetch ₹ 20-25 in retail.

Technology-62

HIGH PROTEIN AND ANTIOXIDANT RICH VADIYALU

1.	Name of Technology	High Protein and Antioxidant Rich Vadiyalu
2.	Name of Inventors	Dr. Inumala Chandini, Dr. Archana Kushwaha and Dr. Sweta Rai
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Our revolutionary technology has the ability to unleash the full potential of ancient grains and completely transform the way we snack. One particular snack that has been given a new lease on life is the Vadiyalu, a traditional delicacy hailing from Andhra Pradesh, India, which is now infused with high levels of protein and antioxidants. This remarkable innovation has not only breathed new life into this beloved snack but has also introduced a whole new level of health benefits to consumers. *Advantages for companies* • **Health-Conscious Snacking:** Tap into the growing market of health-conscious consumers seeking snacks that balance taste and nutrition. • **Ancient Grains Revolution:** Position your brand at the forefront of the ancient grains revolution, offering products that resonate with the trend towards traditional, nutrient-rich options.



Technology-63

HIGH PROTEIN AND FIBRE NOODLES

1.	Name of Technology	High Protein and Fibre Noodles
2.	Name of Inventors	Dr. Anushree R.K., Dr. Archana Kushwaha and Dr. N.C. Shahi
3.	Area/ Field of applicability	• Food Industry: Noodle Manufacturing and Product Diversification • Health and Wellness: Functional Foods and Dietary Supplements • Food Entrepreneurship: Startups and Ventures • Retail and Consumer Goods: Supermarkets and Grocery Stores • Sports Nutrition: Athlete Diets
4.	Description of technology	*Features of technology with their benefits* This innovative noodle technology stands out as a versatile and beneficial solution, addressing nutritional deficiencies, offering a diabetic-friendly option, promoting digestive health, and ensuring cost-effectiveness. This innovation aligns with the growing demand for functional and nutritious food products in the market. *Advantages for companies* 1. **Health and Nutrition Boost:** Enriching your noodles with higher fiber and protein content, catering to the growing market seeking nutritious options. 2. **Market Appeal:** Consumer preferences are shifting towards healthier choices. These noodles meets this demand head-on, providing a unique selling proposition for your brand. 3. **Versatility:** Noodle formulation ensures a delightful taste and texture, appealing to a broad audience. It complements various flavor profiles and culinary applications. 4. **Shelf Stability:** Noodle maintains its quality over a 3-month storage period, allowing for strategic inventory management and extended product availability. 

Technology-64

HIGH PROTEIN VERMICELLI

1.	Name of Technology	High Protein Vermicelli
2.	Name of Inventors	Dr. Tamilselvan T., Dr. Archana Kushwaha and Dr. N.C. Shahi
3.	Area/ Field of applicability	• Food Industry: Vermicelli Manufacturing and Product Diversification • Health and Wellness: Functional Foods and Dietary Supplements • Food Entrepreneurship: Startups and Ventures • Retail and Consumer Goods: Supermarkets and Grocery Stores • Sports Nutrition: Athlete Diets
4.	Description of technology	*Features of technology with their benefits* This innovative technology addresses the nutritional challenges in extruded products, focusing on vermicelli, a popular ready-to-cook food in the rapidly growing Indian market. The aim is to enhance the nutritional value without compromising on taste, cooking qualities, or sensory appeal. *Advantages for companies* • **Nutrient-Enhanced Product:** Offers a unique vermicelli product that is fortified with lysine, addressing the protein quality limitations of traditional wheat-based products. • **Diverse Market Appeal:** Caters to health-conscious consumers seeking nutritious and balanced food options, aligning with the growing demand for functional foods. • **Optimized Formulation:** The technology provides a specific formulation that balances nutritional quality, cooking characteristics, and sensory appeal, ensuring consistent product excellence. • **Competitive Edge:** Companies adopting this technology gain a competitive edge by offering a product with superior nutritional content, aligning with current health and wellness trends. • **Extended Shelf Life:** Demonstrates good storage stability, allowing for efficient distribution and reducing the risk of product spoilage.

Technology-65

PROTEIN AND ANTIOXIDANT RICH CUTLET MIX

1.	Name of Technology	Protein and antioxidant rich cutlet mix
2.	Name of Inventors	Dr. Harapriya Nayak, Dr. Archana Kushwaha, Dr. N.C. Shahi and Dr. K.P.S. Kushwaha
3.	Area/ Field of applicability	• Food Industry: Cutlet Manufacturing and Product Diversification • Health and Wellness: Functional Foods and Dietary Supplements • Food Entrepreneurship: Startups and Ventures • Retail and Consumer Goods: Supermarkets and Grocery Stores • Sports Nutrition: Athlete Diets
4.	Description of technology	A special mixture has been created to produce cutlets that are not only healthier but also packed with high levels of protein and antioxidants. These cutlets offer various health benefits, including the ability to lower blood sugar levels and protect the liver. Additionally, they aid in the reduction and treatment of constipation. This innovative product serves as a fantastic and nutritious alternative for children as well as individuals of all ages, especially the elderly. Not only does it surpass the taste of regular potato or other cutlets, but it also provides an excellent option for vegans. Furthermore, this mixture has significant marketing potential and is competitively priced compared to traditional cutlets. It can be stored at room temperature for up to six months, making it a convenient choice for restaurants and snacking bars. ***Advantages for companies*** • **Unique Nutritional Offering:** A one-of-a-kind cutlet mix that combines the nutritional benefits appealing to health-conscious consumers. • **Health and Wellness Trend:** Aligns with the current health and wellness trends, providing companies with products that cater to the growing demand for nutritious and functional foods. • **Consumer Acceptance:** Rigorous testing ensures high consumer acceptance, making it a marketable product suitable for a wide range of age groups.

- **Extended Shelf Life:** The technology incorporates effective Packaging methods, ensuring a longer shelf life and greater flexibility in distribution and retail.
- **Social Impact:** Contributes to addressing protein-calorie malnutrition and reducing the risk of degenerative diseases, making it a socially responsible and impactful product.

Technology-66

HIGH PROTEIN PUFFS

1.	Name of Technology	High protein Puffs
2.	Name of Inventors	Dr. Pragya and Dr. Archana Kushwaha
3.	Area/ Field of applicability	• Snack Industry • Healthy Snacking • Plant-Based Protein Products • School and Office Lunches • Fitness and Sports Nutrition • Vegan and Vegetarian Products • Health Food Stores • Grocery Store Snack Aisles • Food Innovation and Research • Snack Subscription Services • Food and Culinary Events • Online Retail Platforms • Nutritional Awareness Campaigns • .Corporate Wellness Programs • Community Events and Festivals • Global Market Expansion • Educational Institutions • Culinary Experiments
4.	Description of technology	*Features of technology with their benefits* This cutting-edge technology addresses the escalating protein crisis by developing protein-rich extruded snacks, contributing to both functional food ingredients and nutritional supplements. *Advantages for companies* • **Protein-Rich Innovation:** Offers a novel way to address the protein crisis by extruded snacks. • **Market Differentiation:** Stands out in the market by providing a unique alternative to contemporary extruded snacks, with improved sensory qualities. • **Consumer Appeal:** Demonstrates high consumer acceptability, making it an attractive product for companies targeting diverse age groups.

- **Extended Shelf Life:** The technology ensures the shelf stability of extruded snacks, providing logistical flexibility for distribution and retail.
- **Nutritional Contribution:** Addresses the demand for functional snacks with nutritional benefits, aligning with the health-conscious consumer trend.

Technology-67

VITAMIN A AND C RICH BEVERAGE

1.	Name of Technology	Vitamin A and C Rich Beverage
2.	Name of Inventors	Dr. Arti Pandey, Dr. Archana Kushwaha and Dr. Satish Kumar Sharma
3.	Area/ Field of applicability	• Functional Beverages Industry • Nutraceuticals and Health Supplements • Dietary Supplements for Immunity • Natural Antioxidant Source for Food Industry • Health and Wellness Products • Functional Ingredients in Culinary Applications • Beverage Market Innovation • Sports Nutrition • Natural Color and Flavor Enhancer • Research in Antioxidant-Rich Ingredients • Retail Market for Health-Conscious Consumers
4.	Description of technology	This groundbreaking technology focuses on creating a highly nutritious and antioxidant-rich beverage by blending vegetable and fruit juices with enhanced nutritional value as well as increased shelf life. ***Advantages for companies*** This technology is attractive to the market because it provides healthy and antioxidant-rich beverages that consumers are seeking. The beverages also have a longer shelf life without the need for preservatives, making them more marketable. Additionally, companies can promote the beverages as a convenient way for consumers to meet their nutritional needs, particularly for vitamin A and C. This technology aligns with the growing trend of health and wellness, offering a product that supports immune health and overall well-being.

Vitamin A and C Rich Beverage

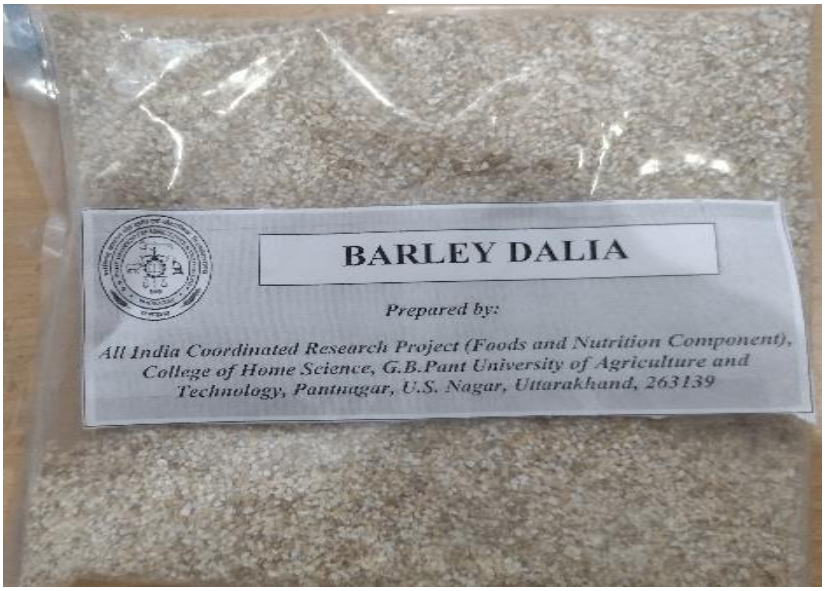
Technology-68

LOW CALORIE GOLA PEAR JAM AND JELLY

1.	Name of Technology	Low Calorie Gola Pear Jam and Jelly
2.	Name of Inventors	Dr. Astuti Verma and Dr. Archana Kushwaha Year 2014
3.	Area/ Field of applicability	• Low-Calorie Spread • Health-Conscious Consumers • Sugar Reduction • Diabetic-Friendly • Culinary Versatility • Breakfast Condiment • Weight Management • Dietary Inclusion • Innovation in Food Products • Food Technology • Research and Development
4.	Description of technology	This technology allows for the transformation of the 'Gola' pear into a low-calorie jam and jelly, preserving its natural qualities and making it available year-round. ***Advantages for companies*** • **Market Novelty:** Introducing a limited edition low-calorie 'Gola' pear jam and jelly taps into the consumer's desire for novel and unique food experiences. • **Health-Conscious Appeal:** The low-calorie aspect aligns with the growing trend of health-conscious consumer choices, making it a marketable and desirable product. • **Increased Profit Potential:** The exclusivity and health benefits of this product can lead to increased demand and profitability for companies. • **Consumer Loyalty:** Offering an innovative and seasonal product can foster consumer loyalty and repeat purchases.

Technology-69

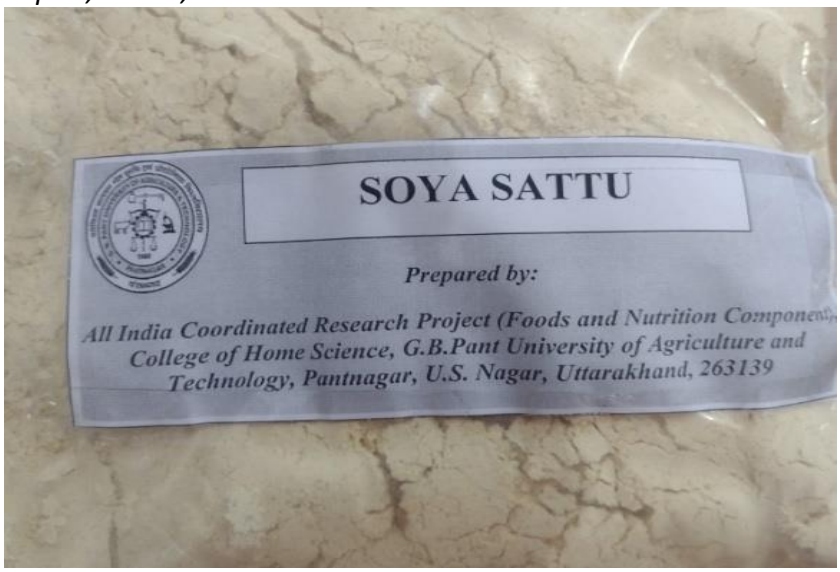
LOW GLYCEMIC INDEX BARLEY DALIA

1.	Name of Technology	Low glycemic index barley dalia
2.	Name of Inventors	Dr. Anuradha Dutta, Mrs. Pushpa Shukla and Dr. Rita S. Raghuvanshi
3.	Area/ Field of applicability	• Functional Foods and Ingredients • Dietary Supplements • Health Foods for Diabetics • Weight Management Products • Sports Nutrition for Athletes • Culinary Applications • Nutritional Supplements for the Elderly • Research and Development Food Technology and Processing
4.	Description of technology	Features of technology with their benefits • Barley dalia has low glycemic index and it is rich in dietary fibre. Hence has therapeutic value for diabetics and obese. • Flavor and cost comparable with regular dalia. • Easy to process and require small infrastructure and less manpower. So, suitable for adoption by entrepreneurs • Considerable marketing potential due to good shelf life, high quality and easy transportation. • The product can be cooked and consumed in a variety of ways like vegetable poha, milk based dalia, khichdi etc. 

Technology-70

NUTRIENT DENSE SOYA SATTU

1.	Name of Technology	Nutrient dense soya sattu
2.	Name of Inventor (s)	Dr. Anuradha Dutta, Mrs. Pushpa Shukla and Dr. Rita S. Raghuvanshi
3.	Area/ Field of applicability	• Protein-Rich Snack • Dietary Supplements • Vegan and Plant-Based Products • Fitness and Sports Nutrition • Protein Fortification • Specialized Nutrition for Vegetarians • Culinary Applications • Research and Development • Food Technology • Health Foods for Weight Management • Sustainable Protein Source
4.	Description of technology	*Features of technology with their benefits* Soya *sattu* developed by AICRP (FN)-Home Science, GBPUA&T is rich in protein (39.20 g), energy (434 kcal) and calcium (210.66 mg) for management of under nutrition, protein and energy dense mix has been developed. The product is shelf stable for 3 months. Flavour compares well with regular sattu Product has considerable marketing potential due to good keeping quality, easy transportation and cost effectiveness. Suitable for adoption by entrepreneurs The product can be consumed in variety of ways: health drink, *chapati, halwa, laddoo.*



Technology-71

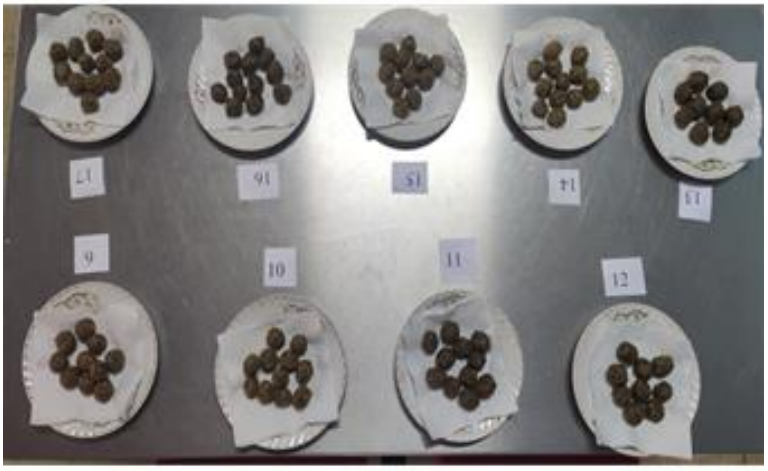
HIGH FIBRE COMPOSITE FLOUR MIX

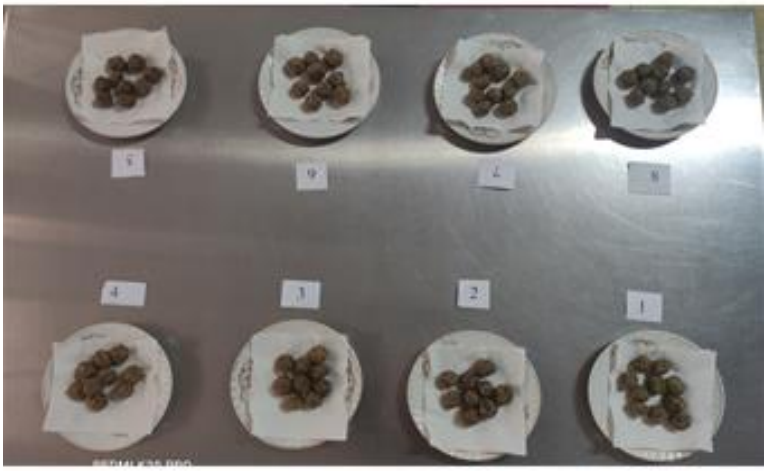
1.	Name of Technology	High fibre composite flour mix
2.	Name of Inventor (s)	Dr. Anuradha Dutta, Mrs. Pushpa Shukla and Dr. Rita Singh Raghuvanshi
3.	Area/ Field of applicability	• Digestive Health • Baked Goods • Gluten-Free Options • Health Foods for Weight Management • Dietary Supplements • Balanced Nutrition • Culinary Applications • Gut Microbiota • Research and Development • Food Technology • Diabetic-Friendly Products
4.	Description of	• Composite flour mix has therapeutic value in diabetes, obesity, constipation and cardiovascular diseases • The product is shelf stable for 3 months. • Product has considerable marketing potential due to good keeping quality, easy transportation and cost effectiveness. So, suitable for adoption by entrepreneurs. • The product can be consumed in variety of ways: health drink*, chapati, halwa, laddoo.*

Technology-72

GILOY (*TINOSPORA CORDIFOLIA*) INCORPORATED SWEET BALLS

1.	Name of Technology	Giloy (*Tinospora cordifolia*) incorporated Sweet Balls
2.	Name of Inventor (s)	Dr. Pratima Awasthi and Dr. Himani Joshi
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Optimization of salt roasting of Bengal gram. Optimization for development of giloy stem powder incorporated sweet balls, its nutritional and storage analysis.





Technology-73

DEVELOPMENT OF IRON AND PROTEIN RICH COOKIES INCORPORATING TAMARIND KERNEL (*TAMARINDUS INDICA L.*) AND LENTIL (*LENS CULINARIS L.*)

1.	Name of Technology	Development of iron and protein rich cookies incorporating tamarind kernel (*Tamarindus indica* L.) And lentil (*Lens culinaris* L.)
2.	Name of Inventor (s)	Dr. Sarita Srivastava and Dr. Priyanka Tangariya
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Iron and protein rich cookies were optimized by utilizing tamarind kernel and lentil with the help of response surface methodology (RSM). Optimized cookies had greater nutritive value (crude protein, fat, fibre, ash, minerals, dietary fibre, bioactive compounds, *invitro* protein digestibility and iron bioavailability) as compared to control whole wheat flour cookies. The optimized cookies also had good essential amino acid balance, vitamin A, vitamin C and niacin content.

Technology-74

REDUCED FAT MUFFINS

1.	Name of Technology	Reduced Fat Muffins
2.	Name of Inventor (s)	Dr. Sarita Srivastava and Dr. Richa Singh- FN
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Reduced Fat Muffins suitable for overweight and obese persons. Sensorially comparable to regular muffin. May attract weight conscious consumers who are willing to reduce their daily intake of empty calories. It is rich in calcium, dietary fibre, carotenoids which indicates the product has health benefits over regular muffins and contains egg also. Shelf life is 3 days at room temperature and 7 days in refrigerator. 
5.	**Patent filed**:	Yes

Technology-75

LOW GLYCEMIC INDEX (GI) & HYPOLIPIDEMIC PIZZA BASE

1.	Name of Technology	Low Glycemic Index (GI) & Hypolipidemic Pizza Base
2.	Name of Inventor (s)	Dr. Sarita Srivastava and Dr. Renu Shrestha
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	New kind of Low GI Pizza base suitable for diabetics and heart patients. Flavour comparable to that of a regular pizza. May attract diabetic consumers. It is rich in dietary fibre and antioxidants. Good market potential at domestic as well as global level. The product contributes to multi-health benefits. Shelf life for 5 days in HDPE bags at room temperature.
		 
5.	**Patent filed:**	yes

Technology-76

LOW GLYCEMIC INDEX (GI) BREAD

1.	Name of Technology	Low Glycemic Index (GI) Bread
2.	Name of Inventor (s)	Dr. Sarita Srivastava and Dr. Chhavi Arya
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Low GI bread suitable for normal and diabetic persons. Flavour comparable to that of regular bread. Low GI bread may attract diabetic persons. It is rich in dietary fibre, calcium, phosphorus and iron. It may have good market potential at domestic as well as global level. It contributes to multi-health benefits.

Technology-77

LOW GLYCEMIC INDEX (GI) BUNS

1.	Name of Technology	Low Glycemic Index (GI) Buns
2.	Name of Inventor (s)	Dr. Sarita Srivastava and Dr. Neha Tiwari
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Low GI buns suitable for normal and diabetic patients. Final product has flavour comparable to that of regular buns. Low GI buns may attract diabetic persons. It is rich in dietary fibre and calcium. It may have good market potential at domestic as well as global level. It contributes to multi-health benefits

Technology-78

HEALTHY EGGLESS CAKE

1.	Name of Technology	Healthy Eggless Cake
2.	Name of Inventor (s)	Dr. Sarita Srivastava
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Healthy cake suitable for vegetarians. The development of this process ensures that the end product possesses a taste similar to that of traditional cakes. These nutritious cakes have the potential to appeal to health-conscious individuals who follow a vegetarian diet. Additionally, they are packed with dietary fiber and calcium, providing numerous health benefits. This product shows promise in both domestic and international markets, offering a range of advantages for consumers' overall well-being. **Shelf life**: 4 days at room temperature and after icing it becomes 2 days. 

Technology-79

HEALTHY EGGLESS DOUGHNUTS

1.	Name of Technology	Healthy Eggless Doughnuts
2.	Name of Inventor (s)	Dr. Sarita Srivastava and Dr. Ayushi Joshi
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Healthy eggless doughnuts suitable for vegetarians. Final product has flavour comparable to that of regular doughnuts. • Healthy doughnuts may attract health conscious consumers. • It is rich in dietary fibre and calcium. • It may have good market potential at domestic as well as global level. • It contributes to multi-health benefits. • **Shelf life**: 3 days at room temperature.

Technology-80

HEALTHY BISCUITS

1.	Name of Technology	Healthy Biscuits
2.	Name of Inventor (s)	Dr. Sarita Srivastava and Dr. Anju Thathola
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Healthy biscuits suitable for health-conscious people. Final product has flavour comparable to that of regular biscuits. • May attract health-conscious consumers. • It is rich in dietary fibre, minerals and vitamins. • It may have good market potential at domestic as well as global level. • It contributes to multi-health benefits. 

Technology-81

GLUTEN FREE MUFFINS

1.	Name of Technology	Gluten Free Muffins
2.	Name of Inventor (s)	Dr. Sarita Srivastava and Dr. Diksha Bisht
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Department of Foods & Nutrition has developed a new kind of gluten free muffins suitable for celiac disease patients and those who have gluten allergy. The process has been developed in such a way that the final product has flavour comparable to that of regular muffins. It is rich in nutrients. It may have good market potential at domestic as well as global level. **Shelf life**: 3 days

5.	Patent filed:	Yes

Technology-82

HIGH PROTEIN BURGER PATTY MIX

1.	Name of Technology	High Protein Burger Patty Mix
2.	Name of Inventor (s)	Dr. Archana Kushwaha and Dr. Shailja Durgapal
3.	Area/ Field of applicability	• Food Industry: Cutlet Manufacturing and Product Diversification • Health and Wellness: Functional Foods and Dietary Supplements • Food Entrepreneurship: Startups and Ventures • Retail and Consumer Goods: Supermarkets and Grocery Stores • Sports Nutrition: Athlete Diets
4.	Description of technology	A mix was developed for making healthier burger patties which have high protein content and fairly good amount of iron and fiber are also present. It helps in reducing and treating problems of constipation. It is a good and healthy alternative for growing children and population of all age group especially the elderly people. It tastes better than regular potato/other patty. It turns out to be a good option for vegans. It has considerable marketing potential and is cost-comparable with the conventional burger. The mix is shelf stable for 6 months at room temperature. The technology is suitable for adoption by restaurants or any snacking bars. 

Technology-83

GLUTEN-FREE EXOTIC FLAVORED HOT DRINK

1.	Name of Technology	Gluten-Free Exotic Flavored Hot Drink
2.	Name of Inventor (s)	Dr. Rita S. Raghuwanshi and Dr. Nivedita
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Its simple but novel technology of making healthy hot drink using local flavoring agents. The developed product would meet the demand of young child feeding, energy calcium source for elderly and an all time favorite for winter months for all. Exotic flavor will meet the taste craving of people who have lived in hills and enjoyed it and for all the people to have a new flavor with health benefits.

Technology-84

DEVELOPMENT OF GREEN LEAFY VEGETABLE POWDER

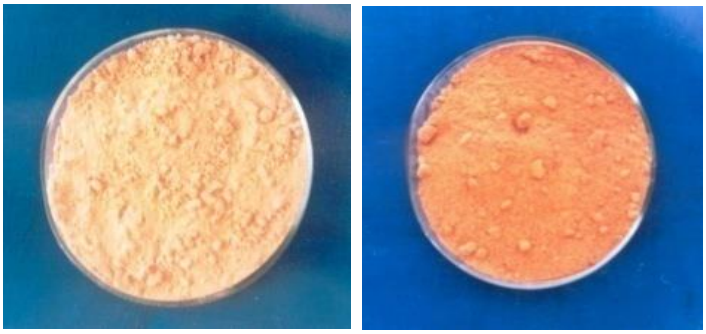
1.	Name of Technology	Development of green leafy vegetable powder
2.	Name of Inventor (s)	Dr. Pushpa Shukla
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Preservation of seasonal greens to increase availability in the lean season and prevent wastage.

Cauliflower Spinach Bengal gram

Technology-85

DEVELOPMENT OF DEHYDRATED FRUIT POWDER

1.	Name of Technology	Development of dehydrated fruit powder
2.	Name of Inventor (s)	Dr. Pushpa Shukla
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Incorporation of dehydrated fruit powder for low cost supplementary food. Provides nutritionally balanced supplementary food for children



Oven dried Papaya powder Freeze dried Papaya powder

Technology-86

DEVELOPMENT OF SPINACH LADDU, SPINACH BISCUIT, CARROT BISCUIT

1.	Name of Technology	Development of spinach laddu, spinach biscuit, carrot biscuit
2.	Name of Inventor (s)	Dr. Pushpa Shukla
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Developed for preschool children

Spinach biscuit

Spinach laddu

Carrot biscuit

Technology-87

DEVELOPMENT OF PAPAYA VERMICELLI, PAPAYA LADDU, PAPAYA KHEER

1.	Name of Technology	Development of Papaya Vermicelli, papaya laddu, papaya kheer
2.	Name of Inventor (s)	Dr. Pushpa Shukla
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology with diagram and photograph, if any	Developed for all age groups.

Papaya vermicelli

Papaya laddu

Papaya kheer

Technology-88

DEVELOPMENT OF SPROUT OAT POWDER MIX

1.	Name of Technology	Development of sprout oat powder mix
2.	Name of Inventor (s)	Dr. Pushpa Shukla
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Development of high fiber recipes from sprouted oat. Developed for diabetics.

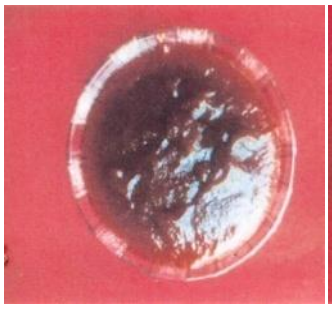
Oat biscuit

Oat chapatti

Technology-89

DEVELOPMENT OF VALUE-ADDED PRODUCT OF KIWI FRUIT

1.	Name of Technology	Development of value-added product of kiwi fruit
2.	Name of Inventor (s)	Dr. Pushpa Shukla
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Utilization of kiwi fruit. Formulation of jam and slab from Kiwi fruit



Kiwi jam

Kiwi slab

Technology-90

DEVELOPMENT OF IRON RICH LEHYAM

1.	Name of Technology	Development of iron rich lehyam
2.	Name of Inventor (s)	Dr. Pushpa Shukla
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Development of iron rich supplement for children

Technology-91

DEVELOPMENT OF SOY ENRICHED NOODLE

1.	Name of Technology	Development of soy enriched noodle
2.	Name of Inventor (s)	Dr. Pushpa Shukla
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Production of protein supplemented cereal product. Development of supplemented cereal product

Technology-92

DEVELOPMENT OF VALUE-ADDED PRODUCT OF AONLA

1.	Name of Technology	Development of value-added product of aonla
2.	Name of Inventor (s)	Dr. Pushpa Shukla
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Formulation of Aonla bar and jam. Production of preserved and concentrated fruit products.


Technology-93

DEVELOPMENT OF IRON RICH RECIPES

1.	Name of Technology	Development of iron rich recipes
2.	Name of Inventor (s)	Dr. Pushpa Shukla
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Developed for adolescent girls, pregnant and lactating women.



Pant namkeen Pant laddu Pant nutria laddu


Pant goli Pant pak

Technology-94

FINGER MILLET NOODLES

1.	Name of Technology	Finger millet noodles
2.	Name of Inventor (s)	Dr. Sarita Srivastava
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	For use as a nutritious substitute of refined wheat flour noodles in chowmein For use by diabetics All people

Noodles hanged for drying

Technology-95

FOXTAIL MILLET BREAD, FINGER MILLET BREAD

1.	Name of Technology	Foxtail millet bread, Finger millet bread
2.	Name of Inventor (s)	Dr. Sarita Srivastava
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Foxtail millet flour and refine wheat flour ratio is 40:60. Sensory evaluation score of 7.2 on Hedonic scale. Loaf weight 328 g Loaf volume 962 ml Finger millet flour and refine wheat flour ratio is 30:70. Sensory evaluation score of 7.4 on Hedonic scale. Loaf weight 330 g Loaf volume 948 ml Nutritious bread rich in dietary fibre and micronutrient as a substitute of refined wheat flour bread. Suitable for all and also for diabetics as it has low glycemic index.

Bread containing foxtail millet flour

Bread containing finger millet flour from genotype VL 146

Technology-96

FENUGREEK LEAF POWDER

1.	Name of Technology	Fenugreek leaf powder
2.	Name of Inventor (s)	Dr. Kalpana Kulshrestha
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Fenugreek leaves are an affordable option for making food products rich in Beta carotene. Fenugreek leaf powder can be stored for a long time in a sealed container. A daily dose of approximately 6-10 grams of fenugreek leaf powder would meet the Beta carotene needs of children aged 7-12.

Technology-97

CARROT POWDER

1.	Name of Technology	Carrot powder
2.	Name of Inventor (s)	Kalpana Kulshrestha
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Carrot powder can be used to prepare different products during off-season. Products like soup, halwa can be made with 100% carrot powder. Dalia, poori, chapatti can be made with its incorporation. Carrots one rich in carotene and minerals so its powder can be used to produce enriched products or can be used as nutraceutical.

Technology-98

PREPARATION OF FLOUR FROM SOYBEAN

1.	Name of Technology	Preparation of flour from soybean
2.	Name of Inventor (s)	Dr. Kalpana Kulshrestha
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	It is devoid of most of antinutritional factors like trypsin inhibitors. It can be used for preparation of traditional foods like chapatti, paratha, poori, kachauri. It can be substituted for other pulse flours for preparing sweet and savoury snack items. It can also be used for preparation of preserved products like bari and papad.

Technology-99

POTATO FLOUR

1.	Name of Technology	Potato Flour
2.	Name of Inventor (s)	Dr. Kalpana Kulshrestha
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	Potato flour can be used as a substitute for cereal flour. Various products can be prepared from potato flour substituting it with cereal flours like in the preparation of paratha, chapatti, poori, halwa, gulabjamun, biscuits, sev mathari, etc. It can be used by reconstitution with hot water in recipes requiring boiled potatoes.

Technology-100

LIME TREATED MAIZE FLOUR

1.	Name of Technology	Lime treated maize flour
2.	Name of Inventor (s)	Dr. Kalpana Kulshrestha
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	The LHT of the grain produces finer flour particles due to the physico-chemical changes in starch component of the endosperm increasing the water absorption capacity of low and ultimately the dough propertyi.e. The dough becomes more plastic and cohesive. In addition to these physico-chemical advantages the flour so obtained becomes nutritionally superior than untreated flour due to the enhanced availability of niacin, iron, calcium and improvement of the protein quality. The chapattis made from LHT flour have better organoleptic properties in terms of texture and taste, therefore have greater chances of acceptability. The flour has greater storage potential due to destruction of enzymes involved in the deterioration of the oil present in the untreated maize flour.

Technology-101

SWEET POTATO FLOUR

1.	Name of Technology	Sweet potato flour
2.	Name of Inventor (s)	Dr. Kalpana Kulshrestha
3.	Area/ Field of applicability	• Food entrepreneurship • Food industry
4.	Description of technology	The versatile sweet potato flour can be seamlessly incorporated into a variety of recipes. This high-quality flour has been successfully utilized to create delicious delicacies such as gulabjamun, puri, and chapatti. The precise combination of ingredients used in these preparations showcases the perfect balance of 25% skimmed milk powder and sweet potato flour for gulab jamun puri, 25% sweet potato flour and buckwheat flour for puri, and 5% sweet potato flour and 45% wheat flour for chapatti. The transformative nature of this sweet potato flour lies in its ability to convert bulky, semi-perishable fresh sweet potatoes into dehydrated products, such as flour and granules. These convenient and long-lasting products enable effortless storage and effortless utilization in the aforementioned dishes.

Technology-102

QUINOA WAFFLES

1.	Name of Technology	Quinoa waffles
2.	Name of Inventor (s)	M. Anuhya and Dr. Neetu Dobhal
3.	Present status about commercialization (Yes/No)	No
4.	Area/ Field of applicability	Food processing industries producing the waffles
5.	Description of technology	Features of technology with their benefits: • Quinoa waffles are rich in dietary fibre, protein and have high in-vitro protein digestibility, thus a healthier alternative for regular waffles made from refined wheat flour. • Suitable for adoption by entrepreneurs due to easy processing and requirement of small infrastructure and less manpower. • Considerable marketing potential due to the high liking of children for ready-to-eat snacks. • Sensory attributes like colour, flavour, texture, taste better than regular waffles. • A healthy alternative in the fast changing world where lifestyle disorders in the children are becoming a major problem.

Technology-103

MORINGA OLEIFERA AND MILLET FLOUR 'SEV'

1.	Name of Technology	Moringa oleifera and millet flour 'Sev'
2.	Name of Inventor (s)	Shrishti Singh and Dr. Neetu Dobhal
3.	Area/ Field of applicability	Food processing industries producing the namkeens like Haldiram, Bikano, Bikanervala, Gopal Snacks Pvt. Ltd., Bikaji etc.
4.	Description of technology	Features of technology with their benefits: ➢ Moringa oleifera and millet flour 'Sev' has high protein and it is rich in dietary fibre. Hence, a healthier alternative for diabetics and obese. ➢ Sensory parameters viz taste, texture and cost comparable with regular sev. ➢ Easy to process and require less manpower. So, suitable for adoption by entrepreneurs. ➢ Considerable marketing potential due to the high liking of children for ready-to-eat snacks, good shelf life, high quality and easy transportation.

Technology-104

JACKFRUIT PEEL BASED 'VERMICELLI'

1.	Name of Technology	Jackfruit peel based 'Vermicelli'
2.	Name of Inventor (s)	Diksha Kalra and Dr. Neetu Dobhal
3.	Area/ Field of applicability	Food processing industries producing the vermicelli like Bambino etc.
4.	Description of technology	Features of technology with their benefits: ➢ Jackfruit peel based 'Vermicelli' has low glycemic index and it is rich in dietary fibre. Hence has therapeutic value for diabetics and obese. ➢ Being rich in insoluble fibre has therapeutic role in managing constipation and promoting bowel movements. ➢ Taste, aroma and cost comparable to regular vermicelli. ➢ Easy to process and require small infrastructure and less manpower. So, suitable for adoption by entrepreneurs. ➢ Considerable marketing potential due to the high consumption of vermicelli in daily life, high quality, good shelf life and easy transportation. ➢ The product can be cooked and consumed in a variety of ways like Veg sewain, milk-based sweet sewain etc.

Technology-105

QUALITY PROTEIN MAIZE (QPM) INCORPORATED NUTRIENT-DENSE BAR

1.	Name of Technology	Quality Protein Maize (QPM) incorporated nutrient-dense bar
2.	Name of Inventor (s)	Himani Belwal and Dr. Neetu Dobhal
3.	Area/ Field of applicability	Food processing industries producing energy bars
4.	Description of technology	Features of technology with their benefits: ➢ QPM nutrient-dense bar is a good source of quality protein and energy, thus a better option for growing children. ➢ Sensory attributes viz taste, texture, appearance and cost comparable to Regular energy bars. So, suitable for adoption by entrepreneurs ➢ Considerable marketing potential due to the high liking of children for chocolates and bars, good shelf life, high quality and easy transportation.

CLOTHING AND TEXTILE

Technology-106

BLENDING OF MILKWEED FIBERS WITH MULBERRY SILK AND LYOCELL FIBERS (EACH).

1.	Name of Technology	Blending of milkweed fibers with mulberry silk and lyocell fibers (each).
2.	Name of Inventor (s)	Dr. Jyoti Joshi and Dr. Alka Goel
3.	Area/ Field of applicability	Textiles and Garment sector
4.	Description of technology	The natural cellulosic fibre milkweed (*Calotropis procera and Calotropis gigantea*) and regenerated cellulosic fibre lyocell were blended for preparation of yarn. The invention is related to novel milkweed floss/ lyocell blended woven fabric with unique texture and properties suitable for making comfortable garments. The fabric is made by using unique milkweed floss/ lyocell blended yarns providing group of properties which are desirable. The invented fabric is new combination of milkweed floss with lyocell fibre, which was not available prior in the market.

Developed products with union fabrics of milk, silk and lyocell

Milkweed Plant

Fibre Po

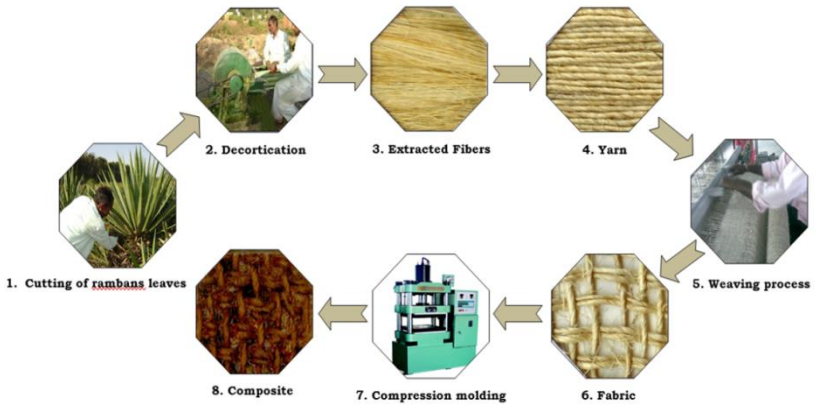
Weave Design

Technology-107

EXTRACTION AND PROCESSING OF TWO UNCONVENTIONAL FIBERS (RAMBANS & MALU).

1.	Name of Technology	Extraction and processing of two unconventional fibers (Rambans & Malu).
2.	Name of Inventor (s)	Dr. Ruchi Kholiya and Dr. Alka Goel
3.	Area/ Field of applicability	Home-Furnishing Textiles and Composite sector
4.	Description of technology	A rambans (sisal) fabric reinforced phenolic composite was prepared by compression molding method.Tensile strength and tensile modulus of the rambans phenolic composite was 24.61 MPa and 207.77 GPa respectively, while flexural strength and flexural modulus of the rambans phenolic composite was 31.1 MPa and 104.55 GPa respectively.The impact strength of the sisal phenolic composite was observed as 117.67kJ/m2. Water absorption of rambans phenolic composite was 17.19 per cent after 24 hours. Results of flammability showed that sisal phenolic composite was flame proof.
5.	Patent filed:	Yes

Process of Composite Development



Technology-108

DEVELOPMENT OF NATURAL FIBER REINFORCED PLASTIC COMPOSITES USING WASTE JUTE BURLAP BAGS AND NANO PARTICLES AND UTILIZING THE SAME TO PREPARE PRODUCTS SUITABLE FOR BUILDTECH AND AUTOTECH.

1.	Name of Technology	Development ofnatural fiber reinforced plastic composites using waste jute burlap bags and nano particles and utilizing the same to prepare products suitable for buildtech and autotech.
2.	Name of Inventor (s)	Dr. Isha Tyagi and Dr. AlkaGoel
3.	Area/ Field of applicability	Technical Textiles
4.	Description of technology	Old, waste jute sack or burlap bags were used to produce polymer composites. The study focused on developing jute fiber reinforced plastics utilizing most commonly used resins to develop products suitable for household and commercial purpose. Polymer nano-composites were also be developed in order to explore the viable applications of nano particles in composites. Several products for mobiltech and buildtech were developed in the present research to suggest possible applications of natural fiber reinforced plastics. It was found that the developed plastics could be used to substitute fiberglass and wood for less demanding applications as doors, panels, partition boards, roofing sheets, packaging materials, furniture and furnishing items, etc.

Motorcycle Front Fendor

Wall Tile

Roofing sheet sample

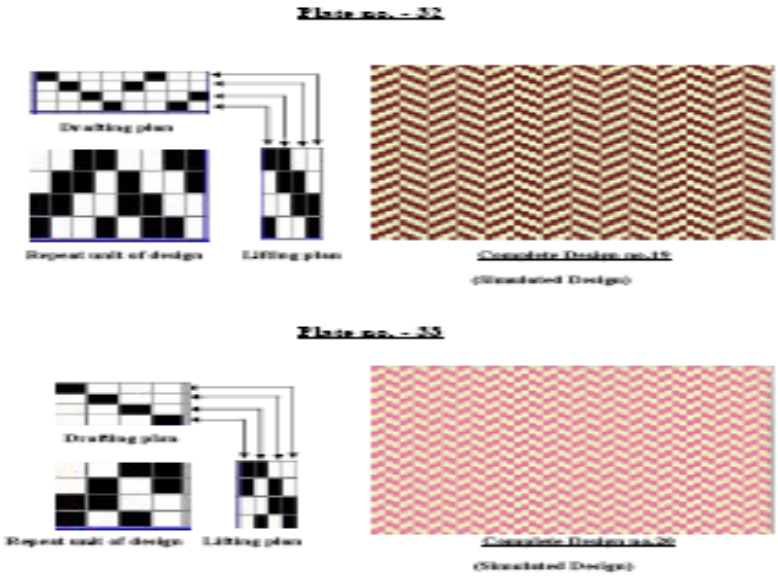
Tray

Technology-109

DEVELOPMENT OF UNION FABRICS FROM ANGORA/ MERINO AND ERI SILK USING ARHA WEAVE SOFTWARE

1.	Name of Technology	Development of union fabrics from angora/ merino and eri silk using arha weave software
2.	Name of Inventor (s)	Ms Reena Garbyal and Dr. Alka Goel
3.	Area/ Field of applicability	Textile and Garment sector
4.	Description of technology	**Articles prepared from different designed union fabrics**

Skirt and top designed with eri × angora/merino



Technology-110

DEVELOP PURE AND BLENDED NONWOVEN FABRICS AND NONWOVEN FABRIC THROUGH MICROENCAPSULATION TECHNOLOGY

1.	Name of Technology	Develop pure and blended nonwoven fabrics from recycled cotton and polyester fiber. Applied insect repellent finish based on gumacacia, eucalyptus, and cedar wood oil to the developed nonwoven fabric through microencapsulation technology
2.	Name of Inventor (s)	Dr. Rachna Sharma and Dr. Alka Goel
3.	Area/ Field of applicability	Textiles and Garment sector / library
4.	Description of technology	The eucalyptus oil-based insect repellent finish has better repellency against silverfish.

Cloth Storage Bag With Insect Repellent Finish

Fold it when not in use

5.	Patent filed:	Yes

Technology-111

DEVELOPMENT OF SIZE CHART FOR FEMALES (21-31 YEARS OF UTTARAKHAND) AND CONSTRUCTION OF DESIGNED KHADI KURTIES

1.	Name of Technology	Development of size chart for females (21-31 years of Uttarakhand) and construction of designed Khadi Kurties.
2.	Name of Inventor (s)	Dr. Gayatri and Dr. Alka Goel
3.	Area/ Field of applicability	Textiles and Garment sector
4.	Description of technology	Anthropometric measurement of 1000 females between ages 21-31 year was collected from plain and hilly area of Uttarakhand. Various statistical methods were applied to analyse the collected data. On the basis of result of collected data S, M, L, XL, XXL size chart were prepared for females.

Plate 86: A-line *khadi kurties* (AKD- 5, C5, III)

5.	Patent filed:	Yes

Technology-112

DEVELOPMENT OF COVER AND CORE SPUN YARNS FROM FLAX, LYOCELL AND SPANDEX FIBERS AND THEIR FABRICS

1.	Name of Technology	Development of cover and core spun yarns from flax, lyocell and spandex fibers and their fabrics
2.	Name of Inventor (s)	Dr. Swati Sahu and Dr. Alka Goel
3.	Area/ Field of applicability	Textiles and Garment sector
4.	Description of technology	The present invention relates to the development of cover and core spun yarns from flax, lyocell and spandex fibers and their fabrics. The developed cover spun yarn of flax and lyocell have good tenacity, breaking force and elongation and cover and core spun yarns of flax and spandex have good stretchability.These deceloped yarns were used to construct handwoven twill weave fabrics and weft knit single jersey fabrics. The invented fabrics in addition to tenacity and stretchability also possessed better.

Fabric code: $CFx_{Ly}Ly_{sp20}$
Warp: CFx_{Ly}, Weft: CLy_{sp20}
Fabric used: 1 meter
Fabric cost: ₹ 534.17 mtr
Embroidery cost: ₹ 80/-
Stitching cost: ₹ 150/-
Total cost: ₹ 764.17

Fabric code: $CFx_{Ly}Ly$
Warp: CFx_{Ly}, Weft: Ly
Fabric used: 1 meter
Fabric cost: ₹ 254.85mtr
Stitching cost: ₹ 150/-
Total total: ₹ 404.85

Fabric code: $CFx_{Ly}Ly_{sp40}$, Warp: CFx_{Ly}, Weft: CLy_{sp40}
Fabric used: 1 meter, Fabric cost: ₹ 557.17 mtr
Cost of net fabric: ₹ 80/- ,
Cost of pink fabric: ₹ 25/-
Stitching cost: ₹ 180/- ,
Total cost: ₹ 842.17 dress

5.	Patent filed:	yes

Technology-113

DEVELOPED NONWOVEN WITH CHICKEN FEATHER FIBERS AND JUTE FIBERS USING THERMAL BONDING TECHNOLOGY

1.	Name of Technology	Developed nonwoven with chicken feather fibers and jute fibers using thermal bonding technology.
2.	Name of Inventor (s)	Dr. Neha Sah and Dr. Alka Goel
3.	Area/ Field of applicability	Textiles, Buildtech, Hometech
4.	Description of technology	The present invention relates to the “Development of a novel thermal bonded nonwovenfabric from chicken feather fibers and jute fibers” with improved insulation and reduced weight. Theprepared nonwoven was found appropriate for developing lining of automobiles and garments, and shoelinings. The chicken fibers were used as reinforcement in the epoxy composite and made into low load-bearingapplications like study table top.

Technology-114

DEVELOPED ECONOMICAL AND SAFE ANTIMICROBIAL FINISH EXTRACTED FROM PLANT SOURCE (FALCONERIA INSIGNIS LEAVES)

1.	Name of Technology	Developed economical and safe antimicrobial finish extracted from plant source (falconeria insignis leaves).
2.	Name of Inventor (s)	Dr. Pooja Singh and Dr. Alka Goel
3.	Area/ Field of applicability	Textiles and Garment sector
4.	Description of technology	Researchers developed an economical antimicrobial finish for textiles using plant extracts. They tested the effectiveness of the extracts against different types of bacteria and fungus. The extract from Falconeria insignis was found to be the most effective and was applied to casement fabric. The optimal conditions for applying the extract were determined using software. The treated fabrics were found to have antimicrobial properties and were deemed safe for use in museums to protect artifacts.
5.	Patent Filed	Yes

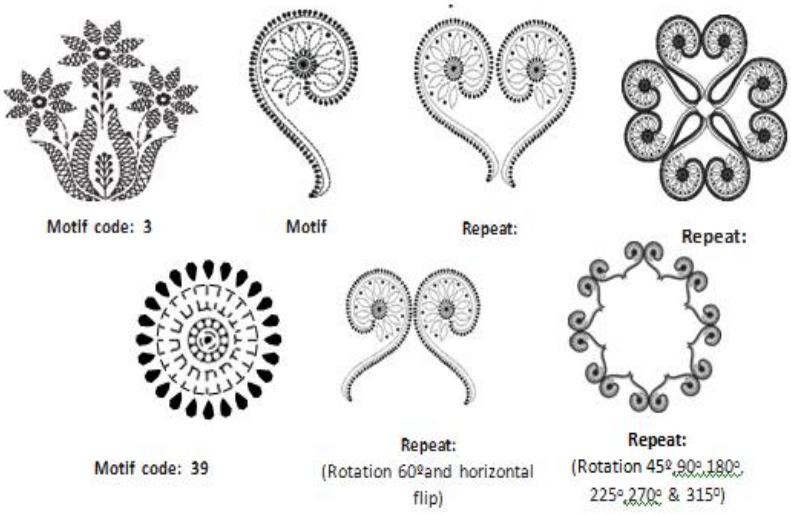
Free Stranding Showcase

Dummy style display

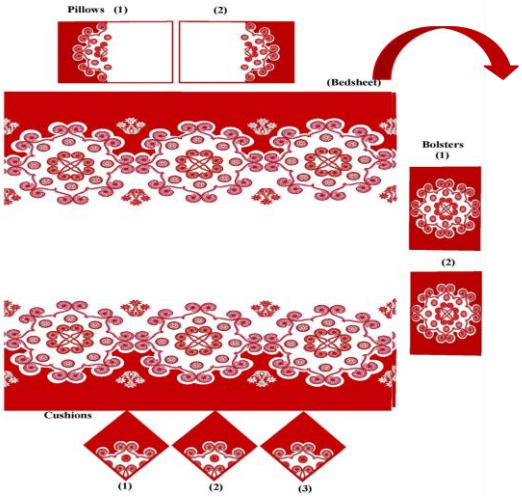
Technology-115

ADAPTATION OF CHIKANKARI EMBROIDERY DESIGNS FOR SCREEN PRINTING SUITABLE FOR SMALL SCALE PRINTERS

1.	Name of Technology	Adaptation of Chikankari Embroidery designs for screen printing suitable for small scale printers Development of screen printson fabric using adapted Chikankari motifs Developmentof Range of Home furnishing articles using generated prints
2.	Name of Inventor (s)	Dr. Hema Upadhyay and Dr. Alka Goel
3.	Area/ Field of applicability	Home textiles and apparel sector
4.	Description of technology	Hand embroidery work on fabric is a time-consuming and expensive craft that affects the cost of the products. These hand embroidered products are also perishable and easily damaged, requiring special care, limiting their use for everyday home furnishings. Screen printing is an effective way to incorporate new designs in a variety of colors without compromising quality. In this study, Chikankari motifs were used to create a range of home furnishings using screen printing techniques. Previous research has documented Chikankari and its applications, but adapting the stitches for screen printing has not been done before. The goal of this research was to make the fine stitches of Chikankari accessible for mass production by small printing clusters at affordable prices.



Developed motif and repeat



Visual illustration and final printed product

Technology-116

DEVELOPMENT OF TEXTILE PRODUCTS I.E. KURTI, TOTE BAG, VEST AND STOLE THROUGH SCREEN PRINTING OF DESIGN PREPARED FROM BUDDHIST MANDALA ART

1.	Name of Technology	Development of textile products i.e. kurti, tote bag, vest and stole through screen printing of design prepared from Buddhist mandala art.
2.	Name of Inventor (s)	Ms. Nupur Srivastava and Dr. Alka Goel
3.	Area/ Field of applicability	Garment and Handicraft sector
4.	Description of technology	Forty five motifs were adopted from nine original mandala motifs according to their suitability for textile printing technology and were modified by the means of coral draw

VEST (FRONT AND BACK)

Stole

Mandala showing *Ashtamangala* & a *Vajra* motif in the center

Technology-117

DEVELOPMENT OF THERMAL KNITTED TEXTILE MATERIALS TO MITIGATE MUSCULOSKELETAL PAIN

1.	Name of Technology	Development of Thermal Knitted Textile Materials to Mitigate Musculoskeletal Pain Used for management of muscles pain, swelling and stiffness.
2.	Name of Inventor (s)	Dr. Sonam Omar and Dr. Alka Goel
3.	Area/ Field of applicability	medical textile sector
4.	Description of technology	• **Survey work done of midde age group**  • **Development of blended yarns**  • **Development of product and its trial** 

Technology-118

CORE SPUN YARNS OF ERI SILK AND SPANDEX FIBRES AND, STRETCHABLE ERI SILK FABRIC

1.	Name of Technology	Core Spun Yarns of Eri silk and Spandex Fibres and, Stretchable Eri silk fabric
2.	Name of Inventor (s)	Dr. Gauri Goel and Dr. Alka Goel
3.	Area/ Field of applicability	Textiles and garment sector
4.	Description of technology	The stretchable yarn of the present invention comprises a non-elastomeric natural fiber in combination with the elastomeric filament. The non-elastomeric natural fiber here is Eri silk which is covered over the elastomeric filament, i.e., Spandex. The core of the core spun yarn is the stretchable filament being Spandex which is initially stretched in draft ratios of 2.0, 2.5, 3.0 and 3.5 and the percentage of the core in the yarn is in the range of 15 to 21 percent. The percentage of the Spandex used in the yarn contributes in providing the stretch recovery properties to Eri Silk core spun yarn. The said yarn has been made in simple ring frame spinning machine. The developed stretchable eri silk yarns can be utilized for making eri silk stretchable fashion fabric for apparels and other textiles use.

Production of Core-spun Yarn on simple ring frame spinning machine

Women shirt stitched using developed eri silk stretch fabric

Technology-119

BIODEGRADABLE GEOTEXTILES FROM *DHAINCHA* FIBERS

1.	Name of Technology	Biodegradable Geotextiles from *DHAINCHA* Fibers
2.	Name of Inventor (s)	Dr Anita Rani and Dr. Monika Negi
3.	Area/ Field of applicability	Soil reclamation and Soil erosion control
4.	Description of technology	Dhaincha (*Sesbania aculeata*) fibres • The yarns were used to prepare 2 type of woven fabric i.e., pure *dhaincha* fabric and *dhaincha* and jute union fabric. • Non -woven and woven fabric were tested for geotextile purpose and found that the properties of pure *dhaincha* fabric (non- woven and woven) were similar to coir geotextile. • Hence can be a substitute of coir geotextile in Uttarakhand for reinforcement of pavement and road: soil erosion on hill sides and soil reclamation.

Non-woven (800 gsm)

Woven *dhaincha* and jute union fabric

Woven pure dhaincha fabric

Technology-120

UV PROTECTIVE SCARF MASK FOR FARM WOMEN

1.	Name of technology	UV Protective Scarf Mask for Farm Women
2.	Name of inventor (s) with photograph	Dr. Manisha Gahlot Dr. Beenu Singh
3.	Area/field of applicability	Farmwomen of different agro climatic regions
4.	Description of technology	*Jamun* (*Syzygium cumini*) leaf extract was used as UV protective finish. *Jamun* (*Syzygium cumini*) leaf extract was prepared and finishing process was optimized for UV protective finish on cotton fabric based on the results of UPF (Ultra Violet Protection Factor). The UPF of this finished fabric was found to be very good (UPF: 36.7) which meant that fabric can provide protection against UV rays. Finished fabric was used for the development of UV Protective Scarf mask for farm women. Features of Scarf mask • Design features of scarf mask meant to give full coverage to the head, face and neck of the wearer • Easy to tie fastening system

Technology-121

A PROCESS FOR DEVELOPMENT OF UV PROTECTIVE FINISH FOR COTTON FABRIC USING *URTICA DIOCA* MICROCAPSULES

1.	Name of the technology	A process for development of UV protective finish for cotton fabric using *Urtica dioca* Microcapsules
2.	Name of the Inventor	Dr. Deepti Pargai and Dr. Shahnaz Jahan
3.	Area/ Field of applicability	Clothing and textiles/ Skin cancer prevention / Medical textiles
4.	Description of technology	UV protective Finish is developed for cotton fabric using Uttarakhand plant
5.	Patent	Granted

SMALL IMPLEMENTS/ TOOLS

Technology-122

REVOLVING STOOL

1.	Name of Technology	Revolving stool
2.	Name of Inventor(s)	Dr. Deepa Vinay and Dr. Suneeta Sharma
3.	Area/ Field of applicability	Dairy production
4.	Description of technology	1. The length and width of the revolving stool is designed as per the dimensions of rural women for reducing musculoskeletal disorders while milking. 2. Seat of the stool is designed to give maximum comfort. 3. Ball bearing is provided to make it possible to move. 4. The steel plate of the revolving stool can be replaced by wooden 5. Helpful in reducing musculo-skeletal disorders, provide ease in work performance

Technology-123

IMPROVED SICKLE (THAMALI) FOR CUTTING FUEL WOOD

1.	Name of Technology	Improved Sickle (Thamali) For Cutting Fuel Wood
2.	Name of Inventor(s)	Dr. Deepa Vinay and Dr. Suneeta Sharma
3.	Area/ Field of applicability	Cutting Fuel Wood
4.	Description of technology	Weight : 450 gm. Length : 15 inches Material used : Iron, wood

1. Use of improved sickle was found effective for reducing physiological stress of worker while cutting firewood.
2. A significant reduction was found in all the ergonomic parameter while using this tool.
3. The tool was found highly acceptable by the respondent as far as work output and field acceptability was concerned.
4. This tool also reduces the incidences of musculoskeletal disorders of the body of the respondent.

Technology-124

PADDY THRESHER

1.	Name of Technology	Paddy Thresher
2.	Name of Inventor(s)	Dr. Deepa Vinay, Dr. Seema Kwatra and Dr. Suneeta Sharma
3.	Area/ Field of applicability	Threshing of paddy
4.	Description of technology	Height : 97 cm Length : 80 cm Width : 63 cm Weight : 50 kg Threshing capacity : 150 -180kg/hour

1. On an average 180 kg of paddy can be threshed in one hour of duration by motorized paddy thresher in comparison to 36 kgs of paddy with the conventional tool/practice.
2. Pace of work by motorized paddy thresher was 5 times more in comparison to that of conventional method of threshing paddy.
3. Cent percent of the respondent felt very satisfied by doing threshing.
4. The improved technology reduced the drudgery score to 15 instead of 27 for conventional method.
5. Increase the efficiency of worker and in turn the productivity of the work.

Technology-125

DUNG COLLECTOR

1.	Name of Technology	Dung collector
2.	Name of Inventor(s)	Dr. Deepa Vinay, Dr. Seema Kwatra and Dr. Suneeta Sharma
3.	Area/Field of applicability	Dung collector
4.	Description of technology	Length of the handle : 90-120 cm Width of dung collector : 37 cm Material : Wood & iron
5.	Salient features:	There was 50 percent reduction in drudgery and time required for dung collection. As the pace of the work gets increased, the number of labourers required for cleaning animal shed will be less.

Technology-126

LONG HANDLE FORK

1.	Name of Technology	Long Handle Fork
2.	Name of Inventor(s)	Dr. Deepa Vinay, Dr. Seema Kwatra and Dr. Suneeta Sharma
3.	Area/ Field of applicability	Cleaning Of Cattle Shed
4.	Description of technology	Length : 3'- 4' Width : 11/2" Material : Wood & Iron
5.	Salient features:	. The fork is designed as per the height of the hill farm women according to their anthropometric measurements. . Convenient handle of the fork improves the work posture of the women. . The comfortable grip of the fork enhances the work efficiency. . Light weight of the fork makes its handling easy.

Technology-127

WATER BAG

1.	Name of Technology	Water Bag
2.	Name of Inventor(s)	Dr. Deepa Vinay, Dr. Seema Kwatra and Dr. Suneeta Sharma
3.	Area/ Field of applicability	Fetching water/ household level
4.	Description of technology	<u>Specifications</u> Height of Bag : 35 cm Width : 27.5 cm Thickness : 17.5 cm Material Used : Plastic Jerry Cane & Synthetic Leather
5.	Salient features:	1. Energy expenditure reduces from 13.93 kj/min to 12.18 kj/min in improved method. 2. 20 liter water can be carried in one time by using improved method

Technology-128

FACE PROTECTOR

1.	Name of Technology	Face protector
2.	Name of Inventor(s)	Dr. Deepa Vinay, Dr. Seema Kwatra and Dr. Suneeta Sharma
3.	Area/ Field of applicability	Harvesting and Weeding
4.	Description of technology	<u>Specifications</u> Length of Transparency Sheet :21.25 cm Width : 27.5 cm Velcro Length : 70 cm Foam Thickness : 5 cm

5. Salient features:

1. Designed to reduce the risk of direct facial contact with sharp crop leaf edges, minute and hazardous dust particles and insects.
2. It avoids the cuts and allergies to the face of the worker.
3. The head band is sufficiently flexible so as to adapt the shape of users head.

Technology-129

SPREADER FRAME & LOW LEVEL CHAIR

1.	Name of Technology	Spreader frame & low level chair
2.	Name of Inventor(s)	Dr. Deepa Vinay, Dr. Seema Kwatra and Dr. Suneeta Sharma
3.	Area/ Field of applicability	Harvesting and Weeding
4.	Description of technology	<u>Specifications</u> Seat height from floor : 25 cm Seat depth : 45 cm Seat width : 38 cm Seat back height : 45 cm Backrest width : 53 cm Seat back recline angle : 5° Slope of seat front to rear : 5°

5. Salient features

1. Energy expenditure, TCCW and PCW reduces in improved method over conventional method from 8.75 to 8.04 kj/min, 1037.95 to 1008.64 beats and 103.79 to 100.86 beats respectively
2. Improves the work posture through spreader frame with low level chair.
3. Avoids squatting posture causing pain in calf muscles and lumbar back muscles.
4. It makes the working comfortable for long hours.
5. Convenient to carry from one place to another

Technology-130

LEATHER THIMBLE

1.	Name of Technology	Leather thimble
2.	Name of Inventor(s)	Dr. Deepa Vinay, Dr. Seema Kwatra and Dr. Suneeta Sharma
3.	Area/ Field of applicability	Improved work efficiency as avoid finger piercing
4.	Description of technology	<u>Specifications</u> Circumference of leather thimble: 5.25 cm Length of leather thimble : 7 cm
5.	Salient features:	Before introducing leather thimble, gauze was used by the worker but it caused hindrance in performing the task and does not protect the piercing of finger fully but leather thimble is helpful in terms of saving time and avoid injury from needle.

Technology-131

GRAIN PICKER

1.	Name of Technology	Grain picker
2.	Name of Inventor(s)	Dr. Deepa Vinay, Dr. Seema Kwatra and Dr. Suneeta Sharma
3.	Area/ Field of applicability	Grain storage and milling
4.	Description of technology	<u>Specifications</u> Length 360 mm. Width 260 mm. Depth 110 mm. Weight 1.5 kg. Material Aluminum Handle Attached between 5-10^0 of angle
5.	Salient features:	Grain picker consist of main frame (rectangle shape,) handle, rope cover made for bagging of grain in grain sacks. With use of this the comfort level of the respondent would be increased by minimizing the exertion. This tool also prevents the occurrence of hot spots and pain in palm of the respondents. Helpful in reducing musculo-skeletal disorders, provide ease in work performance.

OTHER TECHNOLOGIES

Technology-132

REFINED PROCESS FOR SPECIFIC GRAVITY SEPARATION OF FRUIT KERNELS (APPRICOT AND WALNUT) FROM THEIR SHELLS

1.	Name of technology	Refined process for specific gravity separation of fruit kernels (appricot and walnut) from their shells
2.	Name of inventor	Dr. Satish Kumar Sharma and Dr. DC Dimri
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Wild apricot and wild walnut are among the important fruits found growing in Indian Himalayan states. The fruits are small in size, very acidic in nature and sometimes have slightly bitter taste, with a shelf life of just 2-3 days. The kernels of the fruit are similar in appearance to almond kernels, but many a times they are bitter in taste. Kernel decortication is a big problem. A low cost technology for decortication and kernel separation of wild apricot was developed. Technology consisted manual method of seed breaking and then separating the kernel using specific gravity separation 1. Reduced losses due to broken kernels. 2. Time saving 3. 99 % separation of kernels and shells 4. Appreciable cost effectiveness for decortication 5. Considerable scope and potential for adaptation by large units.

Technology-133

PROCESS FOR RETENTION OF COLOUR DURING DRYING OF CHRYSANTHEMUM FLOWERS

1.	Name of technology	Process for retention of colour during drying of Chrysanthemum flowers
2.	Name of inventor	Dr. Satish Kumar Sharma, Dr. Deena Wilson, Dr. V.K. Rao, Dr. V.K. Yadav and Dr. Shachi Shah
3.	Area/field of applicability	Food Technology
4.	Description of Technology	Flowers have a very short shelf life and every flower might loose their freshness within few hours of harvest. If they are kept in vase solution, the life may be extended by few more days, but they can not be stored for many months in any vase solution as well. Drying of flowers is one of the methods for retention of their shape for long duration; however, during this process colour of the petals is lost to a large extent. Technology for the retention of colour of chrysanthemum flower petals during drying enables them to create a product with better aesthetic value and better market potential. Highlights 1. Retention of colour to a significant level 2. Potential for utilization of dried flowers with coloured petals for aesthetic market. 3. Potential for utilization of dried flowers petals in food preparation as seasoning, or decoration ingredient etc. 4. Long shelf life after drying

Technology-134

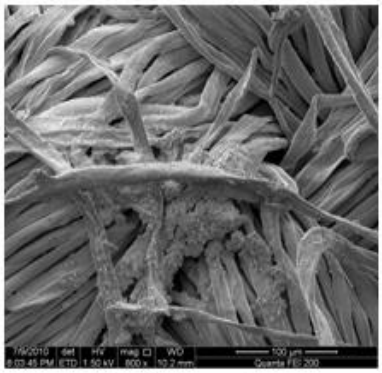
FOLDABLE CAGE UNIT FOR BACKYARD POULTRY

1.	Name of Technology	Foldable Cage unit for backyard poultry
2.	Name of Inventor (s)	Dr. Anil Kumar and Dr. Rajiv Suman
3.	Area/ Field of applicability	Poultry Production (Backyard)
4.	Description of technology	Housing in backyard poultry system is usually found in very primitive, unscientific and unhygienic conditions. Due to which mortality in birds always occurs because of infections/disease. Keeping in view, a scientific cage unit of double/single story has been designed for backyard poultry farming systems to provide clean shelter with adequate housing space.
5.	Salient feature	1. Very use full for backyard poultry farmers especially of remote area. 2. Small sized, double and easy to carry anywhere in the courtyard. 3. Very good from protection point view, as it is made of galvanized iron. 4. Durable and all weather house. 5. Having provision of feeder and drinker. 6. Cost effective.

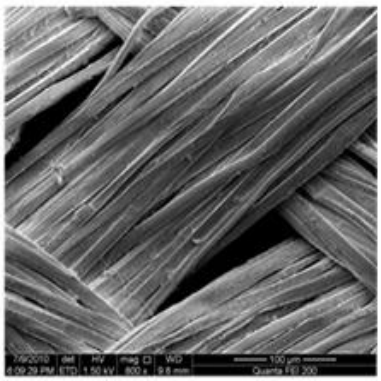
Technology-135

MICROENCAPSULATION OF ESSENTIAL OILS

1.	Name of Technology	Microencapsulation of essential oils
2.	Name of Inventor (s)	Dr. Mansi Hans and Dr. Alka Goel
3.	Area/ Field of applicability	textiles and garment industry
4.	Description of technology	Essential oils are the highly concentrated essences of aromatic plants. Aromatherapy is the art of using these oils to promote healing of the body and the mind. Applying these fragrances of essential oils on textiles can incorporate these properties of oils into the material. Microcapsules are a special form of packaging, in that particulate matter can be individually coated for protection against environment and release the volatile substance from the enclosed capsule as required. Hence, micro-encapsulation can effectively control the release rate of the fragrance compounds and essential oils as required, which ensures the storage life of volatile substances like essential oils. In this study, optimization of microencapsulation process using simple and complex coacervation techniques was done with natural gums(gum acacia, guar gum, sodium alginate) as wall material and essential oils (citronella oil, mint oil, lavender oil)as core material. Microcapsules were prepared by optimized process and coated on cotton and silk fabrics which were tested for various physical parameters in order to ensure its suitability as clothing and textile product.



Acacia-Lavender
(Ratio 2:1, 40°C)



Guar Gum-Mint
(Ratio 1:3, 40°C)

CROP VARIETIES

Released crop varieties for Commercialization

A. Field Crops

1. Cereals

1.1 Wheat *(Triticum aestivum* L.*)*

Kalyan Sona (S 227)

Variety name	:	**Kalyan Sona (S 227)**
Parentage	:	(Fn-K 58 Nth/N10 B)/Gabo S
Year of release	:	1967 by CVRC
Notification No.	:	4045(E), 24.09.1969
Developed by	:	Drs. R.L. Paliwal, J.P. Srivastava, Y.L. Nene, S/Shri S.K. Malik, Sohan Pal
Characters	:	Double dwarf, hard small and amber grains, medium late maturity (140) days
Recommended areas of cultivation	:	Throughout the country, timely sown, good fertility
Yield	:	46.0 q/ha

Sonalika (RR-21)

Variety name	:	**Sonalika (RR-21)**
Parentage	:	(II-53-388/Aa) Yt54/ (N 10 B) LR
Year of release	:	1968 by CVRC
Notification No.	:	4045(E), 24.09.1969
Developed by	:	Dr. J.P. Srivastava, S/Shri S.K. Malik Sohan Pal, Dr. Y.L. Nene
Characters	:	Single dwarf, amber and bold grains, susceptible to lose smut and leaf rust, popular variety in the country, maturity 125 days
Recommended areas of cultivation	:	Throughout the country high fertility, under irrigated and timely & late sown conditions
Yield	:	45.50 q/ha

UP 301

Variety name	:	**UP 301**
Parentage	:	LR 64 x Sonora 64
Year of release	:	1970 by CVRC
Notification No.	:	2067, 04.06.70
Developed by	:	Dr. J.P. Srivastava, S/Shri S.K. Malik, Sohan Pal
Characters	:	Triple dwarf, medium bold, amber and hard grains, resistant to rust and lodging, medium late maturity (140 days) suitable for bread and chapati making quality
Recommended areas of cultivation	:	Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu and Tarai areas of Uttarakhand under high fertility, timely sown and Irrigated conditions
Yield	:	50-55 q/ha

UP 319

Variety name	:	**UP 319**
Parentage	:	Ciano's' (Son. 64 KI Rend) 8156
Year of release	:	1973 by CVRC
Notification No.	:	598(E), 08.10.1974
Developed by	:	Dr. J.P. Srivastava, T.B. Singh, S/Shri S.K. Malik, Sohan Pal, D.P. Saini
Characters	:	Triple gene dwarf, bold amber and hard grains, resistant to rusts, mid-early maturity
Recommended areas of cultivation	:	Western and Central Uttar Pradesh, good fertility and irrigated conditions
Yield	:	56.9 q/ha

UP 310

Variety name	:	**UP 310**
Parentage	:	KI- petraf (LR 64 x Son. 64)
Year of release	:	1973 by SVRC
Notification No.	:	598(E), 08.10.1974
Developed by	:	Dr. J.P. Srivastava, T.B. Singh, S/Shri S.K. Malik Sohan Pal, D.P. Saini
Characters	:	Triple dwarf, medium bold amber and hard grains, susceptible to leaf rusts, mid-early maturity
Recommended areas of cultivation	:	Entire U.P. except hills under good fertility and irrigated conditions
Yield	:	42.2 q/ha

UP 215

Variety name	:	**UP 215**
Parentage	:	TZPP/Sonora 64
Year of release	:	1974 by CVRC
Notification No.	:	193(E), 30.04.1975
Developed by	:	Dr. J.P. Srivastava, T.B. Singh, S/Shri S.K. Malik Sohan Pal, D.P. Saini
Characters	:	Triple dwarf, medium bold amber and hard grains, highly resistant to rusts and lodging, medium maturity. High protein (13%) content
Recommended areas of cultivation	:	Irrigated and good fertility conditions of Maharashtra, Karnataka, Tamil Nadu and Andhra Pradesh
Yield	:	36.2 q/ha

UP 262

Variety name	:	**UP 262**
Parentage	:	S 308/ BJ 66
Year of release	:	1977 by SVRC
Notification No.	:	1004, 23.03.78
Developed by	:	Drs. T.B. Singh, P.L. Gautam, S/Shri S.K. Malik, Sohan Pal, D.P. Saini
Characters	:	Single dwarf, hard, bold, amber and lustrous grains, resistant to rusts and other foliar diseases, medium early maturity (130 days), good for chapatti
Recommended areas of cultivation	:	Eastern U.P., Bihar, West Bengal, Assam, Orrisa and all other eastern states under good fertility irrigated conditions
Yield	:	42.0 q/ha

UP 368

Variety name	:	**UP 368**
Parentage	:	LR 64 x Sonora 64
Year of release	:	1977 by SVRC
Notification No.	:	13, 19.12.1978
Developed by	:	Drs. T.B. Singh, P.L. Gautam, S/Shri S.K. Malik, Sohan Pal, D.P. Saini, N.P. Gupta
Characters	:	Triple dwarf, highly resistant to rusts, profuse tillering, grains amber and hard, medium late maturity (140-145 day), suitable for bread and chapati making
Recommended areas of cultivation	:	Central and Western U.P. under good fertility,irrigated conditions.
Yield	:	50-60 q/ha

UP 115

Variety name	:	**UP 115**
Parentage	:	(NP 887 x E 4870) x UP 302
Year of release	:	1979 by CVRC
Notification No.	:	470 (E), 19.02.1980
Developed by	:	Drs. T.B. Singh, P.L. Gautam, S/Shri S.K. Malik, Sohan Pal, D.P. Saini
Characters	:	Single dwarf, amber and hard grains, resistant to rust and lodging, early maturity (125-130 days)
Recommended areas of cultivation	:	Central and Western U.P. under good fertility and irrigated conditions
Yield	:	48.10 q/ha

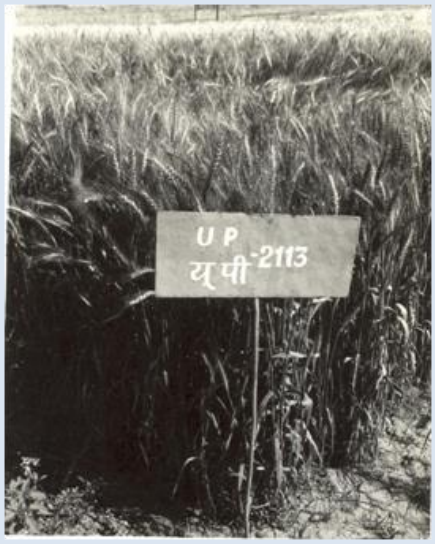
UP 2003

Variety name	:	**UP 2003**
Parentage	:	Bb x 7C
Year of release	:	1980 by SVRC
Notification No.	:	371(E), 29.05.1982
Developed by	:	Drs. T.B. Singh, P.L. Gautam, S/Shri S.K. Malik, Sohan Pal, D.P. Saini
Characters	:	Double dwarf, Field resistant to rust, grains amber, hard and medium bold, Medium late maturity (140 days)
Recommended areas of cultivation	:	Western and Central Uttar Pradesh
Yield	:	49.8 q/ha

UP 2121

Variety name	:	**UP 2121**
Parentage	:	UP 366 x SAMAKA 68
Year of release	:	1984 by SVRC
Notification No.	:	01.01.1986
Developed by	:	Drs. P.L. Gautam, T.B. Singh, S/Shri S.K. Malik, Sohan Pal, D.P. Saini, Amerika Singh
Characters	:	Single dwarf, resistant to rusts and smut, ears and plant colour white maturity 125-130 days
Recommended areas of cultivation	:	Central and Western Uttar Pradesh, irrigated and late sown conditions
Yield	:	43.2 q/ha

UP 2113



Variety name	:	**UP 2113**
Parentage	:	UP 346 x WG 377
Year of release	:	1985 by SVRC
Notification No.	:	01.01.1987
Developed by	:	Drs. P.L. Gautam, T.B. Singh, , S.K. Malik, Sohan Pal, D.P. Saini, Amerika Singh
Characters	:	Plant height 115-120 cm highly resistant to rusts, powdery mildew and loose smut; suitable for rainfed and limited irrigation conditions
Recommended areas of cultivation	:	Central and Western Uttar Pradesh, irrigated and late sown conditions
Yield	:	39.0q/ha

UP 1109

Variety name	:	**UP 1109**
Parentage	:	UP 262/UP 368
Year of release	:	1986 by SVRC and 1989 by CVRC
Notification No.	:	834(E) 18.9.1987
Developed by	:	Drs. T.B. Singh, P.L. Gautam, S.K. Malik, Sohan Pal, D.P. Saini, Amerika Singh
Characters	:	Single dwarf, moderately resistant to rust and smut, ear colour white, maturity 135-140 days
Recommended areas of cultivation	:	Suitable for Northern Hill zone of cultivation
Yield	:	35.0q/ha under rainfed and 41.00 q/ha under irrigated condition

UP 2338

Variety name	:	**UP 2338**
Parentage	:	UP 368/VL 421/UP 262
Year of release	:	1994 by CVRC
Notification No.	:	408 (E) 04.05.1995
Developed by	:	Drs. T.B. Singh, S.K. Malik, Sohan Pal, S.S. Ahlawat, D.P. Saini
Characters	:	Double dwarf, moderately resistant to rust, ear colour white, maturity 125-130 days, good grains, suitable for timely and late sown conditions
Recommended areas of cultivation	:	Suitable for U.P., Punjab, Haryana, Delhi, Eastern Rajasthan and plains of Uttarakhand
Yield	:	55.1 q/ha (Timely sown), 49.0 q/ha (Late Sown)

UP 2382

Variety name	:	**UP 2382**
Parentage	:	CPAN 2004 x HD 2204
Year of release	:	1998 by SVRC
Notification No.	:	425(E), 08.06.1999
Developed by	:	Drs. T.B. Singh, S.K. Malik, Sohan Pal, S.S. Ahlawat, D.P. Saini, K.V. Singh
Characters	:	Double dwarf, resistant to rust and smut, ear colour white, maturity 130-135 days, good grains, suitable for timely sown irrigated conditions of Western U.P.
Recommended areas of cultivation	:	Suitable for U.P. and plains of Uttarakhand
Yield	:	58.4 q/ha

UP 2425

Variety name	:	**UP 2425**
Parentage	:	HD 2320/UP 2263
Year of release	:	1999 by CVRC
Notification No.	:	425(E) 08.06.1999
Developed by	:	Drs. T.B. Singh, S.K. Malik, Sohan Pal, D.P. Saini, R.S. Rawat
Characters	:	Double dwarf, resistant to rusts and smut, highly resistant to yellow rust, good amber and bold grain, ear colour white, maturity 125-130 days, good, suitable for late sown high fertility conditions
Recommended areas of cultivation	:	Suitable for U.P., Punjab, Haryana, Delhi, Eastern Rajasthan and plains of Uttarakhand
Yield	:	44.7 q/ha

UP 2565

Variety name	:	**UP 2565**
Parentage	:	PBW 352 x CPAN 4020
Year of release	:	2004 by SVRC
Notification No.	:	599(E), 25.04.2006
Developed by	:	Drs. Sohan Pal, T.B. Singh, S.K. Malik, D.P. Saini, R.S. Rawat, Shri K.V. Singh
Characters	:	Double dwarf, foliar colour light green at boot stage, auricle pink, ear white, tapering, intermediate with normal awns at maturity, holds high degree of resistance to all three rusts, loose smut and powdery mildew and shattering, late heat tolerance and suitable for late sowing
Recommended areas of cultivation	:	Plains of Tarai and Bhabar region of Uttarakhand
Yield	:	44.4 q/ha

UP 2526

Variety name	:	**UP 2526**
Parentage	:	HD 2009/SKA//HD 2329
Year of release	:	2005 by SVRC
Notification No.	:	122(E), 06.02.2007
Developed by	:	Drs. Sohan Pal, S.K. Malik, D.P. Saini, R.S. Rawat, J.P. Jaiswal, T.B. Singh, Shri K.V. Singh
Characters	:	Matures in 125 days, high resistance to yellow and brown rust, powdery mildew, Loose smut and Karnal bunt, protein content (11.3%), Hectolitre weight: 76.9 kg/ha
Recommended areas of cultivation	:	Uttarakhand plains under irrigated, late sown conditions
Yield	:	64.9 q/ha

UP 2554

Variety name	:	**UP 2554**
Parentage	:	SM 4-HSN 24 e /CPAN 2099
Year of release	:	2005 SVRC
Notification No.	:	122(E), 06.02.2007
Developed by	:	Drs. Sohan Pal, S.K. Malik, D.P. Saini, R.S. Rawat, J.P. Jaiswal, T.B. Singh, Shri K.V. Singh
Characters	:	Matures in 135 days, high resistance to yellow and brown rusts, powdery mildew and loose smut, protein content (11.7%)
Recommended areas of cultivation	:	Uttarakhand plains.
Yield	:	68.5 q/ha

UP 2572

Variety name	:	**UP 2572**
Parentage	:	HD 2009/Sonalika//HD 2329
Year of release	:	2005 by SVRC
Notification No.	:	122(E), 06.02.2007
Developed by	:	Drs. Sohan Pal, S.K. Malik, D.P. Saini, R.S. Rawat, J.P. Jaiswal, T.B. Singh, Shri K.V. Singh
Characters	:	Matures in 166 days in irrigated conditions and 163 days in rainfed conditions, high resistance to yellow and brown rusts, powdery mildew, protein content (13.2%)
Recommended areas of cultivation	:	Uttarakhand hills
Yield	:	55.0 q/ha under irrigated and 30-35 q/ha under rainfed conditions

UP 2584

Variety name	:	**UP 2584**
Parentage	:	UP 2282/WH 593
Year of release	:	2010 by SVRC
Notification No.	:	Not Notified
Developed by	:	Drs. D.P. Saini, R.S. Rawat, J.P. Jaiswal, Swati, Anil Kumar, S.K. Malik, Sohan Pal, T.B. Singh, K.V. Singh, M.C. Upreti
Characters	:	Matures in 155-160 days, resistant to yellow, brown rust, powdery mildew and loose smut, protein content 12%
Recommended areas of cultivation	:	Uttarakhand Hills under irrigated conditions
Yield	:	49.3 q/ha

UP 2628

Variety name	:	**UP 2628**
Parentage	:	HD 2662/RW 3464
Year of release	:	2008 by SVRC
Notification No.	:	S.O. 211 (E), dtd. 29.1.2010
Developed by	:	Drs. D.P. Saini, R.S. Rawat, J.P. Jaiswal, Swati, Anil Kumar, S.K. Malik, Sohan Pal, T.B. Singh, K.V. Singh, M.C. Upreti
Characters	:	Suitable for timely sown irrigated condition. Moderately resistant to brown and yellow rust, resistant to loose smut and powdery mildew. Possesses 12.6% protein
Recommended areas of cultivation	:	Plains of Tarai and Bhabhar Region of Uttarakhand
Yield	:	60 q/ha

UP 2684

Variety name	:	**UP 2684**
Parentage	:	[CHEN x AE. SQUARROSA (TAUS)] x [TURACO x UP 2425]
Year of release	:	2010 by SVRC
Notification No.	:	Not Notified
Developed by	:	Drs. R.S. Rawat, J.P. Jaiswal, Swati, Anil Kumar, D.P. Saini, Sohan Pal, T.B. Singh, K.V. Singh
Characters	:	Resistance to all the three rusts and powdery mildew. Possesses better quality traits, namely higher flour recovery, and gluten strength, which is desired for good quality bread and chapati making
Recommended areas of cultivation	:	Uttarakhand Plains
Yield	:	52 q/ha

UP 2748

Variety name	:	**UP 2748**
Parentage	:	UP 2425/Raj 1731
Year of release	:	2015 by SVRC
Notification No.	:	Not Notified
Developed by	:	Drs. J.P. Jaiswal, Swati, Anil Kumar, R.S. Rawat, Shri K.V. Singh
Characters	:	Matures in 125-130 days, it possesses high level of resistance to stripe (yellow) and leaf (brown) rusts. Grains are bold and amber in colour. It is suitable for good quality bread and chapati making
Recommended areas of cultivation	:	Irrigated, late sown conditions of Uttarakhand plains
Yield	:	59.3 q/ha

UP 2784

Variety name	:	**UP 2784**
Parentage	:	CPAN4078/ PBW 442
Year of release	:	2015 by SVRC
Notification No.	:	3540 (E), 22.11.16
Developed by	:	Drs. J.P. Jaiswal, Swati, Anil Kumar, R.S. Rawat, Shri K.V. Singh
Characters	:	Suitable for timely sown irrigated condition Resistant to yellow and brown rusts and moderate resistant leaf blight. It possesses good sedimentation value (40cc) and hence suitable for bread making quality
Recommended areas of cultivation	:	Plains of Tarai and Bhabhar Region of Uttarakhand
Yield	:	50.8 q/ha

UP 2785

Variety name	:	**UP 2785**
Parentage	:	AKW 2862-2/ HP 1749
Year of release	:	2015 BY SVRC
Notification No.	:	Not Notified
Developed by	:	Drs. J.P. Jaiswal, Swati, Anil Kumar, R.S. Rawat, Shri K.V. Singh
Characters	:	Resistant to all three rusts and powdery mildew. It possesses very low very low score of phenol colour reaction (2.7) and hence chapati remains white for longer period due to its genetic trait
Recommended areas of cultivation	:	Irrigated, timely sown conditions of Uttarakhand plains
Yield	:	54.2 q/ha

UP 2844

Variety name	:	**UP 2844**
Parentage	:	HD2844/FRTL/AGRI//NAC
Year of release	:	2018 by SVRC
Notification No.	:	1326, 02.04.2019
Developed by	:	Drs. J.P. Jaiswal, Swati, Anil Kumar, R.S. Rawat, Shri K.V. Singh
Characters	:	Suitable for late sown irrigated conditions. Resistant to yellow and brown rusts, loose smut and powdery mildew. Possesses 11.7% protein
Recommended areas of cultivation	:	Plains of Tarai and Bhabhar Region of Uttarakhand
Yield	:	69.1 q/ha

UP 2855

Variety name	:	**UP 2855**
Parentage	:	PBW 565/UP 2565
Year of release	:	2018 BY SVRC
Notification No.	:	1326, 02.04.2019
Developed by	:	Drs. J.P. Jaiswal, Swati, Anil Kumar, R.S. Rawat, Shri K.V. Singh
Characters	:	Suitable for timely sown irrigated condition. Highly resistant to brown rust and moderately to yellow rust and resistant to powdery mildew. Possesses 11.8% protein
Recommended areas of cultivation	:	Plains of Tarai and Bhabhar Region of Uttarakhand
Yield	:	70.1 q/ha

UP 2865

Variety name	:	**UP 2865**
Parentage	:	HP 1749/PBW 564
Year of release	:	2018 by SVRC
Notification No.	:	1326, 02.04.2019
Developed by	:	Drs. J.P. Jaiswal, Swati, Anil Kumar, R.S. Rawat, Shri K.V. Singh
Characters	:	Suitable for late sown irrigated conditions. Highly resistant to brown rust and moderately to yellow rust and resistant to powdery mildew. Possesses 12.5% protein. Possesses high sedimentation value (45cc) and suitable for bread making quality
Recommended areas of cultivation	:	Plains of Tarai and Bhabhar Region of Uttarakhand
Yield	:	63.60 q/ha

UP 2903

Variety name	:	**UP 2903** ***(1st Biofortified variety of Uttarakhand)***
Parentage	:	(MILAN/S87230//BABAX)/PBW 550
Year of release	:	2020
Notification No.	:	2986, 20.07.2021
Developed by	:	Drs. J.P. Jaiswal, Swati, Anil Kumar, R.S. Rawat, Shri K.V. Singh
Characters	:	Resistance to leaf rust and stripe rust Possesses 11.8 to 12.68% protein, 39.2ppm Zinc and 39.8ppm Iron. Zinc and iron reported up to 50ppm
Recommended areas of cultivation	:	Plains of Tarai and Bhabhar Region of Uttarakhand
Yield	:	70.9 qtl/ha

UP 2938

Variety name	:	**UP 2938**
Parentage	:	W 15.92/4/PASTOR// HXL7573/2*BAU/ 3/WBLL1
Year of release	:	2020
Notification No.	:	2986, 20.07.2021
Developed by	:	Drs. J.P. Jaiswal, Swati, Anil Kumar, R.S. Rawat, Shri K.V. Singh
Characters	:	Suitable for timely sown irrigated conditions. Resistance to leaf rust and stripe rust. Possesses 11.4% protein and medium score (3.7) for phenol colour reaction, good for chapatti making quality
Recommended areas of cultivation	:	Plains of Tarai and Bhabhar Region of Uttarakhand
Yield	:	76.33 q/ha

UP 2944

Variety name	:	**UP 2944**
Parentage	:	(MILAN/S87230//BABAX)/PBW550
Year of release	:	2020 by SVRC
Notification No.	:	2986, 20.07.2021
Developed by	:	Drs. J.P. Jaiswal, Swati, Anil Kumar, R.S. Rawat, Shri K.V. Singh
Characters	:	Suitable for late sown irrigated conditions. Resistance to leaf rust and stripe rust. Possesses high protein content (14.5% protein), and high sedimentation value (50ml). It possesses good bread and chapati making quality
Recommended areas of cultivation	:	Plains of Tarai and Bhabhar Region of Uttarakhand
Yield	:	73.95 qtl/ha

1.2 Barey (*Hordeum vulgare*)

UPB 1008

Variety name	:	**UPB 1008**
Parentage	:	HIGO/LINO/3/CHANICO/TOCTE/ CONGONA/4
Year of release	:	2011 by CVRC
Notification No.	:	1389 dated 20.07. 2011
Developed by	:	Drs. R.S. Rawat, J.P. Jaiswal, Swati, Anil Kumar, K.V. Singh
Characters	:	Resistance to all the three rusts and leaf blight, bears high number of tillers and has bold grains. It bears high number of tillers and has bold grains leading to high 1000 grain weight of about 44gm
Recommended areas of cultivation	:	Northern Hills Zone of India
Yield	:	30-35q/ha

PRB 508 (502)

Variety name	:	**PRB 508 (502)**
Parentage	:	Selection from local germplasm
Year of release	:	2008 by SVRC
Notification No.	:	211(E), 29.01.2010
Developed by	:	Drs B.B. Bandyopadhyay, M. Dutta, V.K. Yadav, Rajendra Prasad and G.C. Saini
Characters	:	Semi-dwarf, leaves light to dark green, six rowed early flowering, bold seeds, hulled and yellow to grey in colour. Field tolerance to all major diseases. Plant height 90-100 cm and matures in 165 days
Recommended areas of cultivation	:	Timely sown, rain- fed, low input conditions of mid and high hills of Uttarakhand
Yield	:	25-30 q/ha

PRB 701

Variety name	:	**PRB 701**
Parentage	:	Selection from local germplasm
Year of release	:	2011 by SVRC
Notification No.	:	Not Notified
Developed by	:	Drs B.B. Bandyopadhyay, M. Dutta, V.K. Yadav, Rajendra Prasad and G.C. Saini
Characters	:	Erect, medium tall, semi-dwarf light to dark green foliage, ear shape columnar, prism shaped, 6 rows with awn, plant height 85-90 cm, maturity duration 150-155 days,1000 grain weight 40-42 g, protein percentage 11%. Also recommended under organic conditions
Recommended areas of cultivation	:	Timely sown, rain- fed, low input conditions of mid and high Hills of Uttarakhand
Yield	:	25-30q/ha

1.3 Rice (*Oryza sativa* L.)

IR – 24

Variety name	:	**IR – 24**
Parentage	:	(IR8 x Century Patna 231) x (SLO 17) X (Sigadis)
Year of release	:	1972 by SVRC
Notification No.	:	G.O. No. 7-4/73-SD (Vol.II), S.O. No. 598(E) 8-10-1974
Developed by	:	Dr J S Nanda, Dr R C Chaudhary, Harpal Singh and Associates
Characters	:	Dwarf, non-lodging and texture with upright leaves, synchronous tillering, very dark green foliage, photo sensitive, matures in 125 days, long slender grain, susceptible to bacterial blight
Recommended areas of cultivation	:	Uttar Pradesh, Punjab, Madhya Pradesh, Andhra Pradesh and some parts of Bihar
Yield	:	50-52 q/ha

Prasad

Variety name	:	**Prasad**
Parentage	:	IR 747-6-3 x IR 579-48
Year of release	:	1978 by SVRC
Notification No.	:	G.O. No. 7-33/78-SD, S.O. No. 13(E) 19-12-1978
Developed by	:	Rice Program Committee
Characters	:	Dwarf, non-lodging, ideal plant type, photo-insensitive, profuse tillering, moderately resistant to bacterial leaf blight, resistant to blast and stem borer, long slender grains, matures in about 120-125 days
Recommended areas of cultivation	:	Transplanted conditions in Uttar PradeshUttarakhand plain, Bihar, parts of Assam and West Bengal
Yield	:	55 q/ha

Govind

Variety name	:	**Govind**
Parentage	:	IR 20 x IR 24
Year of release	:	1982 by SVRC and 1989 by CVRC
Notification No.	:	G.O.No. 302,S.O. No.449 (E) 8-7-1983
Developed by	:	Rice Program Committee
Characters	:	Dwarf, photo-insensitive, resistant to bacterial leaf blight, blast and brown spot, matures in 105-110 days under rainfed and transplanted conditions respectively, long slender grains, good cooking qualities
Recommended areas of cultivation	:	Suitable for direct seeding as well as transplanting in Uttar Pradesh, Uttaranchal plains and hills up to 3000 feet, Haryana, M.P., Gujrat, Maharashtra, Punjab and Pondicherry
Yield	:	35-40 q/ha

Pant Dhan 4

Variety name	:	**Pant Dhan 4**
Parentage	:	IR 262 (Peta 3 x TN1 x Remajda
Year of release	:	1983 by SVRC
Notification No.	:	G.O. No. 178, S.O. No. 295(E), 9-4-1985 (BG 90-2)
Developed by	:	Rice Program Committee
Characters	:	Semi-dwarf, good stability, stiff straw, good tillering, long slender and translucent grains, moderately resistant to bacterial leaf blight, resistant to blast and brown spot diseases, matures in about 125-130 days
Recommended areas of cultivation	:	Transplanted conditions in Uttar Pradesh and Uttaranchal (except hill)
Yield	:	55-60 q/ha

Manhar

Variety name	:	**Manhar**
Parentage	:	IR 24 x Cauvery
Year of release	:	1985 by SVRC
Notification No.	:	G.O No. 547, S.O. No. 832(E), 18-11-1985
Developed by	:	Drs M .P. Pandey, S.C. Mani, Harpal Singh, J.S. Nanda, R.C. Chaudhary, B.N. Singh, M.D. Gupta, S.S. Malik, Sri C.V. Singh, Late Shri A.K. Gaur and Shri D.D. Bhatt
Characters	:	Semi-dwarf, early maturing, photo-insensitive (120 days), long slender grains, good cooking quality, moderately resistant to bacterial leaf blight under field conditions and field tolerance to white backed plant hopper
Recommended areas of cultivation	:	Suitable for irrigated areas under transplanted conditions of Uttar Pradesh and plains of Uttaranchal
Yield	:	60 q/ha

Pant Dhan 6

Variety name	:	**Pant Dhan 6**
Parentage	:	IR 8608-298- 3-1 × IR 10179-2-3
Year of release	:	1986 (SVRC)
Notification No.	:	S.O. No. 834(E),18-9-1987
Developed by	:	Drs M .P. Pandey, S.C. Mani, Harpal Singh,J.P.Singh, Shri Surendra Singh, Shri. Daroga Singh and J.S. Nanda
Characters	:	Medium slender grain, resistant to blast, blb and brown spot. 113-120days meaning
Recommended areas of cultivation	:	Uttarakhand Hills, Irrigated, Early
Yield	:	40-45 q/ha

Pant Dhan 10

Variety name	:	**Pant Dhan 10**
Parentage	:	IR 20 x Mahsuri x IR 32
Year of release	:	1992 by SVRC
Notification No.	:	G.O. No. 17-2/93-Sd.IV, S.O. No. 615 (E), 17-8-1993
Developed by	:	Drs M.P. Pandey, S.C. Mani, Harpal Singh, J.P. Singh, Surendra Singh and Shri. Daroga Singh
Characters	:	Semi dwarf moderate tilling, long slender grains, awn less panicle, short narrow leaves, apiculas green and easy threshing, moderately resistant to bacterial blight, sheath blight and blast, resistant to stem borer, leaf folder, whorl maggot, white backed plant hopper, cutworm and gundhi bug; matures in 120-130 days
Recommended areas of cultivation	:	Transplanted conditions in western U.P. and plains of Uttarakhand
Yield	:	58-60 q/ha

Pant Dhan 11

Variety name	:	**Pant Dhan 11**
Parentage	:	VL 206 × Dagi
Year of release	:	1992 by SVRC
Notification No.	:	G.O. No. 17-2/ 93-Sd.IV,S.O. No. 615(E)17-8-1993
Developed by	:	Drs M.P. Pandey, S.C. Mani, Harpal Singh, J.P. Singh and Surendra Singh
Characters	:	Long bold grain, moderately resistant toblast, bacterial blight and brown plant hopper, maturity118-125days, Yield 45-50 q/ha
Recommended areas of cultivation	:	Irrigated, Early
Yield	:	42-48 q/ha

Pant Dhan 12

Variety name	:	**Pant Dhan 12**
Parentage	:	Govind x UPRM 201-1-1
Year of release	:	1994 by SVRC
Notification No.	:	G.O. No. 1, S.O. No. 1(E), 1-1-1996
Developed by	:	Drs M.P. Pandey, S.C. Mani, Harpal Singh, J.P. Singh and Surendra Singh
Characters	:	Semi dwarf (95 cm), flag leaf long and erect, synchronous tillering, stiff straw, leaf sheath and apiculus green, compact panicle with awn less and long slender translucent grains, moderately resistant to bacterial blight, field tolerance to brown spot and moderately susceptible to brown plant hopper, matures in 115-122 days
Recommended areas of cultivation	:	Transplanted conditions in U.P. and planes of Uttarakhand
Yield	:	55-60 q/ha

Pant Sankar Dhan 1

Variety name	:	**Pant Sankar Dhan 1**
Parentage	:	UPR195-17A x UPR192-133R
Year of release	:	1997 by SVRC
Notification No.	:	G.O. No. 17-92/ 97-SD (iv), S.O. No. 425(E), 8-6-1999
Developed by	:	Drs M .P. Pandey, S.C. Mani, Harpal Singh, J.P.Singh and Surendra Singh
Characters	:	Semi dwarf (95cm), base purple pigmented, dark green leaves, apiculus pigmented, stiff straw, grains with tip awns, long slender and translucent milled grains, moderately resistant to bacterial blight, blast brown spot and free from fake smut, matures in 115 days
Recommended areas of cultivation	:	Transplanted conditions in U.P. and plains of Uttarakhand, most suited for double cropping specially rice-wheat/ potato/Lahi and table peas etc
Yield	:	65-70 q/ha

Pant Dhan 16

Variety name	:	**Pant Dhan 16**
Parentage	:	BG 380 x BG 367-4
Year of release	:	2001 by CVRC
Notification No.	:	G.O. No. 837, S.O. No. 1134 (E),15-11-2001
Developed by	:	Drs M .P. Pandey, S.C. Mani, Harpal Singh, J.P.Singh, S. Singh and Shri. Daroga Singh
Characters	:	Semi dwarf, 102 cm in the direct seeding and 107 cm in irrigated conditions, stiff straw, tip awn edapiculus green, short bold grains, resistant to gall midge biotype-1, moderately resistant to stem borer, brown plant hopper, leaf blast and brown spot, matures in 105 days under direct seeding, 115 days under transplanted conditions
Recommended areas of cultivation	:	Rainfed and irrigated ecosystem in Bihar, West Bengal and Haryana
Yield	:	35-45 q/ha

Pant Majhera Dhan 7

Variety name	:	**Pant Majhera Dhan 7**
Parentage	:	Selection from local germplasm collected from Pithoragarh
Year of release	:	1997 by SVRC
Notification No.	:	Not Motified
Developed by	:	Dr B V Singh, Dr M Dutta and Dr A P Pandey
Characters	:	Medium tall, matures in about 160 days, grains medium, kernels white
Recommended areas of cultivation	:	Suitable for March sowing in the lower and medium upland hills of Uttarakhand
Yield	:	42 q/ha

Pant Sugandh Dhan 15

Variety name	:	**Pant Sugandh Dhan 15**
Parentage	:	Basmati 370 x Sadari x Bahral x Muskan 41
Year of release	:	2003 by CVRC
Notification No.	:	G.O. No. 400, S.O. No. 599(E), 25-4-2006
Developed by	:	Drs M .P. Pandey, S.C. Mani, Harpal Singh, J.P.Singh, S. Singh and Shri. Daroga Singh
Characters	:	Medium tall (116-120 cm), compact plants, just exserted panicles with tip awned spikelet, green apiculus, light foliage and narrow leaves, tolerant to neck blast, leaf blast, sheath rot, stem borer and leaf folder; matures in 135-140 days, superfine and translucent grains with strong aroma
Recommended areas of cultivation	:	Transplanted conditions in the plains of Uttarakhand
Yield	:	35-40 q/ha

Pant Sugandh Dhan 17

Variety name	:	**Pant Sugandh Dhan 17**
Parentage	:	PUSA Basmati x UPRM 500
Year of release	:	2004 by SVRC
Notification No.	:	G.O. No. 400, S.O. No. 599(E),25-4-2006
Developed by	:	Drs M .P. Pandey, S.C. Mani, Harpal Singh, J.P.S ingh and Surendra Singh
Characters	:	135-140 days to maturity, resistant to sheath blight and MR to leaf and neck blast disease and tolerant to stem borer
Recommended areas of cultivation	:	Uttarakhand plains
Yield	:	35-45 q/ha

Pant Sanker Dhan 3

Variety name	:	**Pant Sanker Dhan 3**
Parentage	:	UPR 195-17 A x 93-287R
Year of release	:	2004 by SVRC
Notification No.	:	G.O. No. 400, S.O. No. 599(E), 25-4-2006
Developed by	:	Drs M .P. Pandey, S.C. Mani, Harpal Singh, J.P. Singh and Surendra Sing
Characters	:	125-130 days to maturity, moderately resistant to blast, brown spot and kernel blunt, tolerant to stem borer, BPH, WBPH
Recommended areas of cultivation	:	Uttarakhand plains
Yield	:	65-70 q/ha

Pant Dhan 18

Variety name	:	**Pant Dhan 18**
Parentage	:	IR 25393-57 / RD 23 / IR 27316-96 / SPRLR 77205-3-2 / SPLR 79234-51-2
Year of release	:	2007 by CVRC
Notification No.	:	G.O. No. 883, S.O. No. 1178(E), 20-7-2007
Developed by	:	Drs M .P. Pandey, S.C. Mani, Harpal Singh, J.P. Singh and Surendra Singh
Characters	:	High degree of resistance to leaf and neck blast disease, moderately resistant to brown spot, sheath blight and sheath rot. Tolerant to stem borer, leaf folder and brown plant hopper. Tolerant to lodging and shattering; consistent performance under zinc phosphorus and potash deficient soil. Grain type long slender
Recommended areas of cultivation	:	Andhra Pradesh, Karnataka, Kerela, Tamil Nadu, Bihar, Chhattisgarh and West Bengal
Yield	:	62-65 q/ha

Pant Dhan 19

Variety name	:	**Pant Dhan 19**
Parentage	:	BG 132 x UPR 195- 141
Year of release	:	2007 by CVRC
Notification No.	:	G. O. No. 1201, S.O. No. 1703 (E), 5-10-2007
Developed by	:	Drs M .P. Pandey, S.C. Mani, Harpal Singh, J.P. Singh and Surendra Singh
Characters	:	130-135 days of maturity, resistant to leaf blast, BLB, sheath rot disease and moderately resistant to leaf folder, resistant to lodging and shattering
Recommended areas of cultivation	:	North India
Yield	:	65-70 q/ha

Pant Sugandh Dhan 21

Variety name	:	**Pant Sugandh Dhan 21**
Parentage	:	Govind/ BR 4698-17-1-5/ UPRBS 92-4/ Haryana Basmati/ PUSA Basmati 1
Year of release	:	2010 by SVRC
Notification No.	:	Not Notified
Developed by	:	Drs Surendra Singh , Indra Deo M.P. Pandey, S.C. Mani, Harpal Singh, J.P. Singh, Sumer Pal
Characters	:	Aromatic fine grain rice variety suitable for organic and inorganic cultivation, long slender translucent grains, good kernel elongation, good cooking quality, tolerant to bacterial blight and stem borer
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	35-40 q/ha

Pant Dhan 22

Variety name	:	**Pant Dhan 22**
Parentage	:	Pant Dhan 12 x UPR 1600-31-1-1
Year of release	:	2010 by SVRC
Notification No.	:	No.91, SO99(E) 06-01-2020
Developed by	:	Dr. Surendra Singh, Dr. Indra Deo, Dr. M.K. Nautiyal, Dr. D. C. Baskheti, Dr. M.K. Karnwal
Characters	:	Matures in about 135-140 days, suitable for organic farming. It is moderately resistant to leaf blight and leaf blast
Recommended areas of cultivation	:	Uttarakhand
Yield	:	35-40 q/ha

Pant Sugandh Dhan 23

Variety name	:	**Pant Sugandh Dhan 23**
Parentage	:	UPR 2870-98-125 x BBL180-5-1-4-1
Year of release	:	2015 by SVRC
Notification No.	:	S.O. 1007 (E), 30-3-2017
Developed by	:	Dr. Surendra Singh, Drs. Indra Deo, M .P. Pandey, SumerPal, Harpal Singh, J.P.Singhr. M.K. Nautiyal, M.K. Karnwal
Characters	:	Dwarf plants (85 cm), matures in 120-125 days, grain type long slender moderately resistant to leaf blight and stem borer
Recommended areas of cultivation	:	Irrigated and transplanted areas of Uttarakhand plains
Yield	:	47-50 q/ha

Pant Dhan 24

Variety name	:	**Pant Dhan 24**
Parentage	:	Mahamaya × Gayabeyo
Year of release	:	2014, CVRC
Notification No.	:	No.2122,SO2680,1.102015
Developed by	:	Dr. Surendra Singh, Dr. Indra Deo, Dr. M.K. Nautiyal, Dr. M.K. Karnwal
Characters	:	Long slender grain, moderately resistant to brown spot, bacterial leaf blight, and stem borer
Recommended areas of cultivation	:	Eastern zone comprising Odisha & Bihar
Yield	:	55-60 q/ha

Pant Sugandh Dhan 25

Variety name	:	**Pant Sugandh Dhan 25**
Parentage	:	Tilakchandan x Basmati 376
Year of release	:	2015 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. Surendra Singh, Dr. Indra Deo, Dr. M.K. Nautiyal, Dr. M.K. Karnwal
Characters	:	Matures in 135-140 days, grain type long slender, moderately resistant to bacterial leaf blight and stem borer
Recommended areas of cultivation	:	Irrigated and transplanted areas of Uttarakhand plains
Yield	:	35-38 q/ha

Pant Dhan 26

Variety name	:	**Pant Dhan 26**
Parentage	:	Mahamaya x Gayabyeo
Year of release	:	2015 by SVRC
Notification No.	:	S.O.1007 (E), 30-3-2017
Developed by	:	Dr. Surendra Singh, Dr. Indra Deo, Dr. M.K. Nautiyal, Dr. D. C. Baskheti, Dr. M.K. Karnwal
Characters	:	Mature in 118-122 days, grain type- medium slender moderately resistant to Stem borer, Bacterial Leaf Blight, sheath Blight, Rice Tungro Disease, Neck Blast and Sheath rot
Recommended areas of cultivation	:	Irrigated and transplanted areas of Uttarakhand plains
Yield	:	47-50 q/ha

Pant Sugandh Dhan 27

Variety name	:	**Pant Sugandh Dhan 27**
Parentage	:	UPR 1840-31-1-1 x PUSA Sugandh 2
Year of release	:	2015 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. Surendra Singh, Dr. Indra Deo, Dr. M.K. Nautiyal, Dr. D. C. Baskheti, Dr. M.K. Karnwal
Characters	:	Matures in 115-125 days, grain type- long slender moderately resistant to Bacterial Leaf Blight and Stem borer
Recommended areas of cultivation	:	Irrigated and transplanted areas of Uttarakhand plains
Yield	:	35-38 q/ha

Pant Dhan 28

Variety name	:	**Pant Dhan 28**
Parentage	:	Pusa Basmati 1 × IET 12603
Year of release	:	SVRC
Notification No.	:	No. 91,SO99(E) 06-01-2020
Developed by	:	Dr. Surendra Singh, Dr. Indra Deo, Dr. D. C. Baskheti Dr. M.K. Nautiyal Dr. M.K. Karnwal
Characters	:	Long slender, moderately resistant to bacterial leaf blight & stem borer
Recommended areas of cultivation	:	Uttarakhand
Yield	:	55-60 q/ha

Pant Basmati Dhan 1

Variety name	:	**Pant Basmati Dhan 1**
Parentage	:	PUSA basmati x IET 12603
Year of release	:	2014 by CVRC
Notification No.	:	No. 98, 13-01-2016
Developed by	:	Dr. Surendra Singh, Dr. Indra Deo, Dr. M.K. Nautiyal, Dr. M.K. Karnwal Dr Sumer Pal & Dr. S C Mani
Characters	:	It is moderately resistant to brown spot and sheath blight. Good degree of tolerance to brown plant hopper & moderately tolerant towards stem borer. Grain type extralong slender and strong aroma content.
Recommended areas of cultivation	:	Uttarakhand, Delhi & UP
Yield	:	48-50 q/ha

Pant Basmati 2

Variety name	:	**Pant Basmati 2**
Parentage	:	UPRBS 9241 × UPR 2263-5-1-5
Year of release	:	CVRC
Notification No.	:	No. 98, 13-01-2016
Developed by	:	Dr. Surendra Singh, Dr. Indra Deo, Dr. M.K. Nautiyal, Dr. D. C. Baskheti, Dr. M.K. Karnwal
Characters	:	Medium slender grain. Moderately resistant to brown spot, bacterial leaf blight, and stem borer.
Recommended areas of cultivation	:	Punjab, Haryana, Uttarakhand & U.P.
Yield	:	45-50 q/ha

1.4 Maize (*Zea mays* L.)

Protina

Variety name	:	**Protina**
Parentage	:	(Lowatiqua x Ant. Gr. 1102) x (Doeto x GCC)
Year of release	:	1971 by CVRC
Notification No.	:	N/A
Developed by	:	VL Asnani, BD Agarwal, BL Verma
Characters	:	Composite with high nutritional quality, contains 11% protein and 4% lysine, sturdy plants, tolerant to Downey mildew and stalk rot, matures in 100-105 days
Recommended areas of cultivation	:	Northern planes
Yield	:	40-50 q/ha

Tarun

Variety name	:	**Tarun**
Parentage	:	Syn P 200 x Kisan
Year of release	:	1977 by CVRC
Notification No.	:	So Bo. 13 dated 19/12/1978
Developed by	:	B.D. Agarwal, I.S. Singh, Pheru Singh MZK Warsi, S.S. Verma
Characters	:	Orange yellow, semi flint typegrains sparsely arranged, narrow leaves wide space between tassel and flag leaf, resistant to brown stripe and Downey mildewdiseases, Matures in 85-90 days
Recommended areas of cultivation	:	Uttar Pradesh
Yield	:	40-45 q/ha

Navin

Variety name	:	**Navin**
Parentage	:	Exotichybrid x Local
Year of release	:	1979 by SVRC
Notification No.	:	SO NO. 19 (E), dated 14/01/1982
Developed by	:	B.D. Agarwal, IS Singh, Pheru Singh MZK Warsi, SS Verma
Characters	:	Orange yellow, semi flint type grains, resistant to brown stripe, Downey mildew and stalk rot diseases
Recommended areas of cultivation	:	Uttar Pradesh
Yield	:	40-45 q/ha

Shweta

Variety name	:	**Shweta**
Parentage	:	White exotic X Local white material
Year of release	:	1980 by SVRC
Notification No.	:	SO No. 19 (E), dated 14/01/1982
Developed by	:	BD Agarwal, IS Singh, Pheru Singh MZK Warsi, SS Verma
Characters	:	White and semi flint type grains, resistant to brown stripe and Downey mildew diseases, tolerant to stalk -rots, matures in 85-90 days
Recommended areas of cultivation	:	Uttar Pradesh
Yield	:	40-45 q/ha

Kanchan

Variety name	:	**Kanchan**
Parentage	:	Crosses of a number of local varieties with
Year of release	:	1982 by SVRC
Notification No.	:	SO No. 258 (E), dated 14/05/1986
Developed by	:	BD Agarwal, IS Singh, MZK Warsi, SS Verma
Characters	:	Yellow grained, resistant to brown stripe, Downey mildew and stalk rot, responds to low water management, matures in 75-80 days
Recommended areas of cultivation	:	Uttar Pradesh
Yield	:	30-35 q/ha

D 765

Variety name	:	**D 765**
Parentage	:	Crosses of indigenous and exotic materials
Year of release	:	1984 by CVRC
Notification No.	:	SO No. 295 (E) dated 04/09/1985
Developed by	:	BD Agarwal, MZK Warsi, SS Verma
Characters	:	Light yellow, flint and hard composite, resembles with the local, resistant to foliar and stalk disease, maturity in 75 days
Recommended areas of cultivation	:	Indo-Gangetic planes
Yield	:	30-35 q/ha

Surya

Variety name	:	**Surya**
Parentage	:	(D 765 x D787) F
Year of release	:	1988 by CVRC
Notification No.	:	S.O. No. 1135 (E)12/01/1988
Developed by	:	BD Agarwal, MZK Warsi, SS Verma
Characters	:	Early yellow flint, tolerant to foliar and stalk diseases, maturity 75-80 days
Recommended areas of cultivation	:	Entire country
Yield	:	35-40 q/ha

Gaurav (D 931)

Variety name	:	**Gaurav (D 931)**
Parentage	:	Open pollinated ears from trials
Year of release	:	1999 by CVRC
Notification No.	:	S.O. 425 (E) dt. 06/08/1999
Developed by	:	SN Mishra, NZK Warsi, SS Verma, Ranjit
Characters	:	Medium plant height, subtropical plant type, yellow semi- flint, maturity 80-85 days
Recommended areas of cultivation	:	Plains of Punjab Haryana, U.P. and Uttarakhand
Yield	:	40-45 q/ha

Amar (D 941)

Variety name	:	**Amar (D 941)**
Parentage	:	Advance generation of 19 indigenous and exotic germplasm crosses
Year of release	:	2000 by CVRC
Notification No.	:	SO No. 92 (E) dated 02/02/2001
Developed by	:	SN Mishra, NZK Warsi, SS Verma, Ranjit
Characters	:	Medium plant height, pale yellow semi-flint kernel, moderately resistant to major foliar and stalk diseases, maturity 80-85 days
Recommended areas of cultivation	:	Maharashtra, Karnataka, Tamilnadu, tribal belt of M.P., Rajasthan and Gujrat
Yield	:	40-45 q/ha

Pragati (D 994)

Variety name	:	**Pragati (D 994)**
Parentage	:	Advance generation of population 31 x Suwan 1
Year of release	:	2003 by CVRC
Notification No.	:	SO No. 642 (E) dated 31/05/2004
Developed by	:	IS Singh, NZK Warsi, SS Verma
Characters	:	Extra early maturing (about 80 days) and tolerant to water logging situations
Recommended areas of cultivation	:	Eastern U.P., Bihar Jharkhand, Orissa, West Bengal
Yield	:	35-40 q/ha

Pant Sankar Makka 1

Variety name	:	**Pant Sankar Makka 1**
Parentage	:	YHPA x 85-4-3-2-3-3-1-1-1 x YHPB x 161-1-4-1-2-1-2-1
Year of release	:	2007 by SVRC
Notification No.	:	S.O. No. 2185 (E) dated 19/09/2013
Developed by	:	M.Z.K. Warsi, SS Verma, NK Singh, DC Baskheti, IS Singh
Characters	:	Matures in 85 days, medium plant type, kernel colour is yellow semi flint, tolerant to Maydis leaf blight, rust, Tursicum leaf blight, brown stripe and downy mildew disease
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	48-83 q/ha

Pant Sankul Makka 3

Variety name	:	**Pant Sankul Makka 3**
Parentage	:	D 131 Comp
Year of release	:	2008 by CVRC
Notification No.	:	S.O. No. 2458 (E) 16/10/2008
Developed by	:	M.Z.K. Warsi, SS Verma, NK Singh, DC Baskheti, IS Singh
Characters	:	Matures in 85 days, tolerant to Turicum leaf blight, post flowering stalkrots, banded leaf and sheath blight diseases of maize, kernel colour is yellow semi flint
Recommended areas of cultivation	:	Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu, Kerela and tribal belt of Rajasthan, Gujrat and Madhya Pradesh
Yield	:	55 q/ha

Pant Sankar Makka 2

Variety name	:	**Pant Sankar Makka 2**
Parentage	:	Pop 3123-3-3-1-1-1-2-1-2 x Pop 3118-2-1-1-4-2-2-1/1-25
Year of release	:	2015 by SVRC
Notification No.	:	Not notified
Developed by	:	SS Verma, NK Singh, DC Baskheti
Characters	:	Medium height, early maturing single cross hybrid with yellow flint grains, moderately resistant to major diseases and insect pests, maturity 80-85 days
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	40-45 q/ha

Pant Sankar Makka 4

Variety name	:	**Pant Sankar Makka 4**
Parentage	:	Pop 3123-3-3-1-1-1-2-1-2 x YHPB 161-1-4-1-2-2-1-2-1-1-1
Year of release	:	2015 by SVRC
Notification No.	:	S.O. No. 1007(E), 30/03/2017
Developed by	:	SS Verma, NK Singh, DC Baskheti
Characters	:	Vigorous medium plant, early maturing in 80-85 days, yellow flint kernels, fairly tolerant to major foliar and stalk diseases
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	40-45 q/ha

Pant Sankar Makka 5

Variety name	:	**Pant Sankar Makka 5**
Parentage	:	CAL 147 x CML 451
Year of release	:	2020
Notification No.	:	S.O. No. 500(E) dated 29/01/2021
Developed by	:	NK Singh, SS Verma, DC Baskheti
Characters	:	Early maturing, flint, orange-yellow karnels, have better tolerance to diseases namely MLB, TLB, P. rust, FSR, SDM and BSR, lodging tolerance, stay green suitable for green fodder, bold grain suitable for starch industry
Recommended areas of cultivation	:	Plain area of Uttarakhand
Yield	:	49.0 q/ha

Pant Sankar Makka 6

Variety name	:	**Pant Sankar Makka 6**
Parentage	:	CAL159 x CML 451
Year of release	:	2020
Notification No.	:	S.O. No. 2986(E) dated 20/07/2021
Developed by	:	NK Singh, SS Verma, DC Baskheti
Characters	:	Lodging, stay green makes it suitable for green fodder and tolerance to terminal water stress, tight husk cover minimize damage by birds and bold grain suitable for starch industry. It has better tolerance to diseases namely MLB, TLB and P. rust. Yellow-orange flint grain
Recommended areas of cultivation	:	Plain area of Uttarakhand
Yield	:	50.0 q/ha

Pant Popcorn 1

Variety name	:	**Pant Popcorn 1**
Parentage	:	DPCI508 x DPCI 513
Year of release	:	2020
Notification No.	:	S.O. No. 99 (E) dated 06/01/2020
Developed by	:	NK Singh, SS Verma, DC Baskheti
Characters	:	Pant Popcorn 1 was developed by combining high grain yield, good popping and palatable attributes. Apart from high yield potential, Pant Popcorn 1 also has good popping attributes, i.e. popping per cent (88-91%). It has improved tolerance to various plant pathogens. Grains of Pant popcorn 1 were small, orange-yellow and flint
Recommended areas of cultivation	:	Zone I (J&K, HP, Uttarakhand, Asam, Arunachal Pradesh, Manipur, Tripura, Meghalaya, Mizoram, Nagaland, Sikkim, Zone IV (Tamil Nadu, Karnatka, Andhra Pradesh, Telangana, Maharashtra
Yield	:	39-49 q/ha

2. Pulse Crops

2.1 Chick pea (*Cicer arietinum* L.)

Pant G 114

Variety name	:	**Pant G 114**
Parentage	:	G 130 x G 154
Year of release	:	1979 by CVRC
Notification No.	:	S.O. 19(E) dated 14-01-1982
Developed by	:	Dr. B.P. Pandya
Characters	:	Medium tall, semi-erect, fairly tolerant to wilt and blight, maturity 155-165 days
Recommended areas of cultivation	:	U.P., Plains of Uttarakhand, Punjab, Haryana, Himanchal Pradesh, Delhi, Rajasthan, Bihar, West Bengal and North Eastern States of India
Yield	:	18-22 q/ha

Pant G 186

Variety name	:	**Pant G 186**
Parentage	:	ILC-613 x Pant G 114
Year of release	:	1996 by SVRC
Notification No.	:	S.O. 647(E) dated 09-09-1997
Developed by	:	Dr. D.P. Singh, Dr. I.S. Singh and Dr. P.P. Arora
Characters	:	Desi type, suitable for late sown conditions, brown seeds, resistant to wilt and blight diseases, matures in 140-145 days
Recommended areas of cultivation	:	U.P. and Uttarakhand
Yield	:	20-25 q/ ha

WCG 1 (Sadbhawana)

Variety name	:	**WCG 1 (Sadbhawana)**
Parentage	:	Mutant of C235
Year of release	:	1997 by SVRC
Notification No.	:	S.O. 401(E) dated 15-5-1998
Developed by	:	Dr. Devi Singh
Characters	:	Semi spreading, growth habit, dark pigmentation on stem and branches, thick stem and broader leaves, maturity 135, 100 seed weight 20 gm, resistant to dry rot and food rot, moderately resistant to stunt, wilt/root rot and pod borer, protein content 23.7%
Recommended areas of cultivation	:	U.P. and Plains of Uttarakhand
Yield	:	20-22 q/ha

WCG 2 (Surya)

Variety name	:	**WCG 2 (Surya)**
Parentage	:	Mutant of G 130
Year of release	:	1999 by CVRC
Notification No.	:	S.O. 425(E) dated 8-6-1999
Developed by	:	Dr. Devi Singh
Characters	:	Semi spreading growth habit, foliage of light green colour, flower colour white, early vigour, maturity 135, plant height 55 cm,100 seed wt. 15 g.,resistant to foot rot, moderately resistant to stunt, wilt dry root rot, collar rot and pod borer, protein content 22.8%
Recommended areas of cultivation	:	U.P. and plains of Uttarakhand
Yield	:	18-20 q/ha

WCG 10 (PG 10)

Variety name	:	**WCG 10 (PG 10)**
Parentage	:	Mutant of G 130
Year of release	:	1999 by SVRC
Notification No.	:	S.O. 92(E) dated 2-2-2001
Developed by	:	Dr. Devi Singh
Characters	:	Semi spreading growth habit, bold pod with bold seeds, plant height 55 cm, days to maturity 147,100 seeds wt. 25.4 g, moderately resistant to wilt/root rot, collar rot, stuntvirus, dry root rot, moderately resistant to pod borer, protein content 22.3%
Recommended areas of cultivation	:	U.P. and Plains of Uttarakhand
Yield	:	20-22 q/ha

Pant Kabuli Chana 1

Variety name	:	**Pant Kabuli Chana 1**
Parentage	:	PG 92-105 x PUSA 362
Year of release	:	2007 by SVRC
Notification No.	:	S.O. 211(E) dated 29-01-2010
Developed by	:	Dr. D.P. Singh, Dr. P.P. Arora, Dr. R.K. Panwar and Dr. Anju Arora
Characters	:	It is across of kabuli and desi chick pea. Seed size large and has attractive seeds, matures in about 140 days, resistant to Botrytis grey mould
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	25-30 q/ha

Pant Kabuli Chana 2

Variety name	:	**Pant Kabuli Chana 2**
Parentage	:	BG 1053 x PKC 1
Year of release	:	2015 by SVRC
Notification No.	:	S.O. 1007(E) dated 30-03-2017
Developed by	:	Dr. R.K. Panwar, Dr. Anju Arora, Dr. S.K. Verma and Dr. D.P. Singh
Characters	:	Beige colour seed, moderately resistant to wilt and botrytis grey mould and alsotolerant to pod borer. It has 1-2 seeds/pod, 100 seed weight 31.35 g with the 145-150 days to maturity
Recommended areas of cultivation	:	Uttarakhand Plains
Yield	:	20-22 q/ha

Pant Chana 3

Variety name	:	**Pant Chana 3**
Parentage	:	K 850 (LM) x Avrodhi
Year of release	:	2015 by SVRC
Notification No.	:	S.O. 1007(E) dated 30-03-2017
Developed by	:	Dr. R.K. Panwar, Dr. Anju Arora, Dr. S.K. Verma and Dr. D.P. Singh
Characters	:	Brown seeds, moderately resistant to wilt and botrytis grey mould and also tolerant to pod borer. It has 1-2 seeds/ pod, 100 seeds weight 24.36 g with 140-150 days to maturity
Recommended areas of cultivation	:	Uttarakhand plains
Yield	:	22-25 q/ha

Pant Chana 4

Variety name	:	**Pant Chana 4**
Parentage	:	Pg 92-97 x C.reticulutum
Year of release	:	2015 by SVRC
Notification No.	:	S.O. 1007(E) dated 30-03-2017
Developed by	:	Dr. R.K. Panwar, Dr. Anju Arora, Dr. S.K. Verma and Dr. D.P. Singh
Characters	:	Brown seeds, moderately resistant to wilt and botrytis grey mould and also tolerant to pod borer. It has 1-2 seeds/ pod, 100 seeds weight 25.03 g with 140-150 days to maturity
Recommended areas of cultivation	:	Uttarakhand Plains
Yield	:	22-25 q/ha

Pant Chana 5

Variety name	:	**Pant Chana 5**
Parentage	:	PG035 X HC5
Year of release	:	2017 by CVRC
Notification No.	:	S.O. 2805(E) dated 29-08-2017
Developed by	:	Dr. R.K. Panwar, Dr. Anju Arora, Dr. S.K. Verma and Dr. D.P. Singh
Characters	:	Higher yield, suitable to mechanical harvesting, moderate resistance to diseases and pests with wider adaptability under late sown conditions. It has moderate resistance to wilt, dry root rot, collar rot and stunt diseases. It has 1-2 seeds/pod, 40-50 pods/plant with 140-150 days to maturity
Recommended areas of cultivation	:	Late sown conditions of Rabi season in North West Plain Zone of India (Punjab, Haryana, Delhi, North West & Central Rajasthan, Western UP and Plains of Uttarakhand and J & K
Yield	:	22-25 q/ha

Pant Chana 6

Variety name	:	**Pant Chana 6**
Parentage	:	PG035 X HC1
Year of release	:	2019 by SVRC
Notification No.	:	S.O. 99(E) dated 06-01-2020
Developed by	:	Dr. R.K. Panwar, Dr. Anju Arora and Dr. S.K. Verma
Characters	:	Tall and semi erect plant, foliage colour is green, flower colour is violet blue and seeds are medium sized with 18.10 g/100 seed weight. Tolerant to wilt and botrytis grey mould diseases. Tolerant to pod borer. It has 1-2 seeds/pod, 45-60 pods/plant with 140-145 days to maturity
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	17-22 q/ha

Pant Chana 7

Variety name	:	**Pant Chana 7**
Parentage	:	IPC 98-12 x ICC 395468
Year of release	:	2019 by SVRC
Notification No.	:	S.O. 2986(E) dated 20-07-2021
Developed by	:	Dr. R.K. Panwar, Dr. Anju Arora, Dr. S.K. Verma, Dr. S.K. Chaturvedi, Dr. N.P. Singh and Mr. Satish Pal Singh
Characters	:	Semi erect plant, foliage colour is green, flower colour is violet blue and seeds are medium with 20.67g/100 seed weight. Tolerant to wilt and root rot. Tolerant to pod borer. It has 1-2 seeds/pod, 45-60 pods/plant with 140-145 days to maturity
Recommended areas of cultivation	:	Plains of Uttarakhand

Pant Chana 8

Variety name	:	**Pant Chana 8**
Parentage	:	PG 037 x PG 97-10
Year of release	:	2021 by SVRC
Notification No.	:	S.O.8(E) dated 24-12-2021
Developed by	:	Dr. R.K. Panwar, Dr. Anju Arora, Dr. S.K. Verma and Mr. Satish Pal Singh
Characters	:	Erect plant, foliage colour is green, flower colour is violet blue and seeds are medium with 20.45g/100 seed weight. Tolerant to wilt and root rot. Tolerant to pod borer. It has 1-2 seeds/pod, 50-70 pods/ plant with 140-144 days to maturity
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	18-25 q/ha

Pant Chana 9

Variety name	:	**Pant Chana 9**
Parentage	:	ICCC 42 x ICC 1069
Year of release	:	2021 by SVRC
Notification No.	:	S.O.8(E) dated 24-12-2021
Developed by	:	Dr. R.K. Panwar, Dr. Anju Arora, Dr. S.K. Verma, Dr. Pooran M. Gaur, Dr. Samineni Srinivasan and Mr. Satish Pal Singh
Characters	:	Semi Erect plant, foliage colour is green, flower colour is violet blue and seeds are medium with 22.41/100 seed weight. Tolerant to wilt and botrytis grey mould. Tolerant to pod borer. It has 1-2 seeds/pod, 60-80 pods/plant with 140-142 days to maturity
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	18-25 q/ha

2.3 Field Pea (*Pisum sativum* L.)

Pant P 5

Variety name	:	**Pant P 5**
Parentage	:	Type-9 x Type 163
Year of release	:	1986 by CVRC
Notification No.	:	S.O. 165(E) dated 06-03-1987
Developed by	:	Dr. B.P. Pandya, Dr. M.P. Pandey and Dr. M.P. Singh
Characters	:	Powdery mildew resistant, tall type variety of field pea, matures in 130-135 days
Recommended areas of cultivation	:	U.P. and plains of Uttarakhand
Yield	:	20-25 q/ha

Pant P 14

Variety name	:	**Pant P 14**
Parentage	:	Aparna x Longittee
Year of release	:	2004 by SVRC
Notification No.	:	S.O. 599(E) dated 25-04-2006
Developed by	:	Dr. D.P. Singh and Dr. R.K. Panwar
Characters	:	Dwarf leafed plants, matures in 125-130 days, resistant to powdery mildew
Recommended areas of cultivation	:	Uttarakhand State
Yield	:	15-20 q/ha

Pant P 13

Variety name	:	**Pant P 13**
Parentage	:	Aparna x FC 1
Year of release	:	2005 by SVRC
Notification No.	:	S.O. 72(E) dated 10-01-2008
Developed by	:	Dr. D.P. Singh and Dr. R.K. Panwar
Characters	:	Dwarf, leafed type with small stipules, matures in 125-130 days, resistant to powdery mildew and rust diseases
Recommended areas of cultivation	:	Uttarakhand State
Yield	:	15-20 q/ha

Pant P 25

Variety name	:	**Pant P 25**
Parentage	:	(EC 32410 x FC 1) x FC 1
Year of release	:	2006 by SVRC
Notification No.	:	S.O. 1703(E)dated 05-10-2007
Developed by	:	Dr. D.P. Singh and Dr. R.K. Panwar
Characters	:	Dwarf, leafed type with 50-60 cm plant height, matures in 120-125 days, resistant to powdery mildew and moderately resistant to rust
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	18-20 q/ha

Pant P 42

Variety name	:	**Pant P 42**
Parentage	:	(HUDP 7 x HFP 4) x EC 1
Year of release	:	2008 by CVRC
Notification No.	:	S.O. 2458(E)dated 16-10-2008
Developed by	:	Dr. D.P. Singh and Dr. R.K. Panwar
Characters	:	Tall plants, matures in 130-135 days, resistant to powdery mildew and moderately resistant to rust and tolerant to pod borer and stem fly
Recommended areas of cultivation	:	North West India
Yield	:	22-25 q/ha

Pant P 155

Variety name	:	**Pant P 155**
Parentage	:	Pant P 13 x DDR 27
Year of release	:	2015 by SVRC
Notification No.	:	S.O. 1007(E)dated 30-03-2017
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. G.C. Bajpai and Dr. D.P. Singh
Characters	:	Round off white seeds. Resistant to rust and powdery mildew and moderately resistant to pod borer. It has 7-8 seeds/pod, pods/plant 23-32 and matures in 122-125 days
Recommended areas of cultivation	:	Uttarakhand Plains
Yield	:	18-20 q/ha

Pant Pea 250

Variety name	:	**Pant Pea 250**
Parentage	:	Pant P 14 x Pant P 41
Year of release	:	2018 by CVRC
Notification No.	:	S.O. 1379(E)dated 27-03-2018
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. G.C. Bajpai and Dr. D.P. Singh
Characters	:	It has round, off white seeds with 120-125 days to maturity. Resistant to powdery mildew and moderately resistance to rust, ascochyta blight and root rot diseases. It has mostly 5-7 seeds/pod and 25-35 pods/plant
Recommended areas of cultivation	:	Rabi season in North West Plain Zone of India (Punjab, Haryana, Delhi, North-West & Central Rajasthan, Western UP and Plains of Uttarakhand and J & K)
Yield	:	25-30 q/ha

Pant P 157

Variety name	:	**Pant P 155**
Parentage	:	FC 1 x Pant P-11
Year of release	:	2015 by SVRC
Notification No.	:	S.O. 1007(E)dated 30-03-2017
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. G.C. Bajpai and Dr. D.P. Singh
Characters	:	Its average plant height is 77 cm with a range of 58 to 95 c over locations. Pant Pea 157 has an average hundred seed weight of 18.6 g and contains 20.73% protein. It is resistant powdery mildew and rust diseases of fieldpea. It is

Pant Pea 243

Variety name	:	**Pant Pea 243**
Parentage	:	Pant P 14 x Pant P 41
Year of release	:	2018 by CVRC
Notification No.	:	S.O. 1379(E)dated 27-03-2018
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. G.C. Bajpai and Dr. D.P. Singh
Characters	:	It has round, off white seeds with same maturity duration as checks. Resistance to powdery mildew and moderately resistance to rust, ascochyta blight and root rot diseases. It has 5-6 seeds/pod, 30-40 pods/plant with 110-115 days to maturity
Recommended areas of cultivation	:	Rabi season in Central Zone of India (Madhya Pradesh, Chhattisgarh and Parts of Rajasthan)
Yield	:	20-24 q/ha

Pant P 195

Variety name	:	**Pant P 195**
Parentage	:	Pant P-13 x IPFD 1-10
Year of release	:	2019 by SVRC
Notification No.	:	S.O. 2986 dated 20-07-2021
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. G.C. Bajpai and Dr. D.P. Singh
Characters	:	It has round, off white seeds and matures in 122-125 days. Resistant to rust and powdery mildew diseases of fieldpea and moderately resistant to pod borer pest. It has 5-6 seeds/pod and pods/plant 25-30
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	18-20 q/ha

Pant P 347

Variety name	:	**Pant P 347**
Parentage	:	Pant P 13 x IPFD 08-3
Year of release	:	2019 by SVRC
Notification No.	:	S.O. 2986 dated 20-07-2021
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. G.C. Bajpai, Dr. D. P. Singh and Sri. Satish Pal Singh
Characters	:	It has round, off white seeds and matures in 122-125 days. Resistant to powdery mildew & ascochyta blight and moderately resistant to rust & root rot diseases and moderately resistant to pod borer. It has mostly 6 seeds /pod and pods/plant 24-32
Recommended areas of cultivation	:	Rabi season in North West Plain Zone of India (Punjab, Haryana, Delhi, North-West & Central Rajasthan, Western UP and Plains of Uttarakhand and J & K)
Yield	:	25-30 q/ha

Pant P 74

Variety name	:	**Pant P 74**
Parentage	:	HUDP 6 x Pant P 11
Year of release	:	1986 by CVRC
Notification No.	:	Not Notified
Developed by	:	Dr. D.P. Singh and Dr. R.K. Panwar
Characters	:	Resistance to powdery mildew and rust diseases and moderately resistance to pod borer. It is mature in 127 days. The plant height of this variety is about 65-70 cm and has 100 seed weight of 20 g.
Recommended areas of cultivation	:	North West Plain zone
Yield	:	20-25 q/ha

Pant P 86

Variety name	:	**Pant P 86**
Parentage	:	FC 1 x P 1361
Year of release	:	2010 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. G.C. Bajpai, Dr. R.K. Panwar, Dr. S.K. Verma and Dr. D.P. Singh
Characters	:	Its average plant height is 135 cm with a range of 102-165 cm over locations. Pant Pea 86 has an average hundred seed weight of 21.16 g. It is resistant to powdery mildew and rust diseases of fieldpea. It is moderately resistant to pod borer and stem fly.It matures in 122 days in the plains of Uttarakhand
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	20-25 q/ha

Pant P 96

Variety name	:	**Pant P 96**
Parentage	:	HFP 8909 x FC 1
Year of release	:	2010 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. G.C. Bajpai, Dr. R.K. Panwar, Dr. S.K. Verma and Dr. D.P. Singh
Characters	:	Its average plant height is 125 cm with a range of 61 to 139 cm over locations. Pant Pea 96 has an average hundred seed weight of 20.7 g. It is resistant to powdery mildew and rust diseases of fieldpea. It is moderately resistant to pod borer. It matures in 123 days in the plains of Uttarakhand
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	20-25 q/ha

Pant P 108

Variety name	:	**Pant P 108**
Parentage	:	Pant P 11 x EC 1
Year of release	:	2010 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. G.C. Bajpai, and Dr. D.P. Singh
Characters	:	Its average plant height is 131 cm with a range of 92 to 148 cm over locations. Pant Pea 108 has an average hundred seed weight of 17.1 g. It is resistant to powdery mildew and rust diseases of fieldpea. It is moderately resistant to pod borer. It matures in 121 days in the plains of Uttarakhand
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	20-25 q/ha

Pant P 484

Variety name Pant P 484
Parentage: Pant P 200 x VL 201
Year of release: 2023 by CVRC
Notification No.: - Awaited
Developed by: Dr. R.K. Panwar, Dr. S.K. Verma and Dr. Anju Arora
Characters: Resistant to ascochyta blight and moderately resistance to rust and powdery mildew and moderately resistance to pod borer. It is mature in 120 days. The plant height of this variety is about 75-80 cm and has 100 seed weight of 18.4 g.
Recommended areas of cultivation: North West Plain zone of India
Yield; 25-30 q/ha

Pant P 497

Variety name Pant P 497
Parentage: IPFD 5-19 x HFP 530
Year of release: 2023 by CVRC
Notification No.: - Awaited
Developed by: Dr. R.K. Panwar, Dr. S.K. Verma and Dr. Anju Arora

Characters: Resistance against ascochyta blight and moderate resistance against rust and powdery mildew diseases and moderately resistant to pod borer. It is mature in 123 days. The plant height of this variety is about 136 cm and has 100 seed weight of 14.0 g.
Recommended areas of cultivation: North West Plain zone of India
Yield; 20-25 q/ha

Pant P 498

Variety name Pant P 498
Parentage: IPFD 5-19 x HFP 530
Year of release: 2023 by CVRC
Notification No.: - Awaited
Developed by: Dr. R.K. Panwar, Dr. S.K. Verma and Dr. Anju Arora

Characters: Resistance against ascochyta blight and moderate resistance against rust and powdery mildew diseases and moderately resistant to pod borer. It is mature in 123 days. The plant height of this variety is about 138 cm and has 100 seed weight of 17.5 g.
Recommended areas of cultivation: North West Plain zone of India
Yield; 20-25 q/ha

Pant P 501

Variety name **Pant P 501**
Parentage: IPFD 5-19 x HFP 530
Year of release: 2023 by CVRC
Notification No.: - Awaited
Developed by: Dr. R.K. Panwar, Dr. S.K. Verma and Dr. Anju Arora

Characters: Resistant to powdery mildew & ascochyta blight and moderately resistant to rust diseases and moderately resistant to pod borer. It is mature in 123 days. The plant height of this variety is about 126 cm and has 100 seed weight of 17.9 g.
Recommended areas of cultivation: North West Plain zone of India
Yield; 20-25 q/ha

Pant P 462

Variety name **Pant P 462**
Parentage: HFP 529 x Pant P 31
Year of release: 2023 by CVRC
Notification No.: - Awaited
Developed by: Dr. R.K. Panwar, Dr. S.K. Verma and Dr. Anju Arora
Characters: Resistant to powdery mildew and moderately resistant to rust and ascochyta blight diseases and tolerant to pod borer . It is mature in 120 days. The plant height of this variety is about 74 cm and has 100 seed weight of 17.7 g.
Recommended areas of cultivation: North East Plain zone of India
Yield; 25-30 q/ha

2.4 Lentil (*Lens culinaris* L. Medic.)

Pant L 406

Variety name	:	**Pant L 406**
Parentage	:	Selection from the germplasm 'P 495'
Year of release	:	1978 by CVRC and 1979 by SVRC
Notification No.	:	S.O. 470 dated 19-02-1980
Developed by	:	Drs. B.P. Pandya, M.P. Pandey and J.P. Singh
Characters	:	Semi-spreading, dark green foliage, highly resistant to rust and wilt, suited for normal sowing as well as sowing after harvest of late paddy crop, medium maturing, small seededand reddish pink cotyledons
Recommended areas of cultivation	:	U.P., plains of Uttarakhand
Yield	:	14-16 q/ha

Pant L 234

Variety name	:	**Pant L 234**
Parentage	:	Selection from the germplasm 'P 230'
Year of release	:	1980 by SVRC
Notification No.	:	S.O. 470 dated 19-02-1980
Developed by	:	Drs. B.P. Pandya, M.P. Pandey and J.P. Singh
Characters	:	Vigorous, bold seeded, highly resistant to wilt, medium maturing dark brownseed coat colour and reddish pink cotyledons
Recommended areas of cultivation	:	U.P. and plains of Uttarakhand, under normal sown conditions
Yield	:	12-14 q/ha

Pant L 639

Variety name	:	**Pant L 639**
Parentage	:	L 9-12 x T 8
Year of release	:	1981 by CVRC
Notification No.	:	S.O. 19(E) dated 14-01-1982
Developed by	:	Dr. B.P. Pandya, Dr. M.P. Pandey and Dr. J.P. Singh
Characters	:	Highly resistant to rust and blight, very widely adapted and pink cotyledon, consistent in performance, suited for normal sown conditions, medium maturing
Recommended areas of cultivation	:	Northern plains (west and east) and central zone of the country

Pant L 4

Variety name	:	**Pant L 4**
Parentage	:	UPL 175 x (PL 184 x P-288)
Year of release	:	1993 by SVRC
Notification No.	:	S.O. 615(E) dated 17-08-1993
Developed by	:	Dr. I.S. Singh and Dr. J.P. Singh
Characters	:	Small seeded variety, matures in 130-135 days, widely adapted, preferred by millers due to high dal recovery and pink cotyledon
Recommended areas of cultivation	:	U.P. and Uttarakhand
Yield	:	14-15 q/ha

Pant L 5

Variety name	:	**Pant L 5**
Parentage	:	L 4126 x LG-171
Year of release	:	1999 by SVRC
Notification No.	:	S.O. 92(E) dated 02-02-2001
Developed by	:	Dr. D.P. Singh, Dr. I.S. Singh and Dr. J.P. Singh
Characters	:	Bold seeded variety, multiple resistance to rust, wilt and blight disease, matures in 125-130 days, and pink cotyledons
Recommended areas of cultivation	:	U.P. and Uttarakhand
Yield	:	14-16 q/ha

Pant L 6

Variety name	:	**Pant L 6**
Parentage	:	Pant L 4 x DPL 55
Year of release	:	2008, SVRC
Notification No.	:	S.O. 211(E) dated 29-01-2010
Developed by	:	Dr. D.P. Singh, Dr. S.K. Verma, Dr. J.P. Singh and Dr. I.S. Singh
Characters	:	125-130day maturity, medium seeded (28 g/ 1000 seed), resistant to rust, Ascochyta blight and wilt diseases, light green foliage and stem, white flowers and erect growth habit. The colour of seed coat is light yellow and cotyledon colour is yellow
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	12-15 q/ha

Pant L 7

Variety name	:	**Pant L 7**
Parentage	:	L 4076 x DPL 55
Year of release	:	2008 by SVRC and 2010 by CVRC
Notification No.	:	S.O. 211(E) dated 29-01-2010 & S.O. 733(E) dated 01-04-2010
Developed by	:	Dr. D.P. Singh and Dr. S.K. Verma
Characters	:	125 -125day maturity, large seeded (29-30 g/ 1000 seed), resistant to rust, tolerant to pod borer, green foliage and stem, white flowers and erect growth habit. The colour of seed coat is yellowish grey and cotyledon colour is pink red
Recommended areas of cultivation	:	Plains of Uttarakhand, North- West India
Yield	:	14-16 q/ha

Pant Lentil 8

Variety name	:	**Pant Lentil 8**
Parentage	:	DPL 59 x IPL 105
Year of release	:	2010 by CVRC
Notification No.	:	S.O. 733(E) dated 01-04-2010
Developed by	:	Dr. D.P. Singh and Dr. S.K. Verma
Characters	:	135-day maturity, small-seeded (1.77 g/ 100 seed), dark brown seed coat and pink cotyledon, resistant to rust, wilt and pod borer
Recommended areas of cultivation	:	North Western plain zone
Yield	:	15-18 q/ha

Pant Lentil 9

Variety name	:	**Pant Lentil 9**
Parentage	:	Pant L 5 x IPL 105
Year of release	:	2015 by SVRC
Notification No.	:	S.O. 1007(E) dated 30-03-2017
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. G.C. Bajpai and Dr. D.P. Singh
Characters	:	Mottled grey seed coat, resistant to rust disease of lentil and moderately resistant to pod borer. It has1-2 seeds/ pod, 51-65 pods/ plant,100 seed weight 2.6 g with 120-125 days to maturity and brown seed coat
Recommended areas of cultivation	:	Uttarakhand Plains
Yield	:	15-18 q/ha

Pant Lentil 11

Variety name	:	**Pant Lentil 11**
Parentage	:	DPL 15 x L 4188
Year of release	:	2019 by SVRC
Notification No.	:	S.O. 2986(E) dated 20-07-2021
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. G.C. Bajpai and Dr. D.P. Singh
Characters	:	It has mottled grey seed coat. Resistant to rust disease of lentil and moderately resistant to wilt disease and moderately resistant to pod borer. It has 1-2 seeds /pod, 39-67 pods/ plant, 100 seed weight 2.64g with 120-125 days to maturity
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	13-15 q/ha

Pant Lentil 12

Variety name	:	**Pant Lentil 12**
Parentage	:	PL 6 x DPL 58
Year of release	:	2022 by SVRC
Notification No.	:	Awaited
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma and Anju Arora
Characters	:	Its average plant height is 33 cm with a range of 15 to 47 cm over locations. Pant Lentil 12 has an average hundred seed weight of 2.56 g. It is resistant to rust diseases of lentil. It is moderately resistant to pod borer pest. It matures in 159 days in the hills of Uttarakhand
Recommended areas of cultivation	:	Hills of Uttarakhand
Yield	:	13-15 q/ha

Pant Lentil 14

Variety name	:	**Pant Lentil 14**
Parentage	:	Pant Lentil 5 x L 4145
Year of release	:	2023 by CVRC
Notification No.	:	Awaited
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma and Anju Arora
Characters	:	Resistant to rust and stemplylium blight diseases of lentil and moderately resistant to aphid and pod borer insect pests. It is mature in 128 days. The plant height of this variety is about 43 cm and has 100 seed weight of 2.4 g.
Recommended areas of cultivation	:	North West Plain zone of India
Yield	:	15-18 q/ha

Pant Lentil 15

Variety name	:	**Pant Lentil 15**
Parentage	:	Pant Lentil 8 x DPL 58
Year of release	:	2023 by SVRC
Notification No.	:	Awaited
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma and Anju Arora
Characters	:	Moderately resistant to rust and wilt. Resistant to ascochyta blight & stemplylium blight diseases of lentil and Moderately resistant to aphid and pod borer insect pests. It is mature in 127 days. The plant height of this variety is about 38 cm and has 100 seed weight of 2.3 g.
Recommended areas of cultivation	:	North West Plain zone of India
Yield	:	15-17 q/ha

2.5 Green Gram- Mung Bean (*Vigna radiata* L.)

Pant M 1

Variety name	:	**Pant M 1**
Parentage	:	LM 294-1 x T 44
Year of release	:	1981 by SVRC
Notification No.	:	S.O. 449(E) dated 08-07-1983
Developed by	:	Dr. D.P. Singh and Dr. B.L. Sharma
Characters	:	Erect plant habit, shattering resistant, moderately resistant to yellow mosaic virus and Cercospora leaf spot, matures in 70-75 days in kharif, and 60-65 days in Zaid
Recommended areas of cultivation	:	U.P. and plains of Uttarakhand in kharif and Zaid
Yield	:	10-15 q/ha

Pant M 2

Variety name	:	**Pant M 2**
Parentage	:	Through mutation (Gamma rays)
Year of release	:	1982 by SVRC
Notification No.	:	S.O. 449(E) dated 08-07-1983 & S.O. 295(E) dated 09-04-1985
Developed by	:	Dr. D.P. Singh and Dr. B.L. Sharma
Characters	:	Moderately resistant to mung bean yellow mosaic virus, matures in 60-65 days in Zaid and 65-70 days in Kharif seasons, medium bold seeds with shinning green colour
Recommended areas of cultivation	:	U.P. and plains of Uttarakhand for Kharif and Zaid (speciallysuitable for late sowing in kharif)
Yield	:	10-12 q/ha in kharif and 6 to 8 q/ha in Zaid

Pant M 3

Variety name	:	**Pant M 3**
Parentage	:	LM 294-1 x T44
Year of release	:	1985 by CVRC
Notification No.	:	S.O. 832(E) dated 18-11-1985
Developed by	:	Dr. D.P. Singh and Dr. B.L. Sharma
Characters	:	Matures in 75-80 days, multiple disease resistant, dirty yellow cotyledon colour.
Recommended areas of cultivation	:	North west plains zone of the country
Yield	:	12-15 q/ha

Pant M 4

Variety name	:	**Pant M 4**
Parentage	:	T-44 x UPU-2
Year of release	:	1997 by CVRC
Notification No.	:	S.O. 662(E) dated 17-09-1997
Developed by	:	Dr. D.P. Singh, Dr. B.L. Sharma, Dr. I.S. Singh and Dr. H.S. Chawla
Characters	:	Developed from a cross of mungbean (T 44) and blackgram (UPU-2), multiple disease resistant, matures in 65-70 days and dirty yellow cotyledon
Recommended areas of cultivation	:	North- east plains zone of the country
Yield	:	12-15 q/ha in Kharif and 6 to8 q/ha in Zaid

Pant M 5

Variety name	:	**Pant M 5**
Parentage	:	Selection from VC 6368
Year of release	:	2002 by SVRC
Notification No.	:	S.O. 211(E) dated 29-01-2010
Developed by	:	Dr. D.P. Singh and Dr. B.L. Sharma
Characters	:	Early maturity (60-65 days), long pods, bold (5-6 g/ 100 seeds) shinning seeds, resistant to mungbean Yellow Mosaic Virus
Recommended areas of cultivation	:	Entire U.P. and plains of Uttarakhand for cultivation in Kharif and Zaid both
Yield	:	12-15 q/ha

Pant M 6

Variety name	:	**Pant M 6**
Parentage	:	Pant Mung 2 x AMP 36
Year of release	:	2007 by CVRC
Notification No.	:	S.O. 72(E) dated 10-01-2008
Developed by	:	Dr. D.P. Singh Dr. B L. Sharma and Dr. C.S. Kar
Characters	:	Matures in 75-80 days, seed colour is shining green, resistant to Yellow Mosaic Virus and Cercospora leaf spot. It is developed from Mungbean x blackgram cross
Recommended areas of cultivation	:	North eastern hill zone of the country
Yield	:	12-14 q/ha

Pant M 8

Variety name	:	**Pant M 8**
Parentage	:	Pant M 3 x NDM 99-3
Year of release	:	2015 by SVRC
Notification No.	:	S.O. 1007(E) dated 30-03-2017
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. B.L. Sharma and Dr. D.P. Singh
Characters	:	Medium seeded, resistant to mung bean yellow mosaic virus, Cercospora leaf spot and powdery mildew diseases and also tolerant to whitefly and Jassid. It has 7-11 seeds/pod, pods/plant 30-44 with the 75-85 days to maturity during kharif season
Recommended areas of cultivation	:	Uttarakhand Plains
Yield	:	13-15 q/ha

Pant M 9

Variety name	:	**Pant M 9**
Parentage	:	PM 5 x Bina Mung
Year of release	:	2019 by SVRC
Notification No.	:	S.O. 99(E) dated 06-01-2020
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. B.L. Sharma and Dr. D.P. Singh
Characters	:	Medium seeded variety with average seed weight of 3.61 g/100 seeds. Resistant to mungbean yellow mosaic virus, Cercospora leaf spot and powdery mildew diseases and also tolerant to whitefly and jassid. It has 8-11 seed/pod, pods/plant 24-40 with the 75-85 days to maturity
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	12-15 q/ha

Pant M 7

Variety name	:	**Pant M 7**
Parentage	:	Pant M 3 x UPM 99-3
Year of release	:	2015 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. B.L. Sharma and Dr. D.P. Singh
Characters	:	Its average plant height is 86.4 cm with a range of 54 to 116 cm over locations. Pant Mung 7 is a medium seeded variety with a average seed weight of 3.26 g/100 seeds and contains 24.10 % protein. It is resistant to MYMV, cercospora leaf spot and powdery mildew diseases. It is also tolerant to whitefly and jassid. It matures in 82 days in the plains of Uttarakhand
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	10-12 q/ha

2.6 Pegion Pea (*Cajanus cajan* L. Millsp.)

UPAS 120

Variety name	:	**UPAS 120**
Parentage	:	Selection from germplasm P 4785
Year of release	:	1979 by CVRC and 1984 by SVRC
Notification No.	:	S.O. 786 dated 02-02-1976
Developed by	:	Dr. B.P. Pandya, Dr. M.P. Pandey, Dr. B.V. Singh and Dr. P.P. Arora
Characters	:	Medium tall, spreading, suitable in rotation with the normal sown wheat, escapes frost, susceptible to diseases, extra- early (125-130) days
Recommended areas of cultivation	:	Rajasthan, Haryana, U.P. and Plains of Uttarakhand
Yield	:	15-16 q/ha

Pant Arhar 291

Variety name	:	**Pant Arhar 291**
Parentage	:	UPAS-120 x KPBR 80-2-1
Year of release	:	2008 by SVRC
Notification No.	:	S.O. 211(E)dated 29-01-2010
Developed by	:	Dr. D.P. Singh, Dr. G.C. Bajpai and Dr. S.K. Verma
Characters	:	It matures in 140-150 days and is suitable for Arhar-wheat rotation, seeds are dark brown and of medium size, resistant to Phytophthora blight, wilt and sterility mosaic disease of pigeon pea
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	18-20 q/ha

Pant Arhar 6

Variety name	:	**Pant Arhar 6**
Parentage	:	ICPL 84023 x ICPL 88039
Year of release	:	2019 by CVRC
Notification No.	:	S.O. 99(E) dated 06-01-2020
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. G.C. Bajpai and Dr. D.P. Singh
Characters	:	It has indeterminate growth habit, reddish brown seed coat colour and medium seed size (8.11g/100 seed). Moderately resistant to Phytopthora stem blight, the most prevalent disease of the zone. Moderately resistant to pod borer (Helicoverpa), Maruca, Apion clavipes and bruchid insect pest. It has 4 seeds/pod, pods/plant 149 and matures in 142-150 days
Recommended areas of cultivation	:	Kharif season in North West Plain Zone of India (Western U.P., Punjab, Haryana, Rajasthan, Delhi, Plains of Uttarakhand and Parts of Jammu & Kashmir)
Yield	:	17-20 q/ha

Pant Arhar 7

Variety name	:	**Pant Arhar 7**
Parentage	:	H 82-1 x UPAS 120
Year of release	:	2019 by SVRC
Notification No.	:	S.O. 2986(E) dated 20-07-2021
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. G.C. Bajpai and Mr. Satish Pal Singh
Characters	:	It has indeterminate growth habit, reddish brown seed coat colour and medium seed size. Resistant to Phytopthora stem blight. Tolerant to sucking pests. It has mostly 4 seeds/pod, pods/plant 143, 100 seed weight 8.27g and matures in 145 days
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	15-20 q/ha

Pant Arhar 3

Variety name	:	**Pant Arhar 3**
Parentage	:	UPAS 120 x ICPL 88039
Year of release	:	2010 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. G.C. Bajpai, Dr. S.K. Verma, Dr. R.K. Panwar and Dr. D.P. Singh
Characters	:	Pant Arhar – 337 is resistant to Phytophthora blight, sterility mosaic and wilt diseases and prevalent insect pests. It is early maturing as compared to UPAS-120 but has larger seed size than UPAS-120
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	18-20 q/ha

2.7 Black Gram (*Vigna mungo* L. Hepper URD BEAN)

Pant U 19

Variety name	:	**Pant U 19**
Parentage	:	UPU 1 x UPU 2
Year of release	:	1981 by SVRC
Notification No.	:	S.O. 19(E) dated 14-01-1982
Developed by	:	Dr. D.P. Singh and Dr. B.L. Sharma
Characters	:	Short and erect plant type, hairy and black pods at maturity, resistant to yellow mosaic virus, medium and black brown seeds, mature in 80-85 days in Kharif and 70-75 days in Zaid
Recommended areas of cultivation	:	North-Eastern plains of the country
Yield	:	8-10 q/ha

Pant U 30

Variety name	:	**Pant U 30**
Parentage	:	UPU 1 x UPU 2
Year of release	:	1981 by SVRC
Notification No.	:	S.O. 19(E) dated 14-01-1982
Developed by	:	Dr. B.P. Pandya, Dr. M.P. Pandey, Dr. D.P. Singh and Dr. B.L. Sharma
Characters	:	Short and erect plant type, hairy and black pods at maturity, brown and medium size seeds resistant to yellow mosaic virus and powdery mildew disease, matures in 80-85 days in Kharif and 70-75 days in Zaid
Recommended areas of cultivation	:	Central and peninsular parts of the country
Yield	:	10-12 q/ha

Pant U 31

Variety name	:	**Pant U 31**
Parentage	:	UPU 97-10 X DPU 88-31
Year of release	:	2005 BY SVRC
Notification No.	:	S.O. 72(E) dated 10-01-2008
Developed by	:	Dr. D.P. Singh and Dr. B.L. Sharma
Characters	:	Dwarf, soybean type of plants, matures in 70 days, resistant to mung bean yellow mosaic virus, matures in 75-80 days
Recommended areas of cultivation	:	Plains and lower hills of Uttarakhand
Yield	:	12-15 q/ha

Pant U 35

Variety name	:	**Pant U 35**
Parentage	:	UPU 3 X Pant U 19
Year of release	:	1985 by SVRC
Notification No.	:	S.O. 165(E) dated 06-03-1987
Developed by	:	Dr. D.P. Singh and Dr. B.L. Sharma
Characters	:	Plant height 100 cm, erect dark green leaves, matures in 76-80 days, dense pubescence on pods, resistant to mung yellow mosaic virus, protein content 24.3%
Recommended areas of cultivation	:	U.P. and Uttarakhand (Kharif and Zaid)
Yield	:	12-14 q/ha

Manikya

Variety name	:	**Manikya**
	:	Type 9 mutant (Gamma ray, 40kr)
Year of release	:	1988 by SVRC
Notification No.	:	Notified by Karnataka State
Developed by	:	Dr. D.P. Singh and Dr. B.L. Sharma
Characters	:	Bold seeded than type-9, resistant to moongbean yellow mosaic virus, mature in 80-85 days
Recommended areas of cultivation	:	Karnataka
Yield	:	10-12 q/ha

Pant U 40

Variety name	:	**Pant U 40**
Parentage	:	UPU 89-6-7 X 7668/4B
Year of release	:	2005 by SVRC
Notification No.	:	S.O.72(E)dated10-01-2008
Developed by	:	Dr. D.P. Singh and Dr. B.L. Sharma
Characters	:	Erect plant type with podding from base to tip of plant, matures in 75-80 days, multiple disease resistant
Recommended areas of cultivation	:	As inter crop with cereals in plains and lower hills of Uttarakhand
Yield	:	12-15 q/ha

Pant Urd 7

Variety name	:	**Pant Urd 7**
Parentage	:	UPU 97-10 x KU 96-3
Year of release	:	2019 by SVRC
Notification No.	:	S.O.99(E)dated06-01-2020
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. B.L. Sharma and Dr. D. P. Singh
Characters	:	Medium seeded variety with average seed weight of 3.88 g/100 seeds. Resistant to mungbean yellow mosaic virus and powdery mildew diseases and also tolerant to whitefly and jassid. It has 5-7 seed/pod, pods/plant 31-49 with the 80-85 days to maturity
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	12-15 q/ha

Pant Urd 8

Variety name	:	**Pant Urd 8**
Parentage	:	Pant U 19 x KU 303
Year of release	:	2019 by SVRC
Notification No.	:	S.O.99(E) dated 06-01-2020
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. B.L. Sharma and Dr. D. P. Singh
Characters	:	Medium seeded variety with average seed weight of 3.88 g/100 seeds. Resistant to mungbean yellow mosaic virus, bacterial leaf spot and powdery mildew diseases and also tolerant to whitefly and jassid. It has 5-7 seed/pod, pods/plant 34-44 with the 80-85 days to maturity
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	12-15 q/ha

Pant Urd 9

Variety name	:	**Pant Urd 9**
Parentage	:	UPU 97-10 x KU 96-3
Year of release	:	2019 by SVRC
Notification No.	:	S.O.99(E)dated06-01-2020
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. B.L. Sharma and Dr. D. P. Singh
Characters	:	Medium seeded variety with average seed weight of 3.85 g/100 seeds. Resistant to mungbean yellow mosaic virus, cercospora leaf spot and powdery mildew diseases and also tolerant to whitefly and jassid. It has 5-7 seed/pod, pods/plant 32-48 with the 80-85 days to maturity
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	12-15 q/ha

Pant Urd 10

Variety name	:	**Pant Urd 10**
Parentage	:	PU 19 x KU 96-3
Year of release	:	2019 by CVRC
Notification No.	:	S.O. 3220(E)dated 16-09-2019
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. B.L. Sharma and Dr. D. P. Singh
Characters	:	Bold seeded variety with average seed weight of 4.5 g/100 seeds. Resistant to mungbean yellow mosaic virus, urdbean leaf crinkle virus, Cercospora leaf spot and powdery mildew diseases and also tolerant to whitefly and jassid. It has 5-7 seed/pod, pods/plant 51-79 with the 80-85 days to maturity
Recommended areas of cultivation	:	Kharif season in North Hill Zone of India (Hills of J & K, Himachal, Uttarakhand and North East States of India)
Yield	:	12-15 q/ha

Pant Urd 12

Variety name	:	**Pant Urd 12**
Parentage	:	PU 31 x TU 94-2
Year of release	:	2021 by CVRC
Notification No.	:	S.O.8(E) dated 24-12-2021
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma and Dr. Anju Arora
Characters	:	Bold seeded variety with average seed weight of 4.0 g/100 seeds. Resistance against MYMV, leaf crinkle, powdery mildew, leaf curl virus, web blight and moderately resistance to cercospora leaf spot, root rot and anthracnose diseases. Moderately resistance to whitefly, pod borer, aphid and pod bug. It has 4-6 seed/pod, pods/plant 65-97 with the 80-85 days to maturity
Recommended areas of cultivation	:	Kharif season in North West Plain Zone of India (Western U.P., Punjab, Haryana, Rajasthan, Delhi, Plains of Uttarakhand and Parts of Jammu & Kashmir
Yield	:	12-16 q/ha

Pant U 6

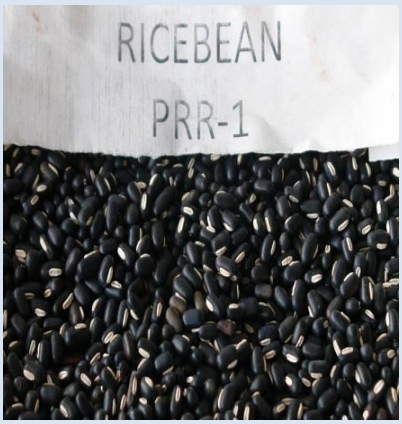
Variety name	:	**Pant Urd 10**
Parentage	:	Pant U 19 x KU 96-3
Year of release	:	2015 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma, Dr. Anju Arora, Dr. B.L. Sharma and Dr. D. P. Singh
Characters	:	Large seeded variety with average seed weight of 4.2 g/100 seeds. Resistant to mungbean yellow mosaic virus, cercospora leaf spot and powdery mildew diseases and also tolerant to whitefly and jassid. It has 5-7seed/pod, pods/plant 21-35 with the 80-90 days to maturity
Recommended areas of cultivation	:	Hills of Uttarakhand
Yield	:	12-15 q/ha

Pant Urd 11

Variety name	:	**Pant Urd 11**
Parentage	:	PU 31 x Mash 1008
Year of release	:	2022 by SVRC
Notification No.	:	Awaited
Developed by	:	Dr. R.K. Panwar, Dr. S.K. Verma and Dr. Anju Arora
Characters	:	Pant Urd 11 is a medium seeded variety with average seed weight of 3.85 g/100 seeds. Its average plant height is 50.58 cm with a range of 24 to 79 cm over locations. It is resistant to Mungbean Yellow Mosaic Virus and moderately resistant to Urdbean Leaf Crinkle Virus and Leaf Curl Virus diseases. It is also tolerant to whitefly and thrips insect pests. It matures in 87 days in the plains of Uttarakhand
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	12-14 q/ha

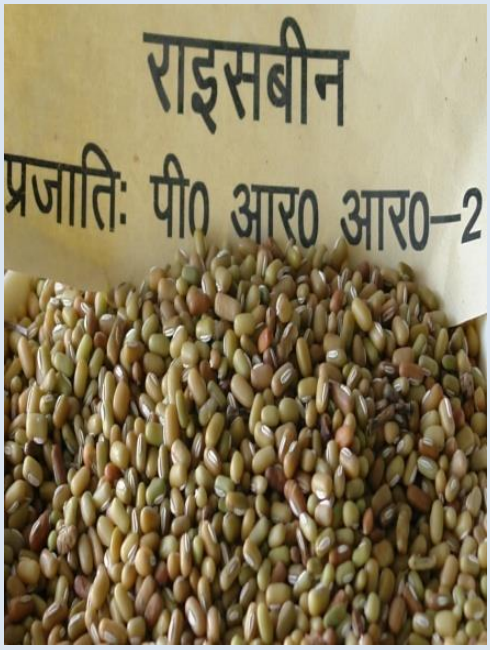
2.8 Rice Bean (*Vigna umbellata*)

PRR-1(PRR8801)



Variety name	:	**PRR-1 (PRR 8801)**
Parentage	:	Pure line selection from Jagdhar (Tehri) Collections
Year of release	:	1997
Notification No.	:	-
Developed by	:	Hill campus Ranichauri, GBPUAT
Characters	:	Its matures, on an average, in 141 days (111-165 days). Growth habit is trailing and indeterminate with average plant height of 90 cm. Foliage colour is dark green and seed colour is bluish black. The seed weight is around 7.0g. Protein content in grains 19.4%. The variety is recommended for low input and rainfed conditions.
Recommended areas of cultivation	:	Hills of Uttarakhand
Yield	:	15.0 q/ha

PRR-2(PRR8901)



Variety name	:	**PRR-2 (PRR 8901)**
Parentage	:	Pure line selection from the Dargi collections in district Tehri Garhwal.
Year of release	:	1997
Notification No.	:	401 (E)/15-05-1998
Developed by	:	Hill campus Ranichauri, GBPUAT
Characters	:	The variety has bold, attractive and light yellow coloured seeds having field tolerance to Ascochyta and is resistant to yellow mosaic disease. The plants are medium tall (av.83.7 cm ht.) indeterminate and less branched. Stem is light purple coloured and bears dark green leaves. Suitable for timely sown and low input conditions. It gives good nodulations. Protein content in grains is 20.0%.
Recommended areas of cultivation	:	Hill region on Uttarakhand, HP and North Eastern states, particularly mid and high altitude areas.
Yield	:	15-20 q/ha

2.9 Cow Pea (Lobia) (*Vigna unguiculata*)

Pant Lobia 1

Variety name	:	**Pant Lobia 1**
Parentage	:	Introduced from IITA, Nigeria
Year of release	:	2009 by SVRC
Notification No.	:	S.O.211(E)., dated : 29/01/2010
Developed by	:	Dr. B.B. Singh, Visiting Professor (formerly cowpea breeder at the International Institute of Tropical Agriculture (IITA), Y.V. Singh, Professor & Head, Vegetable Science, Dr. M.K. Nautiyal, Prof., Genet. & Pl. Breeding and I.D. Pandey Assoc. Prof., Genet. & Pl., G.B.P.U.A.&T., Pantnagar
Characters	:	Matures in 65 days, plant height is 40-50 cm, seed colour is white and 100 -seed weight is 14-15 g, protein content is 27%, resistant to Cowpea Mosaic Virus, Aphids and thrips
Recommended areas of cultivation	:	Hills (upto mid-hills) and plains of Uttarakhand
Yield	:	20 q/ha grain & 25 q/ha dry fodder

Pant Lobia 2

Variety name	:	**Pant Lobia 2**
Parentage	:	Introduced from IITA, Nigeria
Year of release	:	2010 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. B.B. Singh, Visiting Professor (formerly cowpea breeder at the International Institute of Tropical Agriculture (IITA), Y.V. Singh, Professor & Head, Vegetable Science, Dr. M.K. Nautiyal, Prof., Genet. & Pl. Breeding and I.D. Pandey, Assit. Prof., Genet. & Pl. Breeding, G.B.P.U.A.&T., Pantnagar
Characters	:	Matures in 70 days, plant height is 40-45 cm, seed colour is red and 100 -seed weight is 13-15 g, protein content is 30%, resistant to Cowpea Mosaic Virus
Recommended areas of cultivation	:	Hills (upto mid-hills) and plains of Uttarakhand
Yield	:	14-18 q/ha grain & 25 q/ha dry

Pant Lobia 3

Variety name	:	**Pant Lobia 3**
Parentage	:	(PGCP-6)
Year of release	:	2012 by CVRC
Notification No.	:	S.O. 112(E), dated 12-1-2015
Developed by	:	Dr. Y.V. Singh, Dr. B. B. Singh, Dr. M. K. Nautiyal, Dr. C.L. Sharma, Dr. Jyoti Agrawal and Dr. Anil Kumar, G.B.P.U.A.&T., Pantnagar
Characters	:	Days to maturity 65-70 (synchronous maturity), Plant height 50-55 cm, pod length is 16-18 cm, 100 seed weight is 10-11 gm, seed is brown colored, smooth, Kidney to oval shape, medium size, resistant to CYMV and Bacterial Blight, tolerance to aphid, thrips and bruchid
Recommended areas of cultivation	:	Uttarakhand plains
Yield	:	18-20 q/ha

Pant Lobia 4

Variety name	:	**Pant Lobia 4**
Parentage	:	Introduced from IITA, Nigeria
Year of release	:	2010 by CVRC
Notification No.	:	S.O. 2277(E), dated : 17-8-2015
Developed by	:	Dr. B. B. Singh, Dr. Y.V. Singh, Dr. M. K. Nautiyal, Dr. C.L. Sharma, Dr. Jyoti Agrawal and Mr. Anand Singh, G.B.P.U.A.& T., Pantnagar
Characters	:	Matures in 55—60 days, plant height is 40-45 cm, seed colour is red and 100 -seed weight is 15 g, protein content is more than 28%, resistant to Cowpea Mosaic Virus
Recommended areas of cultivation	:	North India
Yield	:	14-18 q/ha

Pant Lobia 5

Variety name	:	**Pant Lobia 5**
Parentage	:	(PGCP-12)
Year of release	:	2015 by SVRC
Notification No.	:	S.O. 2805(E)., dated 25-8-2017
Developed by	:	Dr. B. B. Singh, Dr. Y.V. Singh, Dr. M. K. Nautiyal and Dr. C.L. Sharma, G.B.P.U.A.&T., Pantnagar
Characters	:	Days to maturity 65-70 (synchronous maturity), Plant height is 48-52 cm, pod length is 16-18 cm, no. of seeds per pod is 12-14 seeds are oval bold, 100 seed weight is 17-18 gm, resistant to CYMV and Bacterial Blight, tolerance to aphid, thrips and bruchid
Recommended areas of cultivation	:	Uttarakhand plains
Yield	:	16-20 q/ha

Pant Lobia 7

Variety name	:	**Pant Lobia 7**
Parentage	:	(**PGCP-12** × **PGCP-13**)
Year of release	:	2021 by CVRC
Notification No.	:	S.O. No. 8 (E) dated 24.12.2021
Developed by	:	Dr. B. B. Singh, Dr. Y.V. Singh, Dr. M. K. Nautiyal and Dr. PReeti Massey, G.B.P.U.A.&T., Pantnagar
Characters	:	Days to maturity 70-75 (synchronous maturity), Plant height is 50-55 cm, pod length is 16-18 cm, no. of seeds per pod is 14-16 seeds are oval bold, 100 seed weight is 13-14 gm, resistant to CYMV and Bacterial Blight, tolerance to aphid, thrips and bruchid
Recommended areas of cultivation	:	Uttarakhand plains, Kerala, Karnataka, Tamilnadu and Andhra Pradesh
Yield	:	10-12 q/ha

3. Oil seed

3.1 Soybean (*Glycine max.* L. *Merril*)

Bragg

Variety name	:	**Bragg**
Parentage	:	Jackson x D49-2491
Year of release	:	1969 by CVRC
Notification No.	:	IC 73715
Developed by	:	Dr. B. B. Singh
Characters	:	Medium plant height (75-85 cm), green foliage, white flowers, tawny pubescence, yellow seed coat and black hilum, bold seeded (14g/100 seed), resistant to bacterial pustules, susceptible to yellow mosaic, maturity 120 days, protein content 40% and oil 20%.
Recommended areas of cultivation	:	Northern hills and plains and central zone.
Yield	:	20-25 q/ha

Ankur

Variety name	:	**Ankur**
Parentage	:	Single plant selection from a composite of 22 crosses.
Year of release	:	1974 by SVRC
Notification No.	:	SO 786 Dated: 2-2-1976
Developed by	:	Dr. B. B. Singh
Characters	:	Tall plant height (80-90 cm), white flowers, tawny pubescence, yellow seed coat, light brown hilum, relatively smaller seeds (12g/100 seeds), resistant to rust, Macophomina and bacterial pustules, susceptible to yellow mosaic, maturity 125-130 days, protein content 40-42% and oil 21-22%
Recommended areas of cultivation	:	Northern hills and central zone
Yield	:	20-25 q/ha

Alankar

Variety name	:	**Alankar**
Parentage	:	D 63-6094 (Hill)/ 171-442)/ D61-4249 CD-49-2416 (S-100/CNS) /Borrchet
Year of release	:	1977 by SVRC
Notification No.	:	SO 13 Dated: 19-12-1978
Developed by	:	Dr. B. B. Singh, Dr. Pushpendra, Kamendra Singh
Characters	:	Medium plant height (60-80 cm), white flowers, tawny pubescence, dark green leaves, yellow seed coat and light black hilum, bold seeded (14g/100 seeds), tolerant to yellow mosaic and moderately resistant to rust, bacterial pustules and macrophomina, resistant to shattering and lodging, suitable for early and late planting, medium in maturing (120 days), protein content 40-42% and oil 20-22%.
Recommended areas of cultivation	:	Northern plains of country
Yield	:	25-30 q/ha

Shilajeet

Variety name	:	**Shilajeet**
Parentage	:	Single plant selection from EC 9303
Year of release	:	1980 by SVRC and 1979 by CVRC
Notification No.	:	SO 470 E Dated: 19-2-1980
Developed by	:	Harihar Ram, Pushpendra, Kamendra Singh, V.D. Verma
Characters	:	Medium height (50-70cms), tawny pubescence, purple flowers, erect branching habit, sturdy plant, free from lodging, dark green foliage, yellow seed coat and brown hilum, moderately resistant to yellow mosaic virus, bacterial pustules and rust, early in maturity (105 days), suitable for intensive cropping and mixed cropping systems, medium size grains, protein content 40-42% and 20-22% oil
Recommended areas of cultivation	:	Northern plains of country
Yield	:	20-25 q/ha

PK 262

Variety name	:	**PK 262**
Parentage	:	UPSM 97 x Hardee
Year of release	:	1982 by SVRC
Notification No.	:	SO 499 E Dated: 8-7-1983
Developed by	:	Harihar Ram, Pushpendra, Kamendra Singh, V.D. Verma
Characters	:	Medium plant height (45-60 cm), grey pubescence, dwarf compact sturdy plant, yellow seed coat, brown hilum, medium bold seed, (13g/100 seeds, good germination, shattering resistant, resistant to yellow mosaic virus, bacterial pustules, and Rhizoctonia areal blight, less infected by white fly, late maturing (125 days), 39.00% protein, 21.00% oil
Recommended areas of cultivation	:	Tarai and approx area of Uttarakhand and plains
Yield	:	30-35 q/ha

PK 237

Variety name	:	**PK 237**
Parentage	:	UPSM 82 x Semmes
Year of release	:	1982 by CVRC
Notification No.	:	SO 2E Dated: 3-1-1983
Developed by	:	Harihar Ram, Pushpendra, Kamendra Singh
Characters	:	Medium height (50-65 cm), grey pubescence, purple flowers, cream colour of seeds with brown hilum, medium size seed (10g/100 seed), good germination, vigorous growth, tolerant to yellow mosaic virus, resistant to bacterial pustules, and *Rhizoctonia* areal blight, contains 40-42% protein and 20-21% oil
Recommended areas of cultivation	:	Northern plains of country
Yield	:	25-30 q/ha

PK 308

Variety name	:	**PK 308**
Parentage	:	Type 31 x Hardee
Year of release	:	1984 by CVRC
Notification No.	:	SO 295E Dated: 9-4-1985
Developed by	:	Harihar Ram, B.B. Singh, Pushpendra, Kamendra Singh, V.D. Verma
Characters	:	First narrow leaf type cultivar with 50-55 cm plant height, white flowers, grey pubescence, moderately resistant to yellow mosaic virus, bacterial pustules and Alternaria leaf spots, attractive yellow seed coat colour, medium size seeds with 20-21% oil and 40-42% protein, matures in 110 days
Recommended areas of cultivation	:	Northern plains of country
Yield	:	20-25 q/ha

PK 416

Variety name	:	**PK 416**
Parentage	:	UPSM-534 x Ankur
Year of release	:	1985 by SVRC
Notification No.	:	SO 258E Dated: 14-5-1986
Developed by	:	Harihar Ram, Pushpendra, Kamendra Singh, V.D. Verma, B.B. Singh
Characters	:	Medium plant height (60-70 cm), resistant to yellow mosaic virus, bacterial pustules, good germination, stable yield across varying plant population (0.2-0.6 m/ha), matures in 115-120 days, protein content 41.56% and oil 23.03%
Recommended areas of cultivation	:	Northern plains of country
Yield	:	30-35 q/ha

PK 472

Variety name	:	**PK 472**
Parentage	:	Hardee x Pb-1
Year of release	:	1986 by CVRC
Notification No.	:	SO 258E Dated: 14-5-1986
Developed by	:	Harihar Ram, Pushpendra, Kamendra Singh, B. B. Singh
Characters	:	Medium plant height (60-65 cm), dwarf compact plant, grey pubescence, white flowers, resistant to lodging and shattering, moderately resistant to Yellow Mosaic Virus and bacterial pustules, matures in 100 days, good quality yellow seeds (12g/100 seeds) with light brown hilum colour, 40% protein and 20% oil content
Recommended areas of cultivation	:	Central zone of the country
Yield	:	25-30 q/ha

PK 564

Variety name	:	**PK 564**
Parentage	:	(UPSM 534 x Ankur) x Bragg
Year of release	:	1990 by SVRC
Notification No.	:	SO 793E Dated: 12-11-1991
Developed by	:	Harihar Ram, Pushpendra, Kamendra Singh, V.D. Verma, Ranjeet, B.B. Singh
Characters	:	Medium plant height (60-65 cm) with determinate growth habit, free from lodging & shattering, white flowers, tawny pubescence, yellow seed coat with light black hilum, resistant to yellow mosaic virus and bacterial pustules, matures in 120 days
Recommended areas of cultivation	:	Northern plains of country
Yield	:	32 q/ha

PS 1024

Variety name	:	**PS 1024**
Parentage	:	PK 308 x PK 317
Year of release	:	1994 by SVRC
Notification No.	:	SO 307E Dated: 1-5-1997
Developed by	:	Harihar Ram, Pushpendra, Kamendra Singh
Characters	:	Narrow leaf variety, suitable for inter cropping with maize, medium plant height, dark green leaves, white flowers, tawny pubescence, yellow seed coat and brown hilum, resistant to yellow mosaic virus, bacterial pustules, tolerant to rust, maturity 120 days, protein content 39.45% and oil 21.6%
Recommended areas of cultivation	:	Northern plains of country
Yield	:	30-35 q/ha

PS 1042

Variety name	:	**PS 1042**
Parentage	:	Bragg x 416
Year of release	:	1996 by CVRC
Notification No.	:	SO 307E Dated: 1-5-1997
Developed by	:	Pushpendra, Kamendra Singh, Harihar Ram
Characters	:	Medium plant height (65-70 cm), sturdy plant, free from lodging and shattering, white flower, tawny pubescence, yellow bold seeds (12.0 g/100 seeds), brown hilum, dark brown pod, multiple disease resistant (YMV, bacterial pustules, pod blight and soybean mosaic), maturity 120 days, 21% oil and 39.0% protein
Recommended areas of cultivation	:	Northern plains of country
Yield	:	30-35 q/ha

PS 1029

Variety name	:	**PS 1029**
Parentage	:	PK 262 x PK 317
Year of release	:	1997 by CVRC
Notification No.	:	SO 647E Dated: 9-9-1997
Developed by	:	Pushpendra, Kamendra Singh, Harihar Ram
Characters	:	Determinate, medium plant height (50-60 cm), free from lodging and shattering, white flower, tawny pubescence, dark green leaves, yellow and bold medium seeds, dark black hilum, resistant to YMV and bacterial pustules, tolerant to rust, matures in 94 days (Southern zone) and 120 days (North India), 40.0% protein and 20% oil
Recommended areas of cultivation	:	Southern India
Yield	:	30-35 q/ha

PS 1092

Variety name	:	**PS 1092**
Parentage	:	PK 327 x PK 416
Year of release	:	1999 by SVRC
Notification No.	:	SO 821E Dated: 13-9-2000
Developed by	:	Pushpendra, Kamendra Singh, Harihar Ram
Characters	:	Medium, determinate and sturdy type plant, height 70-80 cm, free from lodging and shattering, purple flowers, grey pubescence, dark grey pod colour, medium bold seeds (12g/100 seeds), resistant to yellow mosaic virus, bacterial pustules, Cercospora leaf spot, maturity duration 125 days (hills) and 118 days (U.P. plains), can be grown in Rabi (plains) as well as in Kharif (Hills and plains), 40% protein and 20% oil
Recommended areas of cultivation	:	Uttarakhand Hills and U.P. Plains
Yield	:	35 q/ha

PS 1241

Variety name	:	**PS 1241**
Parentage	:	PK-1039 x PK 327
Year of release	:	2003 by SVRC
Notification No.	:	IC 296467
Developed by	:	Pushpendra, Kamendra Singh, B. V. Singh, M.K. Gupta
Characters	:	Tall, semi-determinate plant (80-100cm), light green leaves, white flowers, grey pubescence, yellow medium size seeds (10g/100 seeds) black hilum, resistant to fungal complex, yellow mosaic and bacterial pustules, maturity duration 121 days, protein 39.8% and oil 21.9%, retains 88% germination even at 7 months of storage
Recommended areas of cultivation	:	Tarai and Bhabhar areas of Uttarakhand
Yield	:	36 q/ha

PRS 1

Variety name	:	**PRS 1**
Parentage	:	Selection from exotic line
Year of release	:	2004 by SVRC
Notification No.	:	454 E date 11-2-2009
Developed by	:	Rajendra Prasad, M. Dutta, B.B. Bandhyopadhyay, G.C. Saini, P.L. Gautum
Characters	:	Early maturing, determinate (60-75 cm), Dark green leaves, white flower, gray pubescence, yellow medium size seed, light brown hilum, resistant to YMV and Bacterial pustule, maturity duration 85-90 days
Recommended areas of cultivation	:	All India and Hilly areas of Uttarakhand
Yield	:	20-25 q/ha

PS 1347

Variety name	:	**PS 1347**
Parentage	:	PK 1024 x PK 472
Year of release	:	2006 by CVRC
Notification No.	:	SO 2458E Dated: 16-10-2008
Developed by	:	B.V. Singh, Pushperdra, Kamendra Singh, M.K. Gupta, H.H. Ram
Characters	:	Matures in 122-125 days, resistant to yellow mosaic, bacterial pustules and girdle beetle and tolerant to charcoal rot and Rhizoctonia aerial blight, yellow bold, attractive seeds
Recommended areas of cultivation	:	Uttarakhand, Uttar Pradesh, Haryana and Punjab
Yield	:	35 q/ha

PS 1225

Variety name	:	**PS 1225**
Parentage	:	PK515 (*G. soja* x Bragg)
Year of release	:	2007 by SVRC
Notification No.	:	SO 449E Dated: 11-2-2009
Developed by	:	B.V. Singh, Pushpendra, Kamendra Singh, M.K. Gupta
Characters	:	Matures in 121 days, resistant to yellow mosaic virus, bacterial pustules and charcoal rot and moderately resistant to anthracnose, pod blight, *Rhizoctonia* aerial blight and soybean mosaic virus, creamy yellow round seeds with light reddish brown hilum
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	38 q/ha

PS 19

Variety name	:	**PS 19**
Parentage	:	PK 416 x PK 695
Year of release	:	2010 by SVRC
Notification No.	:	SO 952E Dated: 10-4-2013
Developed by	:	Pushpendra, Kamendra Singh, B.V. Singh, Manoj Kumar Gupta
Characters	:	Resistant to yellow mosaic virus, bacterial pustules and moderately resistant to Rhizoctonia aerial blight. Determinate plant type with uniform distribution of pods, free from lodging and shattering. Yellow seeds with brown hilum. It retained > 85% germination even when stored at room temperature for 8-9 months
Recommended areas of cultivation	:	Tarai & Bhabhar area of Uttarakhand
Yield	:	35-0 q/ha

PS 20

Variety name	:	**PS 20**
Parentage	:	PS 1241 x PS 1042
Year of release	:	2015 by SVRC
Notification No.	:	IC 618591
Developed by	:	Pushpendra, Kamendra Singh, B. V. Singh, Manoj Kumar Gupta
Characters	:	Matures in 117-124 days. Resistant to Yellow Mosaic Virus (YMV), SMV, bacterial pustules tolerant and *Rhizoctonia* Aerial Blight (RAB)
Recommended areas of cultivation	:	Plains, Tarai & Bhabhar and mid hills of Uttarakhand
Yield	:	31-36 q/ha

PS 21

Variety name	:	**PS 21**
Parentage	:	PS 1029 x PS 1241
Year of release	:	2015 by SVRC
Notification No.	:	SO 2805E Dated : 25-08-2017
Developed by	:	Pushpendra, Kamendra Singh, P.S. Shukla, Manoj Kumar Gupta, B.V. Singh
Characters	:	Matures in 123-126 days, resistant to Yellow Mosaic Virus (YMV), SMV & Bacterial pustules. Tolerant to *Rhizoctonia* Aerial Blight (RAB)
Recommended areas of cultivation	:	Plains, Tarai Bhabhar and mid hills of Uttarakhand
Yield	:	30-38 q/ha

PS 22

Variety name	:	**PS 22**
Parentage	:	PS 1029 x PS 1241
Year of release	:	2015 by SVRC
Notification No.	:	IC 618593
Developed by	:	Pushpendra, Kamendra Singh, P. S. Shukla, Manoj Kumar Gupta
Characters	:	Matures in 112-121 days, resistant to Yellow Mosaic Virus (YMV), SMV & Bacterial pustules. Tolerant to *Rhizoctonia* Aerial Blight (RAB)
Recommended areas of cultivation	:	Plains, Tarai Bhabhar and mid hills of Uttarakhand
Yield	:	30-35 q/ha

PS 23

Variety name	:	**PS 23**
Parentage	:	PS 1029 x PS 1241
Year of release	:	2015 by SVRC
Notification No.	:	SO 2805 (E) Dated : 25-08-2017
Developed by	:	Pushpendra, Kamendra Singh, P. S. Shukla, Manoj Kumar Gupta
Characters	:	Matures in 112-121 days, resistant to Yellow Mosaic Virus (YMV), SMV & Bacterial pustules. Tolerant to *Rhizoctonia* Aerial Blight (RAB)
Recommended areas of cultivation	:	Plains, Tarai Bhabhar and mid hills of Uttarakhand
Yield	:	30-35 q/ha

PS 24

Variety name	:	**PS 24**
Parentage	:	JS 335 x PS 1024
Year of release	:	2017 by CVRC
Notification No.	:	SO 2805E Dated : 25-08-2017
Developed by	:	Pushpendra, Kamendra Singh, M.K. Gupta, B.V. Singh
Characters	:	Resistance to Yellow Mosaic Virus, SMV & Bacterial Pustule, *Rhizoctonia* Aerial Blight. Resistance to Insect – Hairy caterpillar, stem fly & girdle beetle. Matures in 115 -120 days
Recommended areas of cultivation	:	North Plain Zone
Yield	:	30-34/ha

PS 25

Variety name : **PS 25**
Parentage : (PS 1042 x MACS 450) x (PS1024 x PS1241)
Year of release : 2019 by CVRC
Notification No. : SO 99E Dated: 6/01/2020
Developed by : Kamendra Singh, Pushpendra, P.S. Shukla, Manoj Kumar Gupta
Characters : Sturdy and compact plant with dark green leaves, narrow straight Lanceolate leaf with long peduncle, matures in 118-120 days. Resistance to Yellow Mosaic Virus, SMV, Bacterial Pustule & Bacterial blight, moderately resistant to *Rhizoctonia* aerial blight, Brown spot, *Colletorichum trucatum* (PBct) & Frog eye leaf spot (FLS). Resistance to Hairy caterpillar, stem fly & girdle beetle at par with other existing varieties of the Zone
Recommended areas of cultivation : North Hill Zone (Himanchal Pradesh and Uttarakhand)
Yield : 30-34/ha

PS 26

Variety name : **PS 26**
Parentage : PS 1092 x PS 1042 x PS 1241
Year of release : 2019 by CVRC
Notification No. : SO 99E Dated: 6/01/2020
Developed by : Kamendra Singh, Pushpendra, P.S. Shukla, Manoj Kumar Gupta
Characters : Sturdy and compact plant with narrow straight Lanceolate leaf with long peduncle. Matures in 120-122 days. Resistance to Yellow Mosaic Virus, SMV, Bacterial Pustule & Bacterial blight, moderately resistant to *Rhizoctonia* aerial blight. Resistance to Hairy caterpillar, stem fly & girdle beetle at par with other existing varieties of the Zone
Recommended areas of cultivation : North Plain Zone
Yield : 30-32/ha

PS 27

Variety name	:	**PS 27**
Parentage	:	: PS 1584 x JS 20-69
Year of release	:	: 2023 by CVRC
Notification No.	:	: Awaited
Developed by	:	: Dr. M. K. Karnwal, Dr. Manoj Kumar Gupta, Dr. P S Shukla, Dr. Pushpendra, Dr. Kamendra Singh, Dr. M.K.Nautiyal,
Characters	:	The varieties high yielder compact determinate with improved plant type (long peduncle, strait rounded ovate leaf). Free from lodging and shattering, possessing multiple disease resistance including YMV, RAB and BLB along with good germinability, Matures in 120-122 days, attractive seed.
Recommended areas of cultivation	:	North Plain Zone including Punjab, Uttar Pradesh (except Budelkhand region) and Delhi
Yield	:	31-33/ha

Pant Toria 303

Variety name	:	**Pant Toria 303**
Parentage	:	B54 x DSH 17 MD
Year of release	:	1985 by CVRC
Notification No.	:	SO.832 (E) Dt: 18/11/1985
Developed by	:	Dr. Basudeo Singh and Team
Characters	:	Tolerant to Alternaria blight, white rust and downy mildew diseases, suitable for irrigated conditions, oil content 42.74%.
Recommended areas of cultivation	:	U.P. and plains of Uttaranchal, Assam, Haryana, Punjab, H.P. and Orissa.
Yield	:	15-18 q/ha

Pant Toria 30

Variety name	:	**Pant Toria 30**
Parentage	:	Composite
Year of release	:	1985 by CVRC
Notification No.	:	SO.165 (E) Dt: 06/03/1987
Developed by	:	Dr. Basudeo Singh and Team
Characters	:	Plant height 115-150 cm, matures in about 93 days, tolerant to Alternaria blight, white rust and Downey mildew diseases, brown coloured seeds, oil content 41.9%.
Recommended areas of cultivation	:	U.P. and plains of Uttaranchal.
Yield	:	14-16 q/ha

Pant Toria 507

Variety name	:	**Pant Toria 507**
Parentage	:	Composite
Year of release	:	1990 by CVRC
Notification No.	:	SO.832 (E) Dt: 15/05/1990
Developed by	:	Dr. Basudeo Singh and Team
Characters	:	Yielded 17.20% higher than national check (T9) under rainfed conditions, plant height 110-132 cm, matures in 85-90 days, seeds medium bold (2.9 g/100 seeds), and contains 43% oil.
Recommended areas of cultivation	:	Eastern States (W.B., Orissa, Bihar) of the country
Yield	:	15-18 q/ha

Pant Toria 508

Variety name	:	**Pant Toria 508**
Parentage	:	(PT 507 x Bhawanio)x PT 303
Year of release	:	2015 by SVRC
Notification No.	:	SO.832 (E) Dt: 30/03/2017
Developed by	:	Dr. Ram Bhajan and Team
Characters	:	Plant height-135 cm, maturity 94 days (Plain), oil content 40%, leaves are lobed, medium green, seeds brown and siliqua bilocular with open siliqua bearing
Recommended areas of cultivation	:	Plain areas of Uttarakhand irrigated)
Yield	:	16-19 q/ha

Pant Toria 2002-25 (Uttara)

Variety name	:	**Pant Toria 2002-25 (Uttara)**
Parentage	:	Derivative of PT 303
Year of release	:	2008 by SVRC
Notification No.	:	SO.211 (E) Dt: 29/01/2010
Developed by	:	Dr. Basudeo Singh and Team
Characters	:	Moderately resistant to WR, DM and PM diseases. It matures in 97 days with oil content 41.75%.
Recommended areas of cultivation	:	Uttarakhand State
Yield	:	15-18 q/ha

Pant Hill Toria 1

Variety name	:	**Pant Hill Toria 1**
Parentage	:	PT-9719 x TS 50
Year of release	:	2015 by SVRC
Notification No.	:	SO.1007 (E) Dt: 30/03/2017
Developed by	:	Dr. Ram Bhajan and Team
Characters	:	Plant height-129.75 cm, maturity 95 days, oil content 41.75%, high temperature tolerance.
Recommended areas of cultivation	:	Hilly areas of Uttarakhand
Yield	:	9-12 q/ha

Pant Shweta

Variety name	:	**Pant Shweta**
Parentage	:	PYS-841 x PYS-7
Year of release	:	2015 by SVRC
Notification No.	:	SO.1007 (E) Dt: 30/03/2017
Developed by	:	Dr. Ram Bhajan and Team
Characters	:	Plant height-104 cm. maturity 106 days, oil content 45.24%, special trait tetra ocular upright siliqua alignment and creamish white flower.
Recommended areas of cultivation	:	Plain areas of Uttarakhand (irrigated)
Yield	:	16-20 q/ha

Pant Pili Sarson 1

Variety name	:	**Pant Pili Sarson 1**
Parentage	:	Local selection
Year of release	:	2005 SVRC
Notification No.	:	SO.211 (E) Dt: 29/01/2010
Developed by	:	Dr. Basudeo Singh and Team
Characters	:	Resistant to WR and DM and tolerant to AB, DM and Sclerotia stem rot diseases and oil content 44%. It matures in 107-112 days. Pendent bearing of siliqua
Recommended areas of cultivation	:	areas of Uttarakhand
Yield	:	15-19 q/ha

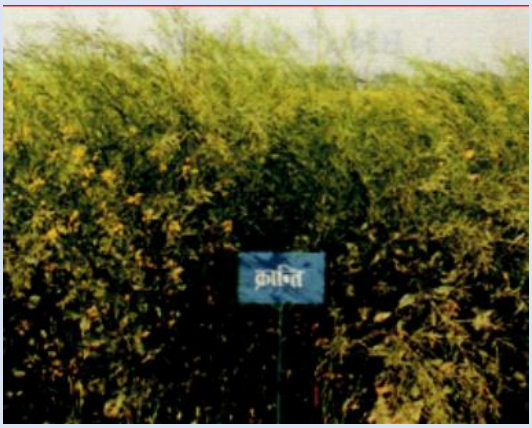
Pant Girija

Variety name	:	**Pant Girija**
Parentage	:	NDYS-123×Ragini
Year of release	:	2018
Notification No.	:	SO.99 (A) Dt: 06/01/2020
Developed by	:	Dr. Ram Bhajan and Team
Characters	:	Medium maturity, yellow flower upright bilocular siliqua bearing
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	10-16q/ha

Pant Pili sarson-2

Variety name	:	**Pant Pili sarson-2**
Parentage	:	RYSK-050-1 × B-9
Year of release	:	2022
Characters	:	Medium maturity, yellow flowered. Upright Multilocular siliqua bearing. Having white rust immune reaction.
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	9.70-18.00q\ha

Kranti



Variety name	:	**Kranti**
Parentage	:	Selection from Varuna
Year of release	:	1982 by CVRC
Notification No.	:	SO.1007 (E) Dt: 30/03/2017
Developed by	:	Dr. Basudeo Singh and Team
Characters	:	Resistant to downy mildew and white rust and tolerant to frost and Alternaria as compared to Varuna, matures in 125-130 days.
Recommended areas of cultivation	:	All mustard growing areas throughout country
Yield	:	30 q/ha

Krishna

Variety name	:	**Krishna**
Parentage	:	Selection from Varuna
Year of release	:	1983 by CVRC
Notification No.	:	SO.596 (E) Dt: 13/08/1984
Developed by	:	Dr. Basudeo Singh and Team
Characters	:	More tolerant to frost and less susceptible to mustard sawfly and aphid as compared to Varuna, matures in about 130 days
Recommended areas of cultivation	:	Uttar Pradesh, Plains of Uttarakhand, Madhya Pradesh, Punjab, Haryana, Delhi, Rajasthan, West Bengal, Bihar and Orissa.
Yield	:	22-28 q/ha

Pant Rai 19

Variety name	:	**Pant Rai 19**
Parentage	:	Krishna-2-1 x HS-027-1
Year of release	:	2012 by CVRC
Notification No.	:	SO.1708 (E) Dt: 26/07/2012
Developed by	:	Dr. Ram Bhajan and Team
Characters	:	Matures in 117 dayswith oil content 41.3%. It is tolerant to high temperature at seedling stage, escapes diseases and aphids, if sown early.
Recommended areas of cultivation	:	Haryana, Punjab, Parts of Rajesthan and New Delhi
Yield	:	20-22 q/ha

Pant Rai 20

Variety name	:	**Pant Rai 20**
Parentage	:	Selection from Kranti
Year of release	:	2012 by SVRC
Notification No.	:	SO.268 (E) Dt: 01/10/2015
Developed by	:	Dr. Ram Bhajan and Team
Characters	:	Matures in 124 days, moderately resistant to Alternaria blight, white rust and Downey mildew diseases. High temperature tolerance at maturity
Recommended areas of cultivation	:	Plain areas of Uttarakhand
Yield	:	25-30 q/ha

Pant Rai 21

Variety name	:	**Pant Rai 21**
Parentage	:	(Varuna x PUSA Bold) x BSIPS 23
Year of release	:	2015 by SVRC
Notification No.	:	SO.1007 (E) Dt: 30/03/2017
Developed by	:	Dr. Ram Bhajan and Team
Characters	:	Plant height- 185.5 cm, matures in 126 days, oil content 40.34% and flowers are creamish white. Bold seeded
Recommended areas of cultivation	:	Plain areas of Uttarakhand (irrigated)
Yield	:	22-25 q/ha

Pant Rai 22

Variety name	:	**Pant Rai 21**
Parentage	:	Krantix Vardan
Year of release	:	2022
Characters	:	Medium maturity, medium plant height, long main raceme. Moderately resistance to Alternaria blight and white rust.
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	11.84-19.40 q/ha

Kiran Rai

Variety name	:	**Kiran**
Parentage	:	Selection from HC 5
Year of release	:	1997 by CVRC
Notification No.	:	SO.401 (E) Dt: 15/05/1998
Developed by	:	Dr. Basudeo Singh and Team
Characters	:	High yielding at low input, tolerant to Alternaria blight and white rust diseases and seed mustard aphid, plant height 210-225 cm, matures in about 170-175 days, seeds medium bold (3.2g/1000 seeds) and dull yellow in colour and contains 40% oil.
Recommended areas of cultivation	:	Rainfed areas in Plains throughout country
Yield	:	18-22 q/ha

4. Millets

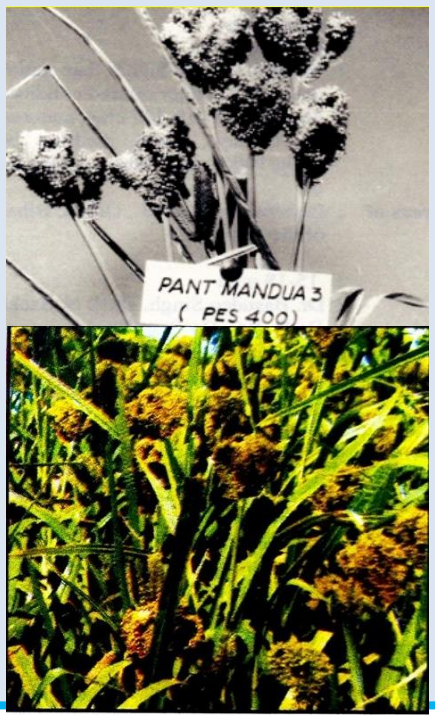
4.1 Barnyard Millets (*Echinocloa frumentacea* L.) Jhingora

PRJ 1

Variety name	:	**PRJ 1**
Parentage	:	Selection from germplasm accession IEC542, collection of ICRISAT, Hyderabad, India
Year of release	:	2003 by SVRC
Notification No.	:	S.O.454(E)/11.2.2009
Developed by	:	Drs. G. C. Saini, B.B.Banyopadhyay, M.Dutta, J.Kumar and Rajendra Prasad
Characters	:	Medium tall, dark, lush green foliage, small awns in spike, profuse tillering, stiff straw, lodging resistant, resistant to smut disease
Recommended areas of	:	Mid Hills of Uttarakhand

4.2 Finger Millets (*Eleucine coracana* L. *Gaertn*.) Mandua, Ragi

Pant Mandua 3

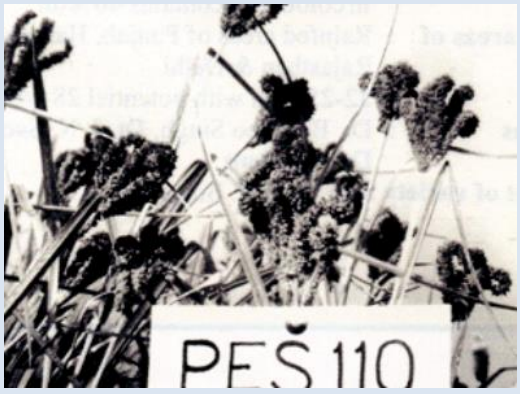


Variety name	:	**Pant Mandua 3**
Parentage	:	Pure Line Selection
Year of release	:	1986 by SVRC
Notification No.	:	-
Developed by	:	Drs. D.V.S Tyagi and R.S. Rawat
Characters	:	Plant height 80-85 cm, ear head top curved, resistant to blast, matures in about 95 days, light brown seed colour, protein 8.5%, fits well in ragi-wheat crop rotation, suitable for both rainfed and irrigated conditions
Recommended areas of cultivation	:	Uttarakhand hills and other ragi growing areas
Yield	:	18-20 q/ha

PES 176

Variety name	:	**PES 176**
Parentage	:	Selection from IC germplasm
Year of release	:	1985 by SVRC
Notification No.	:	-
Developed by	:	Drs. D.V.S Tyagi, B.B.Singh, R.S. Rawat and S.S. Ahalawat
Characters	:	Plant height 80-85 cm, ear head top curved, moderately resistant to blast, matures in about 100-105 days, light brown seed colour, protein 8.5%, suitable for both rainfed and irrigated conditions
Recommended areas of cultivation	:	Uttarakhand hills and other ragi growing areas
Yield	:	q/ha with yield potential 28 q/ha

PES 110



Variety name	:	**PES 110**
Parentage	:	Pure Line Selection from IC germplasm
Year of release	:	1985 by CVRC
Notification No.	:	S.O.540(E)/24.7.1985
Developed by	:	Drs. D.V.S Tyagi, R.S. Rawat and S.S. Ahalawat
Characters	:	Plant height 90-95 cm, ear head top curved, resistant to blast, matures in about 115-120 days, bold light brown seeds, protein 9.0 %, suitable for both rainfed and irrigated conditions, best national variety
Recommended areas of cultivation	:	All ragi growing regions of the country
Yield	:	27-28 q/ha with potential of 28 q/ha

PRM - 1

Variety name	:	**PRM-1**
Parentage	:	Pure Line Selection from germplasm of Ekeshwar region of Pauri Garhwal District
Year of release	:	2006 SVRC
Notification No.	:	S.O.454 (E)/11.2.2009
Developed by	:	Drs. G.C.Saini, V.K.Yadav, M.Dutta, B.B.Bandyopadhyay, R.Prasad, S.C. Gupta, J.Kumar and P.L.Gautam
Characters	:	Plant height 100-110cm, ear head semi-open, pale green stem, light brown ear, moderately resistant to blast, matures in about 110-115 days. 6-10 fingers of 8-10 cm length. Seed light copper in colour, protein about 7.0% good dual purpose variety.
areas of cultivation	:	All ragi growing regions of the Uttarakhand
Yield	:	24-30q/ha

PRM - 2

Variety name	:	**PRM-2**
Parentage	:	Pure Line Selection from Tehri Local
Year of release	:	2010
Notification No.	:	S.O.2326 (E)/10.10.2011
Developed by	:	Dr. Vijay Yadav
Characters	:	Plant height 90-95 cm, ear head semi-compaxt, moderately resistant to blast and cercospora leaf spot, matures in about 100-105 days, seed light copper in colour, good for ragi-wheat crop rotation. rich in protein 9.14%
Recommended areas of cultivation	:	All ragi growing regions of the Uttarakhand
Yield	:	25-28 q/ha

4.3 Italian Millets (*Setaria italica* L. *Beauv*) Kakun, Kauni

Pant Setaria 4

Variety name	:	**Pant Setaria 4**
Parentage	:	563/SIA2616-0.2 EMS (Developed through Mutation Breeding Technique)
Year of release	:	1999 by CVRC
Notification No.	:	S.O. 425 (E)/8.6.1999
Developed by	:	Drs. D.V.S.Tyagi and R. S. Rawat
Characters	:	Plant height 103-105 cm, long droopy ear heads, tolerant to blast, matures in 80-85 days, light yellow seed colour, protein 13-15%, grain husk ratio 80:20, suitable for both rainfed and irrigated conditions, a novel Kakun variety for dry land farming
Recommended areas of cultivation	:	All foxtail millet (Kakun) growing areas of the country
Yield	:	17-18 q/ha

PRK 1 (Himadari)

Variety name	:	**PRK 1 (Foxtail Millet)**
Parentage	:	Selection from Selem Khet Local
Year of release	:	1995 by SVRC
Notification No.	:	-
Developed by	:	Drs. G.C.Saini, R.Prasad, M.Dutta, P.L.Gautam and J.Kumar
Characters	:	Earliest maturing (100-105 days), plant height 90-1000 cm, 2-3 tillers per plant, compact ear head, blunt awn less panicle, violet pigmentation of leaves and stem at maturity, yellowish brown grains, resistant to lodging and shattering
Recommended areas of cultivation	:	Mid & high hills of Uttarakhand
Yield	:	20 q/ha

4.4 Proso Millet (*Panicum miliaceum* L.) Cheena

PRC 1

Variety name	:	PRC-1 (Proso Millet)
Parentage	:	Selection from GPMS 519
Year of release	:	2008
Notification No.	:	S.O.211 (E)/29.1.2010
Developed by	:	Dr. Vijay Yadav and M.Dutta
Characters	:	Erect medium tall plants (110-125 cm), dark green foliage, 25-30 cm long panicles, bold seeded, dark amber coloured grains. resistant to Helminthosporium leaf blight
Recommended areas of cultivation	:	Uttarakhand hills
Yield	:	10-12 q/ha

5. Pseudo Cereals

5.1 Amaranth (*Amaranthus hypochondriacus*) Ramdana

PRA 1

Variety name	:	**PRA 1**
Parentage	:	Selection from Ranichauri germplasm collection
Year of release	:	1996 by SVRC
Notification No.	:	-
Developed by	:	Ranichauri , GBPUAT
Characters	:	Medium maturing (120 days), 39% better yielder and one week earlier in maturity than the national check variety Annapurna, tall (1.5 m), dark green plants with long (60-70 cm), compact year head, bold seeded, 14.5% protein and 9.2% oil
Recommended areas of cultivation	:	Normal sown and rainfed
Yield	:	25 q/ha

PRA 2

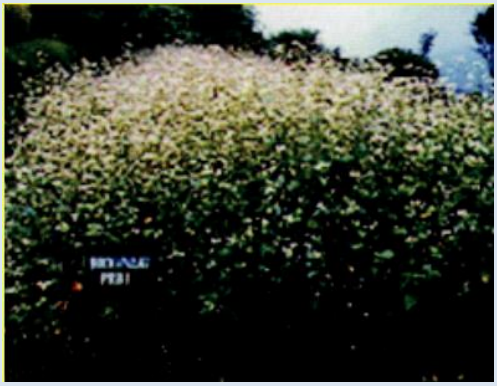
Variety name	:	**PRA 2**
Parentage	:	Selection from Sanawali Local
Year of release	:	2000 by CVRC
Notification No.	:	-
Developed by	:	Ranichauri, GBPUAT
Characters	:	Stem light yellow with dark green leaves, average plant height 138 cm ear head semi compact & yellow, seed medium bold (9.3g/100 seed), protein content 14.10% and oil content 14.1%
Recommended areas of cultivation	:	North Western Himalayan region excluding Jammu and Kashmir
Yield	:	15-20 q/ha

PRA 3 (Grain Amaranth)

Variety name	:	**PRA 3 (Grain Amaranth)**
Parentage	:	PRA 8801 x Suvarna
Year of release	:	2003 by CVRC
Notification No.	:	-
Developed by	:	Ranichauri, GBPUAT
Characters	:	Medium tall (140 cm), dark green plant, long inflorescence, semi-compact ear head, 135day maturity, seed weight 8.33g/100 seeds, creamish yellow and protein content 14,08%
Recommended areas of cultivation	:	North Western Himalayan Region excluding Jammu and Kashmir
Yield	:	15-20 q/ha in Kharif and 6 to 8 q/ha in Zaid

5.2 Buck Wheat (*Fagopyrum esculantum* L. *Moench*) Kuttu

Pant Rani Buck Wheat 1 (PRB 1)



Variety name	:	**Pant Rani Buck Wheat 1 (PRB 1)**
Parentage	:	Selection from Ranichauri germplasm collection
Year of release	:	1997 by CVRC
Notification No.	:	401 (E)/15-5-1998
Developed by	:	Ranichauri, GBPUAT
Characters	:	Very tall (130) plant, purple coloured stem with long internodes, medium maturing (102 days), about 15 days earlier than the national check, Himpriya, flower pinkish white, bold, angular, light brown seeds with high protein (11.4%) content
Recommended areas of cultivation	:	Rainfed hilly region of the country
Yield	:	25 q/ha

6. Forage Crops

6.1 Sorghum (*Sorghum bicolor* L. Moench)

UP Chari 1

Variety name	:	**UP Chari 1**
Parentage	:	Selection from line IS 4776
Year of release	:	1983 by SVRC and 1983 by CVRC
Notification No.	:	499(E) dated 08.07.1983
Developed by	:	Dr. D.L. Singhania
Characters	:	Plant purple colour, tall, high TSS, high digestibility, resistant to shootfly, stem borer, leaf disease like zonate leaf spot, bacterial leaf spot and leaf blight, very low HCN content.
Recommended areas of cultivation	:	Throughout the country
Yield	:	Green fodder: 350-375 q/ha Dry fodder: 125-150 q/ha

UP Chari 2

Variety name	:	**UP Chari 2**
Parentage	:	Vidisha 60-1 x IS 6953
Year of release	:	1984 by CVRC
Notification No.	:	295(E) dated 09.04.1985
Developed by	:	Dr. D.L. Singhania, Dr. Rameshwar Singh, Dr. Vikram Singh, Mr. P.K. Shrotria, Dr. H.S. Chawla
Characters	:	Tan plant colour, tall plant, stem thick and juicy, early to medium flowering, resistant to anthracnose and Zonate leaf spot maturity 105-110 days.
Recommended areas of cultivation	:	Throughout the country.
Yield	:	Green fodder: 375-425 q/ha Dry fodder: 150-200 q/ha

UP Chari 3

Variety name	:	**UP Chari 3**
Parentage	:	Vidisha 60-1 x IS 6953
Year of release	:	1989 by SVRC
Notification No.	:	527(E) dated 16.08.1990
Developed by	:	Dr. Rameshwar Singh, Dr. Vikram Singh, Dr. P.K. Shrotria, Dr. D.L. Singhania, Mr. Dal Chand, Mr. S.V. Singh, Mr. K.P.S. Tomar
Characters	:	Tan plant colour, tall, dual purpose, resistant to foliar diseases, high protein content, medium early maturity.
Recommended areas of cultivation	:	North-Western U.P.
Yield	:	Green fodder: 400-450 q/ha Dry fodder: 150-200 q/ha

UP Chari 4

Variety name	:	**UP Chari 4**
Parentage	:	IS 4776 x RIO
Year of release	:	1995 by SVRC
Notification No.	:	360(E) dated 01.05.1999
Developed by	:	Dr. Rameshwar Singh, Dr. Vikram Singh, Dr. P.K. Shrotria, Mr. Dal Chand
Characters	:	Purple plant, tall, juicy with dark green foliage, high TSS and protein content, resistant to shoot fly and stem borer.
Recommended areas of cultivation	:	North-Western U.P.
Yield	:	Green fodder: 450-475 q/ha Dry fodder: 120-125 q/ha Seed: yield: 10-15 q/ha

UP Chari 5

Variety name	:	**UP Chari 5**
Parentage	:	CS 3541 x IS 6953
Year of release	:	1999 by CVRC
Notification No.	:	SO.1050(E) dated 26.10.1999
Developed by	:	Dr. Rameshwar Singh, Dr. Vikram Singh, Dr. P.K. Shrotria, Dr. P.K. Pandey, Dr. D.C. Baskheti, Mr. Het Ram and Mr. Ajeet Kumar
Characters	:	Tan plant colour, tall, resistant to leaf diseases, juicy stem with high TSS, protein, digestibility and low HCN content, dual purpose variety.
Recommended areas of cultivation	:	Throughout the country
Yield	:	Green fodder: 450-490 q/ha Dry fodder: 125-135 q/ha Seed: yield: 16-18 q/ha

UP Chari 6

Variety name	:	**UP Chari 6**
Parentage	:	Selection from Zimbabwe germplasm line SDSL 92140
Year of release	:	2004 by SVRC
Notification No.	:	SO. 1572(E) dated 20.09.2006
Developed by	:	Dr. Vikram Singh, Dr. P.K. Shrotria, Mr. Shivji Singh, Mr. Rajendra, Mr. Ajeet Kumar, Dr. Rameshwar Singh, Dr. P.K. Pandey, Dr. D.C. Baskheti
Characters	:	Tan, tall plant, low HCN content and high protein & good dry matter digestibility with tolerance to foliar diseases.
Recommended areas of cultivation	:	North-West India
Yield	:	Green fodder: 700-800 q/ha Dry fodder: 175-185 q/ha Seed: yield: 15-17 q/ha

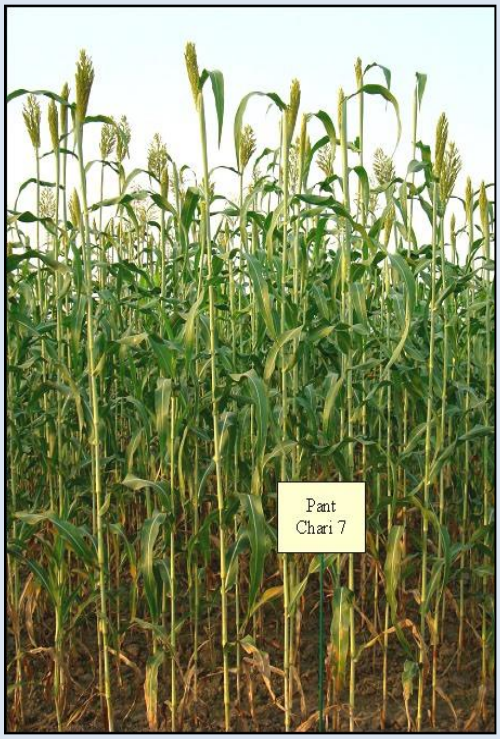
CSH 20 MF

Variety name	:	**CSH 20 MF**
Parentage	:	2219 A x UPMC 503
Year of release	:	2005 by CVRC
Notification No.	:	SO. 1172(E) dated 25.08.2005
Developed by	:	Dr. Vikram Singh, Dr. P.K. Shrotria, Mr. Shivji Singh, Mr. Rajendra, Mr. Ajeet Kumar, Dr. Rameshwar Singh, Dr. P.K. Pandey, Dr. D.C. Baskheti
Characters	:	Tan, tall plant height, multicut, low HCN content and high protein & good dry matter digestibility. Resistant to foliar diseases.
Recommended areas of cultivation	:	North-West plane zone
Yield	:	Green fodder: 800-900 q/ha Dry fodder: 240-255 q/ha

CSH 24 MF

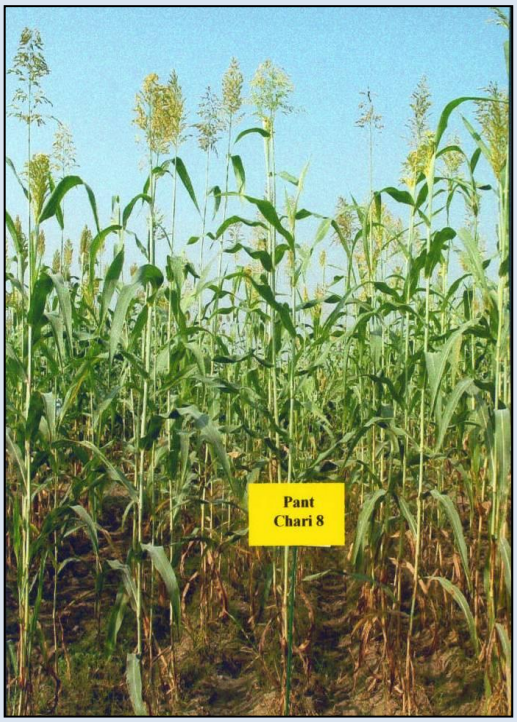
Variety name	:	**CSH 24 MF**
Parentage	:	ICSA467 x Pant Chari 6
Year of release	:	2009 by CVRC
Notification No.	:	SO. 2187(E) dated 27.08.2009
Developed by	:	Dr. P.K. Shrotria, Mr. Shivji Singh, Mr. Ajeet Kumar, Dr. Vikram Singh
Characters	:	Tan with tillering type, tall plant, juicy stem. Resistant to foliar diseases. High protein & good digestibility. Low HCN content. Good seed yield.
Recommended areas of cultivation	:	All India
Yield	:	Green fodder: 850-925 q/ha Dry fodder: 230-245 q/ha

Pant Chari 7



Variety name	:	**Pant Chari 7**
Parentage	:	[Rio x{(IS 4907 x IS 4776) x US 607 x IS 8607}]
Year of release	:	2010 by SVRC
Notification No.	:	SO. 2326(E) dated 10.10.2011
Developed by	:	Dr. P.K. Shrotria, Dr. Vikram Singh, Mr. Shivji Singh, Mr. Ajeet Kumar
Characters	:	Tan type pant, Very tall height Dual purpose type. Semi sweet stem with high protein content and high digestibility (50-57% IVDMD) of fodder. Resistant to major foliar diseases.
Recommended areas of cultivation	:	Rainfed (Kharif) cultivation in planes and lower hills of Uttarakhand
Yield	:	Green fodder: 500-600 q/ha Dry fodder: 170-250 q/ha Seed Yield: 17-19 q/ha

Pant Chari 8

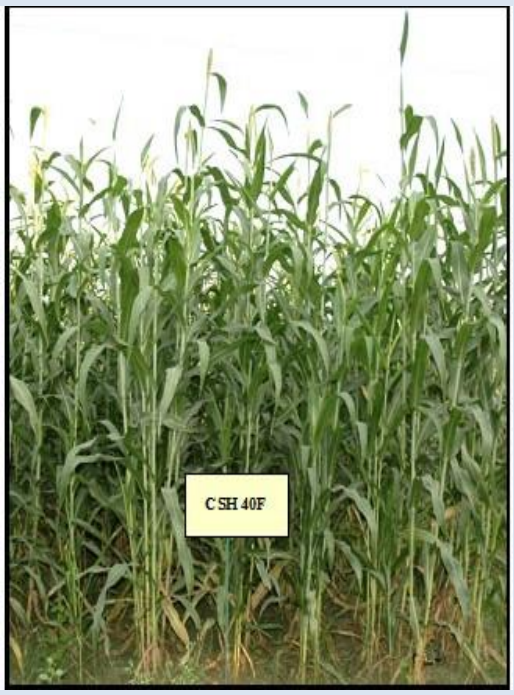


Variety name	:	**Pant Chari 8**
Parentage	:	Selection from Germplasm SDSL 92102
Year of release	:	2010 by SVRC
Notification No.	:	SO. 2326(E) dated 10.10.2011
Developed by	:	Dr. P.K. Shrotria, Mr. Shivji Singh, Mr. Ajeet Kumar
Characters	:	Tan, tall, multi cut, with low HCN content (98.74 ppm) at early stage, suitable for irrigated summer and *Kharif* season. High protein content (7.32%) and high digestibility (55.73% IVDMD). Resistant to major foliar diseases
Recommended areas of cultivation	:	Irrigated spring/summer (March-April sowing and rainfed Kharif cultivation in plains of Uttarakhand
Yield	:	Green fodder: 700-750 q/ha Dry fodder: 200-250 q/ha

CSV 35 F

Variety name	:	**CSV 35 F**
Parentage	:	Pant Chari 5 x IS 7002
Year of release	:	2018 by CVRC
Notification No.	:	SO 6318(E) dated 26.12.2018
Developed by	:	Dr. P.K. Shrotria, Dr. P.K. Pandey, Dr. Shivji Singh, Mr. Ajeet Kumar
Characters	:	Tan type plant, Tall, stay green quality and red colour grain, good grain yield, very high protein content (8.30) and high digestibility (53.71%). Resistance to foliar disease.
Recommended areas of cultivation	:	All India
Yield	:	Green fodder: 650-750 q/ha Dry fodder: 175-200 q/ha Seed Yield: 12-15 q/ha

CSH 40F



Variety name	:	**CSH 40F**
Parentage	:	$11A_2$ x Pant Chari 5
Year of release	:	2018 by CVRC
Notification No.	:	SO 6318(E) and 26.12.2018
Developed by	:	Dr. P.K. Shrotria, Dr. P.K. Pandey, Dr. Shivji Singh, Mr. Ajeet Kumar
Characters	:	Tan type plant, tall height, High, low HCN content (92.42ppm), very high protein content (8.39%) and high digestibility (53.46%). Resistance to foliar disease.
Recommended areas of cultivation	:	All India
Yield	:	Green fodder: 700-900 q/ha Dry fodder: 200-275 q/ha

Pant Chari 9

Variety name	:	**Pant Chari 9**
Parentage	:	IS 3359 x SDSL92101
Year of release	:	2018 by SVRC
Notification No.	:	Waited
Developed by	:	Dr. P.K. Shrotria, Dr. P.K. Pandey, Dr. Shivji Singh, Mr. Ajeet Kumar
Characters	:	Tan, tall, multi cut with low HCN content (100.26 ppm) , suitable for summer and *Kharif* season. Nutritious fodder with protein content (7.29%) and good digestibility (58.74% IVDMD). The variety is resistant to major foliar diseases.
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	Green fodder: 700-800 q/ha Dry fodder: 195-225 q/ha Seed Yield: 10-12 q/ha

Pant Chari 10

Variety name	:	**Pant Chari 10**
Parentage	:	SPV 1616 x UPMC 512
Year of release	:	2018 by SVRC
Notification No.	:	Awaited
Developed by	:	Dr. P.K. Shrotria, Dr. P.K. Pandey, Dr. Shivji Singh, Mr. Ajeet Kumar
Characters	:	Tan, tall plant type, with low HCN content (86.39 ppm) at early stage, suitable for summer and *Kharif* seasons. Highly nutritious fodder with high protein content (7.16%). Resistant to major foliar diseases.
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	Green fodder: 750-800 q/ha Dry fodder: 175-225 q/ha Seed Yield: 8-10 q/ha

Pant Chari 11

Variety name	:	**Pant Chari 11**
Parentage	:	2018 by SVRC
Year of release	:	2018 by SVRC
Notification No.	:	Awaited
Developed by	:	Dr. P.K. Shrotria, Dr. P.K. Pandey, Dr. Shivji Singh, Mr. Ajeet Kumar
Characters	:	Tan, tall, multi cut with low HCN content (89.19 ppm). suitable for summer and *Kharif* seasons. It has highly nutritious fodder with high protein content (7.28%). The variety is resistant to major foliar diseases.
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	Green fodder: 800-875 q/ha Dry fodder: 190-250 q/ha Seed Yield: 8-10 q/ha

Pant Chari 12

Variety name	:	**Pant Chari 12**
Parentage	:	PC 23 x (SDSL 92101 x UPFS 23)-1
Year of release	:	2020 by SVRC
Notification No.	:	Waited
Developed by	:	Dr. P.K. Shrotria, Dr. P.K. Pandey, Dr. Shivji Singh, Mr. Ajeet Kumar
Characters	:	Tan type pant, Very tall with low HCN content (86.83 ppm) Medium bold grains (12-13 q/ha). It has high protein content (7.2%) and high digestibility (60.47% IVDMD) of fodder. The variety has resistance to major foliar diseases
Recommended areas of cultivation	:	Plains and lower hills of Uttarakhand
Yield	:	Green fodder: 550-600 q/ha Dry fodder: 200-250 q/ha Seed Yield: 12-13 q/ha

Pant Chari 13

Variety name	:	**Pant Chari 13**
Parentage	:	PC 23 x (SDSL 92101 x UPFS 23)-2
Year of release	:	2020 by SVRC
Notification No.	:	Waited
Developed by	:	Dr. P.K. Shrotria, Dr. P.K. Pandey, Dr. Shivji Singh, Mr. Ajeet Kumar
Characters	:	Tan, tall, with low HCN content (85.91 ppm) Medium bold grains (10-12 q/ha). Protein content (6.96%) and high digestibility (59.74% IVDMD) of fodder. Resistant to major foliar diseases
Recommended areas of cultivation	:	Plains and lower hills of Uttarakhand
Yield	:	Green fodder: 550-625 q/ha Dry fodder: 200-260 q/ha Seed Yield: 10-12 q/ha

Pant Chari 14

Variety name	:	**Pant Chari 14**
Parentage	:	UPFS 37 x UPMC 6
Year of release	:	2020 by SVRC
Notification No.	:	Waited
Developed by	:	Dr. P.K. Shrotria, Dr. P.K. Pandey, Dr. Shivji Singh, Mr. Ajeet Kumar
Characters	:	Tan, tall plant, multi cut with low HCN content (88.15 ppm), Suitable for cultivation summer and *Kharif* seasons. Nutritious fodder with high protein content (7.18%), high digestibility (62.08% IVDMD). Rresistant to major foliar diseases.
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	Green fodder: 800-900 q/ha Dry fodder: 200-300 q/ha Seed Yield: 10-12 q/ha

Pant Chari 15

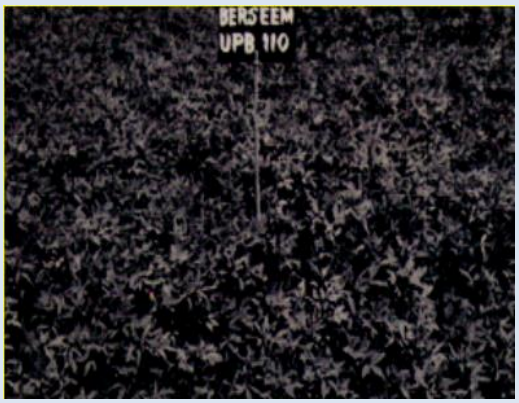
Variety name	:	**Pant Chari 15**
Parentage	:	IS3267 x UPMC 512
Year of release	:	2020 by SVRC
Notification No.	:	Awaited
Developed by	:	Dr. P.K. Shrotria, Dr. P.K. Pandey, Dr. Shivji Singh, Mr. Ajeet Kumar
Characters	:	Tan, tall height multi cut with low HCN content (87.96 ppm) at early stage. It has highly nutritious fodder with high protein content (7.05%), high protein yield (18.17 q/ha). The variety is resistant to major foliar diseases.
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	Green fodder: 840-900 q/ha Dry fodder: 240-260 q/ha Seed Yield: 14-15 q/ha

CSH 43MF

Variety name	:	**CSH 43 MF**
Parentage	:	$11A_2$ x Pant Chari 6
Year of release	:	2020 by CVRC
Notification No.	:	S.O. 500(E) and 29.01.2021
Developed by	:	Dr. P.K. Shrotria, Dr. P.K. Pandey, Dr. Shivji Singh, Mr. Ajeet Kumar
Characters	:	Tan, tall, tillering type, juicy stem. Resistant to foliar diseases. High protein (7.46%) & digestibility (51.19% IVDMD) and low HCN content (75.94 ppm).
Recommended areas of cultivation	:	All India
Yield	:	Green fodder: 1100-1300 q/ha Dry fodder: 300-350 q/ha

6.2 Berseem (*Trifolium alexandrinum* L.)

UPB 110



Variety name	:	**UPB 110**
Parentage	:	Composite of 5 UPB lines
Year of release	:	1993 by CVRC
Notification No.	:	615(E) DATED 17TH AUGUST 1993)
Developed by	:	GBPUAT, Pantnagar
Characters	:	Abundance of dark green, broad foliage, resistant to collar rot, five-six cuts in timely planted crop, better seed yielding ability, tolerant to hairy caterpillar
Recommended areas of cultivation	:	Southern Zone of the country
Yield	:	700-800 q/ha

6.3 Cowpea (*Vigna unguiculata* L. *Walp*. LOBIA)

UPC 5286

Variety name	:	**UPC 5286**
Parentage	:	Selection from CK 72-5286
Year of release	:	1981 by CVRC
Notification No.	:	2103 dated 21st August 1980
Developed by	:	GBPUAT, Pantnagar
Characters	:	resistant to yellow mosaic virus, anthracnose, wilt, stem and shoot rot, pod and seed borer, moderately resistant to hairy caterpillar, tolerant to pod shattering
Recommended areas of cultivation	:	All India
Yield	:	300-350 q/ha

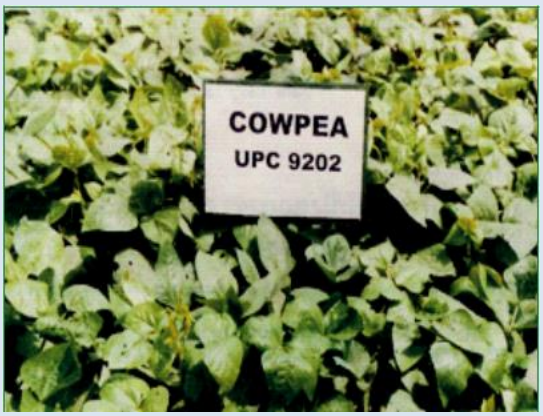
UPC 5287

Variety name	:	**UPC 5287**
Parentage	:	Selection from CK 72-5286
Year of release	:	1986 by CVRC
Notification No.	:	258(E) DATED 14TH MAY 1986)
Developed by	:	GBPUAT, Pantnagar
Characters	:	Resistant to Pythium / Rhizoctonia fusarium complex, CYMV, better tolerance to moisture stress, good summer growth
Recommended areas of cultivation	:	All India
Yield	:	325-375 q/ha green fodder and 35-40 q/ha dry matter

UPC 287

Variety name	:	**UPC 287**
Parentage	:	Selection from CK 72 287
Year of release	:	1989 by CVRC
Notification No.	:	471(E) DATED 5TH MAY 1988)
Developed by	:	GBPUAT, Pantnagar
Characters	:	Suitable for summer cultivation and intercropped situations medium early, resistant to wilt, CYMV, stem rot, anthracnose and pod borer, good tolerance to drought and pod shattering
Recommended areas of cultivation	:	All India
Yield	:	300-35- q/ha

UPC 9202



Variety name	:	**UPC 9202**
Parentage	:	V260 x UPC 9805
Year of release	:	1999 by CVRC
Notification No.	:	5425(E) DATED 9TH JUNE 1999)
Developed by	:	GBPUAT, Pantnagar
Characters	:	Resistant to pod borer, stem and collar rot, yellow mosaic, better dry matter digestibility and seed producing ability, biomass remains green after pod maturity, suitable as dual purpose variety
Recommended areas of cultivation	:	Central zone of the country
Yield	:	350-425 q/ha

UPC 4200

Variety name	:	**UPC 4200**
Parentage	:	Selection from CK-76-4200
Year of release	:	1991 by CVRC
Notification No.	:	793(E) DATED 22ND NOVEMBER 1991)
Developed by	:	GBPUAT, Pantnagar
Characters	:	Resistant to root and collar rot, yellow mosaic virus, pod and seed borer, dark green foliage, fertilizer responsive, suitable for humid, temporary waterlogged and acidic soil areas
Recommended areas of cultivation	:	North-Eastern zone of the country
Yield	:	350-400 q/ha

UPC 8705

Variety name	:	**UPC 8705**
Parentage	:	N425 x H288
Year of release	:	1996 by CVRC
Notification No.	:	349(E) DATED 20TH MAY 1996)
Developed by	:	GBPUAT, Pantnagar
Characters	:	Resistant to root rot, yellow mosaic, pod borer and tolerant to pod shattering, medium bold seeds, long pods
Recommended areas of cultivation	:	All India
Yield	:	350-400 q/ha GFY

UPC 607

Variety name	:	**UPC 607**
Parentage	:	L212 x Singapore
Year of release	:	2003 by CVRC
Notification No.	:	283 (E)/12-3-2003
Developed by	:	GBPUAT, Pantnagar
Characters	:	Resistant to tallow mosaic virus, anthracnose, bacterial blight, aphid, pod borers and root knot nematode, first ever white seeded fodder cowpea variety with smooth to rough testa, most preferred for human consumption, dual purpose (fodder cum grain) variety, good seed producing ability
Recommended areas of cultivation	:	North Western zone of the country
Yield	:	350-425 q/ha GFY

UPC 622

Variety name	:	**UPC 622**
Year of release	:	2007
Notification No.	:	(UPC-8703 × IT-84 E-124 -2-5-1)
Developed by	:	GBPUAT, Pantnagar
Characters	:	Tolerant to drought & other edaphic stresses. Resistant to cowpea YMV, Anthracnose, Root/Collar Rot and BLB diseases, aphids, leaf miner, flea beetle/defoliators, pod borer and root know nematode. Tolerant to bruchids
Recommended areas of cultivation	:	NEPZ (AS,BH,WB) NWPZ (HR, JH, PN, RJ, UP, UK) NHZ (HP, J&K) CZ- MP, SZ - OD
Yield	:	300-350 q/ha Green Fodder

UPC 625

Variety name	:	**UPC 625**
Parentage	:	**(**CL-2 x HLD-1) -1-5-1
Year of release	:	2009 by CVRC
Notification No.	:	449(E) DATED 11TH FEBRUARY 2009)
Developed by	:	Dr. J.S. Verma and Dr. S.N. Mishra
Characters	:	High yield of leafy, palatable green fodder, dual purpose variety, creamy-white, quality seeds with stay-green biomass. Resistant to CYMV, collar/root rot, anthracnose, leaf-spot, aphids, flea beetle, pod borer and root knot nematode
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	350-425 q/ha GFY

UPC 618

Variety name	:	**UPC 618**
Parentage	:	(UPC-8703 × IT-84 E-124 -2-5-1)
Year of release	:	2006 by CVRC
Notification No.	:	599(E) DATED 25TH APRIL 2006)
Developed by	:	GBPUAT, Pantnagar
Characters	:	Erect and non twining, luxuriant growth with profuse branching abundance of dark green broad globose leaves, high leaf: stem ratio leading to quality green fodder (CP- 16-18% , IVDMD- 65-70%). Resistance to BLB, CYMV, Collar Rot, Aphids and Pod Borers. Seed mature at 140-150 days
Recommended areas of cultivation	:	NWZ, NEZ and CZ of the country
Yield	:	350-375 q/ha GFY (85-90 DAS), 45-50 q/ha DMY Seed Yield 8-10 q/ha

UPC 628

Variety name	:	**UPC 628**
Parentage	:	(No. 1 x UPC 8706) – 7-4-2
Year of release	:	by CVRC
Notification No.	:	S.O. 2137 (E)/31-08-2010
Developed by	:	Dr. J.S. Verma and Dr. S.N. Mishra
Characters	:	16-18 % crude protein and 65-70% dry matter digestibility. Field resistance to tallow mosaic, collar rot, anthracnose aphids, flea beetle and other disease and other diseases and pests. Suitable for mixed cropping systems
Recommended areas of cultivation	:	North western and Central India
Yield	:	350-400 q/ha GFY

6.4 Oat (*Avena sativa* L.)

UPO 94

Variety name	:	**UPO 94**
Parentage	:	OGP-73-M94
Year of release	:	1981 by CVRC
Notification No.	:	19(E) dated 14 January 1982)
Developed by	:	GBPUAT, Pantnagar
Characters	:	Multicut, very good regrowth, dark green leaf and palatable, resistant to major diseases, high dry matter, crude protein and digestibility, suitable for controlled grazing, dual purpose, multicut variety, good seed yield, fertilizer responsive
Recommended areas of cultivation	:	All India
Yield	:	350-400 q/ha

Pant Forage Oat 3(UPO-06-1)

Variety name	:	**UPO-06-1**
Parentage	:	(UPO 201/UPO 211// UPO 201)-56-1-15
Year of release	:	2015 by SVRC
Notification No.	:	S.O.3540(E)
Developed by	:	Dr. J.S. Verma and Dr. Indra Deo
Characters	:	Resistant to rust and smut diseases. High crude protein and better dry matter digestibility and better seed producing ability (20-22 q/ha)
Recommended areas of cultivation	:	Uttarakhand States
Yield	:	450-550 q/ha

Pant Forage Oat 4 (UPO-10-2)

Variety name	:	**UPO-10-2**
Parentage	:	Gopher x Kent
Year of release	:	2020 by SVRC
Notification No.	:	S.O.500(E)
Developed by	:	Dr. Birendra Prasad, Dr. J.S. Verma and Dr. Indra Deo
Characters	:	105-110 days to 50% flowering, 145-150 days to maturity, 1000 grain weight 45-50 gm however 1000 groat weight 24-25 gm, resistant to leaf blight, *Sclerotium* root rot, aphids, leaf rust and loose smut
Recommended areas of cultivation	:	Plains of Uttarakhand
Yield	:	450-550 q/ha

7. Sugarcane Crops

7.1 Sugarcane (*Saccharum sp. Complex*)
Varieties developed by Pantnagar

Co Pant 84211

Variety name	:	**Co Pant 84211**
Parentage	:	Co 6806 x Co 6912
Year of release	:	1991 by CVRC
Notification No.	:	-
Developed by	:	Dr A Q Khan, Dr P K Bhatnagar, Dr K A Khan
Characters	:	Early Maturity (9-10 months), 16.0-18.5% sucrose, moderately resistant to ret rot disease
Recommended areas of cultivation	:	U.P. Punjab, Haryana, Rajasthan and Uttarakhand
Yield	:	700-750 q/ha

Co Pant 84212

Variety name	:	**Co Pant 84212**
Parentage	:	Co 1148 x Co 775
Year of release	:	1999 by CVRC
Notification No.	:	-
Developed by	:	Dr A Q Khan, Dr P K Bhatnagar, Dr K A Khan
Characters	:	Mid-late Maturity (11-12 months), 17.0-19.0% sucrose, moderately resistant to red rot disease
Recommended areas of cultivation	:	U.P. Punjab, Haryana and Uttarakhand
Yield	:	750-850 q/ha

Co Pant 90223

Variety name	:	**Co Pant 90223**
Parentage	:	BO 91 GC
Year of release	:	2000 by CVRC
Notification No.	:	-
Developed by	:	Dr A Q Khan, Dr P K Bhatnagar, Dr K A Khan
Characters	:	Mid-late Maturity (11-12 months), 16.0-18.0% sucrose, moderately resistant to red rot disease
Recommended areas of cultivation	:	U.P. Punjab, Haryana, Rajasthan and Uttarakhand
Yield	:	750-850 q/ha

Co Pant 94211

Variety name	:	**Co Pant 94211**
Parentage	:	CP 44-101 x Co 775
Year of release	:	2004 by SVRC
Notification No.	:	-
Developed by	:	Dr A Q Khan, Dr P K Bhatnagar, Dr K A Khan
Characters	:	Early Maturity (9-10 months), 17% sucrose (Records 11.8% sugar recovery in October) moderately resistant to ret rot disease, suitable for late planting (summer) also
Recommended areas of cultivation	:	UP and Uttarakhand
Yield	:	650-700 q/ha

Co Pant 96219

Variety name	:	**Co Pant 96219**
Parentage	:	Co S 767 x Co Pant 84212
Year of release	:	2000 by SVRC (UP), 2001 by CVRC and 2004 by SVRC (Uttarakhand)
Notification No.	:	-
Developed by	:	Dr A Q Khan, Dr P K Bhatnagar, Dr K A Khan
Characters	:	Mid-late Maturity (11-12 months), 15.5-16.5% sucrose (Records 11.3% sugar recovery at 10-month age in December), moderately resistant to red rot disease
Recommended areas of cultivation	:	U.P., Punjab, Haryana and Uttarakhand
Yield	:	700-800 q/ha

Co Pant 97222

Variety name	:	**Co Pant 97222**
Parentage	:	Co Pant 84212 GC
Year of release	:	2005 by SVRC and 2006 by CVRC
Notification No.	:	-
Developed by	:	Dr A Q Khan, Dr P K Bhatnagar, Dr K A Khan
Characters	:	Mid-late Maturity (11-12 months), 16-19% sucrose, moderately resistant to red rot disease
Recommended areas of cultivation	:	U.P., Punjab, Haryana and Uttarakhand
Yield	:	750-850 q/ha

Co Pant 99214

Variety name	:	**Co Pant 99214**
Parentage	:	CoS 767 X CoS 510
Year of release	:	2007 by SVRC
Notification No.	:	-
Developed by	:	Dr A Q Khan, Dr P K Bhatnagar, Dr K A Khan, Dr V K Tyagi
Characters	:	Mid-late Maturity (11-12 months), 16.5-18.5% sucrose, moderately resistant to red rot disease
Recommended areas of cultivation	:	U.P., Punjab, Haryana and Uttarakhand
Yield	:	750-850 q/ha

Co Pant 03220

Variety name	:	**Co Pant 03220**
Parentage	:	CoH 76 GC
Year of release	:	2011 by SVRC
Notification No.	:	-
Developed by	:	Dr S P Singh, Dr V K Tyagi, Dr K A Khan, Dr A Q Khan
Characters	:	Early maturity (9-10 months), 16.1-17.85% sucrose in juice, moderately resistant to red rot disease and good ratooning ability
Recommended areas of cultivation	:	Uttarakhand
Yield	:	800-860 q/ha

Co Pant 05224

Variety name	:	**Co Pant 05224**
Parentage	:	Co Pant 84212 PC
Year of release	:	2013 by SVRC
Notification No.	:	-
Developed by	:	Dr S P Singh, Dr A S Jeena, Dr V K Tyagi, Dr K A Khan,Dr A Q Khan
Characters	:	Mid-late Maturity (11-12 months), 17.5-17.9 per cent sucrose in juice, Soft chewable cane, moderately resistant against red rot and wilt diseases and good ratooning ability
Recommended areas of cultivation	:	Uttarakhand and North-west plain zone
Yield	:	850-950 q/ha

Co Pant 12221

Variety name	:	**Co Pant 12221**
Parentage	:	CoS 8436 GC
Year of release	:	2021 by SVRC
Notification No.	:	-
Developed by	:	Dr A S Jeena, Dr K A Khan, Dr S P Singh
Characters	:	Early Maturity (9-10 months), 16.8-17.8 per cent sucrose in juice, moderately resistant against red rot and smut diseases
Recommended areas of cultivation	:	Uttarakhand
Yield	:	710-1300q/ha

Co Pant 12226

Variety name	:	**Co Pant 12226**
Parentage	:	Co 1158 X Co Pant 90223
Year of release	:	2021 by SVRC
Notification No.	:	
Developed by	:	Dr A S Jeena, Dr K A Khan, Dr S P Singh
Characters	:	Mid-late Maturity (11-12 months), 18.7-19.4 per cent sucrose in juice, moderately resistant against red rot and smut diseases and good ratooning ability
Recommended areas of cultivation	:	Uttarakhand
Yield	:	910-1270q/ha

Co Pant 13224

Variety name	:	**Co Pant 13224**
Parentage	:	Co 1158 X Co Pant 90223
Year of release	:	2021 by SVRC
Notification No.	:	
Developed by	:	Dr A S Jeena, Dr K A Khan, Dr S P Singh
Characters	:	Mid-late Maturity (11-12 months), 180.0-18.7 per cent sucrose in juice, moderately resistant against red rot and smut diseases and good ratooning ability.
Recommended areas of cultivation	:	Uttarakhand
Yield	:	950-1000q/ha

7.2 Sugarbeet (*Beta vulgaris* L.) from copy of pdf

Pant S-10

Variety name	:	**Pant S-10**
Parentage	:	Selection from KWSE, a genetically broad based population
Year of release	:	1987 by SVRC
Notification No.	:	10 (E)/01-01-1988
Developed by	:	Drs. P S Bhatnagar, Baldev Raj and D P Pant,
Characters	:	Plant semi-spreading, root shape spindle, smooth, crown size small, fanzines very low, tolerant to Cercospora leaf spot and Sclerotium root rot, sucrose 14.5-15%
Recommended areas of cultivation	:	Sugar beet growing areas of Sri Ganganagar in Rajasthan, West Bengal, U.P., Punjab and Haryana
Yield	:	50-55 t/ha

8. Fibre Crops

8.1 Cotton (*Gossypium spp.*)

Shyamali

Variety name	:	**Shyamali**
Parentage	:	35/lxC.J.73
Year of release	:	1966 by UP State
Notification No.	:	01/01/1970
Developed by	:	Dr H G Singh
Characters	:	Early maturing, medium staple length, ginning 39%, average spinning count 14, lint yield 4.12 q/ha
Recommended areas of cultivation	:	Western U.P.
Yield	:	12-14 q/ha

Pramukh

Variety name	:	**Pramukh**
Parentage	:	Reselection from M4
Year of release	:	1966, UP State Deptt. of Agri.
Notification No.	:	01/01/1967
Developed by	:	Dr H G Singh
Characters	:	Superior medium staple length, ginning 33%, average spinning count 31
Recommended areas of cultivation	:	U.P.
Yield	:	27 q/ha

Lohit

Variety name	:	**Lohit**
Parentage	:	Selection from Sanguineum collection
Year of release	:	1969, U.P. State Deptt. of Agri.
Notification No.	:	295 (E)/09-04-1985
Developed by	:	Dr H G Singh
Characters	:	Desi cotton variety, matures in about 160-170 days, resistant to most of the insects and diseases, suitable for water logged as well as drought conditions, good quality fiber, 15-17.5 mm in length, flowering stage in 80-90 days and bursting of bolls in 105-110 days
Recommended areas of cultivation	:	Western U.P.
Yield	:	12 q/ha seed yield

9. Green Manuring Crops

9.1 Dhaincha (*Sesbania bispinosa*)

Pant SES 1

Variety name	:	Pant SES 1
Parentage	:	Selection from local gremplasm collected from Kichha
Year of release	:	2003 by SVRC
Notification No.	:	122 (E)/02/02/2005
Developed by	:	Drs B.S.Mahapatra and D Roy
Characters	:	Pant height 3.25 m, matures in 150 days, seeds greenish brown, smooth and cylindrical, variable degree of pigmentation on stem, seed yield 26.6 q/ha, accumulates nitrogen @ 180 kg/ha
Recommended areas of cultivation	:	Irrigated plains of Uttaranchal
Yield	:	23 q/ha at 45 and 42 q/ha at 60 days

B. AGRO-FORESTRY

9.2 Poplar (*Populus deltoides*)

Pant Poplar 5

Variety name	:	**Pant Poplar 5**
Parentage	:	Mutation & Clonal Selection from L Clone
Year of release	:	1998, Pantnagar University
Notification No.	:	-
Developed by	:	GBPUAT, Pantnagar
Characters	:	Resistant to stem borer, high clean bole, high volume, rotation age 6 days
Recommended areas of cultivation	:	Tarai and Plains of Uttaranchal & U.P.

C. HORTICULTURE & ORNAMENTAL CROPS

1. Aonla (*Emblica officinalis* L.)

Pant Aonla 1

Variety name	:	**Pant Aonla 1**
Parentage	:	Clonal selection
Year of release	:	1996 Pant Nagar University
Developed by	:	Dr. Shant Ram and Dr. C.P. Singh
Characters	:	Selection from Pratapgarh area of U.P., plant medium dwarf with upright growth habit, grafted plants star bearing at the age of 4-5 years, profuse in bearing, fruit medium large, oval, yellowish deficiency symptoms of boron, average fruit weight 40g.
Recommended areas of cultivation	:	Tarai and Bhabhar area of Uttarakhand
Yield	:	50-60 kg fruits on 7-8 year

2. Bael (*Aegle marmelos* L. Corr.)

Pant Aparna

Variety name	:	**Pant Aparna**
Parentage	:	Selection
Year of release	:	1998 Pant Nagar university
Developed by	:	Dr. K.K. Mishra
Characters	:	Medium dwarf trees with drooping sparse foliage, almost thornless, precocious and heavy bearer, leaves large, dark green and pear shaped, fruit shape globose, average weight 0.6-0.8 kg,rind thin, fruit pale yellow, mucilage, seeds and fibres low, flavour good,TSS 34%
Recommended areas of cultivation	:	Tarai, Bhabhar and plains of Uttarakhand and U.P.
Yield	:	60-70.00 kg/tree

Pant Shivani

Variety name	:	**Pant Shivani**
Parentage	:	Selection
Year of release	:	1998 Pant Nagar university
Developed by	:	Dr. K.K. Mishra
Characters	:	Tall trees, vigorous, dense, upright growing, precocious and heavy bearer, fruit shape ovoid oblong,average fruit weight 2 kg, Fruit colour lemon yellow with better storage quality, rind medium thin, pulp lemon yellow with pleasant flavour, mucilage seeds and fibre low to medium, flesh 60%,TSS 64%
Recommended areas of cultivation	:	Tarai, Bhabhar and plains of Uttarakhand and U.P.
Yield	:	60-70.00 kg/tree

Pant Sujata

Variety name	:	**Pant Sujata**
Parentage	:	Selection
Year of release	:	1998 Pant Nagar university
Developed by	:	Dr. K.K. Mishra
Characters	:	Medium dwarf trees with drooping and spreading foliage, dense, precocious and heavy bearer, fruit globose shaped depressed at both ends, average weight 1.14 kg fruit rind and pulp light yellow, rind thin, storage quality better, seeds, mucilage and fibre low, flavour pleasant and taste very good flesh 72%, TSS 30%
Recommended areas of cultivation	:	Tarai, Bhabhar and plains of Uttarakhand and U.P.
Yield	:	70.00 kg/tree

Pant Urvashi

Variety name	:	**Pant Urvashi**
Parentage	:	Selection
Year of release	:	1998 Pant Nagar university
Developed by	:	Dr. K.K. Mishra
Characters	:	Tree are tall, vigorous dense, upright growing, precocious and heavy bearer, fruit ovoid and oblong, average weight 1.6 kg, fruit colour lemon yellow rind medium thin and pulp yellow, flesh 64% with pleasant flavour, seeds and mucilage medium, fibre low, TSS 33%
Recommended areas of cultivation	:	Tarai, Bhabhar and plains of Uttarakhand and U.P.
Yield	:	60.00 kg/tree

3. Citrus (*Citrus sinensis* L.)

Pant Lemon 1

Variety name	:	**Pant Lemon 1**
Parentage	:	Selection from Kagzi Kalan
Year of release	:	1978 Pant Nagar University
Developed by	:	Dr. Ranvir Singh and Dr. K.K. Mishra
Characters	:	Precocious, field tolerance to citrus decline and canker, fruits round shaped, thin skinned juicy and fruiting throughout the year
Recommended areas of cultivation	:	Tarai, Bhabhar and plains of Uttarakhand and U.P.
Yield	:	50 kg fruits /year

4. Guava (*Psidium guajava* L.)

Pant Prabhat

Variety name	:	**Pant Prabhat**
Parentage	:	Local Selection
Year of release	:	2003 by SVRC
Developed by	:	Dr. Shant Lal and Dr. J.P. Tiwari
Characters	:	Plant growth upright with broad leaves, fruit round, peel smooth and light yellow in colour, fruit medium in size (150-175g), pulp white, seeds small and soft as compared to sardar, taste sweet with pleasant, ascorbic acid content varies from 125 mg (rainy season) to 300 mg per 100gm fruit weight (winter season), TSS 10.5 to 13.5%
Recommended areas of cultivation	:	Tarai area of Uttarakhand Bhabhar and plains and U.P.
Yield	:	100-125 kg/tree

5. Gladiolus (*Gladiolus palustris*)

Shubhangini

Variety name	:	**Shubhangini**
Parentage	:	mutant (gamma rays) of cultivar Fidelio
Year of release	:	2000, Pant Nagar University
Developed by	:	Dr. Ranvir Singh and Dr. B.D. Bhuj
Characters	:	Mid-season cultivar, 90-95 cm long spike, 16-18 florets/spike, significantly ruffed, petals white with light purple tinged, very good cornel producer
Recommended areas of cultivation	:	Tarai region of Uttarakhand

6. Jack Fruit (*Artocarpus heterophyllus*)

Pant Garima

Variety name	:	**Pant Garima**
Parentage	:	Clonal Selection
Year of release	:	2004
Developed by	:	Dr. Shant Lal
Characters	:	Tall and spreading growth habit of the tree,prolific bearer, light green to light brown fruit colour at maturity, fruit shape oblong. Average fruit weight- 5.0 kg, good for cooking purpose
Recommended areas of cultivation	:	All the growing areas of Jackfruit including Tarai and Bhabhar of Uttarakhand
Yield	:	4.0 to 5.0 q/year/tree at full grown stage

Pant Mahima

Variety name	:	**Pant Mahima**
Parentage	:	Clonal Selection
Year of release	:	2004
Developed by	:	Dr. Shant Lal
Characters	:	tall and spreading growth habit of the tree, light green to light brown fruit colour at maturity, fruit shape oblong. Average fruit weight-6.5 kg, good for cooking purpose
Recommended areas of cultivation	:	All the growing areas of Jackfruit including Tarai and Bhabhar of Uttarakhand
Yield	:	3.5 to 4.0 q/year/tree at full grown stage

7. Karonda (*Carissa carandus* L.)

Pant Manohar

Variety name	:	**Pant Manohar**
Parentage	:	Selection
Year of release	:	1998, Pant Nagar University
Developed by	:	Dr. K.K. Mishra
Characters	:	Plants medium sized, dense bushes, fruit size 2.13 x i.69 cm, colour dark pink bluish on white background, fruit weight 3.49g,seeds 3.92% per fruit, flesh 88.27%, TSS 3.92 %, acidity 1.82%
Recommended areas of cultivation	:	Tarai, Bhabhar and plains of Uttarakhand and U.P.
Yield	:	27 kg/bush

Pant Suvarna

Variety name	:	**Pant Suvarna**
Parentage	:	Selection
Year of release	:	1998, Pant Nagar University
Developed by	:	Dr. K.K. Mishra
Characters	:	Medium size bush, fruit size 2.16 x 1.69cm, colour dark pink bluish on white background, on ripening fruits become dark brown, average fruit weight 3,46g, seeds 4.68 per fruit, flesh 88.47%, TSS 3.45%, acidity 1.89%
Recommended areas of cultivation	:	Tarai, Bhabhar and plains of Uttarakhand and U.P.
Yield	:	30 kg/bush

Pant Sudarshan

Variety name	:	**Pant Sudarshan**
Parentage	:	Selection
Year of release	:	1998, Pant Nagar University
Developed by	:	Dr. K.K. Mishra
Characters	:	Medium size bush, fruit size 2.16 x 1.69cm, colour dark pink bluish on white background, on ripening fruits become dark brown, average fruit weight 3.46g, seeds 4.68 per fruit, flesh 88.47%, TSS 3.45%, acidity 1.89%
Recommended areas of cultivation	:	Tarai, Bhabhar and plains of Uttarakhand and U.P.
Yield	:	29 kg/bush

8. Mango (*Mangifera indica*)

Pant Sinduri

Variety name	:	**Pant Sinduri**
Parentage	:	Clonal Selection
Year of release	:	2004
Developed by	:	Dr C.P. Singh
Characters	:	Tall and spreading growth habit of the tree, light green to light brown fruit colour at maturity, fruit shape oblong. Average fruit weight -6.5 kg, good for cooking purpose
Recommended areas of cultivation	:	all the growing areas of Jackfruit including Tarai and Bhabhar of Uttarakhand
Yield	:	3.50 to 4.0 q/year/tree at full grown stage

Pant Chandra

Variety name	:	**Pant Chandra**
Parentage	:	Clonal Selection
Year of release	:	University authorities, 2005
Developed by	:	Dr C.P. Singh
Characters	:	This is a clonal selection of Dashehari and released for adoption during the year 2005 for hilly/valley areas of Uttarakhand. Plants are tall with erect growth habit and dark green leaves. Fruit colour at maturity remains green. It is a mid season variety. Fruit weight is up to 150g. Fruit pulp is reddish yellow with total soluble solid of about 18% and pleasant aroma. The average yield is 150 kg per tree and about 120 q/ha
Recommended areas of cultivation	:	For Valleys
Yield	:	150 kg/tree

9. Pear (*Pyrus communis* L.)

Pant Pear 3

Variety name	:	**Pant Pear 3**
Parentage	:	Clonal Selection
Year of release	:	2000, Pant Nagar University
Developed by	:	Dr. L.D. Bist
Characters	:	Tree medium size, high yielding, mid maturing variety, medium sized fruit, pyriform, flesh soft, sweet with 15% TSS, thin skin with pale green colour
Recommended areas of cultivation	:	Tarai Bhabhar &Valleys and lower hills up to 1500 above mean sea level
Yield	:	50-60 kg per plant

Pant Pear 17

Variety name	:	**Pant Pear 17**
Parentage	:	Clonal Selection
Year of release	:	2000, Pant Nagar University
Developed by	:	Dr. L.D. Bist
Characters	:	Tree medium size, high yielding, late maturing, large fruits, round to pyriform, thin skinned, flesh soft and sweet with 14.5% TSS
Recommended areas of cultivation	:	Tarai Bhabhar &Valleys and lower hills up to 1500 above mean sea level
Yield	:	50-60 kg per plant

Pant Pear 18

Variety name	:	**Pant Pear 18**
Parentage	:	Clonal Selection
Year of release	:	2000, Pant Nagar University
Developed by	:	Dr. L.D. Bist
Characters	:	medium size trees, early maturing, large and round fruited, hard and juicy flesh, 13% TSS
Recommended areas of cultivation	:	Tarai Bhabhar &Valleys and lower hills up to 1500 above mean sea level
Yield	:	High yielder

10. Papaya (*Carica papaya* L.)

Pant Papaya 1

Variety name	:	**Pant Papaya 1**
Parentage	:	Selection
Year of release	:	1984 Pant Nagar University
Developed by	:	Dr. I.D. Singh, Dr. S.C. Sirohi, Dr. Ranjit Singh, Dr. Hari Har Ram, Dr. M.L. Lawania and Dr. C.P. Singh
Characters	:	Dwarf plant, heavy yielder, plants start bearing from 40-45 cm from ground level, fruit weight 1-1.5 kg, resistant to anthracnose
Recommended areas of cultivation	:	Tarai, Bhabhar and plains of Uttarakhand and U.P.
Yield	:	35-40 fruits /plant

Pant Papaya 2

Variety name	:	**Pant Papaya 2**
Parentage	:	Selection
Year of release	:	1984 Pant Nagar University
Developed by	:	Dr. I.D. Singh, Dr. S.C. Sirohi, Dr. Ranjit Singh, Dr. Hari Har Ram, Dr. M.L. Lawania and Dr. C.P. Singh
Characters	:	Medium size plants, tolerant to frost & wet feet conditions, vigorous, medium height, bear at 60-90 cm height, fruits are medium to large, tolerant to water logging
Recommended areas of cultivation	:	Tarai, Bhabhar and plains of Uttarakhand and U.P.
Yield	:	25-30 fruits/plant

11. Peach (*Prunus persica* L. Batsh)

Pant Peach 1

Variety name	:	**Pant Peach 1**
Parentage	:	Selection
Year of release	:	1998 Pant Nagar University
Developed by	:	Dr. R.L. Arora
Characters	:	Fruits ripen about one week prior to Sharbati fruits, medium in size and have red pigmentation on the surface, semi-cling stone
Recommended areas of cultivation	:	Tarai, Bhabhar and plains of Uttarakhand and U.P.
Yield	:	35-40 Kg per plant

12. Plum (*Pyrus domostica*)

Pant Plum 1

Variety name : **Pant Plum 1**

Parentage : Selection
Year of release : 1993 Pant Nagar University

Developed by : Dr. R.L. Arora
Characters : Selection from seedling population raised from open pollinated seeds, dwarf, yellow coloured, sub-acidic fruits, good root-stock for other plum cultivars
Recommended areas of cultivation : Tarai, Bhabhar and plains of Uttarakhand and U.P.
Yield : 25-30 kg/tree

Fla 12

Variety name : **Fla 12**

Parentage : Selection
Year of release : 1999 Pant Nagar University

Developed by : Dr. R.L. Arora
Characters : Exotic type, much larger fruits than titron or Jamuni, fruits comparativelymorejuicy, ripen about one week after titron or Jamuni
Recommended areas of cultivation : Tarai, Bhabhar and plains of Uttarakhand and U.P.
Yield : 30-35 kg/tree

D. VEGETABLE AND SPICE CROPS

1. Ajwain (*Trachyspermum ammi*)

Pant Ruchika

Variety name	:	**Pant Ruchika**
Parentage	:	Through pure line selection from the germplasm maintained at Pant Nagar University
Year of release	:	2001 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. R.S. Tewari and Dr. S.C. Senger
Characters	:	Bushy plants grow to a height of 80-90 cm having 4-5 primary and 20-25 secondary branches per plant, numbers of umbels per plant may be up to 30, matures in 172 days, free from major diseases
Recommended areas of cultivation	:	Northern plains of the country
Yield	:	7.0-7.5 q/ha

2. Bitter Gourd (*Momordica charantia* L.)

Pant Karela 1

Variety name	:	**Pant Karela 1**
Parentage	:	Pure line selection from the inbred of indigenous germplasm
Year of release	:	1999 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. H.H. Ram, Dr. D.K. Singh and Dr. H.R. Jaiswal
Characters	:	Vine length about 2m, fruits thick, about 15cm long with tapering ends, takes about 55 days to first harvest
Recommended areas of cultivation	:	Suitable for planting in the hills and plains
Yield	:	Yield potential 150 q/ha

Pant Karela 2

Variety name	:	**Pant Karela 2**
Parentage	:	Selection from PBIG 1
Year of release	:	2002 by CVRC
Notification No.	:	SO 2035(E) (2004)
Developed by	:	Dr. H.H. Ram, Dr. D.K. Singh and Dr. H.R. Jaiswal
Characters	:	Fruits are thin, about 25 cm long, dark, green in colour and with tapering ends. First fruit harvest in this variety is possible in 50 days after sowing
Recommended areas of cultivation	:	North India
Yield	:	200 q/ha

Pant Karela 3

Variety name	:	**Pant Karela 3**
Parentage	:	Selection from PBIG 4
Year of release	:	2008 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. D.K. Singh and Dr. H.R. Jaiswal
Characters	:	Fruits of this variety are cylindrical (about 25 cm) and of dark green colour. This is an early and high yielding variety
Recommended areas of cultivation	:	North India
Yield	:	150-160 q/ha

3. Black Cumin (*Nigella sativa* L.)

Pant Krishna

Variety name	:	**Pant Krishna**
Parentage	:	Trough pure line selection
Year of release	:	2001 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. R.S. Tewari and Dr. S.C. Senger
Characters	:	Erect, sturdy 50-60 cm tall, 8-9 primary branches per plant, plants bear about 40 capsules, carrying 80-85 seeds/capsule with the test weight of about 2.65g, maturity in about 2.65g, maturity in 165-170 days
Recommended areas of cultivation	:	Northern plains of the country
Yield	:	8-9 q/h

4. Bottle Gourd (*Lagenaria siceraria*)

Pant Sankar Lauki 1

Variety name	:	**Pant Sankar Lauki 1**
Parentage	:	PBOG 22/PBOG 40
Year of release	:	1999 by SVRC
Notification No.	:	SO 1052 (E) (1999)
Developed by	:	Dr. H.H. Ram, Dr. D.K. Singh and Dr. H.R. Jaiswal
Characters	:	Fruits intermediate size, long, cylindrical (about 35 cm long), green, vine length 5.5 m, first pick possible in about 60 days
Recommended areas of cultivation	:	Suitable for planting in the plains as well as in the hills
Yield	:	400 q/ha

Pant Sankar Lauki 2

Variety name	:	**Pant Sankar Lauki 2**
Parentage	:	PBOG22/PBOG40
Year of release	:	1999 by CVRC
Notification No.	:	SO 2035 (E) (2006)
Developed by	:	Dr. H.H. Ram, Dr. D.K. Singh and Dr. H.R. Jaiswal
Characters	:	Fruits about 40 cm long, club shaped with smooth green colour, first green fruit harvest in 65 days, can be sown from March to July in plains and April and May in the hills, seed rate 6 kg/ha
Recommended areas of cultivation	:	Suitable for plains and hills both
Yield	:	400 q/ha

Pant Lauki 3

Variety name	:	**Pant Lauki 3**
Parentage	:	Selection from PBOG 61
Year of release	:	2006 SVRC
Notification No.	:	SO 2035 (E) (2006)
Developed by	:	Dr. H.H. Ram, Dr. D.K. Singh and Dr. H.R. Jaiswal
Characters	:	Fruits of this variety of bottle gourd are around 40 cm long, cylindrical in shape and light green in colour. Harvest of first fruit in this variety starts from 60 days
Recommended areas of cultivation	:	North India
Yield	:	350 q/ha

Pant Lauki 4

Variety name	:	**Pant Lauki 4**
Parentage	:	Selection from PBOG 61
Year of release	:	2008 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. D.K. Singh and Dr. H.R. Jaiswal
Characters	:	Medium duration and high yielding variety of bottle gourd. It has long fruits (about 40 cm) of light green colour with light strips having hairs
Recommended areas of cultivation	:	North India
Yield	:	300 q/ha

5. Brinjal (*Solanum melongena* L.)

Pant Samrat

Variety name	:	**Pant Samrat**
Parentage	:	Pure line selection from local germplasm line available around Haldwani (foot hills of the Himalayas)
Year of release	:	1983 by SVRC and 1984 by CVRC
Notification No.	:	SO 295 (E) (1985)
Developed by	:	Dr. H.H. Ram, Dr. R.D. Singh, Dr. Y.V. Singh and Dr. Ranvir Singh
Characters	:	Long fruited, produces dark purple, medium long fruits in cluster, tall (80-100 cm) and robust, young leaves purplish green, 70 days for first picking after transplanting, resistance against Phomopsis blight and bacterial wilt under field conditions, tolerant to fruit and shoot borer
Recommended areas of cultivation	:	Throughout the country
Yield	:	300 q/ha

Pant Rituraj

Variety name	:	**Pant Rituraj**
Parentage	:	Type 3 x PUSA Purple Cluster
Year of release	:	1984 by SVRC and 1985 by CVRC
Notification No.	:	SO 540 (E) (1985)
Developed by	:	Dr. H.H. Ram, Dr. R.D. Singh, Dr. Y.V. Singh and Dr. Ranvir Singh
Characters	:	Semi-erect plant with dark green foliage and occasional light purple colour on new leaves, fruits almost round with slight tapering towards the bottom, 60 days for first picking after transplanting, suitable for planting both in winter and summer seasons and a prolific bearer unlike type -3 which is one of the parental cultivars, semi- spreading plant type leading to ground touching by first few fruits which get rotten rather easily
Recommended areas of cultivation	:	Throughout the country
Yield	:	300 q/ha

Pant Brinjal Hybrid 1

Variety name	:	**Pant Brinjal Hybrid 1**
Parentage	:	PB-129/ PB-225
Year of release	:	1993 by SVRC
Notification No.	:	SO 636(E) (1994)
Developed by	:	Dr. Y.V. Singh and Dr. H.H. Ram
Characters	:	Long fruited, plants medium tall, purplish green colour of stem, leaves dark green, purple young leaves, fruits long, bright deep purple in colour and, fruiting in clusters, 70-75 days for first picking, field resistance against bacterial wilt, Phomopsis blight, less infested by shoot and fruit borer
Recommended areas of cultivation	:	U.P. and Uttarakhand
Yield	:	600 q/ha

Pant Brinjal 4

Variety name	:	**Pant Brinjal 4**
Parentage	:	PB-129/PB-7
Year of release	:	2001by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. Y.V. Singh and H.H. Ram
Characters	:	Dwarf variety with dark green foliage, fruits thick, long, deep purple in colour with green calyx, fruit picking in 60-65 days after transplanting, 90-100 days to seed maturity, field resistance to bacterial wilt, Phomopsis blight, Alternaria leaf spot, less effected by fruit and shoot borer
Recommended areas of cultivation	:	Suitable for cultivation in Northern hills and plains

6. Cauliflower (*Brassica oieracea* L. var. Botrytis)

Pant Gobhi 2

Variety name	:	**Pant Gobhi 2**
Parentage	:	composite cultivar
Year of release	:	1986 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. Y.V. Singh and B.P. Singh
Characters	:	Early maturing variety available in October in the plains, sowing is done by the middle of June, curds are yellowish and medium compact
Recommended areas of cultivation	:	Suitable for northern plains of the country
Yield	:	100 q/ha

Pant Subhra

Variety name	:	**Pant Subhra**
Parentage	:	Through simple recurrent selection from a local variety Agahani
Year of release	:	1985 by SVRC and 1985 by CVRC
Notification No.	:	SO 295 (E) (1985)
Developed by	:	Dr. H.H. Ram and Dr. B.P. Singh
Characters	:	Medium long stem, sparse and semi-erect leaves, hemispherical creamish white, medium compact, non-rice curds, stalk length about 15 cm, plant type, atypical November maturity group cauliflower and takes 115-120 days from nursery sowing to curd availability, out yielding the only check variety improved Japanese by 20% and about 16 days earlier in maturity than it
Recommended areas of cultivation	:	Suitable for Northern plains of the country
Yield	:	Average of 143 q/ha net marketing curd

Pant Gobhi 3

Variety name	:	**Pant Gobhi 3**
Parentage	:	Simple recurrent selection in a germplasm identified as PI 272775
Year of release	:	1983 by SVRC and 1984 by CVRC
Notification No.	:	Not Notified
Developed by	:	Dr. H.H. Ram and Dr. B.P. Singh
Characters	:	Semi erect outer leaves, inner leaves partially cover the curds, curds compact, slightly conical, non-rice, creamish white in colour, December - January maturity, 120 days to produce curds from nursery sowing
Recommended areas of cultivation	:	Suitable for Bengal, Assam basin and Sutlej-Ganga alluvial plain, also suitable for hill conditions as well where the nursery sowing is to be done by middle of July
Yield	:	250 q/ha

Pant Gobhi 4

Variety name	:	**Pant Gobhi 4(235-5)**
Parentage	:	Synthetic cultivar
Year of release	:	1989 by CVRC
Notification No.	:	SO 408 (E) (1995)
Developed by	:	Dr. H.H. Ram and Dr. B.P. Singh
Characters	:	Variety classified as September maturity, marketable curds available in September in Northern plains, nursery sowing is to be done around middle of May, curds creamish white and non-rice
Recommended areas of cultivation	:	Suitable for northern plains of the country
Yield	:	150 q/ha

7. Chilli (*Capsicum annuum* L.)

Pant C 1

Variety name	:	**Pant C 1**
Parentage	:	Natural selection in a population of local Kandhari which cot naturally crossed with NP46A
Year of release	:	1977 by CVRC
Notification No.	:	SO 19(E) (1982)
Developed by	:	Dr. G. Lal, Dr. K.V. Peter and Dr. Durvesh Kumar Singh
Characters	:	Maturity in 100 days easily distinguishable, upright, fruiting pods, highly pungent, small in size, narrow towards the tip, moderately resistant to mosaic and leaf curl virus
Recommended areas of cultivation	:	Throughout the country
Yield	:	15 q/ha, green pods yield 75 q/ha

8. Coriander (*Coriadrum sativum* L.)

Pant Haritima

Variety name	:	**Pant Haritima**
Parentage	:	Through selection in the germplasm lines
Year of release	:	1993 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. R.S. Tewari and Dr. S.C. Sengar
Characters	:	Good yielder, leaves broader, appealing fragrance, attractive green colour, smaller in size (14000 seeds/100g), rich in oil content (0.1 and 0.4% respectively in leaves and grain), relatively taller (1.5 m), 8 to 9 branches, resistance to stem gall forming fungus (Protomyes macrosporous) which causes small tumour like swellings at all the herbaceous parts of the plant, maturity duration 150-160 days
Recommended areas of cultivation	:	Suitable for cultivation in U.P., Bihar, Parts of Assam and other similar geographical regions
Yield	:	125-140 q/ha of green leaves, 15-18 q/ha of dry seeds

9. Cucumber (*Cucumis sativus* L.)

Pant Kheera 1

Variety name	:	**Pant Kheera 1**
Parentage	:	PCUC-28 x PCUC-8
Year of release	:	1999 by SVRC
Notification No.	:	SO 2035 (E) (2006)
Developed by	:	Dr. H.H. Ram, Dr. D.K. Singh and H.R. Jaiswal
Characters	:	Fruits 20 cm long, cylindrical and green with light green stripes, vine length about 120 cm, takes 50 days to first pick
Recommended areas of cultivation	:	Suitable for planting in the plain as well as hills
Yield	:	200 q/ha

Pant Parthenocarpic Cucumber 2

Variety name	:	**Pant Parthenocarpic Cucumber 2**
Parentage	:	Selection as PCUC2
Year of release	:	2011 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. D.K. Singh
Characters	:	It is a Parthenocarpic (seedless fruits) Cucumber variety in which plant bears only female flowers (gynoceious), 551 in number per plant. The single fruit weight is 630g
Recommended areas of cultivation	:	Polyhouse conditions
Yield	:	1755 q/ha

Pant Parthenocarpic Cucumber 3

Variety name	:	**Pant Parthenocarpic Cucumber 3**
Parentage	:	Selection as PCUC3
Year of release	:	2011SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. D.K. Singh
Characters	:	It is parthenocarpic producing seedless cucumber. Plant bears only female flowers (gynocious). Around 465 female flowers appear per plant. The single fruit weight is 415gm
Recommended areas of cultivation	:	Polyhouse conditions
Yield	:	1605 q/ha

Pant Sankar Kheera 1

Variety name	:	**Pant Parthenocarpic Cucumber 2**
Parentage	:	PCUC-28x PCUC-8
Year of release	:	2001
Notification No.	:	Not Notified
Developed by	:	GBPUAT, Pantnagar
Characters	:	Fruits are long 20 cm, cylindrical and green with light stripes. Vine length is about 120 cm. it takes 50 days for first picking
Recommended areas of cultivation	:	Plains and Hills of Uttarakhand
Yield	:	1755 q/ha

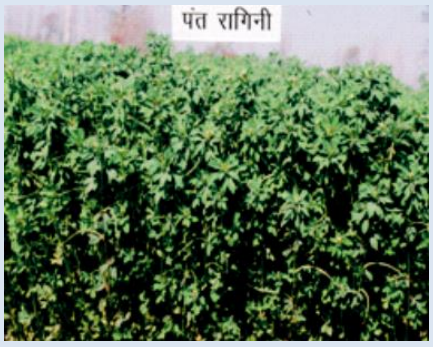
10. Fennel (*Foeniculum vulgare* L. Mill)

Pant Madhurika

Variety name	:	**Pant Madhurika**
Parentage	:	Through selection in germplasm lines
Year of release	:	2001 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. R.S. Tewari and Dr. S.C. Sengar
Characters	:	Medium long stem (150-175cm), 7-12 primary branches 25-35 secondary branches per plant, 50-75 umbels/plant each having 35-40 umbellets, maturity in 180-185 days, suitable for dual purpose (green saunf as well as spice).
Recommended areas of cultivation	:	Suitable for growing in plains
Yield	:	18-20 q/ha

11. Fenugreek (*Trigonella foenum-graecum* L.)

Pant Ragini



Variety name	:	**Pant Ragini**
Parentage	:	Through pure line selection from the germplasm maintained at Pant Nagar
Year of release	:	2001 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. R.S. Tewari and Dr. S.C. Sengar
Characters	:	Medium duration variety, pods mature in 170-175 days, plants have a compact and robust growth and grow up to a height of 80-100 cm, bears 4-7 primary and 14-18 secondary branches, pods more or less straight and 8-10 cm long, 180-200 pods/plant with 15-18 seeds /pod, a dualpurpose variety with comparatively high seed yield of 15-20 q/ha showing about 20 percent superiority over PUSA Early branching
Recommended areas of cultivation	:	Suitable for hills and plains
Yield	:	18-20 q/ha

12. French Bean (Phaseolus vulgaris L.)

Pant Anupama

Variety name	:	**Pant Anupama**
Parentage	:	Through selection in germplasm lines maintained at Pant Nagar
Year of release	:	1983 by SVRC
Notification No.	:	SO 295(E) (1985)
Developed by	:	GBPUAT, Pantnagar
Characters	:	Bush plant type with concentrated fruiting at mid height, plant bushy dwarf, upright with green foliage, pods tender, smooth, round, non-stringy, fully covered by the leaf canopy, protected against sunlight, first picking in 55-65 days, moderately resistant to been common mosaic virus and angular leaf spot
Recommended areas of cultivation	:	Suitable for Northern plains of the country
Yield	:	90 q/ha

Pant Bean 2

Variety name	:	**Pant Bean 2**
Parentage	:	Turkish brown x Contender
Year of release	:	1995 by SVRC
Notification No.	:	SO 115(E) (1996)
Developed by	:	GBPUAT, Pantnagar
Characters	:	Bush growth habit, light colour, bigger leaves and dense foliage, green pods flat round, straight and non- stringy in the early stage, seed dark brown, 60 days for first green pod picking and about 130 days for seed maturity, moderately resistant to bean common mosaic virus, especially suitable for transportation in gunny bags in the hills
Recommended areas of cultivation	:	Suitable for hills and plains both
Yield	:	100 q/ha

13. Garlic (*Allium sativum* L.)

Pant Lohit

Variety name	:	**Pant Lohit**
Parentage	:	Through selection in the germplasm lines maintained at Pant Nagar
Year of release	:	2001 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. R.S. Tewari and Dr. S.C. Sengar
Characters	:	Moderately resistant to purple blotch, bulbs compact and bold, weighing 18-20 gm, 15-18 cloves per bulb having light purple colour, medium maturity group, 175 days to mature
Recommended areas of cultivation	:	suitable for planting from March to July in plains and April to May in hills
Yield	:	bulb yield of 125-130 q/ha

14. Long Melon (*Cucumis melo* L. *var. Utilissiums*)

Pant Kakri 1

Variety name	:	**Pant Kakri 1**
Parentage	:	Through inbreeding and selection in the indigenous germplasm
Year of release	:	2001 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. H.H. Ram, Dr. D.K. Singh and Dr. H.R. Jaiswal
Characters	:	Vines vigorous with long light green straight fruits, free from common diseases and insects, green fruit picking is possible in 50 days after sowing, seed to seed stage 90 days – suitable for planting from February to April, seed rate 5kg/ha
Recommended areas of cultivation	:	Plains of Uttar Pradesh and Uttarakhand
Yield	:	300 q/ha

15. Petha (*Benincasa hispida* L.)

Pant Petha 1

Variety name	:	**Pant Petha 1**
Parentage	:	Selection
Year of release	:	2006 by CVRC
Notification No.	:	Not Notified
Developed by	:	Dr. H.H. Ram, Dr. D.K. Singh and Dr. H.R. Jaiswal
Characters	:	Fruits are oblong in shape and light in colour. Skin of fruit is thin and average fruit weight is 7-8 kg. Resistant to common diseases including Downey mildew
Recommended areas of cultivation	:	North India
Yield	:	600 q/ha

16. Ridge Gourd (*Luffa acutangular* L.)

Pant Toria 1

Variety name	:	**Pant Toria 1**
Parentage	:	Pure line selection from the inbred of indigenous germplasm
Year of release	:	1999 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. H.H. Ram, Dr. D.K. Singh and Dr. H.R. Jaiswal
Characters	:	Shoot 5m long, fruits 15-20 cm long, club shaped, about 65 days to first harvest, especially suitable for rainy season
Recommended areas of cultivation	:	Suitable for Northern plains
Yield	:	100 q/ha

Pant Chikno toria 1

Variety name		**Pant Chikni Toria 1**
Parentage	:	Pure line selection from PSG40
Year of release	:	2007 by CVRC
Notification No.	:	Not Notified
Developed by	:	GBPUAT Pantnagar
Characters	:	Fruits are cylindrical, long (25 cm) green with tapering ends seed maturity is in 50-60 days
Recommended areas of cultivation	:	Suitable for Northern plains
Yield	:	180 q/ha

17. Tomato (*Solanum lycopersicum Mill.*)

Pant Bahar

Variety name	:	**Pant Bahar**
Parentage	:	Selection from a germplasm line AC 238
Year of release	:	1985 by CVRC
Notification No.	:	SO 540 (E) (1985)
Developed by	:	Dr. G. Lal, Dr. K.V. Peter and Dr. Durvesh Kumar Singh
Characters	:	Plant height 90 cm, plants bushy profusely branched, fruits are flattish round, medium in size with 5-6 locules slightly ridged, red at maturity, first picking 75-80 days, resistance to Verticillium and Fusarium wilt under field conditions, good storage and processing qualities
Recommended areas of cultivation	:	Northern hills and plains
Yield	:	250 q/ha

Pant Polyhouse Hybrid Tomato 1

Variety name	:	**Pant Polyhouse Hybrid Tomato 1**
Parentage	:	-
Year of release	:	2011 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. D.K. Singh
Characters	:	The variety is having 7-8 fruits per cluster. The single fruit weight is 130-140 gm. This cultivar has better keeping quality because of its thick pericarp (1.0-1.25 cm)
Recommended areas of cultivation	:	Polyhouse conditions
Yield	:	1616 q/ha

Pant Polyhouse Tomato 2

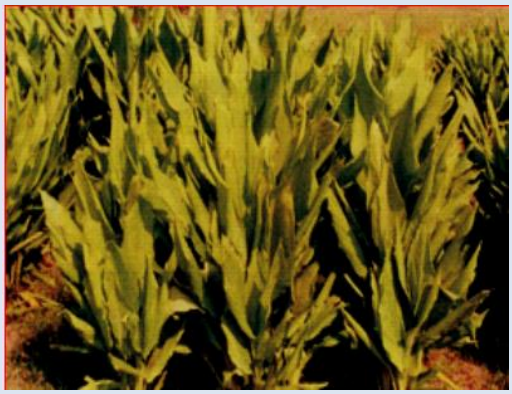
Variety name	:	**Pant Polyhouse Tomato 2**
Parentage	:	-
Year of release	:	2011 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. D.K. Singh
Characters	:	The variety is having 5-6 fruits per cluster. The single fruit weight is 100-105 gm. This cultivar has better storage quality because of its thick pericarp. (0.9-1.0 cm)
Recommended areas of cultivation	:	Polyhouse conditions
Yield	:	1291 q/ha

Pant T3

Variety name	:	**Pant T3**
Parentage	:	Pure line selection in the tomato germplasm maintained at Pant Nagar
Year of release	:	1987 by CVRC
Notification No.	:	SO 1135 (E) (1988)
Developed by	:	Dr. G. Lal, Dr. K.V. Peter and Dr. Durvesh Kumar Singh
Characters	:	Semi-determinate, stem thick, round and hairy, leaves medium in size, dark green in colour, suitable for cultivation in the winter season, fruits ripe in about 75 days after transplanting, fruits round, smooth and weigh about 70 gm
Recommended areas of cultivation	:	Northern hills and plains
Yield	:	300 q/ha

18. Turmeric (*Curcuma longa* L.)

Pant Pitabh



Variety name	:	**Pant Pitabh**
Parentage	:	Through selection in germplasm lines
Year of release	:	2001 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. R.S. Tewari and Dr. S.C Sengar
Characters	:	Early maturing (210-215 days) plants dwarf having a height of 130-140 cm at full grown stage, 7-8 leaves per plant, leaf area of 750-800 cm^2, light green colour, fingers very attractive and light yellow, yield of primary rhizome 200-340 gm /plant, curing % 18.75
Recommended areas of cultivation	:	Northern plains of the country
Yield	:	250-260 q/ha

19. Vegetable Pea (*Pisum sativum* L.)

Pant Uphar

Variety name	:	**Pant Uphar**
Parentage	:	Through selection in germplasm lines maintained at Pant Nagar
Year of release	:	1985 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. H.H. Ram, Dr. R.D. Singh, Dr. R.V. Singh and Dr. Y.V. Singh
Characters	:	Light green foliage, white flowers, well filled round pods, relatively thin stem, smaller leaflets and wrinkled yellowish green seeds, medium maturity duration, first green pods picking in 70-80 days after sowing, shelling percentage approximately 52%
Recommended areas of cultivation	:	Throughout the country
Yield	:	100 q/ha

Pant Sabji Matar 2

Variety name	:	**Pant Sabji Matar 2**
Parentage	:	Early Badger x IP3 (Pant Uphar)
Year of release	:	1989 by CVRC
Notification No.	:	Not Notified
Developed by	:	Dr. H.H. Ram, and Dr. Y.V. Singh
Characters	:	First green pods picking in 60 days after sowing, features resemble with Arkel, gives about 10% higher yield than Arkel
Recommended areas of cultivation	:	Suitable for cultivation in the hills and Northern plains
Yield	:	100 q/ha

Pant Sabji Matar 3

Variety name	:	**Pant Sabji Matar 3**
Parentage	:	Arkel x GC 141
Year of release	:	1996 by SVRC
Notification No.	:	SO 2277(E)2015
Developed by	:	Dr. Y.V. Singh and Dr. H.H. Ram
Characters	:	Plants dwarf with dark green foliage, pods long curved and well filled, seeds wrinkled with green seed coat colour, first picking of green pods in 60-65 days. Seeds maturity 110-120 days, susceptible to powdery mildew but escapes due to early maturity, longer pod (about 9.0 cm against 8.5 cm of Arkel), 8-9 seeds per pod in comparison to 7-8 seeds per pods in Arkel
Recommended areas of cultivation	:	Suitable for cultivation in the hills and Northern plains
Yield	:	90 q/ha

Pant Sabji Matar 4

Variety name	:	**Pant Sabji Matar 4**
Parentage	:	Arkel x HFP-4
Year of release	:	2001 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. Y.V. Singh and Dr. H.H. Ram
Characters	:	Early variety (70 days to green pod picking) and resistant to powdery mildew, leafless type
Recommended areas of cultivation	:	Hills and Northern plains
Yield	:	90 q/ha

Pant Sabji Matar 5

Variety name	:	**Pant Sabji Matar 5**
Parentage	:	(Arkel x T10) x Arkel
Year of release	:	2008 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. Y.V. Singh and Dr. H.H. Ram
Characters	:	Plants are dwarf (65 cm) and foliage is green. Pods are curved towards the tip. Seeds are wrinkled and remain green at maturity. It is an early variety taking about 60-65 days for first green pod picking and 100-110 days for seed maturity. This variety is resistant to powdery mildew
Recommended areas of cultivation	:	North India
Yield	:	90-100 q/ha green pods

Pant Sabji Matar 6

Variety name	:	**Pant Sabji Matar 6**
Parentage	:	Early Peltham First x E6
Year of release	:	2018 by SVRC
Notification No.	:	Not Notified
Developed by	:	Dr. Y.V. Singh, Dr. Alka Verma and Dr. Sanjeev Kumar
Characters	:	Early matari by (65-70 days) variety with average green pod yield of 109.5 q/ha with resistance to powdeng mildew
Recommended areas of cultivation	:	North India
Yield	:	100-110 q/ha

Pant Ranichauri Capsicum- 1

Variety name	:	**Pant Ranichuri Capsicum-1**
Parentage	:	Pure line selection
Year of release	:	2011
Notification No.	:	
Developed by	:	Dr. Vinod Kumar Dr. S. P. Uniyal Dr. Lalit Bhatt
Characters	:	Plants are dwarf, vigorous in growth and crinkled leaves. Fruits dark green 2-4 lobes heart shaped, Fruit turns orange yellow after maturity. Resistant to phytophthora fruit rot and leaf blight disease under field conditions.
Recommended areas of cultivation	:	Mid & high hill areas of Uttarakhand
Yield	:	100-110 q/ha

ASSOCIATED SCIENTISTS

20. Potato (*Solanum tuberosum*)

Kufri Ganga

Variety name	:	**Kufri Ganga**
Parentage	:	MS/82-668 × Kufri Gaurav
Year of release	:	2018
Notification No.	:	2019 {S.O. No. 692 (E)}
Associated Scientists	:	Dr. Dhirendra Singh and Dr. Manoj Raghav
Characters	:	Medium maturing variety (90-100 days), attractive white-cream ovoid tubers with shallow eyes and cream flesh, suitable for table purpose, dry matter 16-18%, field resistant to late blight (*Phytophthora infestans*) and possesses good keeping quality
Recommended areas of cultivation	:	North Indian plains
Yield	:	35-40 t/ha

Kufri Sangam

Variety name	:	**Kufri Sangam**
Parentage	:	Kufri Himsona × Kufri Pukhraj
Year of release	:	2019 by CVRC
Notification No.	:	2021 {S.O. 1480(E)}
Associated Scientists	:	Dr. Dhirendra Singh and Dr. S. K. Maurya
Characters	:	Medium maturing variety (90-100 days) with very good keeping quality, attractive white-cream oblong tubers with shallow eyes and cream flesh, texture mealy, suitable for table purpose and also processing into French fries, dry matter 18-22%, easy to cook (15-20 minutes), field resistant to late blight (*Phytophthora infestans*)
Recommended areas of cultivation	:	Uttarakhand plains and Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Rajasthan, Gujrat, Punjab and Haryana
Yield	:	35-40 t/ha

Kufri Kiran

Variety name	:	**Kufri Kiran**
Parentage	:	CP 2372 (LT-9) × CP1748 (Irish Cobbler)
Year of release	:	2020
Notification No.	:	2022 {S.O. 3254(E)}
Associated Scientists	:	Dr. Dhirendra Singh and Dr. S. K. Maurya
Characters	:	Early-medium maturing variety (85-90 days), heat tolerant variety, attractive white-cream ovoid tubers with shallow eyes and cream flesh, suitable for table purpose, tolerant to mite and hopper burn and possesses excellent keeping quality
Recommended areas of cultivation	:	Uttarakhand plains and Uttar Pradesh, Madhya Pradesh, Chhattisgarh, West Bengal, Rajasthan, Gujrat, Maharashtra, Odisha, Andhra Pradesh, Punjab and Harvana

A COMPENDIUM OF PROMISING TECHNOLOGIES OF PANTVARSITY

Dr P. K. Singh is an eminent professor and Joint Director Research at G. B. Pant University of Agriculture & Technology, Pantnagar (Uttarakhand). Prof Singh is an eminent teacher, researcher and excellent extension scientist having more than 30 years of experience. He has developed design procedure and charts for the design of drip irrigation system for hilly terraced land, which has been adopted in the operational guideline of Per Drop More Crop component of PMKSY. Dr Singh has published more than 150 research and extension publications including 52 research papers in international & national journals. Dr Singh has been honoured with many awards and recognitions including prestigious Eminent Agricultural Engineer award by The Institution of Engineers (India).

Dr. Ajay Kumar is Assistant Professor and Assistant Director Research, G. B. Pant University of Agriculture and Technology, Pantnagar. He is having more than 17 years experience of teaching, research and extension experience. He has published 35 research papers in reputed journals, 2 books regarding Crop Production in Hilly areas. Also published 8 book chapters in different books and have 20 popular articles. In addition, 25 papers presented in different seminars and symposium. He has handled externally funded grants for developed package of practices for different farming situations of Uttarakhand. He significantly contributed in collection and evaluation of germplasm of Munsyari Rajma and development of its package of practices.

Dr. Dhirendra Singh, a distinguished Professor and Joint Director of Research at G. B. Pant University of Agriculture & Technology, Pantnagar (Uttarakhand), having 25 years of experience in Vegetable Breeding. He has authored 4 books and 4 manuals/booklets aimed at farmers and students alike, facilitating knowledge dissemination and practical understanding. Dr. Singh's impact reverberates in the agricultural landscape, having developed 2 varieties and 4 elite germplasms of rapeseed and mustard. Moreover, his involvement in the development of 4 potato varieties. Dr Singh has been honoured with many awards and recognitions including prestigious LT. Amit Singh Memorial Foundation Award 2014. He received Fellowship of International Society for Noni Science.

Dr Ajeet Singh is a professor of Agrometeorology and is also shouldering the responsibility of Director Research at GBPUAT, Pantnagar. His expertise includes Geospatial Technology, Climate Change, Crop Simulation Modelling and Agro-ecological regionalization. He has handled more than 20 research projects and published more than 135 research papers in National and International Journals of high repute. He has been nominated by Government of India as NABARD-Chair (2016-2020) and by Government of Uttarakhand as convener of State Action Plan on Climate Change (SAPCC). He has to his credit more than 30 different types of awards including BB Singh Distinguished Researcher Award, Young Scientist Award by Association of Agrometeorologists, Young Scientists Award by Society of Plant Research, Fellow of Association of Agrometeorologists, DAAD Fellow etc. He was visiting scientist at ZALF Muncheberg, German from 2003-2005. He is known for liberalization of research and bringing impactful administrative reforms in Research Ecosystem of the University.

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