DEPARTMENT OF CROP IMPROVEMENT

CSK Himachal Pradesh Krishi Vishvavidyalaya
Palampur - 176 062 (HP)

CROP IMPROVEMENT IN HIMACHAL PRADESH

OUR FIVE DECADES

Teaching, Research and Extension

2018

Prof. H. K. Chaudhary & Dr. V. K. Sood

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Edited and compiled by

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Head, Department of Crop Improvement

Dr. V.K . Sood

Principal Scientist (Plant Breeding)

CSK HIMACHAL PRADESH KRISHI VISHVAVIDYALAYA
PALAMPUR- 176062 (HP)

Website: https://www.hillagric.ac.in

PREFACE

Himachal Pradesh possesses a vast agro-ecological variability, from subtropical Shivalik hill zone starting from 360m to high hill wet and dry temperate zones encompassing the alpine pastures up to 6800m. Around 82% of area under cultivation is rainfed, which consequently reduces the productivity. The role of high yielding crop varieties alongwith tolerance to biotic and abiotic stresses in increasing agricultural productivity is momentous. The Department of crop improvement has so far developed 156 improved varieties of different crops namely rice, maize, wheat, oilseeds, pulses, potential crops and fodders suitable for different agro climatic conditions of the state. Niche based crops like *rajmash*, *mash*, red rice, *kulthi* and vegetable type Soybean have shown considerable performance under varied agroecological conditions which are likely to have export potential in near future. In addition to conducting research in the field of crop improvement, the Department has also played an instrumental role in teaching Plant Breeding and Genetics at both the undergraduate and Post graduate levels. To date, it has trained 169 M.Sc. and 97 Ph.D. students, many of whom have received awards at the National and International levels and serving at prestigious positions. Crop Improvement is a never-ending activity being followed for the genetic amelioration of yield and quality. The goal of this compilation is to provide a glance on the high yielding varieties developed by the department for the benefit of farmers, students and other stakeholders. I thank my colleagues Dr. Satish Paul, Dr. V. K. Sood, Dr. Daisy Basandrai, Dr. R. K. Mittal, Dr. Swaran Lata, Dr. Vedna Kumari, Dr. Vijay Rana, Dr. D. P. Pandey, Dr. Dhirendra Singh, Dr. Neelam Bhardwaj, Dr. Uttam Chand and Dr. Adarsh Bala for providing assistance in gathering information and insightful suggestions.

(H.K. Chaudhary)
Professor & Head

ACCOMPLISHMENTS OF THE DEPARTMENT OF GENETICS AND PLANT BREEDING DURING THE LAST FIVE DECADES (1970-2018)

The Department of Plant Breeding was established in the year 1972 under the Agriculture Complex component of the HP University, Shimla to develop skilled and efficient human resource in the field of Plant Breeding & Genetics for imparting education to the undergraduate & postgraduate students, undertaking research for crop improvement on sustainable basis in the hills and mountains and extend knowledge and skill to the hill farmers. An important accomplishment in this process was the approval of number of research projects in the major crops by ICAR under All India Coordinated Programmes besides being funded by the State Govt. and other Indian (DBT, DST, CSIR, BARC, Ministry of Environment etc.) and foreign agencies (JSPS, Japan, EU Brussels etc.) to provide excellence among students in different spheres.

MANDATE

- Imparting education at the undergraduate and post graduate levels, modernization of the technology and strengthening of high-tech expertise of the faculty through national and international exchange programmes and association with world renowned laboratories.
- Conservation and sustainable utilization of North-West Himalayan plant genetic resources for the development of superior varieties of various hill crops for varied agro-climatic regions of the state following conventional and modern breeding techniques.
- Nucleus and breeder seed production and popularization of improved varieties of various crops.

STRENGTH OF THE DEPARTMENT

- Department is equipped with efficient technology being utilized for the genetic up gradation of various hill crops and development of improved varieties for varied agro-climatic conditions and farming systems of the state.
- A high-tech Molecular Cytogenetics & Tissue culture Lab of the Department enriched with modern facilities has been providing unique opportunities to the students and faculty to undertake cutting edge research activities in innovative spheres related to various crop improvement endeavours.
- Extending facilities and high-tech expertise in modern areas of plant breeding and molecular biology to the UG & PG students and faculty of this university as well as students, faculty of other institutes/universities of the country.

TEACHING

- Department is equipped with skilled and efficient human resources in the field for imparting teaching at undergraduate and postgraduate levels. So far, 169 M.Sc. and 97 Ph.D. students have passed out, a number of whom have been honoured and got prestigious positions at national & international levels. Exposure to the students and faculty of the Department for interacting with globally renowned authorities in various spheres of modern plant breeding and biotechnology.

Students' recognition

1. Jawahar Lal Nehru Thesis Award for best thesis: Dr. R.K. Kapila
2. M.Sc. Gold Medals: R.P. Kaushik, Anita Dogar & Naval Kishore
3. Ph.D. Gold Medals: R.P. Kaushik, P. Plaha, R.K. Kapila & Shayla Bindra
4. Krishi Ratna Dr. Punjab Rao Deshmukh (WAFM) Fellowship: Prof. H.K. Chaudhary
5. ICAR NAAS National Elocution Award (2000, 2001 & 2003): Dr. Aditya Pratap
6. Overseas Fellowship to Ph.D. student (Molecular Biol. Lab., OKU, Japan) : Tisu Tayeng
7. Best paper presentation award in International/ National Seminars : Shivali & Vineeta
8. ICAR International Fellow and Graduate Research Assistantship : Waseem Hussain
9. Monsanto's Beachell Borlaug International Fellowship-2012: Navdeep Singh Jamwal

RESEARCH

- Department of Plant Breeding & Genetics came into existence during 1972 with the responsibility of imparting teaching at undergraduate and postgraduate levels as well as research on the genetic improvement of different crops of Himachal Pradesh for developing high yielding, good quality and disease resistant varieties suitable for general cultivation under diverse agro-climatic conditions of the state.
- An important accomplishment in this process was the approval of a number of ICAR funded projects (AICRPs), ad-hoc projects besides being funded by the State Govt. Presently, ad-hoc projects worth Rs. 2 crores from outside Agencies like DBT, DST, CSIR, Indo-Japan and European Mission are running in the department at main campus as well as out stations addressing nitch based problem oriented research.
- Department has so far released **156 varieties** of various crops *viz.*, rice (26), wheat (26), barley (12), maize (12), pulses (29), oilseeds (31), fodders (16) and Underutilized Crops (04).
- A high-tech Molecular Cytogenetics and Tissue Culture Lab with modern facilities established in this department have been providing unique opportunities for training of the students of the department and other institutions (on payment basis). Besides, a Quality Lab has also been established for quality analysis of fodder & other crops.
- Testing of private sector maize hybrids rice hybrid & sorghum sudan grass/bajra on payment basis.
- Disseminating technical know-how in innovative spheres of modern plant breeding and biotechnology to the students and faculty of the department and other universities/institutes across the country on payment basis.
- Developed highly efficient and unique protocols in doubled haploidy breeding in bread wheat following chromosome elimination mediated approach (Wheat x *Imperata cylindrica*).
- Generated infrastructure and created facilities to undertake research work in innovative spheres of biotechnology like molecular cytogenetics (GISH & FISH approaches).

EXTENSION

- ✓ The scientists of the department took active part in transfer of technology through research articles, radio and Doordarshan talks, frontline demonstrations and mother & baby trials in various crops for popularization of the improved crop varieties.
- ✓ Department is also actively involved in the transfer of latest technology to the farmers and quality seed production of various crops.

Faculty members who have won the Award/ Honour/ Recognition etc.

a. Awards

Year	Name	Name of the Award/ Honours/ Recognition etc
1997	Prof. H.K. Chaudhary	ICAR Young Scientist Award (Renamed as 'Lal Bahadur Shasrti Outstanding Young Scientist Award') for Agricultural Research for the biennium 1995-96 by the ICAR, New Delhi
2004	Dr. Naval Kishore	Crop Research Award by Agricultural Research Information Centre, HAU, Hisar
2004	Prof. G.S. Sethi	Rai Bahadur Dr. Ramdhan Singh Memorial Trust Award for life time achievements in Wheat and Barley Breeding & Genetics during All India Wheat & Barley Meet (ICAR)
2007	Prof. H.K. Chaudhary	Himachal Kesari Award-2007 for significant contributions in crop improvement and biotechnology

2009	Prof. H.K. Chaudhary	Prerna Strot Samman Purskar: 2008-09 of the Himachal Pradesh Govt. for significant contributions in Crop Improvement & Biotechnology
2009	Prof. S.K. Sharma	Rashtriya Udyog Ratan Award
2010	Dr. S.C. Sharma	Sankalp Shree Award for outstanding contributions in the field of Agriculture by Society for Cultural and Social Welfare
2015	Dr. R.P. Kaushik	Awarded *doyen of rice research*, Golden Jubilee Life Time Achievement Award for outstanding contributions in developing mega rice varieties by ICAR
2016	Dr. R.P. Kaushik	Honoured by Republic of Myanmar for developing bacterial blight resistant rice variety "Sin Thu Kha" under IRRI-Myanmar Collaborative Project during 1998-2001, which is now grown in about 20% rice area during wet season in Myanmar.

b. Honours/ Recognition etc

1989	Prof. G.S. Sethi	Member Board of Studies in Genetics & Plant Breeding in BHU, Varanasi
2004	Prof. H.K. Chaudhary	Conferred Honorary Visiting Professor, Osaka Kyoto University, Japan
2004	Prof. H.K. Chaudhary	Nominated Member UKAN, Commonwealth Commission, London, UK
2006	Prof. H.K. Chaudhary	Nominated Member European Association for Research on Plant Breeding (EUCARPIA), Spain
2006	Dr. Devender Sharma	Honorary Doctorate Degree of CSKHPKV
2008	Prof. H.K. Chaudhary	Nominated Member from India, International Steering Committee, Asian Chromosome Colloquium (3^{rd} to 5^{th}) Japan, China & India scheduled during 2008, 2010 & 2012
2009	Prof. S.K. Sharma	Chairman, Projects Steering Committee of FAO
2009	Dr. R.P. Kaushik	Bayer Crop Science for promotion and introduction of early maturing rice hybrids in the Himachal Pradesh
2011	Dr. R.P. Kaushik	Honoured by Rotary Club, Palampur for contributions to the rice farmers of Himachal Pradesh
2013	Dr. R.P. Kaushik	Honour of registering Chhohartu red rice farmer variety under PPV&FR Act Govt. of India. The first variety to be registered from Himachal Pradesh.

Other Foreign Assignments of the Faculty

Year	Name	Foreign Assignment
1979	Dr. K.D. Sharma	Rice Improvement Programme, IRRI, Philippines
1982	Dr. K.D. Sharma	Indo-Mongolian Work Plan, Mongolia
1984	Dr. S.R. Thakur	Assignment under Indo-Russian Exchange Programme in USSR
1985	Dr. L.N. Singh	Forage Training, U.K.
1986	Dr. R.K. Sharma	Maize Programme, Mexico
1987	Dr. Tashi Dawa	Wheat Programme, Mexico
1987	Dr. S.L. Sharma	Rice Programme, IRRI, Philippines
1988	Dr. P.C. Katoch	Rice Programme, Afghanistan

1989	Dr. D.C. Katoch	New Zealand under FAO Programme
1990	Dr. J.C. Bhandari	Indo-Mongolian Work Plan, Mongolia
1997	Dr. V.P. Gupta	Professor Biometrics, Ethiopia
1993 2000	Dr. S.C. Sharma	Wheat Programme, Mexico
1998-2001	Dr. R.P. Kaushik	Project Scientist (Rice), Mayanmar
2001	Dr. P. Plaha	Project Scientist, IRRI, Philippines
2000 2002 2004 2005-2009 2010	Prof. H.K. Chaudhary	Germany Thailand Japan and Scotland P.I., Indo-Japan Collaboration Project (Modern Biol. & Biotech), Japan (Visited four times), Netherland and Australia China
2006	Dr. Jai Dev	Training in Agriculture Biotech, Israel U.S.A. Japan
2007	Dr. Daisy Basandrai	Pulses Exchange visit, Syria and Wheat Programme Mexico in 2015
2007	Dr. Dhirendra Singh	Rice Improvement Programme, IRRI, Philippines
2008	Dr. Satish Guleria	Maize Programme, Mexico
2013	Dr. Vijay Rana	China Mexico
2015	Dr. Daisy Basandrai	Mexico
2008 2010	Dr. Dorin Gupta	Australia China
2008	Dr. R.K. Mittal	Japan
2008	Dr. R.K. Chahota	Japan
2008	Dr. Naval Kishore	Japan
1986-88	Dr. R.P. Kaushik	Post Doctoral Fellow, International Rice Research Institute, Manila, Philippines
2011	Dr. R.P. Kaushik	Attended Golden jubilee Celebrations, University of Agriculture, Faisalabad, Pakistan
2004	Dr. V.K. Sood	United Kingdom

VIP visits in the Department

Year	Name	Purpose of visit
1972	Prof. Yoshida, Japan	Interacted with the faculty in the Department
1979	Dr. G.S. Khush, Eminent Scientist, IRRI	Rice Improvement Programme
1981	Dr. M.S. Swaminathan, Ex. DG, ICAR & IRRI	Reviewed ongoing research programme on winter & spring wheat

1989	Dr. N.S. Randhawa, DG, ICAR	Inaugural lecture in Pulses Workshop
1990	Dr. B.P. Foster, Professor, Scotland	Lecture to the faculty & students
1990	Dr. B.D. Singh, Head Biotech, BHU	Lecture to the faculty & students
1991	Dr. K.S. Gill, VC, PAU	Reviewed ongoing research programmes
1991	Dr. Sukhdev Singh, Ex. VC, PAU	Reviewed ongoing research programmes
1996	Dr. (Mrs.) M.R. Knox, Prof. England	Lecture to the faculty & students on RFLP
1996	Prof. Rogor Haggar, IGER, UK	Monitoring ongoing Forage Programme
1998	Dr. Mangla Rai, DDG, ICAR	Reviewed ongoing research programme
2000	Dr. V.P. Gupta, VC, BHU, Ranchi	Brain Storming Meet on Forage Crops
2001	Dr. R.S. Paroda, DG, ICAR	Visited Molecular Cytogenetics & Tissue Culture Lab
2001	Dr. R.A. Mashelkar, DG, CSIR	Visited Molecular Cytogenetics & Tissue Culture Lab
2006	Prof. Yasuhiko Mukai, Japan	Visited Molecular Cytogenetics & Tissue Culture Lab
2007	Dr. M. Yamamoto, Japan	Visited Molecular Cytogenetics & Tissue Culture Lab
2007	Dr. Glyn Jenkin, UK	Reviewed Forage Improvement Programme
2007	Dr. Peter, Norway	Ricebean Project under European Mission
2008	Dr. P.L. Gautam, DDG	Workshop on Maize
2008	Dr. S.K. Vassal, Distinguished Scientist	Visited Molecular Cytogenetics & Tissue Culture Lab
2008	Dr. R.B. Singh, FAO DDG	Visited Molecular Cytogenetics & Tissue Culture Lab
2013	Dr. Sanjay J. Jambhulkar,Head EGFFS, Barc, Mumbai	Reviewed doubled haploid wheat improvement programme
2015	Prof. K.S. Khokhar, VC, CCSHAU, Hisar	Visited Molecular Cytogenetics & Tissue Culture Lab
2017	Dr. Kuldeep Singh, Director, NBPGR, Delhi	Reviewed doubled haploid wheat improvement programme
2017	Kevin Pixley, Director Genetic Resources Program, CIMMYT, Mexico	Reviewed doubled haploid wheat improvement programme
2017	Dr. G.S. Khush, FRS, Adjunct Prof, Univ. Of California, USA	Visited Molecular Cytogenetics & Tissue Culture Lab
2018	Prof Ion King, Director of Wheat Research Centre, University of Nottingham, UK	Visited Molecular Cytogenetics & Tissue Culture Lab

Faculty of the Department

Main Campus	
Name	**Designation**
Prof. H.K. Chaudhary	Professor & Head
Dr. Satish Paul	Principal Scientist, Department of Seed Science and Technology
Dr. R.K. Mittal	Professor
Dr. Daisy Basandrai	Principal Scientist

Dr. V.K. Sood	Principal Scientist
Dr. Jai Dev	Professor
Dr. Swaran Lata	Professor
Dr. Vedna Kumari	Professor
Dr. R.K. Chahota	Professor, Department of Agricultural Biotechnology
Dr. Gopal Katna	Scientist, Department of Organic Agriculture and Natural Farming
RWRC, Malan	
Dr. Vijay Rana	Plant Breeder
Dr. D.P. Pandey	Plant Breeder
Dr. Neelam Bhardwaj	Assistant Scientist
HAREC, Bajaura	
Dr. S.K. Guleria	Principal Scientist
Dr. Naval Kishore	Assistant Scientist
HAREC, Dhaulakuan	
Dr. Dhirender Singh	Plant Breeder
SAREC, Kangra	
Dr. Uttam Chand	Assistant Plant Breeder
Dr. Adarsh Bala	Assistant Plant Breeder

Former Head of the Department
Dr. Laxman Singh
Dr. K.D. Sharma
Dr. M.M. Verma
Dr. G.S. Sethi
Dr. V.P. Gupta
Dr. P.C. Katoch
Dr. B.C. Sood
Dr. J.C. Bandari
Dr. K.C. Sood

Fellowships

Commonwealth Fellowship	Dr. G.S. Sethi, Prof. S.K. Sharma, Dr. H.K. Chaudhary & Dr. V.K. Sood
BOYSCAST and other	Dr. R.P. Kaushik, Dr. P. Plaha & Dr. Satish Paul
Fellowships of DST	Dr. T.R. Sharma & Dr. R.K. Kapila
Norman E. Borlaug Fellowship	Dr. R.K. Chahota
Vavilov Frankel Fellowship	Dr. Satish Paul & Dr. Dorin Gupta
Marie Curie EC Fellowship	Dr. S.K. Sharma
Royal Society-INSA Fellowship (UK)	Dr. S.K. Sharma & Dr. V.K. Sood
DBT Overseas Associateship	Prof. H.K. Chaudhary (Sr. Associateship) & Dr. R.K. Chahota
NAIP Fellowship	Dr. Jai Dev

Publications (Number Only)

1	Research Papers (Only in referred journals)	:	(i) National: 1275 (ii) International: 150
2	Technical Bulletins	:	15
3	Manuals	:	03
4	Documentaries	:	01
5	Teaching Aids	:	Use of multimedia in teaching (Latest audio visual aids)
6	Brochures	:	02 (One each for the Department & Molecular Cytogenetics & Tissue culture lab of the Department)

Paper Presentation (Abroad)

1) Dr. G.S. Sethi (UK,1980)
2) Dr. S.C. Sharma (Canada,2002 and Austraila,2008)
3) Prof. H.K. Chaudhary (Germany, 2000, Thailand, 2002, Scotland, 2004, Japan, 2004, Netherland, 2007, Australia 2008, Japan, 2008 and China, 2010)
4) Dr. Jai Dev (Japan, 2008)
5) Dr. R.K. Chahota (Japan, 2008)
6) Dr. R.K. Mittal (Japan,2008)
7) Dr. Naval Kishore (Japan, 2008)
8) Dr. S.C. Sharma (Canada, 1998, Australia 2008)

Workshops organized by the Department

1) AICRP Workshop on Soybean: 19-22 April, 1976
2) AICRP Workshop on Sesamum & Niger: 27-29 April, 1981
3) AICRP Workshop on Maize: 23-26 October, 1986
4) AICRP Workshop on Forage Crops: 13-15 August, 1987
5) AICRP Workshop on Pulses Crops: 1-4 June, 1989
6) AICRP Workshop on Maize: 10-12 April, 1996
7) AICRP Workshop on Soybean: 3-5 May, 1997
8) AICRP Workshop on Rapeseed-Mustard: 7-9 August, 2003
9) AICRP Workshop on Underutilized Crops: 5-7 May, 2004
10) AICRP Workshop on Forages Crops: 1-3 June, 2004
11) AICRP Workshop on Oilseeds (Safflower & Linseed): 22-24 August, 2005
12) AICRP Workshop on Maize: 4-6 June, 2008
13) Awareness Workshop on PPV & FRA: 20-21 March, 2009
14) AICRP Workshop on Forage Crops: Sep 30-Oct 2, 2010
15) AICRP Workshop on Soybean: 22-24 March, 2012
16) Awareness Programme on PPV & FRA: April 2nd, 2012
17) Workshop on "Intellectual Property Rights Issues & Challenges": March 16th, 2017
18) AICRP Workshop on Forage Crops: 18-19 April, 2017
19) AICRP Workshop on Maize: 7-9 April, 2018
20) 2nd IPR workshop on "Policy Guidelines and Operational Mechanism": March 30th, 2019

Infrastructural facilities developed/ created in the Department:

1) Molecular Cytogenetics & Tissue Culture Lab for undertaking cutting edge research activities in modern spheres of Molecular Genetics, Cytogenetics & Tissue Culture.
2) Quality Lab for analyzing crop samples for various quality parameters.
3) Created Audio Visual Facilities for innovative teaching at UG & PG levels.
4) Research work on DH (wheat), Wide Hybridization (wheat, oat, *Trifolium* & pulses), quality protein maize, mutagenesis (wheat, soybean, mustard) and Protection of Plant Varieties (Ricebean) are going on.

Varieties Registered/ Submitted with PPV & FRA, New Delhi:

Wheat	DH 114 (Him Pratham) HPW 368 (Him Palam Gehun 2) HPW 249 (Asmi) HPW 184 (Chandrika) HPW 147 (Palam) HPW 155 (Onkar) HPW 89 (Surbhi) HPW 251
Rice	HPR 1068 HPR 2143 HPR 2656 (Him Palam Dhan 1) HPR 2795 (Him Palam Lal Dhan 1) HPR 2880 (Him Palam Dhan 2) HPR 1156 (IET-16007)
Chickpea	DKG 986 (Him Palam Chana 1)
Oilseeds	
Gobhi Sarson	Him Sarson 1
Indian Mustard	RCC 4
Rapseed (Gobhi Sarson)	HPN 3 (Neelam)
Toria	KBS-3
Soybean	Palam Soya (P-30-1-1)
Maize	Him 129 (EHF 1121) (Denotified)
	L 173 (Bajaura Makka 1)
	Palam Sankar Makka 1
	Palam Sankar Makka 2
Farmer's Varieties	
Rice	R575 (Purple) Kali Jhini Dhan Matali Dhan Jattu Dhan
Rajmash	Barot Rajmash (Yellow) Barot Rajmash (Red)
Black Gram	HPCM 1 (Chamba Mash)

Registration of Germplasm:

Application for Gl registration of *Japonica* red rice of the state to Geographical Indications Registry Office, Chennai. In addition to this, presently University is working on three projects funded by HIMCOSTE, Shimla on the aspect of GI tagging of Red Rice of the state, Karsog Kulthi and Chamba Chukh. Registered three farmers varieties of maize of Bhandal panchayat of Chamba District, *viz.*, Hachhi Kukri, Ratti and Chitkanu with PPV & FRA.

Detail of the enrolled and passed out students of the Department

S.No.	Name of the Department	Date of start of PG Programmes (M.Sc./Ph.D.)	Students enrolled		Total	Students passed out		Total
			M.Sc.	Ph.D.		M.Sc.	Ph.D.	
1.	Genetics and Plant Breeding	1972/1974	158	100	258	143	91	234
2.	ARS	-	-	-	-	-	-	11
3.	NET	-	-	-	-	-	-	160
4.	Gold Medals	-	3	3	-	-	-	6
5.	Fellowships	-	50	41	-	-	-	91

Graduate/ postgraduates students served/ serving at higher positions

Name of the Department	Programme	Year of passing	Positions	Sectors
Dr. J.C. Rana	M.Sc.	1980	Director of Agriculture	Department of Agriculture, H.P. Govt.
Dr. S.C. Sharma	Ph.D.	1983	Director of Research	CSKHPKV, Palampur
Dr. S.K. Sharma	B.Sc.	1971	Director	NBPGR, New Delhi
Dr. L.K. Sharma	B.Sc.	1972	Ex. Brigadier	Indian Army
Dr. Devender Sharma	M.Sc.	1980	Journalist	Journalism
Dr. M.P. Sood	Ph.D.	1983	Managing Director	HIMFED, H.P. Govt.
Dr. B.C. Sood	B.Sc.	1973	Director of Research	CSKHPKV, Palampur
Dr. A.K. Sarial	M.Sc.	1983	Vice Chancellor	CSKHPKV, Palampur
Dr. S.K. Sharma	B.Sc.	1971	Vice Chancellor	CSKHPKV, Palampur

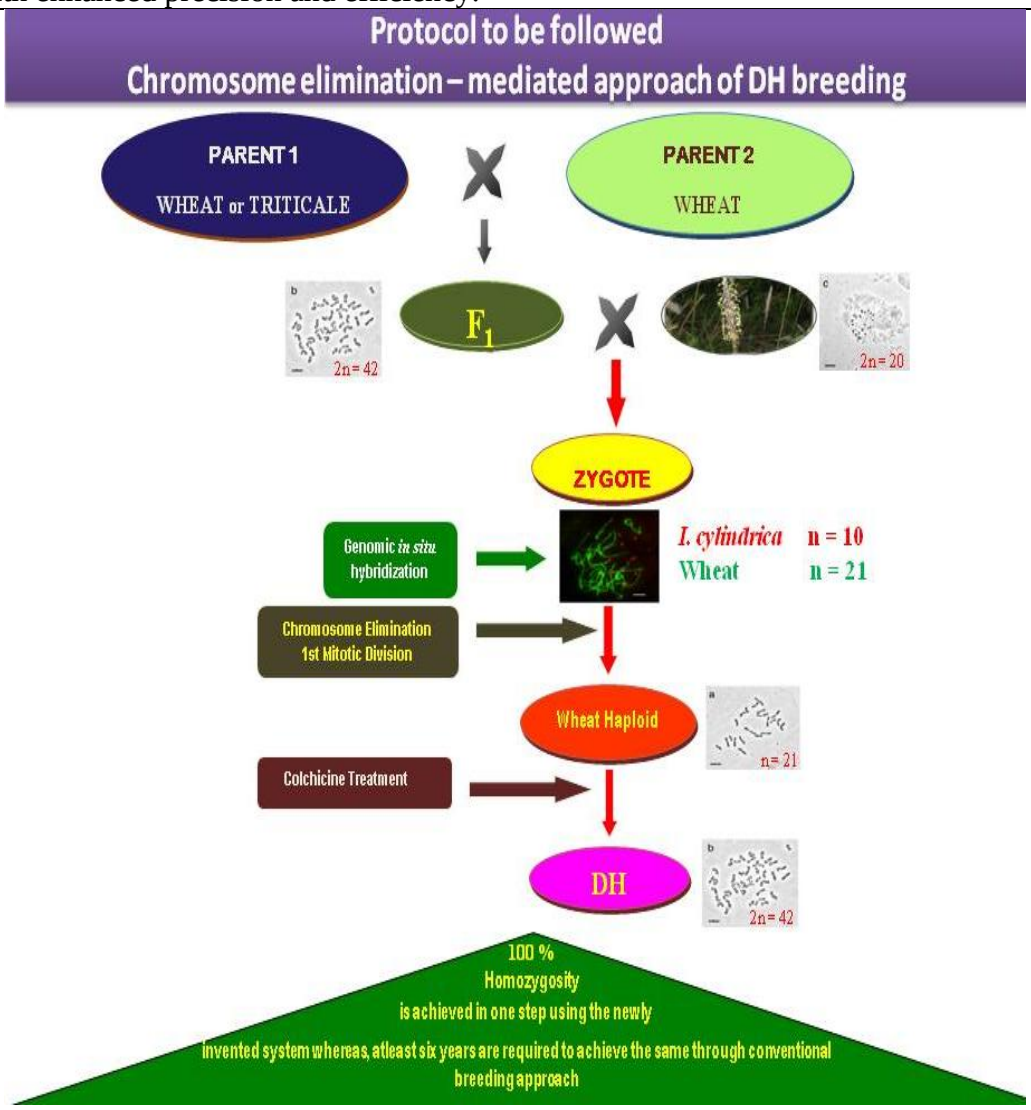
Research

Development / Identification of improved crop varieties

The faculty has been instrumental in identifying / developing various high yielding varieties of different crops suitable for cultivation in different agro-climatic zones of the State. Department has so far released **156 varieties** of various crops *viz.*, rice (26), wheat (26), barley (12), maize (12), pulses (29), oilseeds (31), fodders (16) and Underutilized Crops (04).

SPEED BREEDING FOR PRECISION CROP IMPROVEMENT

Innovative chromosome elimination- mediated approach following Wheat x *Imperata cylindrica* system developed by Prof. Harinder Kumar Chaudhary and his co-workers for acceleration of wheat breeding endeavours with enhanced precision and efficiency.



Wheat (*Triticum aestivum* L.)

Variety	:	HPW 42 (Aradhna)
Breeding method	:	Selection
Source/Parent/Pedigree	:	VEE 'S'/4/ PVN 'S'/CBB//CNO 'S'/3/JAR/ORZ 'S'
Year of release	:	1992, CVRC (North Hill Zone) & SVRC (HP)
Evolved at	:	HAREC, CSKHPKV, Bajaura (Kullu)
Notification Details	:	S.O.814 (E) & S.O.815 dated 04.11.1992
Specific features	:	Early maturity, high degree of resistance to stripe and leaf rusts, amber, medium bold, hard lustrous grains with better quality parameters.
Key characters for identification	:	Double dwarf, white glumes, white awns, short glume beak
Productivity	:	2.5 – 3.0 t/ha
Areas of adaptation	:	Timely sown rainfed conditions in high altitude areas of NHZ & late sown rainfed conditions in Mid & Low hills of HP

Variety	:	HPW 89 (Surabhi)
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	Intermedio rodi / HD 2248
Year of release	:	1996, SVRC (HP)
Evolved at	:	Department. of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O.401 (E) dated 01.05.1998
Specific features	:	Resistance to stripe rust, leaf rust & early flowering, high tillering with strong stem, amber semi-hard/soft grains with significantly higher grain yield even at lower nitrogen doses.
Key characters for identification	:	Dark green foliage, waxiness on leaves, ear and peduncle, very long awns
Productivity	:	2.8 - 4.0 t/ha
Areas of adaptation	:	Timely sown rainfed and irrigated conditions in mid & low hills of HP

Variety	:	DH 114 (Him Pratham)
Breeding method	:	Doubled Haploidy
Source/Parent/Pedigree	:	Pedigree VWFW 452 × WW 24
Year of release	:	2016, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O. 3540 (E)
Specific features	:	Resistance to yellow & brown rusts and powdery mildew. The seeds contain 12.79% protein and 7.81 % gluten content. Early maturing, semi dwarf variety and suitable for sowing in Oct-Nov or at least one month before snowfall.
Key characters for identification	:	Awned spikes and amber, bold & hard grains
Productivity	:	37-40 q/ha
Areas of adaptation	:	Sowing in Oct-Nov or at least one month before snowfall. Due to its vernalization requirement for shorter period, also suitable for the regions having poor snowfall due to changed climate. Recommended for dry & wet temperate regions of north-west Himalayas.

Variety	:	HPW 147 (Palam)
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	CPAN 1869 × Him 10
Year of release	:	1999, SVRC (HP)
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O.122(E) dated 02.02.2005
Specific features	:	High degree of resistance to both stripe and leaf rusts with diverse genetic base for resistance, high grain yield, amber, bold, semi hard grains and lodging resistance.
Key characters for identification	:	Blackish-brown awns and distinctly brown spike with hairy glumes, distinctly high waxiness in all plant parts, thick and strong stem with long and broad leaves.
Productivity	:	2.5 – 3.7 t/ha
Areas of adaptation	:	Timely sown rainfed and irrigated conditions in Mid & Low hills of HP

Variety	:	HPW 184 (Chandrika)
Breeding method	:	Selection
Source/Parent/Pedigree	:	ND/VG9144/KAL/BB/3/YACO/4/VEE#5 CM85836 (ATTILA)
Year of release	:	2003, SVRC (HP)
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O.122 (E) dated 2.2.2005
Specific features	:	High degree of resistance to stripe & leaf rust and tolerance to hill bunt, karnal bunt, leaf blight, loose smut. High tillering capacity & highly responsive to nitrogen application
Key characters for identification	:	Creamish white ear colour at maturity, tapering ear shape, dense ear
Productivity	:	3.0 - 4.0 t/ha
Areas of adaptation	:	Timely sown irrigated and rainfed conditions in mid & low hills of HP

Variety	:	HPW 155 (Onkar)
Breeding method	:	Selection
Source/Parent/Pedigree	:	BT2549/FATH
Year of release	:	2006, CVRC & SVRC
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Notification Details	:	S.O 599 (E) dated 25.4.06
Specific features	:	Dark green leaves with strong stem, highly responsive to fertilizers with amber semi-hard lustrous grains.
Key characters for identification	:	Light brown ear colour at maturity, broad leaf, dense ear, waxiness of leaf sheath and peduncle
Productivity	:	2.5 - 4.0 t/ha
Areas of adaptation	:	Timely sown rainfed & irrigated conditions in high, mid & low hills of HP and high hills of North hill zone

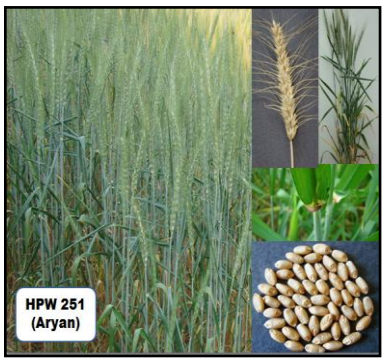
Variety	:	HPW 211
Breeding method	:	Selection
Source/Parent/Pedigree	:	MO 88/MILAN
Year of release	:	2006, SVRC (HP)
Evolved at	:	HAREC, CSKHPKV, Dhaulakuan
Specific features	:	High degree of resistance to Karnal bunt, leaf and stripe rusts and powdery mildew, highly responsive to nitrogen application. Amber, hard grains with better quality parameters.
Key characters for identification	:	Swollen nodes and brown spots on outer glumes
Productivity	:	4.5 - 5.0 t/ha
Areas of adaptation	:	Timely sown irrigated conditions in low hills of HP

Variety	:	HPW 236
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	WL 711/PGS 990//VL 780
Year of release	:	2007, SVRC (HP)
Evolved at	:	HAREC, CSKHPKV, Dhaulakuan
Specific features	:	High degree of resistance to stripe, leaf and stem rusts, resistance to powdery mildew and Karnal bunt.
Key characters for identification	:	White coloured glumes, fusiform ear shape and long awns
Productivity	:	2.7 – 3.3 t/ha
Areas of adaptation	:	Timely Sown rainfed conditions in High, Mid & Low hills of HP

Variety	:	Saptdhara
Breeding method	:	Selection
Source/Parent/Pedigree	:	Atou
Year of release	:	1994, SVRC
Evolved at	:	HAREC, Kukumseri, CSKHPKV, Palampur
Notification Details	:	S.O 408 (E)
Specific features	:	Resistant to yellow, brown rust and powdery mildew
Key characters for identification	:	High regenerability, vernalization requirement for flowering. Spread during early growth, awnless, slightly reddish grain, waxiness on whole plant
Productivity	:	Grain yield: 40-45 q/ha
Areas of adaptation	:	First winter wheat variety of the country for dry temperate regions

Variety	:	HPW 249 (Asmi)
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	WW24/Lehmi-P1
Year of release	:	2007, SVRC (HP)
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Specific features	:	Resistant to yellow rust, brown rust and powdery mildew.
Key characters for identification	:	Waxiness of peduncle, tapering ears and long awns
Productivity	:	2.6 – 4.9 t/ha
Areas of adaptation	:	Timely sown rainfed and irrigated conditions in mid hills of HP

Variety	:	HPW 251 (*Aryan*)
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	WW24/Lehmi-P2
Year of release	:	2008, CVRC
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Notification Details	:	S.O.1108 (E) dated 08.05.2008
Specific features	:	High degree of resistance to yellow and brown rust with higher degree of resistance to Karnal bunt and flag smut diseases, yields amber, hard and elongated gains with high iron and manganese.
Key characters for identification	:	Anthocyanin pigmentation of auricles and creamish white ear colour
Productivity	:	2.5 – 3.4 t/ha
Areas of adaptation	:	Early sown rainfed conditions in mid & low hills North Hill Zone



Variety	:	HPW 349
Breeding method	:	Selection
Source/Parent/Pedigree	:	OASIS/SKAUZ//4*BCN/3/PASTOR/4/KAUZ*2/YACO//KAUZ
Year of release	:	2013, CVRC
Evolved at	:	RWRC, CSKHPKV, Malan
Notification Details	:	S.O. 952 (E) dated 10.04.2013
Specific features	:	Semi tall, Amber, bold and hard grains with excellent "*chapatti*" and bread making quality parameters, nutritionally rich on account of high iron and manganese contents with high degree of resistance to both yellow and brown rust.
Key characters for identification	:	Strong waxiness of leaf sheath and peduncle and white tapering ears. Distinct character of leaf tip necrosis a typical yellowing of leaf tip in green crop stage
Productivity	:	2.5 - 4.5 t / ha
Areas of adaptation	:	Timely sown rainfed and irrigated conditions in low & mid hills of North Hill Zone

Variety	:	HPW 360 (Him Palam Gehun 1)
Breeding method	:	Selection
Source/Parent/Pedigree	:	WL711 / HPW 89 S
Year of release	:	2016, SVRC (HP)
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Specific features	:	Medium tall with semi hard, medium bold and amber grains with good *chapatti* making quality parameters and lodging resistance, having high degree of resistance to yellow rust, brown rust and loose smut diseases.
Key characters for identification	:	Erect broad leaves, high tillering capacity and thick strong stem
Productivity	:	2.5 – 3.3 t/ha
Areas of adaptation	:	Early sown rainfed conditions in low & Mid hills of HP

Variety	:	HPW 368 (Him Palam Gehun 2)
Breeding method	:	Selection
Source/Parent/Pedigree	:	NAC/TH.AC//3*PVN/3/MIRLO/BUC/4/2/*PASTOR
Year of release	:	2016, SVRC
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Notification Details	:	Approved for notification in the meeting held on 04.10.2019
Specific features	:	Medium tall variety with amber, semi- hard and bold grains with better '*chapatti*' making quality parameters, high grain yield having high degree of resistance to yellow and brown rusts (with different genes) .
Key characters for identification	:	Bent spikes at maturity and wide grain germ width
Productivity	:	2.6 -4.5 t/ha
Areas of adaptation	:	Timely sown rainfed and irrigated conditions in low & mid hills of HP

Rice (*Oryza sativa* L.)

Variety	:	HPR 2880 (Him Palam Dhan 2)
Breeding method	:	Pedigree method
Source/Parent/pedigree	:	HPU 2216 × Tetep
Year of release	:	2016
Evolved at	:	Rice & Wheat Research Centre , CSKHPKV, Malan
Notification details	:	S.O. 99 (E), 2019
Specific features	:	Suitable for irrigated conditions with higher yield potential and resistance to neck blast and rice hispa.
Key characters for identification	:	Intermediate plant height (120 cm), medium maturity (120 - 125 days), medium panicle (23.0cm), medium spikelets / panicle (124-145) and spikelet sterility of only 12 %. It has medium slender translucent grains.
Productivity	:	45.50-55.00 q/ ha
Area of adaptation	:	For low and mid hills of Himachal Pradesh under irrigated conditions

Variety	:	HPR 2795 (Him Palam Lal Dhan 1)
Breeding method	:	Selection
Source/Parent/pedigree	:	RP 2421 / VL Dhan 221
Year of release	:	2016
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Notification details	:	S.O. 1379 (E), 2018
Specific features	:	Suitable for dry direct seeded upland conditions for low elevated hills of Meghalaya, HP and Manipur
Key characters for identification	:	Resistance to leaf and neck blast, red rice variety with red pericarp, stem thick flag leaf very long and maturity in 120-125 days
Productivity	:	28-32 q/ha
Area of adaptation	:	For low elevated hill of Meghalaya, HP and Manipur

Variety	:	HPR 2720 (Palam Lal Dhan)
Breeding method	:	Introduction
Sources/Parent/pedigree	:	Improved begmi
Year of release	:	2013
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Specific features	:	Red rice variety suitable for irrigated condition
Key characters for identification	:	Plant height: 120 -125cm. Red rice variety and matures in 135-140 days and was resistant to blast.
Productivity	:	40 -45q/ha
Area of adaptation	:	Suitable for cultivation under irrigated conditions of Zone I and II of HP

Variety	:	HPR 2612
Breeding	:	Pedigree- MLN 2062-1-13-3-4
Sources/Parent/pedigree	:	Hassan Serai/T 23//IR 66295-36-2
Year of release	:	2013
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Specific features	:	Intermediate plant height (90-105), early maturity (125-130days), high tillering, panicles 23 cm in length and very low spikelet sterility (6%). It has long slender (7.6mm) translucent grains.
Key characters for identification	:	It has long slender grains. Spikelets are beaked towards the apiculus.
Productivity	:	35-40 q/ha
Area of adaptation	:	Low and mid hills of HP

Variety	:	HPR 1068
Breeding method	:	Pedigree
Sources/Parent/pedigree	:	IR 53455-NAG11-1-1-2-1-3 IR 42015-83-3-2-2/IR9758-K2
Year of release	:	2005
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Notification details	:	Registration No. 65 of 2012
Specific features	:	Early Maturing (125-130 days), long bold grains. Moderately susceptible to leaf blast but resistant to neck blast
Key characters for identification	:	Long bold grains
Productivity	:	38-44 q/ha
Area of adaptation	:	Irrigated areas of mid hills of the state

Variety	:	HPR 2143
Breeding method	:	Pedigree
Sources/Parent/pedigree	:	HPR 9020-2-2-2-1-1-1 Phul patas/HPU 741
Year of release	:	2005, SVRC
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Notification details	:	Registration No. 66 of 2012
Specific features	:	Long panicles (27.3 cm), high spikelets per panicle(195 no), high grains per panicle (160 no), panicles hard, fit for mechanical harvesting, matures in about 125-135 days, long slender translucent grains, moderately susceptible to leaf blast but resistant to neck blast
Key characters for identification	:	Spikelets are beaked towards the apiculus
Productivity	:	35-40 q/ha
Area of adaptation	:	Irrigated areas of mid hills of the state

Variety	:	HPR 1156 (Sukara dhan 1)
Breeding method	:	Pedigree
Sources/Parent/pedigree	:	IR 53332-Nag6-1-1-3-1-1 IR 32429-122-3-1-2/IR 31868-64-2-3-3-3
Year of release	:	2004 CVRC
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Notification details	:	S.O. 161 (E)
Specific features	:	Semi tall having erect tillers, long and intermediate panicles and awnless long slender grains, matures in 112 days, resistant to blast, leaf folder and rice hispa
Key characters for identification	:	Long slender grains
Productivity	:	Average yield: 28 -32 q/ha
Area of adaptation	:	Rainfed uplands in hilly areas of Meghalaya, HP and Uttarakhand

Variety	:	Kasturi
Breeding method	:	Introduction
Sources/Parent/pedigree	:	Basmah 370 × CRR 88-17-1-5
Year of release	:	1994
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Notification details	:	S.O. 915 (E) 1989
Specific features	:	Mature in 135-140 days
Key characters for identification	:	Semi tall with long panicles having awned spikelets
Productivity	:	30-35 q/ha
Area of adaptation	:	Irrigated (<1000mm)

Variety	:	HPU 2216
Breeding method	:	Hybridization followed by pedigree method
Sources/Parent/pedigree	:	IR 8 × IR2053-521-1-1/IR 36
Year of release	:	1994, CVRC
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Notification details	:	S.O. 408 (E), 1995
Specific features	:	Medium duration high yielding variety with intermediate plant height
Key characters for identification	:	Maturity 125-130
Productivity	:	3.8-4.2
Area of adaptation	:	Irrigated Mid hills(650-1300mm) of HP

Variety	:	RP 2421
Breeding method	:	Hybridization followed by pedigree method
Sources/Parent/pedigree	:	IR 36 × kathwar
Year of release	:	1994, CVRC
Notification details	:	S.O. 408 (E), 1995
Specific features	:	Early maturing variety with intermediate plant height with medium bold grains
Key characters for identification	:	Mature in 120-125 days
Productivity	:	3.7-4.0
Area of adaptation	:	Irrigated mid hills of HP

Variety	:	Brighudhan
Breeding method	:	Pedigree
Sources/Parent/pedigree	:	Chucheng/Deval/Matali
Year of release	:	2005, SVRC
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Notification details	:	S.O. 599 (E) dated 25.04.2006
Specific features	:	Early maturing, cold tolerant, semi dwarf, red grained variety, tolerant to shattering. It has short bold grains with acceptable cooking quality. Field resistance to leaf and neck blast, brown spot, glume discoloration and sheath rot
Key characters for identification	:	Red rice
Productivity	:	35-40 q/ha

Variety	:	Varun Dhan
Breeding method	:	Introduction from China
Sources/Parent/pedigree	:	Kunjen 4 (HPR K 2001) IET 16020
Year of release	:	2006, SVRC
Evolved at	:	Rice & Wheat Research Centre, CSKHPKV, Malan
Notification details	:	S.O. 72 (E)
Specific features	:	Cold tolerant, hail tolerant, early maturing, semi dwarf and lodging resistant, short bold grains with acceptable cooking quality and resistance to major diseases and pests, resistance to lodging, shattering and hailing. It is japonica type variety with short bold grains. It cooks sticky because of low amylose content.
Key characters for identification	:	Short bold grains
Productivity	:	32-35 q/ha
Area of adaptation	:	Recommended for High hills of HP under transplanted conditions

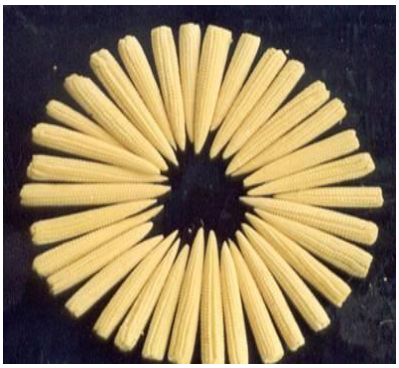
Maize (*Zea mays* L.)

Variety	:	Early Composite
Breeding method	:	Hybridization
Year of release	:	1980 , SVRC
Evolved at	:	HAREC, CSKHPKV, Bajaura
Notification details	:	01.01.1982
Specific features	:	Early maturing and tolerant to *Turcicum* leaf blight
Key Characters for identification	:	Grains medium bold, semi flint to flint, dark green leaves, silk colour green
Productivity	:	32-35 q/ha
Area of adaptation	:	Mid and high hills of HP

Variety	:	Parvati
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	Syn P200×Kissan, YUZP-SC710, J603, DIV, BIV, Phillippino DMR-I, Bokyo Comp. 2, Thai composite, H 52-53, C2 composito
Year of release	:	1987, CVRC
Evolved at	:	HAREC, CSKHPKV, Bajaura
Notification details	:	S.O. 386 (E) 15.05.1990
Specific features	:	Medium maturing, medium tall with high cob placement, medium long ears.
Key Characters for identification	:	Orange yellow flint to semi flint grains
Productivity	:	30-35 q/ha
Area of adaptation	:	Mid hills under rainfed conditions of HP

Variety	:	Girija
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	Composite (Navjot/ Parvati/ KH 9405/ ZC 2810 MMH 81/ MMH 60/ PRO 306/ ICI 736/ L 110/ ZC 2733/ JH 1136/ JH 1146)
Year of release	:	2001, SVRC
Specific features	:	Medium maturing and tolerant to *Turcicum* leaf blight
Key Characters for identification	:	Grains medium bold, semi flint to flint, dark green leaves, silk colour green
Productivity	:	35-40 q/ha
Area of adaptation	:	Lower and mid hill of HP

Variety	:	VL 78 (Baby Corn)
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	Composite (VL 16 × Murulia) × VL 16) × VL 16)
Year of release	:	2005, SVRC (CVRC in 2004 across the country from VPKAS, Almora)
Evolved at	:	HAREC, CSKHPKV, Bajaura
Notification details	:	S.O. 122 (E) dated 02.02.2005
Specific features	:	Extra early maturing, medium plant height variety which can withstand in high population density. Prolific bearing habit, silking in 50 days and gives 5-6 picking having light yellow colour of baby corn sweet and crunchy in taste
Key Characters for identification	:	Silk colour red, prolificacy
Productivity	:	12-14 q/ha
Area of adaptation	:	Low, mid and high hills of HP



Variety	:	Bajaura Makka
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	Composite (PS 62/ FH 3209/ FH 3198/ FH 3202/ Early Composite 10 half sibs progenies of Hill early yellow pool and Kullu Local)
Year of release	:	2008, CVRC
Evolved at	:	HAREC, CSKHPKV, Bajaura
Notification details	:	Registration No. 41 of 2015 (PPV&FRA) Notification No. 2458 (E) 16.10.2008
Specific features	:	Early maturing, plants are medium height with medium cob placement, medium long ears with shining orange flint grains. It is responsive to moderate to high doses, less reduction in yield at lower doses of fertilizers and moderately resistant to lodging and diseases (TLB & MLB).
Key Characters for identification	:	Shiny orange flint grains
Productivity	:	35-38 q/ha
Area of adaptation	:	Mid and high hills of HP

Variety	:	Bajaura Popcorn
Breeding method	:	Modified mass selection
Source/Parent/Pedigree	:	Composite (selection from Locals (Kullu/ Chamba)
Year of release	:	2009, SVRC
Evolved at	:	HAREC, CSKHPKV, Bajaura
Specific features	:	Special type of maize having ability to pop twenty times in volume upon heating. The grains are small, hard, bright and orange yellow flint and test weight is 120g. It has medium tall plant and its cobs are medium placed. Tolerant to TLB and MLB.
Key Characters for identification	:	Narrow leaves and red silk popcorn variety, grains are orange yellow flint
Productivity	:	30-35 q/ha
Area of adaptation	:	Mid hills of HP

Variety	:	HQPM 1
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	Single cross hybrid (HKI 193-1HK 1163)
Year of release	:	2009, SVRC
Evolved at	:	HAREC, CSKHPKV, Bajaura
Notification details	:	S.O. 1178 (E) 20.07.2007
Specific features	:	Long cylindrical with white glumes, grains yellow coloured dent. Plants are medium in height, thick stem. Resistant to maydis leaf blight, tolerant to *Turcicum* leaf blight.
Key Characters for identification	:	Broad and dark green leaves and green silk.
Productivity	:	50-58 q/ha
Area of adaptation	:	Low and mid hill areas of H.P.

Variety	:	Bajaura Sweet Corn
Breeding method	:	Modified mass selection
Source/Parent/Pedigree	:	Composite (selection from US population college synthetic sugar)
Year of release	:	2009 , SVRC
Evolved at	:	HAREC, CSKHPKV, Bajaura
Specific features	:	Sweet corn is one of the most popular fresh and processed vegetable. Plants are vigorous, thick stems with dark green leaves, medium tall, cobs are medium placed. This variety has a tendency to bear two cobs with tight husk cover.
Key Characters for identification	:	Sweet corn type, large, lax tassel red silk and less shrivelled grain with yellow golden colour
Productivity	:	120 q/ha
Area of adaptation	:	Mid hills of HP

Variety	:	Palam Sankar Makka 2
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	BAJIM 08-26 × BAJIM 08-27
Year of release	:	2015, CVRC
Evolved at	:	HAREC, CSKHPKV, Bajaura
Notification details	:	S.O. 238 (E) 29.06.2016
Specific features	:	Medium maturing orange yellow flint grains with medium height. It is responsive to higher dose of nitrogen up to 250 kg/ha and moderately resistant to *Turcicum* and maydis leaf blight.
Key Characters for identification	:	Large and sparse tassel with coloured anthers, light brown coloured silk and broad dark green and drooping leaves. Grains are yellow with cap, semi flint and indented in shape. Anthocyanin pigmentation at the base of glumes is absent and present in glumes.
Productivity	:	65-70 q/ha
Area of adaptation	:	Mid hills of HP under irrigated conditions

Variety	:	Palam Sankar Makka 1
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	HKI 1040-7×BAJIM 09-64
Year of release	:	2015, CVRC
Evolved at	:	HAREC, CSKHPKV, Bajaura
Notification details	:	S.O. 2680 (E) dated 01.10.2015
Specific features	:	Early maturing yellow orange semi dent grain and nitrogen responsive. Tolerant against TLB and MLB
Key Characters for identification	:	Medium size and sparse tassel with coloured anthers, dark green and drooping leaves. Grains are yellow with cap, semi dent and indented in shape. Anthocyanin pigmentation at the base of glumes is absent and present in glumes.
Productivity	:	58-60 q/ha
Area of adaptation	:	Zone 5 (Central Western Zone) comprising the states viz. Rajasthan, Gujarat, Chhattisgarh and Madhya Pradesh.

Barley (*Hordeum vulgare* L.)

Variety	:	HBL 316 (Gopi)
Breeding method	:	Mutation
Source/Parent/Pedigree	:	Mutant of HBL 98
Year of release	:	1992, CVRC
Evolved at	:	HAREC, CSKHPKV, Bajaura
Notification details	:	S.O. 408 (E) dated 04.05.1995
Specific features	:	High tillering ability, lodging resistance, moderately resistant to yellow rust and leaf blight.
Key characters for identification	:	Six rowed, Hulled, plant height 70-75cm, spike non- drooping, non-waxy
Productivity	:	26 to 28 q/ha
Areas of adaptation	:	Timely sown rainfed conditions under low and mid hill areas (Northern Hill Zone).

Variety	:	HBL 113 (Vimal)
Breeding method	:	Selection
Source/Parent/Pedigree	:	Zephyre
Year of release	:	1994, CVRC
Evolved at	:	HAREC, CSKHPKV, Bajaura
Notification details	:	S.O. 408 (E) dated 04.05.1995
Specific features	:	Two-rowed, hulled high yielding variety having high tillering ability. Grains are bold, shining and yellow in colour. Highly resistant to yellow rust and leaf blight.
Key characters for identification	:	2 rowed, Hulled, plant height 70-75cm, spike non-drooping, non-waxy
Productivity	:	25-30 q/ha
Areas of adaptation	:	Timely sown rainfed conditions under low and mid hill areas (Northern Hill Zone).

Variety	:	HBL 276 (Harit)
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	HBL 233 × HBL 238
Year of release	:	1997, CVRC
Evolved at	:	HAREC, CSKHPKV, Bajaura
Notification details	:	S.O. 425 (E) dated 08.06.1999
Specific features	:	Six rowed, hulless, profuse tillering, semi-dwarf variety. Dual-purpose variety, for fodder and feed. The variety is resistant to yellow, brown and black rusts.
Key characters for identification	:	Hulless, 6 rowed, plant height 75-85 cm, spike erect, light green and waxy.
Productivity	:	Average green forage yield 30-35q/ha and grain yield of 20-22 q/ha.
Areas of adaptation	:	Timely sown rainfed conditions under low and mid hill areas (Northern Hill Zone)

Variety	:	HBL 391 (Gokul)
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	HBL 316 × HBL 113
Year of release	:	2009, SVRC
Evolved at	:	HAREC, CSKHPKV, Bajaura
Notification details	:	S.O. 2137 (E) dated 31.08.2010
Specific features	:	Two-row hulled variety with profuse tillering ability. Grains are medium and yellow in colour. Highly resistant to yellow, brown and black rusts.
Key characters for identification	:	Hulled, 2 rowed, plant height 75-85 cm, spike erect, non-waxy.
Productivity	:	28-32 q/ha
Areas of adaptation	:	Timely sown rainfed conditions under mid hill areas of HP.

Variety	:	BHS 380 (Pusa Losar)
Breeding method	:	Selection
Source/Parent/Pedigree	:	VIOLETA/MJA/7/ABNB/6/BA/GAL/FZA-B/5/DG/DCB/ PT-BAR/3/RAB/BA*3/4/TRYIGAL
Year of release	:	2009, CVRC
Evolved at	:	IARI, Regional Station, Tutikandi Centre, Shimla
Notification details	:	S.O. 733 (E) dated 01.04.2010
Specific features	:	Six rowed, hulled and semi-dwarf variety. A dual-purpose variety for fodder and feed. Resistant to yellow rust.
Key characters for identification	:	Hulless, 6 rowed, plant height 60-70cm, spike pale green and non-waxy.
Productivity	:	Green forage yield 40-45q/ha and grain yield of 20-25 q/ha.

Variety	:	VLB 118 (VL Jau 118)
Method of breeding	:	Introduction
Source/Parent/Pedigree	:	14th EMBSN-9313
Year of release and authority	:	2012, CVRC
Evolved at	:	VPKAS, Almora, Uttarakhand
Notification details	:	S.O. 268 (E) dated 28.01.2015
Specific features	:	Six rowed, hulled and dwarf variety. Resistant to yellow, brown and black rusts.
Key characters for identification	:	6 rowed with parallel ears and light wax on leaf sheath.
Areas of adaptation	:	Timely sown rainfed conditions under low and mid hill areas (Northern Hill Zone)

Variety	:	BHS 400 (Pusa Sheetal)
Breeding method	:	Introduction
Source/Parent/Pedigree	:	34th IBON-9009
Year of release	:	2014, CVRC
Evolved at	:	IARI, Regional Station, Tutikandi Centre, Shimla
Notification details	:	1919 (E) dated 30.7.2014
Specific features	:	Six rowed, hulled and semi-dwarf variety. Resistant to yellow, brown and black rust.
Key characters for identification	:	6 rowed, hulled, plant height-80cm, leaf sheath and peduncle is waxy and spike is non-waxy.
Areas of adaptation	:	Timely sown rainfed conditions under low and mid hill areas (Northern Hill Zone)

Variety	:	HBL 713 (Him Palam Jau 1)
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	HBL 276 × HBL 364
Year of release	:	2016, SVRC
Evolved at	:	HAREC, CSKHPKV, Bajaura
Specific features	:	Six rowed, hulled and semi-dwarf variety. Resistant to yellow rust.
Key characters for identification	:	6 rowed, Hulled, Plant height 70-85cm, Tip sterility of the spike having parallel ears and spike is non-waxy. Ears are light green.
Productivity	:	30-35 q/ha
Areas of adaptation	:	Timely sown rainfed conditions under Low & Mid hill areas of HP.

Chickpea (*Cicer arietinum*)

Variety	:	C 235
Breeding method	:	Pedigree
Sources/Parent/pedigree	:	C1234 × IP58
Year of release	:	1960
Evolved at	:	RSS, CSKHPKV, Berthin
Notification details	:	S.O 440 dated 21.08.1975
Specific features	:	Matures in 171-175 days, Plants are medium in height. Brownish and wrinkled seeds of medium size with 12-13g/100 seeds weight. It is moderately susceptible to Ascochyta blight, wilt and root rot diseases.
Key characters for identification	:	It has medium sized grains and brownish seed colour.
Productivity	:	8-10 q/ha
Areas of adaptation	:	Suitable for rainfed agriculture

Variety	:	HPG17
Breeding method	:	Selection
Sources/Parent/pedigree	:	IIPR Kanpur
Year of release	:	1992
Evolved at	:	RSS, CSKHPKV, Berthin
Specific features	:	Plants are semi spreading type with thick foliage. It is a bold seeded variety 100 seed weight of 2g. It Matures in 180-185 days and on an average yields 13-15 q/ha. Resistant to Ascochyta blight, wilt and root diseases.
Key characters for identification	:	Bold seeds, thick foliage
Productivity	:	Yields13-15 q/ha
Area of adaptation	:	Zone I

Variety	:	Himachal Channa II
Breeding method	:	Pedigree
Sources/Parent/pedigree	:	Material received from ICRISAT GL 769 × P 919
Year of release	:	2000
Evolved at	:	HAREC, CSKHPKV, Dhaulakuan
Notification details	:	S.O. 599 (E)
Specific features	:	Short duration variety. Plants are of medium in height. Seed are brown in colour. Matures in 160-165 days. Resistant to Ascochyta blight and root rot
Key characters for identification	:	Early maturing, brown seeds
Productivity	:	Yields 13-14 q/ha
Area of adaptation	:	Zone I

Variety	:	Himachal Chana I
Breeding method	:	Pedigree
Sources/Parent/pedigree	:	F_2 Received from ICRISAT ICCX810800-3H-BW-1H-1H-BW
Year of release	:	1999
Evolved at	:	HAREC, CSKHPKV, Dhaulakuan
Notification details	:	S.O. 599 (E) dated 25.04.2006
Specific features	:	Semi erect, medium in size and with bright yellow seed colour. It is a small seeded. Matures in 180-185 days. Resistant to Ascochyta blight and moderately resistant to wilt, root and collar rot.
Key characters for identification	:	Small seeds with bright yellow seed colour
Productivity	:	Yields 11-12 q/ha
Area of adaptation	:	Zone I

Variety	:	GPF 2
Breeding method	:	Selection
Sources/Parent/pedigree	:	GL 769 × H 75-35
Year of release	:	2009
Evolved at	:	HAREC, CSKHPKV, Dhaulakuan
Notification details	:	S.O. 2137 (E), 2010
Specific features	:	High yielding, medium bold seeded, plants are semi erect with lush green leaves. Long fruiting branches is the characteristic feature of this variety. It is resistant to *Fusarium wilt*, root rot, Botrytis grey mould and *Ascochyta blight* and tolerant to cold stress and lodging. Flowering in 108.4 days and matures in about 159 days. It is a prolific pod bearing variety. Long fruiting branches is the characteristic of this variety.
Key characters for identification	:	Semi erect variety with lush green leaves. Grains are medium bold and brown coloured.
Productivity	:	15.1 q/ha
Area of adaptation	:	Zone I

Lentil (*Lens culinaris*)

Variety	:	HPL 5 (Vipasha)
Year of release	:	1980
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification details	:	S.O. 371(E) dated 29.05.1982
Specific features	:	Foliage is light green in colour and wax free. Seeds are medium, bold and are greyish brown in colour with light orange cotyledons. Highly resistant to rust and *Ascochyta* blight. It is a small seeded variety.
Productivity	:	14-15q/ha.
Area of adaptation	:	Whole of Himachal Pradesh

Variety	:	EC 1 (Markanday)
Breeding method	:	Selection
Year of release	:	2003
Evolved at	:	RSS, CSKHPKV, Berthin
Specific features	:	First bold seeded variety released from the state. Erect with plant height of 45 cm with light green small leaves. The seeds are extra bold with 1000 grain weight of 38g. It is highly resistant to rust and tolerant to *Ascochyta* blight.
Productivity	:	10-15q/ha
Area of adaptation	:	Zone I

Mash (*Vigna mungo*)

Variety	:	HIMACHAL MASH I
Breeding method	:	Selection
Sources/Parent/pedigree	:	UPU-00-31 (UPU 97-10 × DPU 88-1)
Year of release	:	2007
Evolved at	:	HAREC, CSKHPKV, Dhaulakuan
Notification details	:	S.O. 2137 (E), 2010
Specific features	:	Plant type is compact and erect in growth habit having 37-40 pods per plant with 6-7 seeds /pod. Pods are 4.5-4.8 cm long and pubescent. Grains are medium bold with 100 seed weight of 4.4g. Seeds are brownish black in colour. It is synchronous in maturity and matures in about 74-76 days. Resistant to mungbean yellow mosaic virus (MYMV) as compared to UG-218 and PantU-19, the existing varieties. It is also resistant to leaf crinkle, anthracnose and powdery mildew and moderately susceptible to *Cercospora* leaf spot.
Key characters for identification	:	Grains are medium bold, synchronous maturity
Productivity	:	14-16q/ha

Variety	:	UG 218
Breeding method	:	Pedigree
Sources/Parent/pedigree	:	G31 × T9/ T 9 × LU 220
Year of release	:	1988/1988/1996
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification details	:	S.O. 401 (E), 1998
Specific features	:	Matures in about 75-80 days. Grains are medium sized and dull black. It is highly resistant to yellow mosaic virus and tolerant to leaf spots. It can also be cultivated as *Zaid* crop in summer under irrigated condition. It bears 3-5 pubescent pods in clusters and each pod has 5-7 seeds. Pods are in clusters and pubescent.
Key characters for identification	:	Plants are short and it is determinate in growth habit
Productivity	:	11-12 q/ha
Area of adaptation	:	It was released in 1983 for the North-western zone and was adapted in 1996 for cultivation in Zone I of the state.

Variety	:	Pant U 19
Breeding method	:	Selection
Sources/Parent/pedigree	:	(UPU 1 × UPU 2)
Year of release	:	1981
Notification details	:	S.O. 19 (E) dated 14.01.1982
Specific features	:	Plants are erect and early maturing (85 days). The pods are hairy with black medium sized seeds. Resistance to yellow mosaic virus but moderately resistant to leaf spot diseases.
Key characters for identification	:	Pods are hairy with black medium sized seeds
Productivity	:	8-10 q/ha
Area of adaptation	:	Zone 1 of HP

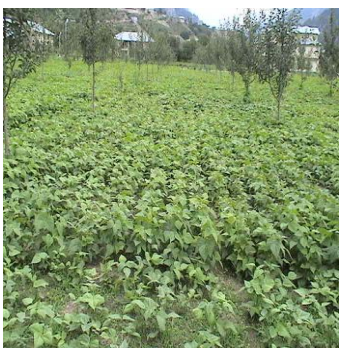
Variety	:	PDU 1
Breeding method	:	Selection
Sources/Parent/pedigree	:	IC-8219
Year of release	:	1994
Evolved at	:	RSS, CSKHPKV, Berthin
Specific features	:	Semi dwarf variety with profuse branching. Its pods are long with bold seeds. Suitable for intercropping with maize. This variety is highly susceptible to MYMV.
Productivity	:	10-12q/ha
Area of adaptation	:	Zone II (mid hills rainfed areas of Kullu district)

Variety	:	Kullu 4
Breeding method	:	Selection
Sources/Parent/pedigree	:	Selection from Kullu mash
Notification details	:	S.O 440(E) dated 21.08.1975
Specific features	:	Possesses bold grain with good cooking quality having 24.35 % protein content. Matures in 100-105 days. Susceptible to yellow mosaic virus.
Key characters for identification	:	Bold grain
Productivity	:	7-9 q/ha
Area of adaptation	:	Kullu valley

Rajmash (*Phaseolus vulgaris*)

Variety	:	Triloki
Breeding method	:	Pure line selection
Source/Parent/Pedigree	:	Local germplasm
Year of release	:	1998
Evolved at	:	Regional Research Station, CSKHPKV, Kukumseri
Specific features	:	Early maturing (98-100 days), seeds bold and creamish yellow with good cooking quality and excellent taste, resistant to bacterial blight, angular leaf spot and anthracnose
Key characters for identification	:	Bold and creamish yellow coloured seeds
Productivity	:	Average seed yield 17-22 q/ ha
Areas of adaptation	:	Suitable for cultivation in dry temperate zone (Zone IV) of HP

Variety	:	Baspa (KRC-8)
Breeding method	:	Pure line selection
Source/Parent/Pedigree	:	Local germplasm
Year of release	:	1994
Evolved at	:	CSKHPKV, MAREC, Sangla
Specific features	:	It is semi dwarf variety and matures in 110-120 days. Recommended hill areas of H.P. Resistant to bean anthracnose. It has attractive magenta colored bold grains with good cooking quality.
Productivity	:	Average seed yield 18-20 q/ ha
Areas of adaptation	:	Suitable for cultivation in dry temperate zone (Zone IV) of HP



Kulthi (*Dolichos biflorus* L.)

Variety	:	HPK 4 (Baizu)
Breeding method	:	Selection
Sources/Parent/pedigree	:	Local germplasm
Year of release	:	1980
Evolved at	:	RSS, CSKHPKV, Berthin
Notification details	:	01.01.1982
Specific features	:	Early maturing (100-125 days) and semi spreading variety with climbing growth habit. Pod length is 4-5 cm and each pod contains 4-5 seeds. It is shattering resistant. Seed colour is dark grey with dotted spots. It is resistant to shattering and leaf spot diseases. Highly tolerant to drought.
Key characters for identification	:	Semi spreading variety with climbing growth habit
Productivity	:	Its average potential yield is very high *i.e.*17-18q/ha. But due to high rainfall and late maturity, it yields about 6-7 q/ha.
Area of adaptation	:	Low and mid hills of HP.

Variety	:	VLG 1
Sources/Parent/pedigree	:	Local germplasm
Year of release	:	2012
Evolved at	:	RSS, CSKHPKV, Berthin
Notification details	:	01.01.1985
Specific features	:	Early maturing (112-123 days), resistant to leaf spot diseases
Key characters for identification	:	Semi spreading with climbing habit
Productivity	:	14-15 q/ha
Area of adaptation	:	Low & mid hills of HP

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

Variety	:	C 475 (Dhaula Lobiya)
Sources/Parent/pedigree	:	Selection from ICARDA germplasm
Year of release	:	2001
Evolved at	:	HAREC, CSKHPKV, Dhaulakuan
Specific features	:	Resistant to *Cercospora* leaf spot, anthracnose, yellow mosaic virus and yellow golden mosaic virus.
Key characters for identification	:	Semi determinate, semi -dwarf with bushy habit. Leaves are light green in colour. Plants are 140-155 cm high and thick stem. Plant bears 12-16 pods / plant of 13-15 cm length with 10-12 seeds /pod. Pods are borne on the uppermost nodes of the peduncle and are drooping on the upper surface of the plant canopy. Fresh pods are tender and can be consumed as green vegetable. It matures in 80-85 days. Seeds are white with brown hilum and medium bold (100 seed weight of 12g).
Productivity	:	14-15 q /ha
Area of adaptation	:	Zone I

Variety	:	C 519 (Himachal lobiya II)
Breeding method	:	Selection from the germplasm received from IITA Nigeria through IARI, New Delhi.
Year of release	:	2007, State Variety Release Committee
Evolved at	:	HAREC, CSKHPKV, Dhaulakuan
Notification details	:	S.O 2137 (E), 2010
Specific features	:	Resistant to *Cercospora* leaf spot and yellow mosaic and golden yellow mosaic virus.
Key characters for identification	:	It is a white seeded variety with medium bold grains. It is semi determinate with thick stem and does not require any support. It is a prolific pod bearing variety with 16-17 pods per plant. It takes about 85-95 days to mature. Semi-determinate cowpea variety with asynchronous maturity.
Productivity	:	Green pod yield of 45-50 q/ha and mean grain yield of 15-16 q/ha.
Area of adaptation	:	Zone I

Mungbean (*Vigna radiata* L. Wilczek)

Variety	:	Saketi 1(DPM 8909)
Year of release	:	2000
Evolved at	:	RSS, CSKHPKV, Berthin
Specific features	:	It has determinate plant type with almost synchronous maturity. Matures in 85 days, it is very tasty and free from hard grains. Moderately resistant to mosaic and tolerant to leaf diseases.
Key characters for identification	:	Tolerant to shattering
Productivity	:	10 q/ha
Area of adaptation	:	Low & mid hills of HP below 1000 m amsl

Variety	:	SML 668
Breeding method	:	Introduction
Year of release	:	2002
Evolved at	:	HAREC, CSKHPKV, Dhaulakuan
Notification details	:	S.O. 283 (E), 2010
Specific features		Grains are bold, dull green with white hilum, almost synchronous in maturity. Resistant to anthracnose, *Cercospora* leaf spot and Mung Bean Yellow Mosaic Virus. Semi determinate, plants are erect with thick stem
Key characters for identification	:	Erect, foliage is dark green colour, Long pods in bunches with 10-12 dull green seed. Protein content 22.7%
Productivity	:	14-15 q/ha

Variety	:	Pusa Baisakhi
Breeding method	:	Selection
Sources/Parent/pedigree	:	Selection from Type 44
Year of release	:	1974
Evolved at	:	HAREC, CSKHPKV, Dhaulakuan
Notification details	:	S.O. 566 (E) dated 21.09.1974
Specific features	:	Plants are semi erect and seeds are dull green. Early variety maturing in 65-70 days. Moderately resistant to yellow mosaic virus.
Productivity	:	6 q/ha
Area of adaptation	:	Suitable for summer and *kharif* cultivation. Wherever irrigation facility is there, it is grown as cash crop after wheat cultivation.

Pigeon pea (*Cajanus cajan* L.)

Variety	:	Sarita (ICPL 85010)
Year of release	:	1996
Evolved at	:	RSS, CSKHPKV, Berthin
Notification details	:	S.O 401 (E), 1998
Specific features	:	Early maturing suitable for the wheat- arhar cropping sequence. It is a dwarf variety and takes 150-155 days to mature.
Key characters for identification	:	Dwarf variety determinate
Productivity	:	15 q/ha
Area of adaptation	:	Zone I and lower areas of Zone II

Linseed (*Linum usitatissimum* L.)

Variety	:	LC 45 (Himalini)
Breeding method	:	Pedigree method
Source/Parent/Pedigree	:	K 2 × Kangra Local
Year of release	:	1985, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	295 (E), 09.04.1985
Specific features	:	Resistant to rust & wilt, high yielding and seed type variety
Key characters for identification	:	Erect growth habit, funnel shaped white flower with twisted aestivation, brown seed colour.
Seed oil content (%)	:	42.00
Productivity	:	1310 (kg/ha)
Areas of adaptation	:	Linseed growing areas of Himachal Pradesh, Punjab, Haryana and Rajasthan

Variety	:	KL 43 (Janaki)
Breeding method	:	Bulk method
Source/Parent/Pedigree	:	New river × LC-216
Year of release	:	1988
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Specific features	:	Resistant to rust, wilt and powdery mildew
Key characters for identification	:	Erect growth habit with blue flowers having brown seeds
Seed oil content (%)	:	43
Productivity	:	1000 (kg/ha)
Areas of adaptation	:	Linseed growing areas of Himachal Pradesh

Variety	:	DPL 21 (Jeevan)
Breeding method	:	Pedigree method
Source/Parent/Pedigree	:	Summit × LC- 216
Year of release	:	1988, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O. 108(E) dated 01.01.1988
Specific features	:	Dual purpose type, resistant to powdery mildew, rust and wilt
Key characters for identification	:	Erect growth habit, disk shaped blue flower with semi twisted aestivation, light brown seed colour
Seed oil content (%)	:	45.00
Productivity	:	1090 (kg/ha) (Seed), 1100 (Fibre) (kg/ha)
Areas of adaptation	:	All linseed growing areas of Northern India

Variety	:	KL 31 (Nagarkot)
Breeding method	:	Pedigree method
Source/Parent/Pedigree	:	New River × LC 216
Year of release	:	1995, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O. 408(E) dated 04.05.1995
Specific features	:	Dual-purpose type variety having wider adaptability, resistant to drought, powdery mildew, rust & wilt
Key characters for identification	:	Erect growth habit, disk shaped blue flower with semi twisted aestivation, seed colour light brown
Seed oil content (%)	:	43.00
Productivity	:	1150 (kg/ha) (Seed), 950 (kg/ha) (Fibre)
Areas of adaptation	:	Himachal Pradesh, Haryana, Punjab, Jammu & Kashmir, Uttar Pradesh excluding Bundelkhand, Bihar, Jharkhand, West Bengal and Assam

Variety	:	KL 1 (Surbhi)
Breeding method	:	Pedigree method
Source/Parent/Pedigree	:	LC 216 × LC 185
Year of release	:	1995, SVRC (HP)
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O. 408(E) dated 04.05.1995
Specific features	:	Recommended for *utera* conditions, medium dwarf, resistant to lodging, powdery mildew, rust & wilt
Key characters for identification	:	Erect growth habit, star shaped white flower with valuate aestivation, yellow seed colour
Seed oil content (%)	:	44.00
Productivity	:	1000 (kg/ha)
Areas of adaptation	:	Himachal Pradesh

Variety	:	KL 210 (Binwa)
Breeding method	:	Pedigree method
Source/Parent/Pedigree	:	Flake l × SPS-47/ 7-10-3
Year of release	:	2004, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O. 122(E) dated 02.02.2005
Specific features	:	Seed type variety, resistance to wilt & rust, moderately resistance to A*lternaria* blight and powdery mildew
Key characters for identification	:	Semi-erect growth habit, disk shaped red violet with twisted flower aestivation, yellow seed colour
Seed oil content (%)	:	40.00
Productivity	:	858 (kg/ha)
Areas of adaptation	:	Himachal Pradesh, Punjab, Haryana and Jammu & Kashmir

Variety	:	KL 224 (Baner)
Breeding method	:	Pedigree method
Source/Parent/Pedigree	:	EC 21741 × LC 216
Year of release	:	2005, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O. 1177 (E) dated 25.08.2005
Specific features	:	High yielding and seed type variety having wider adaptability, recommended for *utera* condition, resistance to rust and wilt, moderately resistant to *Alternaria* blight and powdery mildew
Key characters for identification	:	Erect growth habit, disk shaped blue flower with twisted flower aestivation, light brown seed colour
Seed oil content (%)	:	39.70
Productivity	:	422 (kg/ha)
Areas of adaptation	:	Himachal Pradesh, Punjab, Haryana and Jammu & Kashmir

Variety	:	KL 187 (Him Alsi 1)
Breeding method	:	Pedigree method
Source/Parent/Pedigree	:	K 2 × TLP-1
Year of release	:	2005, SVRC (HP)
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Specific features	:	High yielding and seed type variety, resistant to Alternaria blight**,** rust & wilt
Key characters for identification	:	Semi- spreading growth habit, funnel shaped snow-white flower having brown seed colour
Seed oil content (%)	:	41.50
Productivity	:	800-1000 (kg/ha)
Areas of adaptation	:	All linseed growing areas of H.P.

Variety	:	DPL 17 (Him Alsi 2)
Breeding method	:	Pedigree method
Source/Parent/Pedigree	:	EC-21741 × LC-216
Year of release	:	2005, SVRC (HP)
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Specific features	:	Dual purpose type, resistant to *Alternaria* blight, rust & wilt
Key characters for identification	:	Semi- spreading growth habit, cup shaped white flower having brown seed colour
Seed oil content (%)	:	40.50
Productivity	:	1100 (kg/ha) (seed yield), 600–700 (kg/ha) (fibre)
Areas of adaptation	:	All linseed growing areas of H.P.

Variety	:	KL 215 (Bhagsu)
Breeding method	:	Pedigree method
Source/Parent/Pedigree	:	RL-50-3 × Surbhi
Year of release	:	2008, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Specific features	:	Recommended for *utera* system, seed type variety, moderately resistant to rust and wilt
Key characters for identification	:	Medium tall with blue flowers having brown small seeds
Seed oil content (%)	:	36.4
Productivity	:	428 (kg/ha)
Areas of adaptation	:	Linseed growing areas of Himachal Pradesh, Punjab, Haryana and J&K

Variety	:	KL 214 (Himani)
Breeding method	:	Pedigree selection
Source/Parent/Pedigree	:	DPL 20 × KLS -1
Year of release	:	2008, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	2458 (E), 16.10.2008
Specific features	:	Wider adaptability, recommended for *utera* conditions, moderately resistant to powdery mildew & rust
Key characters for identification	:	Erect growth habit, disk shaped blue flower with semi twisted aestivation, brown seeds
Seed oil content (%)	:	36.4
Productivity	:	583 (kg/ha)
Areas of adaptation	:	Himachal Pradesh, Haryana, Punjab and Jammu & Kashmir

Variety	:	KL 241 (Him Palam Alsi 1)
Breeding method	:	Pedigree method
Source/Parent/Pedigree	:	Giza-7 × KLS-1
Year of release	:	2016, SVRC (HP)
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Specific features	:	Recommended for *utera* system, seed type, resistant to powdery mildew, rust & wilt
Key characters for identification	:	Erect growth habit, disc shaped blue flower having brown seed colour
Seed oil content (%)	:	36.15
Productivity	:	640 (kg/ha)
Areas of adaptation	:	Under assured moisture condition of traditional linseed growing areas of Mid and Low hills of H. P.

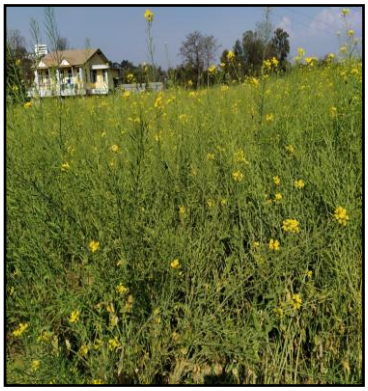
Variety	:	KL 263 (Him Palam Alsi 2)
Breeding method	:	Pedigree method
Source/Parent/Pedigree	:	KL-223 (HimAlsi-2) × KL-224 (Baner)
Year of release	:	2016, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Specific features	:	Seed type, high yielding, resistant to powdery mildew, rust and *Alternaria* blight.
Key characters for identification	:	Erect growth habit, disc shaped blue flower having brown seed colour.
Seed oil content (%)	:	35.27
Productivity	:	1542 (kg/ha)
Areas of adaptation	:	All the linseed growing areas of Zone-1 (Himachal Pradesh, Punjab, Haryana and J&K)

Rapeseed Mustard Varieties

Crop : Brown Sarson (*Brassica rapa* var brown sarson)

Variety	:	KBS 3
Breeding method	:	bulk method
Source/parents/pedigree	:	Segregating material derived from cross between exotic Japanese line Yukina and Indian line Pusa Kalyani provided by PC, AICRP (RM), Bharatpur
Year of release	:	1996, CVRC and SVRC
Evolved at	:	SAREC, CSKHPKV, Kangra
Notification Details	:	S.O 92 (E) dated 02.02.2001
Specific features	:	High oil per cent, good for sag, low fertilizer requirement, can be sown in rainfed or irrigated conditions, sole and intercrop with wheat, resistant to white rust and tolerant to frost
Key characters for identification	:	Dark green very broad lower leaves, thick stem, profuse branching, long siliquae ,medium sized dark brown seed, medium tall
Productivity	:	10-12 q/ha
Areas of adaptation	:	Low and mid hills of HP

Variety	:	HPBS 1
Breeding method	:	Selection
Source/parents/pedigree	:	Local landrace cultivar collected from Kukuriseri near Kais village in Kullu District
Year of release	:	2009, SVRC
Evolved at	:	SAREC, CSKHPKV, Kangra
Notification Details	:	IC 591746
Specific features	:	High oil per cent, good for sag, low fertilizer requirement, tolerant to lodging, resistant to white rust
Key characters for identification	:	Broad leaves with dark green coloured basal leaves, prominent hair on lower side, thick stem, profuse branching starting from base, spreading habit during initial stage of growth but becomes erect as the temperature rises, long siliquae placed thickly on branches with medium bold, round, brown seeds, normal flower size with bright yellow petals, height 108 cm
Productivity	:	10-12 kg/ha
Areas of adaptation	:	Low and high hills of HP



Crop	:	Indian Mustard *(Brassica juncea)*
Variety	:	RCC-4
Breeding method	:	Pedigree Method
Source/parents/pedigree	:	Varuna, Pusa Bold, Pusa Bold 75-2, Pant 18, RH 30, RLM 171, RLM 514, RH 7361
Year of release	:	1996, CVRC, SVRC
Evolved at	:	SAREC, CSKHPKV, Kangra
Notification Details	:	S.O. 92(E) dated 02.02.2001
Specific features	:	compact plant type
Key characters for identification	:	Profusely branched, shining brown seeds, compact plant type, stem with violet pigmentation
Productivity	:	11-13 q/ha
Areas of adaptation	:	Low to mid hills of Himachal Pradesh

Crop	:	Karan Rai (*Brassica carinata*)
Variety	:	Jayanti
Breeding method	:	Mutation
Source/parents/pedigree	:	HC-1
Year of release	:	2005, SVRC
Evolved at	:	JNKVV, Jabalpur
Notification Details	:	IC 523914
Specific features	:	Tolerant to drought, hail storm and bird attack
Key characters for identification	:	Bushy giant plants, branching from base, anthocyanin pigment at base of stem,primary branches and,leaf axils, bold, yellow non glossy seeds
Productivity	:	10-12 q/ha
Areas of adaptation	:	Mid and Low hills of Himachal Pradesh

Crop	:	Gobhi Sarson (*Brassica napus*)
Variety	:	Sheetal
Breeding method	:	Selection
Source/parents/pedigree	:	EC 127129 from Poland
Year of release	:	1994, SVRC
Evolved at	:	SAREC, CSKHPKV, Kangra
Notification Details	:	S.O. 408(E) dated 04.05.1995
Specific features	:	High oil percent, responsive to fertilizer and irrigation
Key characters for identification	:	Tall plants, high branching, chilling requirement and long siliquae
Productivity	:	14 q/ha
Areas of adaptation	:	Low and mid hills of Himachal Pradesh

Crop	:	Gobhi Sarson (*Brassica napus*)
Variety	:	Neelam
Breeding method	:	Selection
Source/parents/pedigree	:	Culture-2 from Canada
Year of release	:	1999, CVRC, SVRC
Evolved at	:	SAREC, CSKHPKV, Kangra
Notification Details	:	S.O. 92(E) 02.02.2001
Specific features	:	First near 00 variety, resistant to white rust, responsive to fertilizer and irrigation, high yielding, high oil percent
Key characters for identification	:	Medium tall, high branching, no chilling requirement, long siliquae
Productivity	:	15-17q/ha
Areas of adaptation	:	Low and mid hills of Himachal Pradesh

Crop	:	Gobhi Sarson (*Brassica napus*)
Variety	:	ONK-1 (Him Sarson 1)
Breeding method	:	Single plant selection followed by pure line breeding method
Source/parents/pedigree	:	Derived from BC/29/27
Year of release	:	2009, CVRC, SVRC
Evolved at	:	SAREC, CSKHPKV, Kangra
Notification Details	:	S.O 2187(E) dated 27.08.2009
Specific features	:	High oil percent, high oleic acid, responsive to fertilizer and irrigation, earlier than Sheetal, wider adaptability
Key characters for identification	:	Round to long, medium broad, light green leaves with light pigmentation in veins and less deep dentation on margins, semi spreading branches, semi spreading long siliquae placed thickly on branches with high number of seeds, flower size smaller than other gobhi sarson varieties
Productivity	:	15-18 q/ha
Areas of adaptation	:	Low and mid hills of HP

Crop	:	Gobhi Sarson (*Brassica napus*)
Variety	:	GSC 7
Breeding method	:	Pedigree method
Source/parents/pedigree	:	Rivette, RR001
Year of release	:	2014
Evolved at	:	PAU, Ludhiana
Notification Details	:	S.O 1228(E) 07.05.2015
Specific features	:	00 oil quality with high oleic acid, responsive to fertilizers and irrigation, high seed yield and oil percent
Key characters for identification	:	Profusely branched, high density of siliquae, light coloured smooth leaves
Productivity	:	14-15 q/ha
Areas of adaptation	:	Low and mid hills of HP

Crop	:	Toria (*Brassica rapa* var. toria)
Variety	:	Bhawani
Breeding method	:	Selection
Source/parents/pedigree	:	Kanpur Local Selection
Year of release	:	1992, CVRC, SVRC
Evolved at	:	CSA University of Agriculture and Technology, Kanpur
Specific features	:	Catch crop
Key characters for identification	:	Bushy, dwarf, profusely branched, early maturity, shining brown seeds
Productivity	:	7-8 q/ha
Areas of adaptation	:	Short duration catch crop, grows on residual moisture from end of September to December in plain parts of HP

Soybean (*Glycine max*)

Variety	:	Shivalik (Himso 333)
Breeding method	:	Selection
Source/Parent/Pedigree	:	PK 73-55
Year of release	:	1987
Evolved at	:	Department of Crop Improvement, CSK HPKV, Palampur
Notification Details	:	S.O 386(E) dated 15.05.1990
Specific features	:	Field resistant to yellow mosaic virus
Key characters for identification	:	Light creamy pubescence on stem, leaves and pods, white flower colour, and yellow seed with dark brown hilum
Productivity	:	15-20q/ha
Area of adaptation	:	Low and mid hills of H.P.
Days to maturity	:	120-125 days

Variety	:	Hara Soya (Himso 1563)
Breeding method	:	Pedigree
Source/Parent/Pedigree	:	(Ankur × Himso 330) × Bragg
Year of release	:	2000
Evolved at	:	Department of Crop Improvement, CSK HPKV, Palampur
Notification Details	:	S.O. 92 (E) dated 22.02.2001
Specific features	:	First ever culinary purpose variety released for general cultivation in the country for Northern Hill state. Low lipoxygenase content.
Key characters for identification	:	Green seeds with black hilum, transparent seed coat and green cotyledons, white flower colour, blackish brown pods
Productivity	:	18-20q/ha
Area of adaptation	:	Suitable for general cultivation in Mid hills of H.P.
Days to maturity	:	114-129 with a mean of 123 days

Variety	:	Palam Soya (Himso 1579)
Breeding method	:	Pedigree selection
Source/Parent/Pedigree	:	Selection from a cross between JS 72-451 × Punjab No 1
Year of release	:	2000
Evolved at	:	Department of Crop Improvement, CSK HPKV, Palampur
Notification Details	:	S.O. 122 (E) dated 02.02.2005
Specific features	:	Determinate growth habit and resistance to lodging
Key characters for identification	:	Purple flower colour, light brown pubescence on stem, leaves and pods and medium bold seeds with brown hilum
Productivity	:	15-20q/ha
Area of adaptation	:	Suitable for early and timely sown conditions in areas having high rainfall and high soil fertility conditions
Days to maturity	:	114-133 with a mean of 121 days

Variety	:	Him Soya (Himso 1588)
Breeding method	:	Pedigree selection
Source/Parent/Pedigree	:	JS 79-295 × Lee
Year of release and authority	:	2005
Evolved at	:	Department of Crop Improvement, CSK HPKV, Palampur
Notification Details	:	National Identity No. IC-520843
Specific features	:	Determinate growth habit, suitable for cultivation under high fertility and high rainfall conditions, moderately resistant to pod blight and bacterial leaf blight
Key characters for identification	:	Purple flower colour, dark brown pubescence on stem, leaves and pods which turn black at maturity, yellow and round seeds of smaller size with dark brown hilum
Productivity	:	15-20q/ha
Area of adaptation	:	Suitable for general cultivation in the mid hills of H.P. where YMV is not a problem
Days to maturity	:	118-123 with a mean of 121 days

Variety	:	Palam Early Soya-1 (Himso 1594 E)
Breeding method	:	Pedigree selection
Source/Parent/Pedigree	:	JS 79-295 × Punjab No 1
Year of release	:	2012
Evolved at	:	Department of Crop Improvement, CSK HPKV, Palampur
Notification Details	:	National Identity No. IC-594184
Specific features	:	First early maturing soybean variety released for intercropping with maize as well as sole crop
Key characters for identification	:	Erect and determinate growth habit, purple flower colour and brown pubescence on stem, leaves and pods
Productivity	:	13 q/ha as a sole crop and 7.5 q/ha as an intercrop with maize
Area of adaptation	:	Suitable for cultivation as an intercrop with maize in mid hills of H.P where YMV is not a problem
Days to maturity	:	100-105 with a mean of 103 days

Forage Crops

Crop	:	Napier – bajra hybrid
Variety	:	NB – 37
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	(*Pennisetum polystachyon* × *P. typhoid*)
Year of release	:	1996
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Specific features	:	Thin, long dark green leaves, thin stem, deep medium thick roots and thin long whitish green panicle.
Key characters for identification	:	Tolerant to water stress conditions
Productivity	:	400-500 q/ha
Areas of adaptation	:	Sub–tropical grasslands and wasteland in Zone I and II of Himachal Pradesh

Crop	:	Setaria grass (*Setaria anceps*)
Variety	:	PSS – 1
Breeding method	:	Synthetic
Source/Parent/Pedigree	:	Developed from Narok, an introduction from Africa
Year of release	:	1989, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	386(E) dated 15.05.1990
Specific features	:	Fast growing perennial grass, dark green leaves, brown rusty head, medium thick stems, remains green for 9-10 months in a year, provides 3-4 cuttings
Key characters for identification	:	Frost resistant
Productivity	:	600-750 q/ha
Areas of adaptation	:	Suitable for introduction in pastures, grasslands, wasteland and forests "glads" of sub-tropical regions between 1100 and 2100 m amsl.

Crop	:	Setaria (*Setaria anceps*)
Variety	:	Setaria-92
Breeding method	:	Single Plant Selection
Source/Parent/Pedigree	:	*S. anceps* × *S. glauca*
Year of release	:	2003, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	Notification no. 122(E) dated 02.02. 2005
Specific features	:	Narrow long dark green leaves, thin stem, multi-tillers, deep fibrous root system and long vegetative growth period. Green inflorescence which turns rusty brown on maturity.
Key characters for identification	:	Drought and frost tolerant
Productivity	:	250-300 q/ha in 2 to 3 cuttings
Areas of adaptation	:	Grasslands and pastures in mid hill and low hill areas

Crop	:	Setaria grass (*Setaria anceps*)
Variety	:	S-18
Breeding method	:	Clonal selection
Source/Parent/Pedigree	:	Open pollinated base population
Year of release	:	2013
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O. 312 (E) dated 01.02.2013
Specific features	:	Broad dark green leaves, medium thick stem, multi-tillers, deep fibrous root system and long vegetative growth period with 10 – 12% crude protein content
Key characters for identification	:	Green inflorescence which turns rusty brown on maturity. Drought and frost tolerant
Productivity	:	500-600 q/ha in 3 to 4 cuttings
Areas of adaptation	:	low & mid hills

Crop	:	Setaria grass (*Setaria anceps*)
Variety	:	S-25
Breeding method	:	Clonal selection
Source/Parent/Pedigree	:	Open pollinated base population of Setaria grass
Year of release	:	2019
Evolved at	:	Dept. of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O. 3482 (E) dated 07.10.2020
Specific features	:	Light green broad leaves, purple pigmentation on basal part of stem, medium thick tillers, deep fibrous root system, crude protein 7.6-8.8% on dry matter basis, tolerant to drought, cold and frost
Key characters for identification	:	Purple pigmentation on basal part of stem, drought and frost tolerant
Productivity	:	700-800 q/ha in 3 to 4 cuttings
Areas of adaptation	:	Low & mid-hills of Himachal Pradesh and Uttrakhand. Cool Sub tropical and sub-temperate grasslands/ pastures under rainfed conditions

Crop	:	White clover (*Trifolium repens*)
Variety	:	Palampur composite – 1
Breeding method	:	Composite
Source/Parent/Pedigree	:	S-100, S-100 no mark, lodigino mother, irrigation merit, oregon and local strains
Year of release	:	1986
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O.122 (E) dated 02.02.2005
Specific features	:	High degree of resistance to both stripe and leaf rusts with diverse genetic base for resistance, amber, bold, semi hard grains and lodging resistance
Key characters for identification	:	Blackish-brown awns and distinctly brown spike with hairy glumes, distinctly high waxiness in all plant parts, thick and strong stem with long and broad leaves
Productivity	:	2.5–3.7 t/ha
Areas of adaptation	:	Timely sown rainfed and irrigated conditions in mid & low hills of HP.

Crop	:	Forage oat (*Avena sativa* L)
Variety	:	Palampur -1
Breeding method	:	Selection
Source/Parent/Pedigree	:	Alogerian
Year of release	:	1980, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification details	:	Notification no. 371(E) dated 29.05.1982
Specific features	:	Resistant to lodging, responsive to fertilizer non-shattering, very good regeneration capacity.
Key characters for identification	:	Broad dark green leaves, profuse tillering, medium plant height and good regeneration capacity.
Productivity	:	400-500 q/ha
Areas of adaptation	:	Low and mid hill regions of HP

Crop	:	Guinea grass (*Panicum maxium*)
Variety	:	PGG – 9
Breeding method	:	Hybridization
Source/Parent/Pedigree	:	CPI 63450 × CPI 60013
Year of release	:	1988, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification details	:	S.O. 165 (E) dated 06.03.1987
Specific features	:	Very responsive to N- fertilizer, provides 3-4 cuttings
Key characters for identification	:	Long light green leaves and thick stems. Leaves have pubescence under neath. Panicle is compact, less shattering and have synchrony in seed maturity
Productivity	:	400 q/ha
Areas of adaptation	:	Zone – I & II

Crop	:	Shaftal (*Trilolium resupinatum*)
Variety	:	Shaftal – 48
Breeding method	:	Selection
Source/Parent/Pedigree	:	Local germplasm
Year of release	:	1994, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Specific features	:	Gives 47% & 37% higher fresh and dry matter yield than berseem in cold climate conditions of H.P and 20% higher digestible dry matter yield
Key characters for identification	:	Broad dark green trifoliate leaves, hollow stem, small whitish head, which turns pinkish on maturity
Productivity	:	400-500 q/ha
Areas of adaptation	:	Cool temperate climate of Kullu, Mandi, Shimla and Lahaul & Spiti

Crop	:	Lucerne (*Medicago sativa*)
Variety	:	Anand – 3
Breeding method	:	Selection
Source/Parent/Pedigree	:	Local germplasm from Gujarat
Year of release	:	1992, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O 408(E) dated 04.05.1995
Specific features	:	Resistant to lodging and frost and only legume surviving in the harsh dry conditions of Spiti valley.
Key characters for identification	:	Dark green trifoliate leaves, medium thick stem, deep root system, tillers vary from 10–15/plant, flower blue in colour and seed are kidney shaped and yellow in colour
Productivity	:	300 q/ha
Areas of adaptation	:	Cold dry zone of Kinnaur and Lahaul & Spiti valley

Crop	:	Tall Fescue (*Festuca arundinacea*)
Variety	:	Hima 4
Breeding method	:	Phenotypic Restricted Reccurrent Selection
Source/Parent/Pedigree	:	Hima-1 x Roa
Year of release	:	2003/2005, CVRC
Evolved at	:	Dept. of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O 122(E) dated 02.02.2005
Specific features	:	Cold and frost tolerant Crude protein (12-14%)
Key characters for identification	:	Thick broad dark green large leaves, thick round stem, deep fibrous root system and long open panicle.
Productivity	:	250-300 q/ha green fodder yield in 2 to 3 cuttings.
Areas of adaptation	:	Temperate Grasslands/ orchards

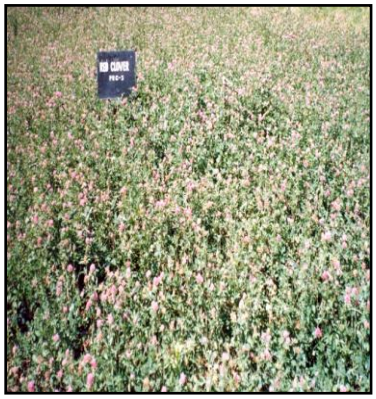
Crop	:	Tall Fescue (*Festuca arundinacea*)
Variety	:	Hima 14
Breeding method	:	Composite variety
Source/Parent/Pedigree	:	Indigenous and Exotic collections
Year of release	:	2013, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O. 3220(E) dated 05.09.2019
Specific features	:	Cold and frost tolerant. Crude protein = 10-12%
Key characters for identification	:	Broad dark green large leaves, multi tillers, quick regeneration capacity, deep fibrous root system and long open panicle.
Productivity	:	300-325 q/ha in 2 to 3 cuttings
Areas of adaptation	:	Temperate grasslands

Crop	:	Tall Fescue (*Festuca arundinacea*)
Variety	:	Hima 1
Breeding method	:	Phenotypic Recurrent Selection method
Source/Parent/Pedigree	:	Elite local ecotypes
Year of release	:	1996/1998, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification details	:	S.O. 401(E) dated 15.05.1998
Specific features	:	Tolerant to drought, acidic and alkaline soils, tall and robust grass suitable for hay purpose in temperate climate
Key characters for identification	:	Thick broad dark green large leaves, thick round stem, deep fibrous root system, long open panicle and bold seed
Productivity	:	250-300 q/ha
Areas of adaptation	:	Temperate grasslands/ orchards

Crop	:	Tall Fescue (*Festuca arundinacea*)
Variety	:	EC 178182
Breeding method	:	Introduction from Western Pullman Regional Station, USA
Source/Parent/Pedigree	:	Exotic collection through NBPGR
Year of release	:	2012
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification details	:	S.O. 2136 (E) dated 31.08.2010
Specific features	:	Cold and frost tolerant with high persistence and productivity for temperate grasslands.
Key characters for identification	:	Thick broad dark green large leaves, thick round stem, deep fibrous root system and long open panicle.
Productivity	:	275-325 q/ha green fodder yield in 2 to 3 cuttings
Areas of adaptation	:	Temperate grasslands

Red Clover (*Trilolium pretense*)

Variety	:	PRC – 3
Breeding method	:	Phenotypic Restricted Recurrent selection
Source/Parent/Pedigree	:	Derivatives of several genotypes of red clover
Year of release	:	2005, CVRC
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O. 122(E) dated 02.02.2005
Specific features	:	Resistant to crown rot disease.
Key characters for identification	:	Semi prostrate growth habit, round dark green trifoliate leaves with whitish crescents round stem pink flower heads and yellow greenish seed. Crude Protein (18-20%)
Productivity	:	250 – 300 q/ha of green fodder in 3 – 4 cuttings.
Areas of adaptation	:	Suitable for humid sub-temperate and temperate pastures, grasslands and orchards.



Underutilized crop varieties

Crop	:	Buckwheat (*Fagopyrum esculentum*)
Variety	:	USDA-1
Breeding method	:	Selection
Source/Parent/Pedigree	:	Local germplasm
Year of release	:	1994
Evolved at	:	Department of Crop Improvement, CSKHPKV, Palampur
Notification Details	:	S.O. 408 (E) dated 04.05.1995
Specific features	:	Very early maturing, with determinate habit, tolerant to frost and resistant to powdery mildew, lodging and shattering
Key characters for identification	:	Bold dark brown conical seeds
Productivity	:	9-11q/ha
Areas of adaptation	:	High hills of HP

Crop	:	Buckwheat (*Fagopyrum esculentum*)
Variety	:	KBB 3 (Uday)
Breeding method	:	Pureline selection
Source/Parent/Pedigree	:	Local germplasm
Year of release	:	2001
Evolved at	:	HAREC, CSKHPKV, Kukumseri (Lahaul & Spiti)
Notification Details	:	S.O. 92 (E), 2001
Specific features	:	Early maturing, tolerant to cold, frost, lodging and drought. Resistant to powdery mildew diseases
Key characters for identification	:	Bold, brownish seeds and synchronized flowering as well as maturity
Productivity	:	14 – 16 q/ha
Areas of adaptation	:	Suitable for dry and wet temperate regions

Crop	:	Buckwheat (*Fagopyrum esculentum*)
Variety	:	Sangla B-1
Breeding method	:	Selection
Source/Parent/Pedigree	:	Local germplasm
Year of release	:	2005
Evolved at	:	MAREC, CSKHPKV, Sangla
Notification Details	:	S.O. 1178 (E) dated 20.07.2007
Specific features	:	High yielding, timely sown and determinate type
Key characters for identification	:	Dark green leaves, pinkish stem, conical and brownish grey seeds
Productivity	:	12-15q/ha
Areas of adaptation	:	High hills and dry temperate zone

Crop	:	Adzukibean (*Vigna angularis*)
Variety	:	HPU-51
Breeding method	:	Selection
Source/Parent/Pedigree	:	Single plant selection from IC 48406
Year of release	:	2013, Identified by SVRC (HP)
Evolved at	:	NBPGR,RRS, Phagli, Shimla
Notification Details	:	Agr H(11-Tech)F(5)-10/87-XII dated 24.8.2013
Specific features	:	Early maturing
Key characters for identification	:	Red colored seeds, medium height
Productivity	:	12-13 q/ha
Areas of adaptation	:	Low & mid hills of HP under timely sown conditions

Crop	:	Chenopodium
Variety	:	Him Bathua
Breeding method	:	Selection
Source/Parent/Pedigree	:	Single plant selection from IC 415777
Year of release	:	2013, SVRC (HP)
Evolved at	:	NBPGR, RRS, Phagli, Shimla
Notification Details	:	Agr H(11-Tech)F(5)-10/87-XII dated 24.8.2013
Specific features	:	Dual purpose variety suitable for use as green leafy vegetable type and seed type, rich in iron, beta carotene and low in oxalate content
Key characters for identification	:	Creamish colored seeds and reddish pink inflorescence
Productivity	:	6-7 q/ha
Areas of adaptation	:	High hills and dry temperate zones of HP

Ricebean (*Vigna umbellate*)

Variety	:	Palam Rajmung 1
Breeding method	:	Selection
Source/Parent/Pedigree	:	Local germplasm
Year of release	:	2016
Evolved at	:	Department of Organic Agriculture, CSKHPKV, Palampur
Notification Details	:	Recommended by Annual Workshop of All India Coordinated Research Network on Potential Crops organized at SK Nagar, Gujarat during May 2-3,2016
Specific features	:	Good alternative for pulses like mash and mung which do not thrive well under high rainfall areas
Key characters for identification	:	Seed color- Light green Flower color-yellow Pod color- Light brown
Productivity	:	12-15 q/ha
Areas of adaptation	:	Low and mid hills of Himachal Pradesh and adjoining areas of North Western Himalayas

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