

PANT RESEARCH NEWS



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DIRECTORATE OF RESEARCH
GBPUAT, PANTNAGAR

Dean Home Science Message

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Dr. Alka Goel, Dean Home Science

The quality of research work done in the GBPUA&T Pantnagar is an expression of standard of teaching and learning as well as availability of good infrastructural facilities in the university. A meticulously conducted research is crucial to the growth of university. The research findings of the scientist's work not only form the foundation of many programme development but also provides data to the policymakers to shape their decisions. GBPUA&T Pantnagar is a pool of brilliant minds full of innovative ideas

Editor's Desk



Dr. S. P. Singh, Editor-in-Chief

In recent past, a new trend of shifting of population from urban to rural area has been observed; this requires more land for settlements which will ultimately encroach upon agricultural land. Indian agriculture is advancing with every passing day, thanks to innovations made by agricultural scientist. Innovation in modern agriculture is more important as the whole agriculture industry is facing numerous challenges, of rising costs of supplies, a shortage of labor, changing environment conditions and changes in consumer preferences for transparency and sustainability.

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Dean's Message

but still our education and research system faces a lot of challenges. University fraternity/ research scientists locate the thrust areas based on local/ national/ global needs for relevant innovative research so that the challenges of funds and diligent faculty may be satisfied by focused research plans. The quality research includes professional learning, knowledge and skill development.

Home Science / Community Science education is a combination of basic and applied sciences. It's a multidisciplinary field of education where five main and many allied fields offer various research oriented issues. Since the last many decades, faculty has devoted sincere efforts to support research and has made research and innovation on the top of its strategic priorities. Various National and International research projects funded by reputed agencies were granted in the past and currently running in different departments of the college. College has also fostered research collaborations and has worked on building potent connections with different national and international stakeholders for the expansion and implementation of research.

The academic fraternity is required to work continuously to promote quality research contributing to the betterment of society and environment.

I congratulate Director Research and the staff for their efforts in bringing out this news letter "Pant Research News". It's a welcoming initiative to highlight the research achievements of the University as it will be motivating factors for the faculty and students to conduct quality research.

Looking forward for bright future prospects.

Editor's Desk

In near future the demand for quality and nutritive food will be of prime need of the population whether it is human being or animals. The scientists of Pantnagar University are working hard and coming up with new varieties (cereals, pulses, fodder) and farm technologies. The ongoing threat of COVID-19 pandemic even couldn't shake their will and they remained determined to give their best to the farming society. The new technologies of fruits like poor man's apple (Guava) are certainly worthy to deal with nutrient requirements. We, Pantnagarians are not only engaged in developing new technologies for the farmers but also determined to systematically disseminating these ideas of innovations to different stakeholders of farming via different means like social media, zoom, MS team, webinars etc.

Research Story

New released pulse varieties from SVRC, 2020



*Dr. R.K. Panwar
Professor
Genetics & Plant Breeding*



Name of Variety : Pant Pea 399 (Pant P 399)

Parentage : HFP 530 X Pant P 74

**Year of Release and Releasing Agency : 2020,
State Varietal Release Committee**

Salient Characters :

1. Its average plant height is 138 cm with a range of 95 to 175 cm over locations.
2. Pant Pea 399 has an average hundred seed weight of 20.17 g.
3. It is resistant to rust and powdery mildew diseases of fieldpea.
4. It is moderately resistant to pod borer pest.
5. It matures in 130 days in the plains of Uttarakhand.
6. **Yield : 18-22 q/ha**

Recommended Area of Adoption : Plains of Uttarakhand.

Name of Variety : Pant Lentil 12 (PL 245)

Parentage : PL 6 x DPL 58

**Year of Release and Releasing Agency : 2020, State
Varietal Release Committee**

Salient Characters :

1. Its average plant height is 33 cm with a range of 15 to 47 cm over locations.
2. Pant Lentil 245 has an average hundred seed weight of 2.56 g.



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Research Story

3. It is resistant to rust diseases of lentil.
4. It is moderately resistant to pod borer pest.
5. It matures in 159 days in the hills of Uttarakhand.
6. **Yield** : 15-18 q/ha

Recommended Area of Adoption : Hills of Uttarakhand

Name of Variety : Pant Arhar 8 (PA 514)

Parentage : PA 291 x ICPL 88039

Year of Release and Releasing Agency : 2020, State Varietal Release Committee

Salient Characters :

3.It matures in 165 days in the hills of Uttarakhand.

4.Its average plant height is 186 cm with a range of 142 to 218 cm.

5.Pant Arhar 8 is a medium bold seeded variety with average seed weight of 7.19 g/100 seeds.

6.It is moderately resistant to phytophthora stem blight and sterility mosaic diseases.

7.It is also moderately resistant to pod borer and pod fly pests.

8.**Yield** : 15-20 q/ha

Recommended Area of Adoption : Hills of Uttarakhand



Research Story

Recently released Sorghum varieties/hybrid



Dr. Yogendra Singh
Professor, Plant Pathology



Dr. P.K. Pandey
Professor, GPB



Dr. P.K. Shrotria
Ex-Professor, GPB

1. Pant Chari 12

Released by with year: 2020 State

Characteristics: Single cut forage sorghum variety, average yields of green fodder 927.29 q/ha and dry fodder 318.20 q/ha. Tall 350-360 cm, high protein content (7.12%), high digestibility (60.47% IVDMD). High resistance to major foliar disease viz. anthracnose and tolerant to shootfly. Recommended for Plain areas of Uttarakhand (*Tarai and Bhabar region*) including Udham Singh Nagar, Haridwar, Dehradun. Haldwani and Nainital districts .



2. Pant Chari 13

Released by with year: 2020 State

Characteristics: Single cut forage sorghum variety, average yields of green fodder 850-950 q/ha and dry fodder 250-300 q/ha. Tall 340-360 cm, high protein content (6.96%), high digestibility (59.74% IVDMD). High resistance to major foliar disease viz. anthracnose and tolerant to shootfly. Recommended for Plain areas of Uttarakhand (*Tarai and Bhabar region*) including Udham Singh Nagar, Haridwar, Dehradun. Haldwani and Nainital districts.



Research Story

3. Pant Chari 14

Released by (with year): 2020 State

Characteristics: Multicut forage sorghum variety, tall 280-300 cm, average yield 900 q/ha green fodder and 320 q/ha dry fodder (in three cuttings). Low HCN content (88.15ppm), suitable for cultivation under irrigated summer condition and rainfed *Kharif*. High protein content (7.18%), IVDMD (62.08%) and protein yield (18.89 q/ha). Recommended for Plain areas of Uttarakhand (*Tarai and Bhabar region*) including Udham Singh Nagar, Haridwar, Dehradun. Haldwani and Nainital districts.



4. Pant Chari 15

Released by (with year): 2020 State

Characteristics: Multicut forage sorghum variety, tall average yield 843.42 q/ha green fodder and 241.84q/ha dry fodder (in three cuttings). Tall 320-330 cm, low HCN content (87.96ppm), suitable for cultivation under irrigated summer condition and rainfed *Kharif*. High protein content (7.05%), and protein yield (18.17 q/ha). Recommended for Plain areas of Uttarakhand (*Tarai and Bhabar region*) including Udham Singh Nagar, Haridwar, Dehradun. Haldwani and Nainital districts.



5. CSH 43MF

Released by (with year): 2020 CVRC

Multicut forage sorghum hybrid, tall 265-275 cm, Average yield 900-950 q/ha green fodder and 210-230 q/ha dry fodder. Low HCN content (75.94), High protein content (7.46), high digestibility (51.19%). Broad and long leaves and resistant to grey leaf spot, leaf blight and tolerant to anthracnose and zonate leaf spot. Recommended for North-western plains of whole India and Zone I (Haryana, Punjab, Uttar Pradesh, Rajasthan, Gujarat, Uttarakhand) and Zone II (Maharashtra, Tamilnadu, Telangana & Karnataka)for



Research Story

PANT FORAGE OAT -4



Dr. Birendra Prasad

Professor,
Department of Genetics and Plant Breeding



Oat variety UPO-10-2(Pant Forage Oat-4) has been developed through hybridization from the cross (Gopher x Kent)-97-1-1, followed by pedigree method of selection was released in 13th meeting of SVRC on May 19 2020. Oat variety UPO-10-2 has been tested in the Standard Varietal Trial (SVT) of Uttarakhand for three consecutive years during *Rabi*: 2012-13, 2013-14 and 2014-15 seasons with an average yield of 339.86q/ha Green Forage Yield (GFY) and 74.63 q/ha Dry matter yield (DMY) over 17 locations. In SVT of Uttarakhand the proposed oat variety UPO-10-2 has shown significant superiority in GFY and DMY over the checks viz., Kent (NC) UPO 94 (ZC) by an overall increase of 6.01 and 15.92 % respectively for GFY and an advantage of 11.40 %, and 12.53 % respectively for DMY. In All India Coordinated Varietal Trials (ICAR) the forage Oat variety UPO-10-2 showed overall superiority of 11.3 % and 10.6 % in green forage yield over the national check (Kent) and zonal check (OL-125/Palampur-1) re-

Research Story

Similarly for dry matter yield of UPO-10-2 out yielded the national check and zonal checks by a margin of 18.54 % and 12.66 % respectively. Based on its overall superiority UPO-10-2 was identified for release and cultivation in plains and foot hills of Uttarakhand by “State Level Agricultural Research Workshop *Rabi*- 2017-18 held on 26.9.2018 at Dehradun under the Chairmanship of Director, Agriculture, Uttarakhand. The proposed forage oat variety UPO-10-2 also showed agronomic superiority over the national check (Kent) and zonal check (Palampur-1) in terms of green forage yield at Palampur (38.63 % & 15.21%), dry matter yield at Srinagar (6.74 % & 7.23%) and crude protein yield at Ranchi (7.53 % & 5.01 %) quintals per hectare in response to varying nitrogen levels.

UPO-10-2 has shown better dry matter digestibility (IVDMD %) over the zonal check viz., OL-125/Palampur-1 by a margin of 8.98% while at par with the national check (Kent). The new variety has better quality fodder due to its lower content of Neutral Detergent Fibre (NDF %) as compared to the National checks (Kent) and Zonal checks (OL-125 and Palampur-1) by a margin of at par and - 2.86%, respectively. Similarly the Acid Detergent Fibre (ADF %) is also lower (better) by an overall margin of at par and -3.7% over the checks. Oat variety UPO-10-2 has shown resistance to leaf blight, crown rust, loose smut, aphids and *Sclerotium* root rot under field conditions. The improved new oat variety UPO-10-2 would provide a replacement for old varieties like Kent, OL-125 and Palampur-1 *etc* due to its high yield of quality fodder, diseases resistance and seed production ability. It may be, exploited for better quality seed production in fodder oat, a major problem in most fodder oat varieties. High Leaf: Stem ratio (0.58) of UPO -10-2 with an overall advantage of 5.45 % over the National check Kent and advantage 31.82 % over Zonal check *i.e.* OL-125 and Palampur-1 leads to enhanced feeding value and nutritional quality. The new forage oat variety UPO-10-2 performed quite satisfactorily in the Farmer’s Field Trials during *Rabi* : 2015-16.

PANT FORAGE OAT-5

Oat variety UPO-16-4(Pant Forage Oat-5) has been developed through hybridization from the cross (Wright x UPO-265)-6-1-1, followed by pedigree method of selection. Oat variety UPO-16-4 has been tested in the Standard Varietal Trial (SVT) of Uttarakhand for four consecutive years during *Rabi*: 2016-17, 2017-18, 2018-19 and 2019-20 seasons with an average yield of 619.84q/ha GFY and 116.7 q/ha DMY over 24 loca-

Research Story



In SVT of Uttarakhand the proposed oat variety UPO-16-4 has shown significant superiority in GFY and DMY over the checks viz., Kent (NC), UPO 94 (ZC) and UPO-6-1 by an overall increase of 5.696, 18.66 % and 29.53% respectively for GFY and an advantage of 9.54 %, 17.49 % and 10.63% respectively for DMY.

Based on its overall superiority UPO-16-4 was identified for release and cultivation in plains and foot hills of Uttarakhand by “State Level Agricultural Research Workshop *Rabi*- 2020-21 held on 22.9.2020 at Dehradun under the Chairmanship of Director, Agriculture, and Uttarakhand. The proposed forage oat variety UPO-16-4 also showed agronomic superiority over the national check (Kent) and zonal check (UPO-94 & UPO-6-1) in terms of green forage yield, dry matter yield and crude protein yield.

UPO-16-4 has shown better dry matter digestibility (IVDMD %) over the zonal check viz., UPO-94 & UPO-6-1 and the national check (Kent). The new variety has better quality fodder due to its lower content of Neutral Detergent Fiber (NDF %) as compared to the National checks (Kent) and Zonal checks (UPO-94 and UPO-6-1). Similarly the Acid Detergent Fibre (ADF %) is also lower (better) by significant margin over the checks. Oat variety UPO-16-4 has shown resistance to leaf bight, crown rust, loose smut, aphids and *Sclerotium* root rot under field conditions. The improved new oat variety UPO-16-4 would provide a replacement for old varieties due to its high yield of quality fodder, diseases resistance and seed production ability. It may be, exploited for better quality seed production in fodder oat-a major problem in most fodder oat varieties. High Leaf: Stem ration of UPO-16-4 with an overall advantage over the National check as well as over Zonal check i.e. UPO-94 and UPO-6-1 leads to enhanced feeding value and nutritional quality. The new forage oat vari-

Research Story

Technology Development for Big Sized Guava Production

V.P. Singh, Professor, Horticulture

P.K. Singh, Professor, Irrigation & Drainage Engg.

Rajesh Kumar, Associate Professor, Horticulture

In the present era of health awareness, demand of quality fruits has increased globally. The ever growing demand for the quality fruits accompanied with market competition has encouraged the farmers to produce more quantity with quality fruits for getting higher income. Guava, owing to its high nutritional and medicinal values, is becoming a very important crop in present scenario. Earlier, it was also termed as “poor’s man apple” but it does not hold true in today’s context as the premium quality guava is being sold at a price comparable to apple specially in winters. The demand for soft fleshed and less seeded fruits is very high in the market. Taking into consideration the above fact, the soft fleshed, big sized and less seeded guava variety VNR-Bihi was introduced from Raipur (Chattisgarh) and was planted with hi-tech interventions (high density planting, drip fertigation and mulching) under PFDC project at HRC, Patharchatta. The plants were provided free of cost by VNR Nursery Pvt. Ltd., Raipur for experimental purpose. Further guava is a low water requiring crop and chances of inducing soil borne diseases (as guava wilt) and reduction in fruit quality aggravates with flooding. Hence, this variety was evaluated under various drip fertigation treatments coupled with plastic mulching. The treatment combination included drip irrigation (DI) and fertigation levels at 100, 80 and 60 per cent of estimated water requirement along with the recommended dose of fertilizers (RDF).

However, despite having large size and soft flesh even in unripe stage, VNR-Bihi is severely affected by diseases and insect-pests in rainy season as compared to other prominent guava varieties grown in this region. This is probably due to humid and high temperature conditions prevailing in the *tarai* region. To counter this problem, crop regulation practice (one leaf pair shoot pruning technique developed by the University) was being followed in whole orchard. The treatment where fertilizer dose comprising 100% RDF with 80% DI and 100 micron plastic mulch was found to be the best for growing high quality guava of VNR-Bihi during winter season. In addition to this, it is also advocated to add 50 gm borax in the fertigation schedule

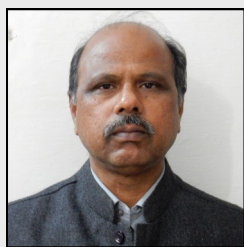
Research Story



Pic—Scientist narrating the technology to the farmers on site and weight of one guava

The individual fruit weight ranges between 500 to 750 gram and it can also be effectively achieved through fruit thinning. This variety is fetching almost 2 times higher price when compared to other conventional varieties cultivated in this area and is highly remunerative if scientifically grown with proper care.

TECHNICAL TRAINING ON SEED-TO-SEED BASIS OF MAJOR RABI CROPS



Dr. K.P. Singh
Professor
Plant Pathology

Ramcides Crop Science organised technical training on crops from seed to harvest, especially in detail on crop nutrition and crop protection via Online mode from 6 to 7th Nov. 2020. The technical training began with a talk by Krishnamurthi S., Senior Manager, Ramcides. He said that Ramcides is an Agro Solutions Company serving all sectors of agriculture especially in the Plant Protection and Plant Health segment by providing products and services of the highest quality and in time.

Research Story

He stressed that Ramcides are committed to contributing significantly towards the mission of national food self sufficiency program by enabling every potential farmer to produce more and better quality from the same land. Technical training of Ramcides was attended by over 300 personnel, predominantly in Sales/Marketing and field workers, working in 18 states across India.

A S Nain, Director, Experiment Station, GBPUAT, said the technical training was designed to provide budding field/ marketing workers an overview of the recent developments in the area of crop protection with the emergence of new R&D directions and provide latest developments in the area of crop nutrition. The course director, K P Singh said the structure of the technical sessions of Seed-to-seed basis were focused on finding ways to produce adequate food for the rapidly increasing world population, with discussion on various types of products such as those from plants and chemical origins, new varieties, fertilizers, new combi-products and plant nutrients. He gave details on need based fungicidal spray through forecasting for the management of apple diseases. D C Dimri dwelt on temperate fruit crop production and productivity viz. climate, varieties, pollinizers, pollinators, training, pruning, nutrition, irrigation, rejuvenations of unproductive apple orchards etc were described and possible management strategies were suggested. S K Guru, Rajeev Shukla and Deepshika elaborated upon the Wheat Cultivation in India: Physiology, Distribution and Diseases. The major challenges for future wheat production in India are increasing heat stress, dwindling water supplies for irrigation, a growing threat of new virulence of diseases and pests. Wheat is attacked by a number of diseases such as rusts, smuts, bunts, leaf blight, powdery mildew and head scab, cereal cyst nematode and ear cockle and the fungicides are the most and only excellent approach of controlling of wheat diseases. The talk by D K Singh and Shailbala gave an overview of potato diseases viz., late blight, early blight, black scurf, common scab, wart disease, soft rot, viral diseases etc. They also gave an account of the success in the area of management aims at controlling diseases by combining use of fungicides with other package of practices like disease free planting material, disease resistant varieties, biological control along with cultural practices. AK Panday and Lalit Bhatt talked on temperate vegetables, comprising important crops like cauliflower, cabbage, sprouting broccoli or broccoli, Brussels sprout, kale, and knol khol. They also discussed on integrated pest management (IPM) starts with crop rotation, cultivar selection, proper transplant production and pests control with microbial pest control agent, *Bacillus thuringiensis* (Bt), already commercialized on a large scale. 2nd days started with lecture by R M Srivastava for his work on major insect pests of apple and wheat under field and storage conditions.

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Research Story

He emphasized on the production and quality of apple is poor as compared to that of the developed countries because of several factors including insect and diseases. Although a large number of insect pests attack apple crops but some of them are very serious and need attention for their control. If not managed effectively, they render apple cultivation nonviable.

The lecture by Navneet Pareek emphasized that the cultivated soils suffer from growth-limiting problems due to deficiencies of mineral nutrients occurring globally. Soils also need to sustain root growth so that the growing plants can capture a sufficient proportion of the available nutrients. In order to sustain soil fertility sufficient amounts of nutrients needs to be delivered to growing plants in the form of inorganic or organic fertilizers. It can be concluded that fertilizer applications must be optimized in order to limit costs and restrict environmental damage. He emphasized on the common management strategy based on the “Five Rs”: to apply the right fertilisers at the right time in the right rate and at the rate place and also recycling nutrients. A K Singh shared the experience on the management of physiological and nutritional disorders in fruit crops. Fruits, whether fresh or dried, have always formed a part of the staple diet of human beings. The reason for this is that they are rich in nutrients and provide some of the essential minerals, vitamins, and the like, to our body. Various pre- and post-harvest disorders and diseases not only reduce the marketable yield and quality of fruits but may also become endangered to human health. The symptoms of physiological disorders may appear disease-like, they can usually be prevented by altering environmental conditions such as deviation from normal state of temperature, light, moisture, nutrient, harmful gases and inadequate supply of growth regulators. He covered different type of plant/plant part showing symptoms of nutrient deficiency. it is likely that that season’s yields and quality will be affected adversely.

Several hot topics were discussed which consisted of the talk by K P Singh. The technical training was concluded with a discussion on the Seed-to-Seed basis i.e. sowing, crop management, nutrition, identification, crop protection, harvesting and post harvest. The President, Ramcides, while summing up the deliberations, hoped that the awareness generated through this training would led to more focused meetings and implementation of emerging ideas. The future of this vast discipline of seed-to-seed basis in the 21st century seems bright, according to the concluding message by Guna Gnana Sowandari, P. and Subhasani, Ramcides, Chennai.

Research Story

Training on Systems Thinking and Modelling in Agriculture and Plant Pathology

INRA, France and GBPUAT, Pantnagar, India conducted an online training in the leadership of Dr. Serge Savary and Dr. Laetitia Willocquet from France and DR J Kumar Registrar and Dr A.S.Nain, Director Research, GBPUAT, Pantnagar.

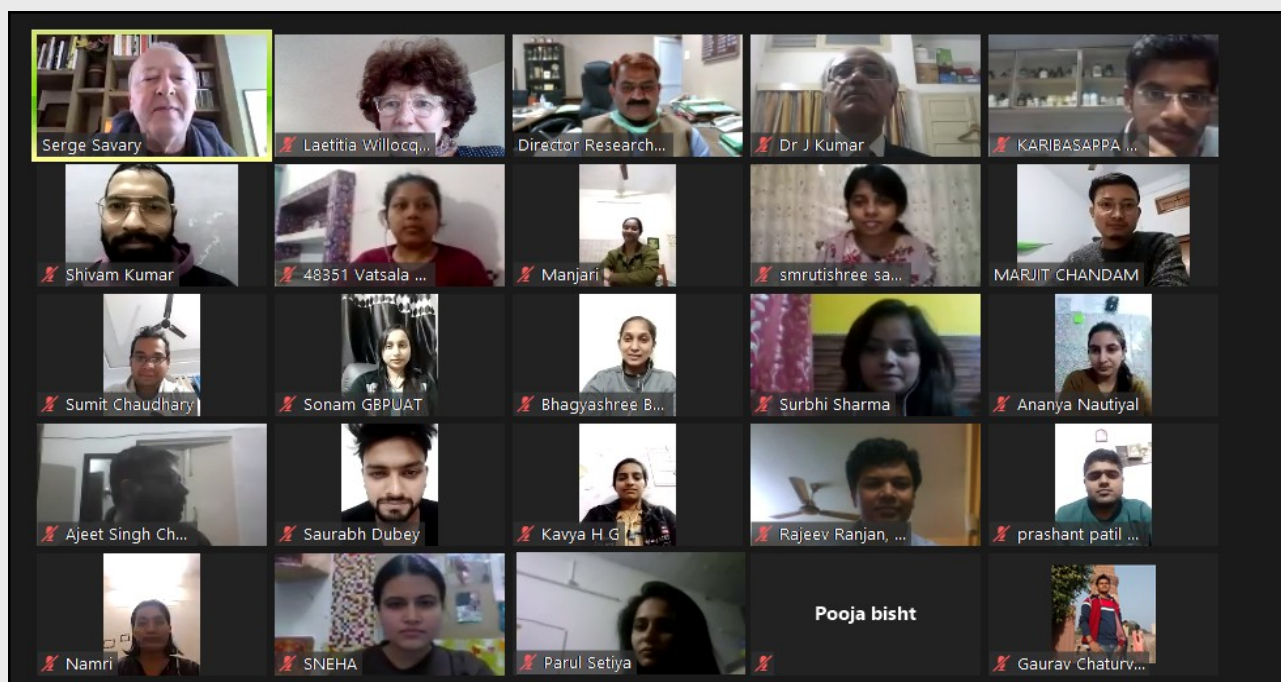
This training was on the topic "Systems Thinking and Modelling in Agriculture and Plant Pathology" which was held on: Nov 25, Nov 26, Nov 27; and Nov 30, December 1, Dec 2, Dec 3, Dec 4, 2020. This training was basically for the participants from Agrometeorology, Pathology, Agronomy, Entomology etc.

The objective of the training was-

1. Basic concepts in Systems Science: definition of a system, of a process, of a time-constant, of a model;
2. Introduce the concepts behind mechanistic simulation models;
3. Discuss with the students the importance, limits and use of simulation models;
4. Expand and apply these concepts to examples in plant disease epidemiology.

This training was open to MSc and PhD students, and to BSc student who intends to pursue further academic education.

In the training the focus on hands on exercise so that students could learn how to develop model in STELLA environment and take up their thesis research in the simulation modeling field.



Research Story

Honey Bee



Dr. Pramod Mall

Professor

Department of Entomology

The Uttarakhand state is rich in biodiversity especially in medicinal flora hence the importance of medicinal honey production is being emphasized and popularized among the farmers in order to enhance the biodiversity and encompass the health prospects of human being. Simultaneously, to add the extra income for the farmers. Safe use of chemicals against various disease like foul brood disease and Varroa mite have been narrated and popularized among the beekeepers. In general, farmers have already been trained to stop the use of the pesticide at the time of blooming in any crops or orchards to save our precious pollinators. Improved queen rearing techniques have been introduced among farmers to improve their stock culture and production.

A New Research Center “Model Bee Garden for Research & Training has established with a outlay of 80 acres during 2013-14, where, honey processing plant has been installed in 2015 for processing of honey. Approximately 9000 bee flora plantation have been done so far for pollinators and honey bees in bid to conserve, promote and augment the pollinators. Realizing the role of pollinators in enhancing the quality and yield of various crops and trees, it would be necessary to formulate the strategy accordingly to give an impetus for promotion and augmentation of our precious pollinators in bid to increase the overall agricultural production and productivity of the country. Since the Pantnagar centre is located in foothills of Himalaya encompassing the large area of Tarai as well as high altitudes of Himalaya. This is well known fact that Uttarakhand is rich in floral as well as fauna diversity. Therefore, there is huge scope and immense potential to get the centre recognized as pollinators diversity centre. The data based information generated by this centre will be useful for all the plains as well as hills.



