Dr G.S. Kalkat, Chairman, Punjab State Farmers’ Commission, inaugurating Dr Gurcharan Singh Kalkat Laboratories at PAU.
ANNUAL REPORT
2015-16

Punjab Agricultural University
LUDHIANA
This Annual Report covers the period from July 1, 2015 to June 30, 2016

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Youtube: https://www.youtube.com/channel/UCa3bxtjJAu3jUnUvV1BxhXQ
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The Punjab Agricultural University (PAU) is involved in research, teaching and extension activities in agriculture, agricultural engineering, basic sciences, home science and allied disciplines. During the period July 2015 to June 2016, the University made remarkable contributions.

**RESEARCH**

With research being the major mandate of the University, its main focus is on developing new crop varieties and their production, protection and processing technologies for enhancing productivity and profitability. A greater thrust is also on developing technologies to mitigate the effect of climate change, conserve natural resources and enhance input use efficiency. The salient achievements during the period under report are as under:

**Crop Improvement**

The University developed/recommended 26 varieties (9 of field crops, 10 of vegetable crops and 7 of flower crops) of different crops at the state level.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Varieties</th>
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<tbody>
<tr>
<td>Wheat</td>
<td>PBW 677, PBW 725 and HD 3086</td>
</tr>
<tr>
<td>Rice</td>
<td>PR 126</td>
</tr>
<tr>
<td>Desi cotton</td>
<td>LD 949</td>
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<tr>
<td>Kharif moong</td>
<td>ML 2056</td>
</tr>
<tr>
<td>Raya</td>
<td>RLC 3</td>
</tr>
<tr>
<td>Sunflower</td>
<td>PSH 1962</td>
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<tr>
<td>Napier Bajra</td>
<td>PBN 346</td>
</tr>
<tr>
<td>Tomato</td>
<td>Punjab Gaurav, Punjab Sartaj and Punjab Red Cherry</td>
</tr>
<tr>
<td>Pea</td>
<td>AP-3</td>
</tr>
<tr>
<td>Pumpkin</td>
<td>PPH-1 and PPH-2</td>
</tr>
<tr>
<td>Brinjal</td>
<td>PBHR-41, PBHR-42 and PBHL-4</td>
</tr>
<tr>
<td>Garlic</td>
<td>PG-18</td>
</tr>
<tr>
<td>Chrysanthemum</td>
<td>Punjab Shyamli</td>
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<tr>
<td>Gladiolus</td>
<td>Punjab Glad-2</td>
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</tbody>
</table>
Varieties identified at national level

Four crop varieties, developed by PAU, have also been recommended at national level.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Variety</th>
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<tbody>
<tr>
<td>Soybean</td>
<td>SL 955</td>
</tr>
<tr>
<td>Summer moong</td>
<td>SML 1115</td>
</tr>
<tr>
<td>Cotton</td>
<td>LH 2256</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>CoPb 92</td>
</tr>
</tbody>
</table>

- The University produced around 72,000 qraw seed (breeder, foundation and certified/TL) of different field crops, out of which, 3,595 q seed was produced through public-private partnership.
- Wild wheat and wild rice germplasm, consisting of 1400 and 1200 accessions, respectively, were screened for major wheat and rice diseases. Accessions with high level of resistance to yellow rust in wheat and sheath blight in rice were crossed with elite cultivars for transferring these genes to cultivated background. Heat tolerance QTL (quantitative trait loci) mapped in T.durum – Ae. speltoides introgression lines are being transferred to stripe rust resistant elite bread wheat lines using marker assisted selection (MAS).
- In rice, a novel brown plant hopper resistance gene from Oryza nivara has been mapped on chromosome 4 and MAS ready markers have been developed.
- Sugarcane transgenics for glucanase gene were evaluated for red rot resistance against isolate CF-08 and two plants were found to be resistant. Micropropagation was optimized in three peppermint collections and new sugarcane variety CoPb 92.

Crop Production Technologies

- The crop production technologies recommended include need-based N scheduling using leaf color chart (LCC) for basmati rice; and sowing of moongbean and arhar (in medium to heavy textured soils) on beds spaced at 67.5 cm (37.5 cm bed top and 30 cm furrow).
- Application of two sprays of salicylic acid @ 7.5 g/acre in 100 litres of water or KNO3 (Potassium nitrate) enhanced the seed yield of berseem.
- In fruits, bud forcing technique for early nursery production of kinnow and a new propagation ‘wedge grafting’ technique in mango were developed.
- In vegetables, application of paddy straw mulch @ 25 q/acre in potato fields improved tuber yield and maintained soil health. Besides, application of biofertilizer + FYM (50% N) was found to be the best organic fertilizer, as it resulted in significantly higher microbial population and soil enzymatic activities, which consequently increased the NPK content of the soil and yield attributes of the potato crop.
- The use of Consortium biofertilizer @ 500 g/acre through seed treatment in maize obtained higher grain yield as well as better soil health.
- Azorhizobium based biofertilizer was recommended for the rice crop.
- In agro-forestry, wheat variety WH 1105 was identified for sowing in poplar plantations.

Crop Protection Technologies

- Green manuring with 60 day old crop of marigold was recommended for the management of root knot nematode in net houses.
- Based on weather prediction, a forewarning model for yellow rust of wheat was developed for timely management of the disease.
- In fruits, fixing PAU fruit fly traps@ 16 traps/acre in second and third week of May provided eco-friendly management of fruit flies in mango and plum orchards.
- Recommendations also include application of Amistar Top 325SC (azoxystrobin 18.2% + difenoconazole 11.4% SC for management of sheath blight and blast of rice; treating wheat seed with Raxil Easy (tebuconazole 6%) @ 13 ml/40kg seed or with Seedex 2DS @ 40 g per 40 kg seed for management of loose smut and flag smut; application of Mitpro-G and Mahaveer-GR (fipronil) @ 6 kg/acre and Miftap 4% GR (cartap hydrochloride) @ 10 kg/acre for...
management of rice stem borer and leaf folder in *basmati* rice; application of Quinalmass 25EC (quinalphos) @ 800 ml/acre for management of rice planthoppers; application of Goldban 20EC (chlorpyriphos) @ 350 ml/acre for management of black bug in sugarcane; application of Thompson 25WG (thiamethoxam) @ 40 g/acre in 150 litres of water for management of cotton jassid; and application of Ulala 50WG (flonicamid) @ 80 g/acre, Lano 10EC (pyriproxyfen) @ 500 ml/acre and Craze 50WP (diafenthion) @ 200 g/acre in 150 litres of water for management of cotton whitefly.

- In vegetables, paddy straw mulch @ 100 q/ha immediately after planting of turmeric (organic) followed by one hand/spot weeding three months after planting (if needed) provided effective control of weeds.

**Farm Machinery**

During this period, farm engineers modified and developed several machines.

- The Happy Seeder machine was modified by attaching press-wheels for better crop performance.
- Lucky Seed Drill was developed for simultaneous application of pre-emergence herbicide along with sowing of wheat.
- A tractor PTO operated trail type Loose Straw Chopper was developed and is under final stage of evaluation.
- A prototype of tractor operated finger type Cotton Stripper was developed and evaluated on local cotton variety sown with high density planting system.

**Post-Harvest Technologies**

- Method for obtaining flour from sweet potato (PSP-21) was standardized, and used for preparation of nutritious convenience foods like cookies and extruded snacks, using cereal grains such as sorghum and maize.
- Technologies for preparation of sugarcane juice beverage using blend of different fruit juices; and for preparation of naturally fermented baby corn pickle preserved with spices and mustard oil, were developed.
- Packaging of brinjal fruits in paper moulded trays followed by wrapping with shrink and cling film improved their shelf life for one week.
- Packaging of tomatoes in paper moulded trays followed by wrapping with shrink and cling film extended their marketing period for six days.
- Packaging of cabbage with shrink and cling film extended its retail marketing period with acceptable quality for 15 days.
- Bacteriological Food Testing Kit, developed to detect nine pathogens in one go, was validated.
- Sugarcane vinegar production by semi-continuous fermentation was standardized at a commercial scale (500 L) in collaboration with the industry.
- Experiments were conducted to develop and evaluate iron rich maize based snacks, gluten free cookies and extruded snacks.

**Other Technologies**

- A low-cost hive for stingless bee (*Tetragonula iridipennis*), using a plastic pipe of 10 cm diameter and 45 cm length, was developed.
- Pollinators' visitations on sunflower blooms increased seed yield by 7-18 percent.
- *Pleurotus eryngii*, the king oyster mushroom, was cultivated successfully in Punjab.
- Alternative formulation for long method compost using diammonium phosphate (DAP); and coir pith based casing soil formulation with FYM (1:1, v/v) were recommended for button mushroom cultivation. Utilization of paddy straw for cultivation of button mushroom, paddy straw mushroom and 'dhingri' was also recommended.
- Multilayered winter clothing was developed for the elderly after studying their clothing needs and practices. Experiments were also carried out on the use of Arjun (*Terminalia arjuna*) dye, and replacement of guar gum (*Cymopopsis tetragonolobus*) by Cassia gum (*Cassia obtusifolia*) as natural thickening agent for printing on both cotton and silk fabrics with block and screen printing techniques.
EDUCATION

- During 2015-16, the University offered 10 Undergraduate programmes, 44 Master's programmes, 29 Doctorate programmes and one Diploma programme. A total of 3,882 students were enrolled during the academic year 2015-16. As many as 26 foreign students from countries like Afghanistan, Bhutan, Egypt, Maldives, Nepal, Nigeria, Tanzania and Uganda were admitted in different academic programmes of the University. Admissions to various undergraduate and postgraduate programmes were made through entrance tests.

- As many as 721 students in various programmes were awarded scholarships and financial assistance.

- At the Annual Convocation of Punjab Agricultural University on October 16, 2015, a total of 393 Ph.D, M.Sc., M.Tech., MCA, MBA, MBA (Agri-business) and MJMC (Journalism and Mass Communication) students received degrees. Seventeen students were awarded Medals and Gold Medals, and several others received Merit Certificates. Six members of PAU's faculty were conferred with plaque and cash prizes.

- Apart from this, two students bagged Jawaharlal Nehru Award (ICAR), two Prime Minister's Fellowship (Confederation of Indian Industry) and two International Travel Grants (Department of Science and Technology). One student each was awarded Monsanto Beachell Borlaug International Scholarship, Jeanie Borlaug Laube Women in Triticum (WIT) Early Career Award, and International Young Scientist Award (International Science Community Association, Union Ministry of Corporate Affairs, India).

- In sports and cultural activities, PAU teams won Gold and Silver Medals in different games during the XVI All India InterAgricultural Universities Sports and Games Meet, held at Tamil Nadu Agricultural University, Coimbatore on February 22-26, 2016. In addition, PAU awarded 57 Merit Certificates, 9 University Colour and 7 Roll of Honour to the outstanding sportspersons/artists of the University for their proficiency in sports, games, cultural and literary events.

- In cultural activities, students won Gold Medal in group song (Indian), Silver Medal in patriotic group song, and Bronze Medals in poster making and quiz events during the 16th All India Inter Agricultural Universities Youth Festival, organized by ICAR, New Delhi at Orissa University of Agriculture and Technology, Bhubaneswar (Odisha) from February 1-4, 2016. The students also won Silver Medal in the installation event and Bronze Medals in debate, cartooning, rangoli and clay modeling events during the 31st Inter-University North Zone Youth Festival 2015-16, held at PAU from January 14-18, 2016.

EXTENSION

The University transfers new technologies to the farmers through various extension activities. During the period under report:

- It organized 14 Kisan Melas during September 2015 and March 2016. A large number of farmers from Punjab and adjoining states of Haryana, Himachal Pradesh, Jammu and Kashmir, and Rajasthan participated in these melas, discussed their farm problems with experts, purchased seeds and farm literature, and participated in produce competitions. Ten progressive farmers were honoured during PAU Kisan Melas at Ludhiana for their outstanding contributions to agriculture, horticulture and allied occupations.

- A total of 237 adaptive research trials were conducted at different locations to evaluate new crop varieties as well as production and protection technologies.

- As many as 2,356 front line demonstrations (FLDs) were conducted by all KVKs on improved varieties of oilseed crops (groundnut, sesame, gobhi sarson, toria, raya and sunflower), pulses (summer moong, kharif moong, mash, soybean, gram and lentil), rice, basmati, cotton (American, desi, BT and non BT varieties), maize and maize fodder.

- Besides, 144 on-farm trials and 1,511 training
programmes were conducted.

- A Skill Development Centre in Agriculture at PAU, Ludhiana and a Food Industry Training-cum-Business Incubation Centre at Regional Research Station, Bathinda were established wherein several farmers and farm women were imparted trainings in food processing and other allied fields for skill development.

- Four Research and Extension Specialists' Workshops and one State Level Training and Planning Workshop were also organized.

- In addition, 232 field days were organized in different villages to promote new crop varieties, IPM in paddy, mechanical transplantation of paddy, use of Happy Seeder, nutrition garden, mushroom cultivation, etc.

- Technical guidance was also provided to 45,602 farmers in the office, field and through telephone helplines.

- The University enrolled 319 PAU doots in different villages of Punjab and about 98 advisory messages on various aspects of crop production and protection were sent to them. Till date, 5,109 farmers have been enrolled as PAU doots.

COMMUNICATION AND MEDIA

- The University coordinated with Doordarshan Kendra, Jalandhar for 557 TV talks and AIR, Jalandhar for 366 radio talks of PAU scientists.

- About 940 press releases (522 in English and 418 in Punjabi) were issued to various newspapers. About 165 articles (15 in English and 150 in Punjabi), authored by PAU scientists, were sent for publication in vernacular newspapers and magazines.

- The University published two monthly farm magazines namely Changi Kheti (in Punjabi) and Progressive Farming (in English). The combined circulation of these magazines has increased from 1,89,075 in 2014-15 to 2,17,985 copies (annually) in 2015-16.

- The Package of Practices for Crops of Punjab, twice a year, both in English and Punjabi were published. In addition, 16 farm publications in English and 9 in Punjabi were also brought out.

MEMORANDA OF UNDERSTANDING (MOUs)

To strengthen linkages with the national and international institutions/organizations, PAU signed six memoranda of understanding in 2015-16:

- Maharashtra State Seeds Corporation Limited, Akola, Maharashtra.

- International Crops Research Institute for the Semi-arid Tropics (ICRISAT), Patancheru, Telengana.

- Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur.

- Aston University, United Kingdom

- M/s Nutech Dairy Engineers Pvt. Ltd., Ambala

- Agriculture Skill Council of India, Gurugram

AWARDS AND HONOURS

- The Punjab Agricultural University was conferred with the coveted "Agricultural Leadership Award 2015." The Union Home Minister, Sh Rajnath Singh presented the award to Dr Baldev Singh Dhillon, Vice Chancellor, PAU, in a glittering ceremony, held in New Delhi on September 18, 2015.

- Dr Baldev Singh Dhillon, Vice Chancellor, PAU, was conferred with “Lifetime Achievement Award” by Punjab Academy of Sciences during the 19th Punjab Science Congress, held at SUS Institute of Engineering and Technology, Tangori, Mohali on February 7, 2016.

- Dr M.S. Bhullar (Agronomy) and AICRP-Weed Management (WM) team members bagged “Best AICRP-Weed Management Centre Award 2015-16” during 23rd Annual Review Meeting of AICRP-WM, held at Jalgaon, Maharashtra from April 28-30, 2016.

- The Krishi Vigyan Kendra, Bathinda won the "Best KVK Award 2015" from ICAR for accomplishing the mandated activities of KVK successfully.

- Many other faculty members brought laurels to PAU by bagging awards and honours at the national level.
RESEARCH

The Punjab Agricultural University (PAU) has been making consistent efforts and reorienting its research agenda in the field of agriculture and allied sciences to provide viable solutions to the emerging farm challenges. Recently, greater thrust has been laid on developing technologies to mitigate the effect of climate change, conserve natural resources and enhance input use efficiency for increasing agricultural productivity. To keep pace with the private sector, biotechnological tools such as marker assisted selection (MAS), transgenics, etc. have been integrated into crop improvement programme for precision breeding. Further, doubled haploid technology is being applied in wheat, maize and rice to accelerate varietal development process. The facilities at Keylong (Himachal Pradesh), Cuttack (Odisha) and Hyderabad (Telangana) are also being used to advance generation during off season. Seed production of moongbean and maize hybrids has been enhanced through public-private partnership. Apart from developing new crop varieties and their production-protection technologies, focus is also being laid on post-harvest handling and processing to reduce post-harvest losses in vegetables and fruits.

The salient research achievements during the period under report are:

CROP IMPROVEMENT

Keeping in view the current agricultural challenges, crop improvement research has been reprioritized. More emphasis is being laid on breeding for abiotic and biotic stress tolerance as well as improving quality of the produce.

Varieties recommended at state level

During the period under report, PAU developed/recommended 26 varieties (9 of field crops, 10 of vegetable crops and 7 of flower crops) of different crops for cultivation in Punjab.

Field Crops

- **PBW 677 (Wheat)**: It is a double dwarf variety recommended for cultivation under irrigated and timely sown conditions. It is resistant to yellow and brown rusts. Its average grain yield is 22.4 q/acre.
- **PBW 725 (Wheat)**: It is a double dwarf variety released for cultivation under irrigated and timely sown conditions. It is resistant to yellow and brown rusts. Its average grain yield is 22.9 q/acre.
- **HD 3086 (Wheat)**: It has been recommended for cultivation under irrigated and timely sown conditions.
conditions. It is a double dwarf variety that is resistant to yellow and brown rusts. Its average grain yield is 23 q/acre.

- **PR 126 (Rice) (Adhoc release):** It matures in about 123 days after seeding. It is resistant to 7 of the 10 presently prevalent pathotypes of bacterial blight pathogen in Punjab. The average paddy yield is 30 q/acre.

- **LD 949 (Desi cotton):** It produces an average seed cotton yield of 10 q/acre. It is tolerant to *Fusarium* wilt, whitefly, jassid, and bacterial blight. Its lint is suitable as absorbent cotton. It possesses ginning out turn of 40.1 per cent.

- **ML 2056 (Kharif moong):** It is resistant to yellow mosaic virus and gives grain yield of 4.6 q/acre. It has medium bold shining grains with good cooking quality.

- **RLC 3 (Raya):** It is a first canola quality raya variety with grain yield of 7.3 q/acre with 41.5 per cent oil content. It is tolerant to white rust.

- **PSH 1962 (Sunflower):** It is a hybrid that matures in 99 days and has an average seed yield of 8.2 q/acre. The oil content of this hybrid is 41.9 per cent.

- **PBN 346 (Napier Bajra):** It is a multi-cut, leafy variety with long, smooth, non-hairy and broad leaves. The fodder yield and silage quality of this variety is better than PBN 233. It yields 714 q/acre of green fodder.

**Horticultural Crops**

**Vegetable Crops**

- **Punjab Gaurav (Tomato):** The fruits are borne in clusters of eight to nine with 5.5% TSS and 4.9 mg/100g lycopene. It gives 247 q/acre early (till end of March) and 934 q/acre total yield. This variety is suitable for cultivation under poly-net house.

- **Punjab Sartaj (Tomato):** This variety is tolerant to leaf curl virus and is suitable for protected cultivation under poly-net house. The fruits are borne in clusters of five to six with 5.7% TSS and 5.3 mg/100g lycopene. It gives 254 q/acre early (till end of March) and 898 q/acre total yield.

- **Punjab Red Cherry (Tomato):** The fruits are borne in clusters of 18-20 with an average fruit weight of 12 g. It gives 156 q/acre early (till end of March) and 437 q/acre total yield. It is tolerant to leaf curl virus and is suitable for protected cultivation.

- **AP-3 (Pea):** It is an early maturing variety. Each pod contains 7-8 seeds with shelling out turn of 50 per cent. The first picking can be done in
60-65 days, if sown in the second week of October. Its total yield is 31.5 q/acre.

- **PPH-1 (Pumpkin):** Its fruits are small, round, mottled-green at immature stage and mottled-brown at mature stage. Fruit cavity is small and flesh is golden yellow. It is extra-early in maturity and gives 206 q/acre yield.

- **PPH-2 (Pumpkin):** Its fruits are small, round, light green at immature stage and smooth-brown at mature stage. Fruit cavity is small and flesh is golden yellow. It is extra-early in maturity and gives 222 q/acre yield.

- **PBHR-41 (Brinjal):** The fruits are round, medium-large, shining, deep purple with purple green calyx. Its average yield is 269 q/acre.

- **PBHR-42 (Brinjal):** The fruits are oval-round, medium sized, shining, purple-black with green calyx. Its average yield is 261 q/acre.

- **PBHL-4 (Brinjal):** It is an early maturing F₁ hybrid of long group brinjal. The fruits are long, medium sized, shining and purple-black with green calyx. Its average yield is 267 q/acre.

- **PG-18 (Garlic):** Its bulbs are large (4.55 cm diameter), attractive and white with average bulb weight of 28.4 g. It has 38 per cent dry matter and 1.15 per cent allicin content. Its average yield is 51 q/acre.

**Flowers and Ornamentals**

- **Punjab Shyamli (Chrysanthemum):** It is a mid-season variety that requires 117 days for flowering. Flowers are pompon-type, purple with a deep purple center. The variety produces up to 49 flowers per plant and is suitable for cut flower purpose.

- **Punjab Glad-2 (Gladiolus):** The florets are bright yellow with 16 days vase life. It takes 93 days to flower and is suitable for cut flower production.

- **Punjab Sweet Pea-1 (Sweet Pea):** Its plants are tall and climbing. It has light green leaves and magenta flowers. It flowers in 102 days and duration of flowering is 42 days.

- **Punjab Sweet Pea-2 (Sweet Pea):** Its plants are tall and climbing. It has light green leaves and pink flowers. It flowers in 105 days and duration of flowering is 45 days.

- **Punjab Sweet Pea-3 (Sweet Pea):** Its plants are tall and climbing. It has dark green leaves
and maroon flowers. It flowers in 106 days and duration of flowering is 47 days.

- **Punjab Sweet Pea-4 (Sweet Pea):** Its plants are tall and climbing. It has dark green leaves and purple flowers. It flowers in 105 days and duration of flowering is 47 days.

- **Punjab Sweet Pea-5 (Sweet Pea):** Its plants are tall and climbing. It has light green leaves and cream flowers. It flowers in 106 days and duration of flowering is 48 days.

**Varieties identified at national level**

- **SL 955 (Soybean):** This variety has been identified for Northern Plain Zone (Punjab, Haryana, Delhi, Uttar Pradesh, Uttarakhand and Bihar). It is resistant to yellow mosaic virus (YMV) and soybean mosaic virus (SMV). Seeds contain 19 per cent oil and 39.0 per cent protein.

- **SML 1115 (Summer moong):** It has been identified for North Eastern Hill Zone (Manipur, Mizoram and Tripura) in 2015. It has medium size seeds with shining green colour and good cooking quality. It is resistant to mungbean yellow mosaic virus (MYMV), moderately tolerant to Web blight and Cercospora leaf spot.

- **LH 2256 (Cotton):** It has been identified for North Zone comprising states of Punjab, Haryana and Rajasthan. It has seed cotton yield of 2165 kg/ha. It has higher boll size (4.0 g), ginning out turn (34.9%) and 2.5% span length (28.1 mm).

- **CoPb 92 (Sugarcane):** It is an early maturing variety recommended for cultivation in North West Zone (Uttar Pradesh, Uttarakhand, Haryana, Punjab and parts of Rajasthan). It is a good ratooner having 8.8 per cent higher cane yield than CoJ 64. It has higher level of resistance to red rot and lesser susceptibility to borer complex than the check varieties.

**Germplasm strengthening**

A large number of germplasm accessions in different crops have been procured from different parts of the country and abroad to strengthen the ongoing crop breeding programme. These include wheat (330), rice (532), maize (531), sesame (100), groundnut (68), chickpea (1000), lentil (50), soybean (50), quinoa (25), fababean (50), pigeon pea (20), peach and nectarines (5), apple (5), walnut (2), persimmon (1), apricot (1), jamun (2), chilli (13), tomato (16), potato (10), cauliflower (2), brinjal (12), pea (2), cucumber (2), garlic (5), muskmelon (11), watermelon (5), pumpkin (5), bitter gourd (3), onion (8), chrysanthemum (2), gladiolus (5), tuberose (2), mangold (2), rose (3) and gerbera (2).

**Biotechnology**

**Field Crops**

Wide hybridization, molecular breeding and genomics
Wild wheat and wild rice germplasm, consisting of 1400 and 1200 accessions, respectively, were screened for major wheat and rice diseases. Accessions with high levels of resistance to yellow rust in wheat and sheath blight in rice were crossed with elite cultivars for transferring these genes to cultivated background.

A leaf rust resistance gene, transferred from wild wheat *Aegilops peregrina*, has been fine mapped using a new technology known as RenSeq. The leaf rust and stripe rust resistance genes *Lr76* and *Yr70*, introgressed from *Ae. umbellulata*, have been fine mapped using the genome sequence information of wheat chromosome 5D and alien chromosome 5U.

Heat tolerance QTL (quantitative trait loci) mapped in *T. durum* – *Ae. speltoides* introgression lines are being transferred to stripe rust resistant elite bread wheat lines using marker assisted selection.

High grain weight has been transferred from different accessions of *Ae. tauschii* to wheat cultivars PBW 621 and PBW 550. The BC$_2$F$_4$ introgression lines with high grain weight were evaluated for yield component traits in replicated trials. The SNP markers associated with high grain weight have been identified in *Ae. tauschii* using genome wide association mapping (GWAS). These linked SNP markers are being validated in these introgression lines for further use in MAS.

In rice, a novel brown plant hopper resistance gene from *Oryza nivara* has been mapped on chromosome 4 and MAS ready markers have been developed.

A grain number QTL from *O. longistaminata* has been fine mapped on chromosome 2. The candidate gene sequence has been submitted at the National Center for Biotechnology Information (NCBI), a public repository of genome sequence information. This QTL is being mobilized to Punjab Basmati 3 through MAS for yield improvement.

An improved version of PAU 201 (RYT 3388) has been nominated for national trials.

Novel alleles of a rice phosphorus use efficiency gene PSTOL, identified from *Oryza rufipogon*, are being transferred to PR 121.

In maize, RIL population of I172 x I110 was phenotyped for waterlogging stress and data on morpho-physiological traits and yield contributing traits were recorded. The QTL identified for water logging are being fine mapped using maize genome sequence information. Major QTL for maydis leaf blight (MLB) have been mapped on chromosome 3, 8 and 9.

### Transgenics and tissue culture

- Pigeon pea transgenics for *Cry1Ac* gene for pod borer resistance have been developed using *in planta* method in cv. PAU 881. *In vitro* insect bioassay for *Helicoverpa armigera* was carried out on six RT-PCR positive plants. In two *T$_2$* transgenic plants, PAU 881-13 and PAU 881-21, 97.8 per cent larval mortality was observed on the pods and 100 per cent on leaves. The *T$_3$* generation of these plants is being analysed for the presence of the gene and will also be evaluated for pod borer resistance.

- Sugarcane transgenics for glucanase gene were evaluated for red rot resistance against isolate CF-08 and two plants were found to be resistant. Bioassay for another isolate CF-09 is in progress.

- Micropropagation was optimized in three peppermint collections and new sugarcane variety CoPb 92.

### Fruits

- Seven rough lemon transgenic plants with glucanase gene were screened for phytophthora resistance. Two plants have been found to be resistant which are being multiplied through micropropagation for replicated bioassays.

- Total transcriptomes from different tissues of six guava genotypes have been sequenced and data are being analyzed for identification of gene based markers, which will be used for mapping important quality traits in guava.
- Delayed bitterness gene encoding limonoid glucosyl transferase (LGT) from kinnow mandarin has been cloned and gene sequence of LGT has been submitted at NCBI. Expression studies of LGT are in progress.
- Direct organogenesis and plant regeneration have been optimized in W. Murcott and Daisy mandarins.

**Seed Technology**

- Seed production by PAU is undertaken at University Seed Farms located at Faridkot, Ladhowal, Nabha, Naraingarh and at various Krishi Vigyan Kendras. During the period under report, the University produced around 72,000 q raw seed (breeder, foundation and certified/TL) of different field crops, out of which, 3,595 q seed was produced through public-private partnership. The details are given in Table 1.
- Effect of pulsed electro-magnetic field (EMF) on seed quality enhancement in green gram (SML 668) was studied. Treatment with EMF of 50 Hz and 100 Hz enhanced seed quality in terms of seed germination (84 and 83.8%), seed vigor (2346.4 and 2385.6) and chlorophyll content (6.888 and 6.894 mg/g) over that in control (78%, 2014.5 and 4.363 mg/g), respectively. Seed storability was better as indicated by absence of insects in treated seeds as compared to 1.25 per cent in control, after eight months of storage.
- Studies were conducted to develop a simple, cost-effective and practical seed drying and storage technique using water absorbing desiccants and to determine its effect on seed quality during storage. Germination of seeds stored with the desiccant beads was 88 per cent whereas it was 80 per cent in control. It was observed that seed storability was maintained after drying seeds with drying beads (which are made up of micro-porous material that is selective for water).
- A total 674 samples of various field and vegetable crops from University Seed Farms, Research Stations and other departments of the University were lab tested for physical purity and germination.
- For testing the genetic purity of nucleus and breeder seed of various field crops, field grow out test was conducted on 161 samples (76 during Kharif 2015 and 85 during Rabi 2015-16).
- Out of 700 samples of farmers’ own saved wheat seeds, 63 (9%) samples had germination below Indian Minimum Seed Certification Standards. Karnal bunt infection ranging from 0.05-8.5 per cent was found in 486 samples and 191 (27.3%) samples failed Indian Minimum Seed Certification Standards due to >0.25% incidence.
- Three formulations of Trichoderma harzianum obtained from Anand Agricultural University, Anand; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar; and Punjab Agricultural University, Ludhiana were tested (under ICAR National Seed Project) as seed bio-priming and soil application by mixing it with farm yard manure. The results of first year revealed that bio-priming of seed with PAU formulation of Trichoderma harzianum followed by soil application of T. harzianum amended farm yard manure, was the best treatment for reducing wilt and root rot. It reduced the wilt incidence by 75 per cent and root rot incidence by 60 per cent as compared to control.

### Seed Production (Table 1)

<table>
<thead>
<tr>
<th>Crops</th>
<th>Breeder seed (q)</th>
<th>Foundation seed (q)</th>
<th>Certified seed (q)</th>
<th>Truthfully labelled seed (q)</th>
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<tr>
<td>Field Crops</td>
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<td><strong>Total</strong></td>
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<td><strong>15,709</strong></td>
<td><strong>13,719</strong></td>
<td><strong>44,551</strong></td>
<td><strong>80,677</strong></td>
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</tbody>
</table>

About 7,244 q seed of potato and 255 q seed of turmeric were produced by the University during 2015-16.
Crop Production Technologies

Field Crops
- Need-based N scheduling using leaf color chart (LCC) is recommended for basmati rice.
- In maize-wheat system, it is recommended not to apply P to both the crops for soil test-P status more than 16 kg/acre.
- In medium to heavy textured soils, sowing of moongbean is recommended on beds spaced at 67.5 cm (37.5 cm bed top and 30 cm furrow). Two rows should be sown on each bed at a spacing of 20 cm using the same quantity of seed, fertilizers and other cultivation practices as in flat sowing. Similarly, sowing of arhar in medium to heavy textured soils is recommended on beds spaced at 67.5 cm (37.5 cm bed top and 30 cm furrow). One row can be sown on each bed using the same quantity of seed, fertilizers and other cultivation practices as in flat sowing. Raised bed sowing not only saves irrigation water but also saves the crop from adverse effects of heavy rainfall.
- To enhance the seed yield of berseem, application of two sprays of salicylic acid or KNO₃ (Potassium nitrate) @ 7.5 g/acre in 100 litres of water at flower initiation and one week after the first spray is recommended.
- There is no need to apply urea to basmati rice, if the field has been green manured with 45-55 days old sunhemp/dhaincha or incorporated with summer moongbean straw (after picking of pods).
- In maize, the use of Consortium biofertilizer @ 500 g/acre through seed treatment is recommended for higher grain yield as well as better soil health.
- Azorhizobium based biofertilizer has been recommended for the rice crop.
- In situ paddy straw degradation was observed from the application of bacterial isolate Delftia spp after 120 days with increased yield of wheat crop.
- Bacteriocin producing Rhizobium spp in moongbean (Vigna radiata) was dual inoculated with indicator strain (indicator +N8) to show a significant increase in number of nodules (24.3) over bacteriocinogenic isolates alone, indicator strain alone and uninoculated control.
- The cross sub-soiling before cotton sowing at 1m x 1m spacing gave significantly higher yield than no sub-soiling. It also had positive effects on root growth and root biomass production.

Fruit Crops
- Early nursery production of kinnow using bud forcing technique has been developed. It induces early scion bud break and faster growth of nursery of Kinnow and Kagzi lime, and also provides early saleable nursery plants.
- A new propagation technique 'wedge grafting' has been developed in mango. Mango can be propagated through wedge grafting from the end of July to the end of August on rootstock of same or higher diameter than the bud stick under open field or protected conditions.
- The field experiment on the management of fruit drop in Kinnow mandarin with foliar application of nutrients and plant growth regulators indicated a significant reduction in fruit crop (18.25% decrease over control) and increase in yield with three (mid-April, mid-June and mid-September) foliar applications of salicylic acid (10 µg/ml).

Agro-forestry
- Wheat variety WH 1105 has been identified for sowing in poplar plantations. This variety should be sown in the first fortnight of November for getting higher productivity.
- The fertilizer dose, timing and its method of application for clonal eucalyptus plantations, during different growth years, has been standardized for obtaining higher productivity.

Vegetable Crops
- Drip irrigation and fertigation schedules in pea saved 30 per cent of water, 20 per cent of NPK fertilizers and resulted in 30 per cent higher yield than the conventional method.
- Drip irrigation and fertigation schedules in turmeric saved 33 per cent of water, 20 per cent
of NPK fertilizers and increased yield by 25 per cent as compared to the conventional practice.

- Drip irrigation along with plastic mulch resulted in 70–106 per cent yield increase in brinjal, with approximately 50 per cent of water saving as compared to the conventional practice.

- Poor quality tubewell water can be used for irrigation in cyclic mode with canal water for obtaining optimum tuber yield of potato in light textured soils. Application of paddy straw mulch @ 25 q/acre in potato fields improved tuber yield and maintained soil health.

- Application of biofertilizer + FYM (50% N) was found to be the best organic fertilizer, as it resulted in significantly higher microbial population and soil enzymatic activities, which consequently increased the NPK content of the soil and yield attributes of the potato crop.

### Crop Protection Technologies

#### Field Crops

- Green manuring with 60 day old crop of mangold is effective for the management of root knot nematode in net houses.

- Application of Amistar Top 325SC (azoxystrobin 18.2% + difenoconazole 11.4% SC) is recommended for the management of sheath blight and brown spot of rice.

- Based on weather prediction, a forewarning model for yellow rust of wheat has been developed using fundamental approach. This will help in timely management of disease in Punjab.

- The continuous monitoring of yellow rust during July to October in lower and upper hills/valleys of the neighbouring state (Himachal Pradesh) indicated that the disease started early in December 2015 and was managed by timely application of fungicides. Dryness and low rainfall in February also checked the disease to some extent. Maximum disease severity was reported at Ropar and Shaheed Bhagat Singh Nagar (40%) followed by that at Jalandhar, Pathankot and Kapurthala (30%); and Amritsar, Mohali, Ludhiana and Fazilka (10%) districts.

Traces of disease were also observed at Ferozepur, Mansa and Muktsar Sahib districts. Average disease severity in Punjab was recorded as 15.2 per cent.

- Treating wheat seed with Raxil Easy (tebuconazole 6%) @ 13 ml/40kg seed or with Seedex 2DS @ 40 g per 40 kg seed is effective for the management of loose smut and flag smut.

- Two sprays (first at boot stage and second after 15 days interval) with Nativo 75WG (tebuconazole + trifloxystrobin) @ 80 g in 200 litres of water per acre are recommended for the management of sheath blight and brown spot of rice.

- Endophytic actinomycete isolates, J-3-S1 and C-51-B exhibited the plant growth promoting (PGP) traits along with antifungal activity against Rhizoctonia solani, Fusarium oxysporum, F. moniliforme and Sclerotium sp.

- Application of Coragen 18.5SC (chlorantriniliprole) @ 150 ml/acre IS recommended for the management of early shoot borer in sugarcane.

- Application of Coragen 18.5SC (chlorantriniliprole) @ 30 ml/acre at 10-15 days after germination is recommended for the management of maize stem borer.

- Application of Ulala SOWG (flonicamid) @ 80 g/acre, Lano 10EC (pyriproxyfen) @ 500 ml/acre and Craze 50WP (difen thiuron) @ 200 g/acre in 150 litres of water is recommended for the management of cotton whitefly.

- Application of Thompson 25WG (thiamethoxam) @ 40 g/acre in 150 litres of water is recommended for the management of cotton jassid.

- Application of Milpro-G and Mahaveer-GR (fipronil) @ 6 kg/acre and Miftap 4% GR (cartap hydrochloride) @ 10 kg/acre is recommended for the management of rice stem borer and leaf folder in basmati rice.

- Application of Quinalmass 25EC (quinalphos) @ 800 ml/acre is recommended for the management of rice planthoppers.
- Application of Goldban 20EC (chlorpyriphos) @ 350 ml/acre is recommended for the management of black bug in sugarcane.
- Application of Rippen 0.3GR (fipronil) @ 10 kg/acre at 45 days after planting is recommended for the management of early shoot borer in sugarcane.
- Application of post-emergence herbicide, Rice star 6.7EC (fenoxaprop) @ 400 ml/acre at 20 days after sowing is effective in controlling aerobic grasses in direct seeded rice.
- Post-emergence (10-12 days after transplanting) spray of Penoxsulam (Granite 240 SC) at 100 ml/ha is effective in controlling annual grasses, broadleaf weeds and sedges (mixed weed flora) in transplanted rice.
- Application of post-emergence application of Rice star 6.7EC (fenoxaprop) @ 400 ml/acre at 20 days after transplanting is effective in controlling grass weeds in puddle transplanted rice.
- Post-emergence application of Sulfosulfuron @ 13 g/acre, Metsulfuron @ 10 g/acre Sulfosulfuron + Metsulfuron @ 16 g/acre, Pinoxaden @ 400 ml/acre, Mesosulfuron + Iodosulfuron @ 160 g/acre and Carfentrazone-ethyl @ 20 g/acre 30-35 days after intercropping wheat in autumn sugarcane is effective in controlling annual weed flora.
- Application of Nominee Gold 10SC (bispyribac-sodium) @ 100 ml/acre 15-20 days after nursery (rice) sowing is effective in controlling mixed weed flora.
- Fixing PAU fruit fly traps @ 16 traps/acre in second and third week of May provides eco-friendly management of fruit flies in mango and plum orchards.
- Fruit flies, *Bactrocera dorsalis* and *Bactrocera zonata*, are recorded as new insect pests in mango and plum, respectively.
- Fruit crops: Fixing PAU fruit fly traps @ 16 traps/acre in second and third week of May provides eco-friendly management of fruit flies in mango and plum orchards.
- Fruit flies, *Bactrocera dorsalis* and *Bactrocera zonata*, are recorded as new insect pests in mango and plum, respectively.
- Vegetable Crops
  - Soil sterilization of nursery beds of tomato with Basamid @ 40g/m² is effective for the management of root knot nematode.
  - Green manuring with 7-8 week old sunhemp or summer *moongbean* is effective for the management of potato scab.
  - Paddy straw mulch @ 100 q/ha immediately after planting of turmeric (organic) followed by one hand/spot weeding three months after planting (if required) provides effective control of weeds.
- Food Science and Technology
  - Method for obtaining flour from sweet potato (PSP-21) has been standardized, and used for preparation of nutritious convenience foods like cookies and extruded snacks, using cereal grains such as sorghum and maize. These were found to have higher vitamin C, potassium and beta carotene contents.
  - Technology for preparation of sugarcane juice beverage using blend of different fruit juices has been developed. The products have been prepared by using sugarcane juice (80%), *kinnow* juice (6%) and *aonla* juice (4%) along with lemon and ginger juice. This technology is ready for commercialization.
  - Technologies for production of debittered beverage (using innovative naringinase) from citrus fruits (*kinnow*, grapefruit, *kinnow-lemon* and *W. Murcott*) and low alcoholic naturally carbonated beverage from Parlette grapes were developed.
  - Technology for retention of colour and flavor, during the manufacturing of strawberry jam, has been standardized in collaboration with an industry, M/s Kulwant Nutritions, Batala.
Technology for preparation of naturally fermented baby corn pickle, preserved with spices and mustard oil, has been developed in collaboration with M/s Field Fresh Pvt. Ltd., Ladhowal, Ludhiana (Punjab).

Bacteriological Food Testing Kit, developed to detect nine pathogens in one go, was validated for one hundred food samples.

Sugarcane vinegar production by semi-continuous fermentation was standardized at a commercial scale (500 L) in collaboration with the industry.

Production of natural vinegar from Perlette grapes and red wine from Punjab MACS purple grapes was scaled up to 50 L.

Post-Harvest Technologies

- Packaging of brinjal fruits in paper moulded trays followed by wrapping with shrink and cling film improved their shelf life for one week.
- Packaging of tomatoes in paper moulded trays followed by wrapping with shrink and cling film extended their marketing period for six days.
- Packaging of cabbage with shrink and cling film extended its retail marketing period with acceptable quality for 15 days.
- Fully mature, light green and smooth skinned fruits of lemon cv. PAU Baramasi Lemon-1, harvested during first week of June, can be de-greened in 6-7 days at room temperature by dipping in 1250 ppm (31.25 ml/10 litres of water) ethephon solution for five minutes, followed by packing in corrugated fibre board (CFB) boxes with paper lining for advance marketing of summer crop.
- The physiologically mature fruits of mango cv. Dusehni and Langra, packed in CFB boxes with paper lining, can be ripened at 25°C in 4-5 days after harvesting. The fruits should be washed in chlorinated water @ 0.01% (sodium hypochlorite 4% @ 2.5 ml/litre) and dried under shade before packaging in CFB boxes.
- The physiologically mature fruits of pear cv. Punjab Soft, dipped in calcium chloride (2%) for five minutes, can be stored for 60 days at 0-1°C and 90-95% RH after packing in CFB boxes with paper lining.
- Daisy fruits, harvested at colour break stage, develop an orange colour in 3-4 days after dipping in ethephon @1000 ppm for five minutes.

Subsidiary Occupations

Beekeeping

- Rescreening of selected A. mellifera colonies revealed that hygienic and non-hygienic colonies removed 88.3 and 49.4 per cent pin pricked dead brood, respectively, in 24 hours. Validation of these selected colonies, done by inoculating the brood with Varroa mites, revealed that hygienic and non-hygienic colonies took 33.4 and 51.8 hours, respectively, to achieve 100 per cent uncapping and cleaning of inoculated cells.
- A low-cost hive for stingless bee (Tetragonula indipennis) using a plastic pipe of 10 cm diameter and 45 cm length was developed.
- Pollinators’ visitations on sunflower blooms of various genotypes (DK 3849, SH 3322, PSH 569, PSH 1962 and PSH 996) increased seed yield/plant by 7-18 per cent.
- To minimize the pesticide toxicity to pollinators, the pesticide application should be done after 1 pm in bitter gourd, 3 pm in muskmelon and 5 pm in sponge gourd.

Mushrooms

- Pleurotus eryngii, the king oyster mushroom, has been successfully cultivated in Punjab.
- Alternative formulation for long method compost using diammonium phosphate (DAP) has been recommended for button mushroom cultivation under Punjab conditions.
- Coir pith based casing soil formulation with FYM (1:1, v/v) has been recommended for button mushroom cultivation under Punjab conditions.
- Strain evaluation of different mushroom varieties is a continuous process.
Utilization of paddy straw for cultivation of button mushroom, paddy straw mushroom and 'dhingri' has been recommended.

**FARM MECHANIZATION**

- The Happy Seeder machine has been modified by attaching press-wheels to press the chopped straw, thrown by the flails of Happy Seeder in between the furrows. It forms thick uniform layer of mulch in the inter-row spaces. Before sowing of wheat with this modified machine, one operation of stubble shaver is required for cutting and spreading stubbles and loose straw. With this machine, the furrows remain uncovered from the straw mulch, resulting in better emergence, initial growth and development of the crop. Thick and uniform mulch cover also helps in reducing density and diversity of weed flora.

- Lucky Seed Drill has been developed for simultaneous application of pre-emergence herbicide along with sowing of wheat. Spray begins automatically as the sowing starts, and stops when the sowing gets completed. No planking is required after sowing with Lucky Seed Drill, as each tine of the drill is fitted with a metal chain that puts sufficient soil on the seed before the application of herbicide. Highest efficacy of herbicide (above 90%) was achieved with Lucky Seed Drill.

- A tractor PTO operated trail type Loose Straw Chopper has been developed and is under final stage of evaluation. The machine consists of a comb type pick-up conveyor for picking-up and conveying only the loose paddy straw into straw chopping unit. The straw chopping unit consists of a chopping cylinder, having serrated blades for chopping the loose straw into small pieces and uniformly spreading these in the field. The machine reduces choking of Happy Seeder and enhances its capacity.

- A prototype of tractor operated finger type Cotton Stripper has been developed and evaluated on local cotton variety sown with high density planting system. Picking efficiency of the developed cotton stripper is about 90 per cent and trash content in the picked cotton is about 20 per cent.

- Forced circulation solar dryer, installed previously at a farm in the village Kang Khurd, district Kapurthala, has been modified to improve its performance. The dryer now works only on solar energy. The electric energy required for running of 1 hp air blower is now supplied from solar photovoltaic panels. The air blower has also been modified to work on DC electricity.

- Technology of paddy straw bale combustor/ geyser for heating water at farmer's field has been recommended.

**AGRICULTURAL MARKETING**

- The studies on marketing behaviour and extent of participation of small and marginal farmers in modern milk marketing indicated that 62.3 per cent and 60.3 per cent milk marketed through the modern channel was from small and marginal farms, respectively. The age of dairy farmers, volume of milk produced, level of education of dairy farmers and land holding size greatly influenced the decision making towards participation in modern milk marketing chains. An effective way of involving small holders in modern milk marketing channels is to encourage them to organize themselves into cooperatives and self-help groups to improve their bargaining power and also generate economies of scale in acquisition of inputs, technology, services and information.

**HOME SCIENCE**

- Experiments were carried out to optimize printing conditions for Arjun (Terminalia arjuna) dye. The conventionally used guar gum (Cyamopsis tetragonolobus) was replaced by Cassia gum (Cassia obtusifolia) as natural thickening agent. These were fairly good for printing on both cotton and silk fabrics with block and screen printing techniques. Products such as cushion covers, coasters, wall hangings and trays were printed using optimized conditions. The study is at stage one. The products will be multiplied and sold during exhibitions.
Cotton fabric was finished with microcapsules, developed using optimized concentration of essential oils namely Citronella, Eucalyptus and Rosemary, having mosquito repellent properties. The effectiveness of application of essential oils was best achieved at 10 per cent concentration. The microencapsulation method showed good mosquito repellent activity up to 30 washes. This work is at stage one. The mosquito repellent tests will be carried out on a larger group, and products will be sold at Kisan Melas and exhibitions.

Multilayered winter clothing was developed for the elderly after studying the clothing needs and practices of 10 respondents (five males and five females) between the age of 65-70 years. Ten layers from different fabrics were prepared. Most preferred fabrics were the woven cotton wool blended fabrics and knitted cotton for layering. This study is at stage one. The multilayered winter clothing will be stitched and sold.

The prevalence of depression and adjustment problems among the elderly revealed that elderly female experienced more physical problems whereas elderly male experienced more psychological problems. Elderly belonging to low socio-economic strata experienced more physical and psychological abuse and neglect as compared to elderly from middle and high socio-economic strata whereas higher percentage of respondents from middle socio-economic strata experienced financial abuse. Prevalence of depression was found to be higher among elderly females belonging to low socio-economic strata.

COMMERCIALIZATION OF TECHNOLOGIES

- Multi Grain Flour (2015): The PAU has licensed the formulation of multi grain flour to M/s Good Brands for a Healthy Life Private Limited, Pune on non-exclusive basis.

### Patents Filed

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Year</th>
<th>Invention</th>
<th>Department</th>
<th>Application No.</th>
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<tr>
<td>1</td>
<td>2016</td>
<td>Modified PAU Fruit Fly Trap</td>
<td>Department of Fruit Science and Department of Entomology</td>
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<tr>
<td>2</td>
<td>2016</td>
<td>Bacteriological Food Testing Kit (BFTK)</td>
<td>Department of Microbiology</td>
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<tr>
<td>3</td>
<td>2016</td>
<td>Improvement and Evaluation of Filter for Canal Water Potability</td>
<td>Department of Soil and Water Engineering</td>
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<td>4</td>
<td>2016</td>
<td>Microencapsulation of Rosemary Oil on Cotton Fabric for Mosquito Repellency</td>
<td>Department of Apparel and Textile Science</td>
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EDUCATION

Academic programmes of the University are run through its four constituent colleges at Ludhiana namely College of Agriculture (CoA), College of Agricultural Engineering and Technology (CoAE&T), College of Basic Sciences and Humanities (CoBSc&H), College of Home Science (CoHSc) and two Institutes of Agriculture at Gurdaspur and Bathinda.

ADMISSIONS

During 2015-16, the University offered 10 Undergraduate programmes, 44 Master's programmes, 29 Doctorate programmes and one Diploma programme as per following details.

<table>
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<tr>
<th>Programme</th>
<th>Number of seats</th>
<th>Number of students admitted</th>
<th>Number of students passed out</th>
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* Programme discontinued at PAU campus from 2014-15
** The students will study for first two years at outstations and then will be shifted to PAU, Ludhiana.
*** Programme discontinued from 2010-11
**** Programme suspended for 2015-16
EXAMINATION CELL

The Examination Cell under Controller of Examinations conducted entrance tests for admitting meritorious students to various academic programmes of PAU. Details are given below:

- Conducted Common Entrance Test (CET) for admission to B.Sc. Agri. (Hons) 4-year, B.Sc. Biotech. (Hons) 4-year, B.Tech Food Tech. 4-year, B.Sc. Agri. (Hons) 6-year, B.Sc. (Hons) Home Science 4-year, B.Sc. (Hons) Nutrition & Dietetics 4-year, B.Sc. (Hons) Fashion Designing 4-year, B.Sc. (Hons) Interior Design 4-year and 5-year Integrated M.Sc. (Hons) programmes in June 2016 for which 6,529 candidates applied for admission.
- Conducted 16 Masters' entrance tests for admission to M.Sc./MBA(AB)/MJMC/M.Tech programmes during May-June 2016 for which 1,215 candidates applied for admission.
- Conducted entrance tests for admission to 29 Ph.D. programmes during November 2015.
- Conducted written test for recruitment to the posts of Clerks on compassionate grounds on September 8, 2015 and April 11, 2016. For recruitment to the posts of Assistants at Vigyan Kendras, a computer test was conducted on November 5, 2015. Besides, a written test for recruitment to the posts of Programme Assistants (Computer) was conducted on April 11, 2016 for 87 candidates. In addition, shorthand dictation test (Punjabi and English) for recruitment to the posts of Steno Typists was conducted on May 18-19, 2016 for 211 candidates. The written test for recruitment to the posts of Senior Assistants and Clerks in Punjab Remote Sensing Centre (PRSC) was also conducted on April 11, 2016 for 109 candidates. Apart from this, the capability test (to use MS Excel and typewriting test in Punjabi) of the candidates who qualified in the written test was conducted on May 31, 2016. Also conducted six papers of Higher Standard Departmental Examination for PAU employees during September 2015 and April 2016. It organized a 10-day training programme for the candidates appearing in Higher Standard Departmental Examinations during February-March 2016.
- Helped in the conduct of Civil Services (Preliminary) Examination of Union Public Service Commission on August 23, 2015, by creating one Centre on PAU campus.
NEW COURSES
College of Agriculture

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College of Basic Sciences and Humanities

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STUDENTS' ACADEMIC ACCOMPLISHMENTS

College of Agriculture

- Manpreet Singh (L-2010-A-2-D) received "Jawaharlal Nehru Award 2015" from the Indian Council of Agricultural Research, New Delhi, for his outstanding doctoral thesis research entitled "Dry seeded rice (Oryza sativa L.) productivity and weed dynamics in relation to copper cropping, tillage and weed control."

- Hament Thakur (L-2014-A-44-D) and Ashok B. Jagtap (L-2014-A-17-D) bagged "Prime Minister's Fellowship 2016" each from the Confederation of Indian Industry (CII), New Delhi, for their doctoral research. Hament is working on "Genetics and molecular mapping of leaf curl virus disease resistance gene(s) in chilli pepper (Capsicum annuum L.)" while
Ashok is working on the “Identification and characterization of high temperature stress responsive genes in maize (Zea mays L.).”

- Karaminderbir Kaur (L-2014-A-16-D) bagged “Monsanto Beachell Borlaug International Scholarship 2016” from the University of California, Davis, USA. She will carry out research on the “Development of an in vivo haploid induction system in rice using intergeneric crosses and manipulation of CenH3 gene.”

- Mitaly Bansal (L-2011-A-50-D) was awarded “Jeanie Borlaug Laube Women in Triticum (WIT) Early Career Award 2016” for her excellent research achievements.

- Ankita Thakur (L-2013-BS-83-D) participated in a 15-day sponsored training programme “SERB School in Entomology,” organized by the Department of Science and Technology, New Delhi in Hyderabad from December 7-21, 2015.

- Ramadeep Kaur (L-2012-BS-79-D) got second best poster award during the National Conference on “Medical and Life Sciences,” held at Baba Farid University of Health Sciences, Faridkot from April 11-12, 2016.

**College of Basic Sciences and Humanities**

- Rimaljeet Kaur (L-2010-BS-49-D) was conferred with “Jawaharlal Nehru Award 2015” by the Indian Council of Agricultural Research, New Delhi, for her outstanding doctoral thesis research entitled, “Characterization of Helicoverpa armigera (Hubner) α-amylase and status of anti-oxidants in Pigeonpea, Cajanus cajan (Millspaugh).”

**SCHOLARSHIPS AND FINANCIAL ASSISTANCE**

**College of Agriculture**

- Twenty two students got ICAR-National Talent Scholarship, four ICAR-Senior Research Fellowship, 25 ICAR-Junior Research Fellowship, seven ICAR Fellowship (foreign student) and 21 Innovation in Science Pursuit for Inspired Research Fellowship (DST).

- Three students were awarded Monsanto Beachell Borlaug International Scholarship and four Monsanto Merit Fellowship.

- Four students received Rajiv Gandhi National Fellowship (UGC), 55 Post-matric Scholarship
(Welfare Department, Punjab), 30 Dr G.S. Khush Scholarship (PAU) and 188 PAU Merit Scholarship/Fellowship/stipends.

- Two students qualified UGC-Junior Research Fellowship/National Eligibility Test and two got Nepal Aid Fund (Department of Agricultural Research and Education-DARE).
- One student each was awarded UGC-Senior Research Fellowship, Department of Biotechnology (DBT)-Junior Research Fellowship and National Fellowship for Higher Education (UGC).
- Five students received Bharti Field Fresh Fellowship.

**College of Agricultural Engineering and Technology**

- Fourteen students were awarded ICAR-National Talent Scholarship, three ICAR-Junior Research Fellowship, two Rajiv Gandhi National Fellowship (UGC) and two Innovation in Science Pursuit for Inspired Research Fellowship (DST).
- One student qualified ICAR-National Eligibility Test and one got ICAR-Senior Research Fellowship.
- Seventeen students received Post-matric Scholarship (Welfare Department, Punjab), six Dr G.S. Khush Scholarship (PAU), 29 PAU Undergraduate Merit Fellowship (for B.Tech.), 15 PAU Merit Fellowship (for M.Tech., Ph.D.) and three got stipends.

**College of Basic Sciences and Humanities**

- Two students received ICMR Fellowship, eight UGC-Senior Research Fellowship and Junior Research Fellowship, two Council of Scientific and Industrial Research (CSIR)-UGC Junior Research Fellowship, and 10 Innovation in Science Pursuit for Inspired Research Fellowship (DST).
- Ten students were awarded Rajiv Gandhi National Fellowship (UGC), 11 Maulana Azad National Fellowship (UGC), 17 Post-matric Fellowship (Punjab Government) and five Dr G.S. Khush Scholarship (PAU).
- A total of 91 students received PAU Merit Fellowship and 38 students got student aid fund.
- One student each was awarded ICAR-Senior Research Fellowship, ICAR-Junior Research Fellowship, Indian Council of Social Science Research (ICSSR) Fellowship, PG Indira Gandhi Scholarship (UGC), National Fellowship for OBC (UGC), Women Scientist Scholarship (UGC) and Bihar Samajya Kalyan Vibhagya Fellowship. One student qualified ICAR-National Eligibility Test.

**College of Home Science**

- Eleven students got Innovation in Science Pursuit for Inspired Research Fellowship (DST), two ICMR-Senior Research Fellowship, seven ICAR-Junior Research Fellowship and eight PAU Merit Fellowship.
- A total of 15 students qualified UGC-Junior Research Fellowship/National Eligibility Test.
- One student each was awarded ICAR-Senior Research Fellowship, Maulana Azad National Fellowship for Minority Students (UGC), National Fellowship for OBC (UGC) and USAID/Tanzania project (Ohio State University, USA).

**CONVOCATION**

- The Annual Convocation of Punjab Agricultural University was held on October 16, 2015. Prof. Kaptan Singh Solanki, Former Governor of Punjab and Present Governor of Haryana, presided over the convocation while Dr Ved Prakash, Chairman, University Grants Commission, New Delhi, was the chief guest. During the convocation, a total of 393 Ph.D., M.Sc., M.Tech., MCA, MBA, MBA (Agribusiness) and MJMC (Journalism and Mass Communication) students received degrees. Besides, 17 students were awarded Medals and Gold Medals, and several other received
Professor Ramesh Chand, Member of NITI Aayog, Government of India, awarding a Merit Certificate to the PAU student during the Annual Convocation of the College of Agriculture, PAU.

Dr Ved Prakash, Chairman, University Grants Commission, New Delhi, delivering his convocation address at PAU.

Merit Certificates. Six members of PAU's faculty were conferred with plaque and cash prizes. On the occasion, the Doctor of Science degree (honoris causa) was bestowed on Dr K.S. Gill, former Vice Chancellor, PAU.

The Annual Convocation of the College of Agriculture, PAU was held on January 25, 2016. Professor Ramesh Chand, Member of NITI Aayog, Government of India, was the chief guest. A total of 421 students of B.Sc. Agri. (Hons), B.Sc. Biotechnology (Hons) and B.Tech. Food Technology (Hons) received degrees. Three students won University Gold Medals and seven students other medals. Three students won the Academic Roll of Honour while 79 students were awarded Merit Certificates. Twenty nine students of B.Sc. Agri. (Hons) 4- and 6-year programmes won prizes for having achieved academic distinctions during their degree programmes.

Professor Kaptan Singh Solanki, Former Governor of Punjab and Present Governor of Haryana, presenting Doctor of Science degree (honoris causa) to Dr K.S. Gill, former Vice Chancellor, PAU, during Annual Convocation of Punjab Agricultural University.

STUDENTS' WELFARE ACTIVITIES

Important Sports Achievements

Inter-Varsity Tournaments

The PAU teams participated in the North Zone/All India Inter-Varsity tournament in Lawn Tennis (M), Cricket (M), Football (M), Table Tennis (M&W), Basketball (M&W), Swimming (M&W), Kabaddi (M), Cycling (M&W), Handball (M&W), Badminton (M&W), Volleyball (M), Hockey (M), Athletics (M), Shooting (M&W) and Weight Lifting (M).

University Level Tournaments

The teams from constituent colleges of PAU participated in Inter-College Tournaments for Volleyball (M), Basketball (M&W), Football (M), Swimming (M&W), Lawn Tennis (M), Handball (M&W), Hockey (M), Badminton (M&W), Weight Lifting (M), Cricket (M), Table Tennis (M&W) and Cycling (M&W). Karan Gakhar (CoA) was declared as Best Cyclist, Manjinder Singh (CoA) as Best Hockey Player, and Amritpal Singh (CoA) and Khushmanpreet Hanjhra (CoA) as Best Swimmers in men and women category, respectively.

Annual Athletic Meet

The 50th Annual Athletic Meet of PAU for the session 2015-16 was held at PAU Athletic Track on March 9-10, 2016. Japjit Singh (CoAE&T) and Pratishtha Verma (CoA) were declared Best Athletes in men and women category, respectively.
Students from constituent colleges of PAU participating in Annual Athletic Meet.

University Colour/Merit Certificates

The PAU Sports and Youth Activities Council in its 52nd meeting held on December 9, 2015 awarded 57 Merit Certificates, 9 University Colour and 7 Roll of Honour to the outstanding sportspersons/artists of PAU for their proficiency in sports, games, cultural and literary events for the session 2014-15. The students were awarded these honours during the 50th Annual Athletic Meet of the University.

Sports Coaching Camps

The Annual National Sports Organization (NSO) coaching camp was organized at PAU for the session 2015-16. As many as 179 trainees enrolled under NSO programme including officials attended the camp. Before participation of PAU teams in All India Inter Varsity/Inter Agricultural Universities Tournaments, a coaching camp of 15-20 days duration in respective games was also held in the University.

Sports Scholarships

The Sports Scholarship Committee in its meeting held on June 6, 2016 approved 10 sports scholarships of the value of Rs 350/- per month in four major and six minor games for the academic session 2015-16 to outstanding sportspersons for their proficiency in sports and games.

Outstanding Players

- The PAU teams won Gold and Silver Medals in different games during XVI All India Inter-Agricultural Universities Sports and Games Meet, held at Tamil Nadu Agricultural University, Coimbatore from February 22-26, 2016.
  - The Basketball (M) team won Gold Medal. The team comprised students Aalamdeep Singh (CoA), Harsimar Singh (CoAE&T), Gurjeet Singh (CoA), Harpreet Singh (CoA), Pukhray Singh Brar (CoA), Karan Brar (CoA), Karan Bawa (CoA), Simarjeet Singh (CoA), Sawantpreet Singh (CoAE&T) and Hardeep Singh (CoA).
  - The Badminton (M) team won Gold Medal. The team comprised students Gurjan Singh Matharoo (CoAE&T), Puneetinder Singh (CoA), Chanpreet Singh (CoA) and Amit Bhasin (CoA).
  - The Volleyball (M) team won Gold Medal. The team comprised students Kamaljit Singh (CoA), Simarjeet Singh (CoA), Amanpreet Singh (CoA), Miladdeep Singh (CoA), Vikramjeet Singh Brar (CoA), Shehbaz Singh (CoA), Lovejeet Singh (CoA), Yograjdeep Singh (CoA) and Jatinder Singh (CoAE&T).
  - The Badminton (W) team won Silver Medal. The team comprised students Harveen Kaur (CoHSc), Navdeep (CoA), and Gagandeep Kaur (CoBSc&H).
  - Tejinder Pal Singh (CoA) won first position in shot put and third position in discus throw.
  - Mehekpreet Kaur Randhawa (CoA) got first position in 1500M, second in 800M and third in 400M.
  - Pratishtha Verma (CoA) bagged second position in 100M in athletics.
  - Amanpreet Singh (CoA) got third position in Youth National Volleyball Championship, held at Nagpur from January 30 to February 5, 2016.
Puneetinder Singh Grewal (CoA) and Harveen Kaur (CoHSc) won third position in North Zone Inter-State Senior Badminton Championship 2015-16 for Men and Women, held at New Delhi from October 27-30, 2015. Both the students represented the teams of Punjab.

Amandeep Singh (CoA) bagged first position in Senior Punjab State Handball Men and Women Tournament, held at Sangrur from September 16-18, 2015.

Arjun Singh (CoA) won first position in Senior State Hockey Championship, held at Kapurthala from October 30 to November 1, 2015.

Parasdeep Singh (CoA) got second position in Senior Punjab State Handball Men and Women Tournament, held at Sangrur from September 16-18, 2015.

Jagpal Singh (CoA), Barinderpal Singh (CoA) and Manveer Singh (CoA) bagged second position in Senior State Hockey Championship, held at Sangrur from October 30 to November 1, 2015.

Aditi Sewak (CoHSc) got third position in 50th Punjab State Shooting Championship, held at PAP, Jalandhar from August 26-30, 2015.

Puneetinder Singh Grewal (CoA), Chanpreet Singh (CoA), Guranjan Singh (CoAE&T) and Harveen Kaur (CoHSc) won second position in Inter District Team Championship in Men and Women Sections during Senior Open Punjab State and Inter District Badminton Championship, held at Patiala from November 3-6, 2015. The students represented Ludhiana district.

The academic session 2015-16 witnessed transformation in NSS activities and structure. For proper coordination and developing leadership quality among students, a Students’ Coordination Committee (SCC) was formed in the University. Under this, many volunteers extended their services to NSS after completion of two years of compulsory NSS course. Inspired by the programme, about 50 NSS volunteers participated in the North Zone Youth Festival (Goonj) from January 14-18, 2016 to maintain Help Desk Stall for guiding participating universities.

A special seven-day camp on 'Campus Beautification' was organized from January 21-27, 2016.

Seven NSS volunteers of the University participated in the 6th Conclave of Bharatiya Chhara Sansad, held at Maharashtra Academy of Engineering and Educational Research's MIT (Maharashtra Institute of Technology) Campus, Pune from January 27-30, 2016.

A special blood donation-cum-free blood group check-up camp was jointly organized by the Punjab Agricultural University, Dayanand Medical College and Hospital, Christian Medical College and Hospital, and Raghunath Hospital (CMC&H), Ludhiana on March 18-19, 2016. As many as 305 units of blood were collected and more than 500 farmers came for check-up and to know their blood group. Dr Aikaj Jindal, Blood Transfusion Officer, CMC&H, Ludhiana supervised the whole camp.

An 'International Biodiversity Day' was jointly celebrated by the NSS Cell, PAU, National Biodiversity Authority and Punjab Biodiversity Board, Chandigarh on May 22, 2016. On this occasion, a technical session and poster making competition were organized.

The NSS volunteers also participated in the 'World Environment Day' celebrations, organized by the Indian Society of Geomatics and Indian Ecological Society at Punjab Remote Sensing Centre, Ludhiana on June 5, 2016.

An 'International Yoga Day' was celebrated by the NSS Unit on June 21, 2016.

National Service Scheme Activities

- Three NSS volunteers of PAU were conferred with 'Swami Vivekananda Youth Award' for their contributions to the society.

- Asish Kumar Padhy, an NSS volunteer, received a National Award from Indian Council of Agricultural Research (ICAR) and All India Agricultural Students' Association (AIASA) for his contributions to the agricultural society as a social worker.
Awareness about HIV/AIDS, drug abuse, environment safety and biodiversity conservation was spread among the masses through banners, posters, distribution of pamphlets and interactions with the rural as well as urban people during Kisan Melas and in the form of rallies in the city. Special lectures on social issues like female foeticide, drug abuse, stress management, etc. were also organized.

**Cultural Activities**

- Independence Day and Republic Day were celebrated on August 15, 2015 and January 26, 2016, respectively. A large number of students, staff and faculty of the University participated in the celebrations.
- The PAU Inter-College Youth Festival was organized from November 27 to December 4, 2015. Nearly 400 students from constituent colleges and outstation institutes of PAU participated in the literary, fine arts, music, theatre and dance events. The overall running trophy was bagged by the College of Agriculture.
- The 31st Inter-University North Zone Youth Festival 2015-16 was jointly organized by the Punjab Agricultural University and Association of Indian Universities (AIU), New Delhi at PAU from January 14-18, 2016. A total of 29 Universities from North India with approximately 1200 students participated in this festival.
- A contingent of 40 PAU students participated in the 31st Inter-University North Zone Youth Festival 2015-16. The students won Silver Medal in the installation event and Bronze Medals in debate, cartooning, rangoli and clay
Dr Om Gauri Dutt Sharma, Deputy Director General, Doordarshan Kendra, Jalandhar, inaugurating the 31st Inter-University North Zone Youth Festival at PAU. A PAU contingent participated in the Punjab State Inter-University Youth Festival, organized by Punjab Art Council, Chandigarh at Baba Banda Singh Bahadur Engineering College, Fatehgarh Sahib from January 21-23, 2016. The students won Gold Medal in traditional ladies songs; Silver Medals in slogan writing, cartooning, photography, debate; and Bronze Medals in one-act play, mono acting and geet gazal.

A PAU contingent of 27 members participated in the 16th All India Inter Agricultural Universities Youth Festival, organized by Indian Council of Agricultural Research, (ICAR) New Delhi at Orissa University of Agriculture and Technology, Bhubaneswar (Odisha) from February 1-4, 2016. The students won Gold Medal in group song (Indian), Silver Medal in patriotic group song, and Bronze Medals in poster making and quiz events.

The installation team of PAU represented North India at 31st Inter-University National Youth Festival 2015-16, organized by the University of Mysore, Mysore, Karnataka from February 15-19, 2016. The University team won Silver Medal.
EXTENSION

The University undertakes the transfer of improved agricultural technologies to the farmers' fields through 15 Farm Advisory Service Centres (FASCs) and 17 Krishi Vigyan Kendras (KVKs) located in different districts and various departments; Agricultural Technology Information Centre (ATIC); and Advanced Centre of Training at Kairon Kisan Ghar (KKG) on the main campus. Technologies are transferred through various extension modes like Kisan Melas, field days, workshops, adaptive research trials, on farm trials, demonstrations, trainings (short, vocational and in-service), exhibitions, camps, campaigns, technical guidance, TV/radio talks, Kisan Club/committee meetings, agricultural publications and sale of farm literature. The University also plays a vital role in capacity building of farmers, farm women and extension functionaries in scientific farm technologies and practices, and subsidiary occupations through various training programmes.

Kisan Melas

Kisan Melas play a key role in the dissemination of improved knowledge among the masses. The farmers are acquainted with the new technologies through live demonstrations, exhibitions and technical sessions. The question-answer session during these melas addresses the queries of the farmers. A total of 14 Kisan Melas were organized during the period under report: seven Kisan Melas each were organized during the months of September 2015 and March 2016 at the main campus of PAU, Ludhiana; KVK Rauni (Patiala); KVK Nag Kalan (Amritsar); Regional Research Station (RRS) Faridkot; RRS Ballowal Saunkhri, RRS Bathinda and RRS Gurdaspur. A large number of farmers from the Punjab and adjoining states participated in these melas. Field demonstrations and elaborate exhibitions on improved varieties, production-protection technologies, mushroom cultivation, beekeeping, nutritional gardening, protected cultivation, etc. were organized for the farmers. The seeds of improved varieties of crops, vegetables and fodders; saplings of fruit plants and farm literature were also sold to the farmers in these melas. In addition, exhibitions on other farm inputs including fertilizers, pesticides, implements and farm machinery were also arranged.
Dr Baldev Singh Dhillon, PAU VC, apprising Dr Robert Thompson, former Assistant Secretary for Economics, Department of Agriculture, USA, of PAU developed fruit crop varieties (left). Dr Christopher Gibbins, Counsel General of Canada in Chandigarh, who was the Guest of Honour at PAU Kisan Mela (Ludhiana) in March 2016, seeing experimental areas at PAU (right).

**Awards to Progressive Farmers**

The progressive farmers were honoured during PAU Kisan Melas for their outstanding contributions to agriculture, horticulture and allied occupations. During PAU Kisan Mela on September 25-26, 2015, four progressive farmers and one farm woman were honoured. S. Gurpreet Singh of village Mehraj (Bathinda) was conferred with Sardar Dalip Singh Dhaliwal Memorial Award; S. Jinder Singh of village Sandhuan (Ropar) with Parwasi Bharti Award; S. Gurdeep Singh of village Mehma Sawai (Bathinda) with Sardar Surjit Singh Dhillon Award; S. Harbans Singh of village Tarpai (Amritsar) with Sardar Ujagar Singh Dhaliwal Memorial Award; and Smt. Shehnaz of Model Town (Bathinda) with Sardarni Jagbir Kaur Grewal Memorial Innovative Woman Farmer.
Award. During PAU Kisan Mela on March 18-19, 2016, S. Sohan Singh Bhangla of village Bishanpura (Sangrur) was conferred with "Chief Minister Award" for excellence in agriculture whereas S. Avtar Singh Ratol of village Saroud (Sangrur) was awarded "Chief Minister Award" for excellence in horticulture. Besides, S. Gurmail Singh of village Uchhagoan (Patiala); S. Harjit Singh of village Jhita Kalan, (Amritsar); and Mr. Surinderpal Singh of village Dhingwali, Abohar (Fazilka) were honoured with "CRI Pumps Awards" for adopting improved water management techniques, farm mechanization and excellence in organic farming, respectively.

FIELD DAYS

Under the principle of 'seeing and believing,' the University holds field days in order to popularize improved technologies and practices among farmers. A total of 232 field days were organized in different villages to promote new crop varieties, IPM in paddy/basmati, mechanical transplantation of paddy, use of happy seeder, nutrition garden, mushroom cultivation, etc.

ADAPTIVE RESEARCH TRIALS

Adaptive Research Trials (ARTs) are conducted at farmers' fields under different agro-climatic conditions to test new technologies generated by the research system. A total of 420 ARTs were conducted at different locations to evaluate new crop varieties, and production and protection technologies. Based on these trials, a total of 93 recommendations were made, out of which, 40 were of new varieties (12 field crops, 16 vegetables, 4 fruit crops and 8 flowers), 33 of production technologies and 20 of protection technologies.

ON FARM TRIALS (OFTs)

On Farm Trials are conducted to test a new technology/idea under farmer's field conditions along with PAU recommended practice and farmer's own practice. A total of 144 OFTs were conducted by the KVK scientists, out of which, some important OFTs are given as under:

Wheat: Comparison of various methods of sowing, evaluation of seed rate of wheat sown with Happy Seeder in heavy textured soils, impact of tank mix application of zinced urea on wheat yield and quality, and effect of phosphorus solublizing bacteria on wheat productivity.

Paddy: Mechanical transplanter and direct seeded rice, effect of time of urea application on incidence of false smut in rice, testing of newly released insecticide Fame in comparison to Dursban for the control of stem borer and leaf folder, optimization of plant population in paddy/basmati, control of foot rot in basmati, seed treatment of basmati with Trichoderma, and effect of potash application in paddy.

Cotton: Evaluation of phosphorus requirement of Bt cotton crop sown after wheat and management of whitefly in cotton by using HMO (Horticulture Mineral Oil).

Maize: Use of tricho-cards for the control of maize borer and effect of biofertilizers on the yield.
Vegetables: Effect of potash and sulphur on yield and quality of onion, need based use of fungicides for management of late blight of potato, different techniques of cultivation of kharif onion, seed rate of early sown pea, weed control in pea, use of post-emergence herbicide in cauliflower nursery and plastic mulch effect on muskmelon.

Fruits: Effect of different methods of pruning on yield and quality of guava, effect of potassium application on fruit yield and quality of kinnow, control of fruit drop in kinnow, integrated management of guava fruit fly, and effect of different mulch materials on yield and weed growth in bearing orchards.

Animal Science: Effect of feeding mineral mixture and de-worming on production and reproduction performance in cross bred cows, prevention of mastitis in dairy animals, assessment of milking management practices of dairy animals and tick control in buffaloes.

DEMONSTRATIONS

For the promotion of crop production, protection and other improved agricultural technologies developed by PAU, demonstrations are conducted at farmers' fields and KVK farms. As many as 2,356 front line demonstrations (FLDs) were conducted by all KVKs on improved varieties of oilseed crops (groundnut, sesame, gobhi sarson, toria, raya and sunflower), pulses (summer moong, kharif moong, mash, soybean, gram and lentil), rice, basmati, cotton (American, desi, Bt and non Bt varieties), maize and maize fodder.

The FLDs were also conducted on nitrogen management in paddy using leaf colour chart, control of foot rot in basmati, weed control in direct seeded rice, weed control in maize, management of stem borer/leaf folder in paddy and basmati, green manuring before paddy and basmati, use of paddy transplanter, management of maize borer using Trichoderma harzianum, use of fertilizer on soil test basis, mixed cropping of toria and gobhi sarson, use of biofertilizers in wheat, and amelioration of manganese deficiency.

Apart from this, demonstrations were carried out on nutritional gardening of summer and winter vegetable crops, turmeric cultivation, low tunnel technology for vegetable crops, orchard protection in summers, bulb set technique in kharif onion production, cultivation of rainy season tomato and broccoli, and fungicidal management of foot rot/gummosis in citrus.

In addition, field demonstrations of different straw management machinery namely Happy Seeder, Straw Chopper-cum-Spreader, Loose Straw Chopper, Reversible Mould Board Plough and Spatial No-till Drill were conducted at farmers' fields and farms of PAU/KVKs. Straw management machines were also demonstrated to the farmers at two-day Kisan Mela organized at PAU, Ludhiana in September 2015 and March 2016.

A total of 955 method demonstrations were conducted on the collection of soil and water samples, use of LCC and tensiometer, seed treatment, Rhizobium inoculation in berseem/gram/peas/lentil, nursery raising of vegetables, beekeeping, mushroom cultivation, and different aspects of cooking and home management. Demonstrations on animal sciences were also carried out.

TRAININGS AND EXHIBITIONS

Trainings

The KVKs and Advanced Centre of Training at PAU campus organized 1,511 training programmes (1,074 short, 246 vocational, 130 in-service and 61 sponsored) for the farmers, farm women and extension functionaries to enhance their knowledge.
Farm women selling their food products after acquiring training from PAU.

for increasing agricultural productivity and profitability. Vocational trainings were given on hybrid seed production, protected cultivation of vegetables, value addition to agricultural produce, precision farming, mushroom cultivation, apiculture, poultry, dairying, tie and dye, stitching and embroidery, preparation of pickle/murabba/ketchup and other kitchen recipes, etc. A total of 19,907 farmers, 8,495 farm women and 1,997 extension personnel participated in these training programmes.

The extension scientists also acted as resource persons in 757 farmers’ training camps, organized by different line departments (Agriculture, Horticulture, Soil Conservation, IFFCO, KRIBHCO, etc.).

Exhibitions

Exhibitions are arranged during Kisan Melas, district level training camps, field days, scientific advisory committee meetings, technology week celebrations, special days, etc. to create awareness among farmers about the use and benefits of improved/new technologies and practices. During the period under report, knowledge on newly developed improved varieties/hybrids of different field and horticultural crops, efficient nutrient management practices, integrated pest management practices and other plant protection technologies, improved crop production technologies, etc. was disseminated through models and charts. Besides, models of integrated farming system, drip irrigation, vermicompost and kitchen gardening were displayed. Agro-processing and value addition in agriculture were also promoted by the sale of such products, prepared by KVK trained farmers/farm women and self-help groups.

SKILL DEVELOPMENT COURSES

A Skill Development Centre in Agriculture at PAU, Ludhiana and a Food Industry Training-cum-Business Incubation Centre at Regional Research Station, Bathinda were established. The skill development courses in food processing are being organized regularly at both the centres. The PAU Centre conducted seven training courses for baking technicians, craft bakers and tractor operators in which 144 trainees participated. The Food Industry Training-cum-Incubation Centre at RRS, Bathinda conducted 29 skill development courses in which 686 farmers and farm women participated. Besides, a ‘Horticulture Supervisor Training Course’ was organized at PAU, Ludhiana and KVKs Bathinda and Gurdaspur in which 52 trainees participated. Similarly, a ‘Gardener Training Course’ was organized at KVKs Bathinda and Gurdaspur, from which 53 trainees were benefitted. The skill training courses on ‘Precision Agriculture’ were conducted by the University (for 14 batches of 40 trainees each) with focus on drip fertigation and protected cultivation.

WORKSHOPS

Workshops are organized regularly by PAU in which the University Scientists and Extension Officers of line departments discuss results of latest technologies, developed by the University and finalize the Package of Practices for the farmers.
advancements in various disciplines. Ten monthly training camps for the members of PAU Kisan Club were organized in which 5,955 farmers and 562 farm women participated. In addition, 10 monthly training camps for the members of Progressive Beekeepers Association were also organized in which 489 farmers participated. Two meetings of the Tree Growers Association were organized in which 70 growers participated. Four training camps were organized for the members of Seed Producers and Nursery Growers Association, benefitting 205 farmers.

**PLANT CLINIC AND TECHNICAL GUIDANCE**

The PAU provides diagnostic services pertaining to various crop disorders including nutritional deficiencies and weed, pest and disease infestation in the field, vegetable, fruit, forest and ornamental crops, through Plant Clinic at PAU, KVKs and FASCs in different districts of the state. The extension scientists also provided technical guidance on different aspects of crop production and subsidiary occupations to 45,602 farmers in the office, field and through telephone helplines.

**PAU DOOTS**

The University enrols farmers, having access to internet, as PAU doots for the transfer of technologies in their respective villages through public address system and other modes of communication. These doots are being sent 2-3 messages per week on various agricultural practices through e-mail for further spread to the fellow farmers. During the period under report, 319 doots were enrolled and 98 messages were sent to them. Till date, 5,109 farmers have been enrolled as PAU doots.
COMMUNICATION THROUGH
MASS MEDIA

The Centre for Communication and
International Linkages (CCIL) maintains a constant
liaison with the print and electronic media
including Doordarshan and AIR, Jalandhar to
publicize the activities of the University. It issues
press releases to different newspapers and news
channels on regular basis. During the period under
report, the Centre issued 940 press releases (522 in
English and 418 in Punjabi). The Centre also sent
165 articles (15 in English and 150 in Punjabi),
authored by PAU scientists, for publication in
vernacular newspapers and magazines. The
Centre provided TV coverage to different events
and also produced 14 Kisan Mela reports for
telecast from Doordarshan. It coordinated with
Doordarshan Kendra, Jalandhar for 557 TV talks
and AIR, Jalandhar for 366 radio talks of PAU
scientists.

FARM PUBLICATIONS

The CCIL publishes two monthly farm
magazines Changi Kheti (in Punjabi) and
Progressive Farming (in English). Both the farm
magazines are printed in four colours on offset
machines to maintain top quality. The combined
circulation of these magazines has increased from
1,89,075 in 2014-15 to to 2,17,985 copies
(annually) in 2015-16. The Centre also publishes
Package of Practices for Crops of Punjab, twice a
year, both in English and Punjabi. Besides,
technical farm bulletins are published regularly on
various crops and technologies. During the period
under report, the Centre brought out 16 farm
publications in English and 9 in Punjabi. Revised
editions of Package of Practices for Rabi and
Kharif Crops (in English and Punjabi), Field
Problems of Important Crops of Punjab (in Punjabi),
Renewable Energy Biogas: An Ideal Source, etc.
were published by the Centre. In addition, new
editions of Agro-Processing, Storage of Food
Purchase of Home Appliances, Nursery Production
of Ornamental Plants, Rodent Pests: A Practical
Guide for Management, Care and Maintenance of
Farm Machinery, etc. were brought out by the
Centre.
New appointments

During the period under report, following new appointments were made. Besides, 39 Assistant Professors & equivalent and five Associate Professors & equivalent were directly recruited.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name</th>
<th>Appointed as</th>
<th>Date of appointment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr Baldev Singh Dhillon</td>
<td>Vice Chancellor</td>
<td>01.07.2015 (second term)</td>
</tr>
<tr>
<td>2</td>
<td>Dr Pardeep Kumar Khanna</td>
<td>Registrar</td>
<td>01.03.2016 (re-employed)</td>
</tr>
<tr>
<td>3</td>
<td>Dr Major Singh Dhaliwal</td>
<td>Additional Director of Research (Horticulture and Food Science)</td>
<td>09.09.2015 (AN)</td>
</tr>
<tr>
<td>4</td>
<td>Dr G.S. Buttar</td>
<td>Additional Director of Extension Education</td>
<td>19.01.2016 (AN)</td>
</tr>
<tr>
<td>5</td>
<td>Dr S.S. Kukal</td>
<td>Additional Director of Research (Natural Resources and Plant Health Management)</td>
<td>09.03.2016</td>
</tr>
<tr>
<td>6</td>
<td>Dr Swarndeep Singh Hundal</td>
<td>Head, Department of Zoology</td>
<td>20.07.2015 (AN)</td>
</tr>
<tr>
<td>7</td>
<td>Dr (Mrs) Tejpreet Kaur Kang</td>
<td>Head, Department of Human Development</td>
<td>11.08.2015</td>
</tr>
<tr>
<td>8</td>
<td>Dr (Mrs) Muninder Sidhu</td>
<td>Head, Department of Family Resource Management</td>
<td>01.10.2015</td>
</tr>
<tr>
<td>9</td>
<td>Dr Ajmer Singh Dhatt</td>
<td>Head, Department of Vegetable Science</td>
<td>03.11.2015 (AN)</td>
</tr>
<tr>
<td>10</td>
<td>Dr Jaswinder Singh Bhalla</td>
<td>Head, Department of Extension Education</td>
<td>18.11.2015</td>
</tr>
<tr>
<td>11</td>
<td>Dr Ranjit Singh Gill</td>
<td>Head, Department of Entomology</td>
<td>19.01.2016 (AN)</td>
</tr>
<tr>
<td>12</td>
<td>Dr (Mrs) Kiranjot Sidhu</td>
<td>Head, Department of Home Science Extension and Communication Management</td>
<td>21.01.2016</td>
</tr>
<tr>
<td>13</td>
<td>Dr (Mrs) Seema Bedi</td>
<td>Head, Department of Botany</td>
<td>03.02.2016</td>
</tr>
<tr>
<td>14</td>
<td>Dr Sukhjinder Singh Sidhu</td>
<td>Head, Department of Math. Stat. and Physics</td>
<td>13.02.2016</td>
</tr>
<tr>
<td>15</td>
<td>Dr Babu Singh Brar</td>
<td>Head, Department of Soil Science</td>
<td>29.03.2016</td>
</tr>
<tr>
<td>16</td>
<td>Dr (Mrs) Pratibha Goyal</td>
<td>Director, School of Business Studies</td>
<td>12.03.2016</td>
</tr>
</tbody>
</table>

Promotions and retirements

During the period under report, 49 Assistant Professor level teachers having grade pay of Rs 6,000 were placed in the grade pay of Rs 7,000/- in the pay scale of Rs15,600-39,100; 48 Assistant Professor level teachers having grade pay of Rs 7,000 were placed in the grade pay of Rs 8000/- in the pay scale of Rs 15,600-39,100; 4 Assistant Professors having grade pay of Rs 8,000/- in the pay scale of Rs 15,600-39,100 were promoted/designated to the post of Associate Professor & equivalent in the grade pay Rs 9,000/- in the pay scale of Rs 37,400-67,000 and 78 Associate Professors having grade pay of Rs 9,000/- were promoted to the post of Professor & equivalent in the grade pay of Rs 10,000/- in the pay scale of Rs 37,400-67,000. A total of 29 teachers retired/resigned from the University service.
AWARDS, DISTINCTIONS AND RECOGNITIONS

- The Punjab Agricultural University was decorated with the coveted "Agricultural Leadership Award 2015." The Union Home Minister, Sh Rajnath Singh presented the award to the PAU Vice Chancellor, Dr Baldev Singh Dhillon in a glittering ceremony, held in New Delhi on September 18, 2015.

- Dr Yadvinder Singh (Soil Science) got "Professor K S Bilgrami Memorial Prize 2015" from Indian National Science Academy, New Delhi.

- Dr H.S. Rattanpal (Fruit Science) was awarded "International Fellowship 2016" under Netherlands Fellowship Programme by Wageningen University, The Netherlands.

- Dr Beant Singh (Plant Breeding and Genetics) received "Rothamsted International Fellowship 2016" from Rothamsted Research, Harpenden, United Kingdom.

- Dr M.S. Bhullar (Agronomy) and AICRP-Weed Management (WM) team members bagged "Best AICRP-Weed Management Centre Award 2015-16" during 23rd Annual Review Meeting of AICRP-WM, held at Jalgaon, Maharashtra from April 28-30, 2016. Besides, with the collaborative efforts of AICRP-WM team and residents of Mansuran village in Ludhiana district, 'Mansuran' has achieved the distinction of being the 'First Parthenium free village of India.'

- Dr A.S. Dhatt (Vegetable Science) was conferred with "Harpal Kaur Memorial Prize 2016" by PAU.
• Dr MIS Gill (Fruit Science) got "Hans Raj Pahwa Award 2016" from PAU.

• Dr Harminder Singh (Fruit Science) was awarded "Sardar G.S. Nihal Singh Wala Award 2016" by PAU.

• Dr Parveen Chhuneja (School of Agricultural Biotechnology) got an "Award of Citation and Plaque 2016" from PAU for being the best researcher.

• Dr O.P. Choudhary (Soil Science) was awarded "Plaque and Merit Certificate 2015" by PAU for outstanding research, teaching and extension.

• Dr M.S. Hadda (Soil Science) bagged "Gold Medal 2016" from Soil Conservation Society of India, New Delhi.

• Dr Navtej Bains (Plant Breeding and Genetics) and Dr Amarjeet Kaur (Food Science and Technology) were conferred with "Manjeet Singh Chhinan Distinguished Professor Chair 2016" by PAU.

• Dr Gurpreet Singh Makkar (Plant Breeding and Genetics) bagged "Achiever Award 2015" from Dr Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan.

• Dr Kamaljit Kaur (Food Science and Technology) received first prize in "Oral Presentation" during International Conference on "Growing Trends in Food Technology and Nutrition for Public Health Care," held at Jawaharlal Nehru University, New Delhi in 2016.

• Drs Gaurav Kumar Taggar, Ravinder Singh and H.K. Cheema (Plant Breeding and Genetics) received "Best Poster Presentation Award" during Brain Storming Meeting on "Promotion of Pulses in Indo-Gangetic Plains of India," held at PAU on August 31, 2015.

• Dr Samanpreet Kaur (Soil and Water Engineering) got "Jawaharlal Nehru Award 2015" from ICAR, New Delhi for Best Ph. D. Thesis. Her research work entitled "Modelling the impact of climate change on groundwater resources in Central Punjab" was carried out under the guidance of Dr K.G. Singh.

• Dr K.G. Singh (Soil and Water Engineering) was conferred with "Manjeet Singh Chhinan Distinguished Professor Chair 2015" by PAU.

• Dr K.B. Singh (Soil and Water Engineering) bagged "Best Oral Presentation Award 2015" from Indian Society of Soil Conservation.

College of Basic Sciences and Humanities

• Dr Sukhpal Singh (Economics and Sociology) was nominated as Member, Sub-group on Farmers' Indebtedness and Suicide by Punjab Government Reforms Commission in 2016. Besides, he was appointed as Vice-President of Indian Society of Agricultural Economics in 2015.

• Dr Baljinder Kaur Sidana (Economics and Sociology) received "Dr N. A. Mujumdar Prize Award 2015" from Indian Society of Agricultural Economics.

• Dr (Mrs) Param Pal Sahota (Microbiology) was conferred with "Manjeet Singh Chhinan Distinguished Professor Chair 2016" by PAU.

• Dr S. Kapoor (Microbiology) got an "Appreciation Certificate 2016" from PAU.

Directorate of Extension Education

• The Krishi Vigyan Kendra, Bathinda won the "Best KVK Award 2015" from ICAR for accomplishing the mandated activities of KVK successfully.

• The Krishi Vigyan Kendra, Patiala received "Dr G.S. Khush Team Award 2014-15" for technology transfer.

NATIONAL AND INTERNATIONAL LINKAGES

Memoranda of Understanding (MoUs) signed

During the period under report, PAU signed six MoUs with various national and international...
organisations:

- Agriculture Skill Council of India, Gurugram, Haryana on September 10, 2015 for the training programme aiming at developing qualification packs as per national skill qualification frame work. It also focuses on creating Skill Development Centre for training and capacity building across various segments of agriculture.
- Maharashtra State Seeds Corporation Limited, Akola, Maharashtra on October 31, 2015 for seed production of maize hybrids.
- Aston University, United Kingdom on November 5, 2015 to develop academic research cooperation.
- M/s Nutech Dairy Engineers Pvt. Ltd., Ambala on January 18, 2016 to fabricate portable maize grain dryer.
- International Crops Research Institute for the

Semi-arid Tropics (ICRISAT), Patancheru, Telangana on February 17, 2016 to develop co-operation in research, particularly, breeding for resistance to shoot fly and stem borer in sorghum and pearl millet. It also focuses on academics and other agreed activities.

- Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur on April 30, 2016 to promote research, teaching, extension and technology commercialization as well as strengthen infrastructure support system.

**Eminent Visitors**

- A two-member delegation from Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Bangladesh, visited PAU on July 27, 2015 to exchange ideas on agricultural education system and improve course content of BSMRAU.
- A 38-member delegation from Kenya, Liberia and Malawi visited PAU on July 28, 2015 to acquaint themselves with the research and extension programmes of the University.
- A two-member delegation from the Embassy of the Kingdom of Belgium visited PAU on August 10, 2015 to explore collaborative areas. The delegation comprised H.E. Mr Jan Luykx, Ambassador of the Kingdom of Belgium and Mr Antone Delcourt, Counsellor, Economic Affairs, Embassy of the Kingdom of Belgium.
- A nine-member delegation from International Maize and Wheat Improvement Centre Delegation from Kenya, Liberia and Malawi interacting with senior officials of PAU.
Delegation from International Maize and Wheat Improvement Centre (CIMMYT) seeing experimental areas at PAU.

(CIMMYT) visited PAU on October 5, 2015. The delegation was led by Dr Martin Kropff, Director General, CIMMYT.

- A two-member delegation of PUM Netherlands Senior Experts visited PAU on October 14, 2015 to explore the possibilities of collaboration between the two organizations. The delegation comprised Mr Jacques Eijkens, Country Coordinator, India, and Mr K.R. Jain, a representative of India.

- Prof. Clement Sankat, Pro Vice Chancellor and Campus Principal of St. Augustine Campus, The University of West Indies, Port of Spain, Trinidad and Tobago, visited PAU on November 3-4, 2015 to explore and discuss the scope of mutual cooperation.

- Dr Partap Khanna, Former Senior Principal Research Scientist, CSIRO, Canberra, Australia, visited PAU on November 3, 2015 to deliver a talk on “Soil Carbon Sequestration - Processes, Assessment Methods, and Limitations” during the 5th N.P. Datta Memorial Lecture of Indian Society of Soil Science.

- A six-member delegation from Purdue University, USA, visited PAU on December 7, 2015 to deliberate on the establishment of “PAU-Purdue University Joint Research Centre,” initiated with the agreement signed between PAU and College of Agriculture, Purdue University, USA, in August 2014. The delegation comprised Dr K.G. Raghothama, Associate Director, International Programmes in Agriculture; Dr G.S. Johal, Professor, Botany and Plant Pathology; Dr Mitch Tuinstra, Professor of Agronomy and three Ph.D. students namely Megan Fenton, Brad Thada and R.S. Khangura.

- A 17-member AGRI PASS Group from France visited PAU on January 15, 2016 to study agricultural scenario of Punjab, and have an overview of PAU’s research and extension programmes. The delegation was led by Thomas De Belle and Maryvonne Salaun.

- A Quinquennial Review Team visited PAU on February 2, 2016 to evaluate rapeseed-mustard.

- An eight-member delegation from Nepal visited PAU on February 25, 2016 as a part of policy
reform process to accelerate agricultural growth and enhance food security in Nepal. The delegation was led by Dr Yubak Dhoj, Director General, Department of Agriculture, Government of Nepal.

- Sh Suresh Kumar, Former Additional Chief Secretary, Punjab, visited PAU on March 5, 2016 to inaugurate Girls' Hostel.

- Sh Shivraj Chouhan, Chief Minister of Madhya Pradesh, visited PAU on March 6, 2016 to have an overview of the farm technologies being used by the Departments of Plant Breeding and Genetics, and Plant Pathology.

- Sh Shivraj Chouhan, Chief Minister of Madhya Pradesh, seeing experimental areas at PAU. Also seen in the picture is Jathedar Tota Singh, Minister for Agriculture, Punjab.

- Dr Kuldip Kumar, Senior Environmental Soil Scientist, Metropolitan Water Reclamation District of Greater Chicago, USA, visited PAU on March 25, 2016 to interact with the postgraduate students, research fellows and faculty of the Department of Soil Science, PAU.

- Dr Manohar Singh Gill, Former Member of Parliament (Rajya Sabha) and Former Chief Election Commissioner of India, laying foundation stone of Girls' Hostel (west block) at PAU.

- Dr N.K. Pathania, Former Director of Research, CSK Himachal Pradesh Krishi Víswa Vidhyalaya, Palampur, visited PAU on March 30, 2016 to deliver a lecture on “Protected Cultivation of Vegetable Crops.”

- Dr B.S. Ahloowalia, an Ex-Staff Member, Agriculture and Food Development Authority, Dublin, Ireland, visited PAU on April 4, 2016 to deliver a talk on “Punjab Agriculture and its Problems.”

- Dr M.L. Chadha, Former Director, World Vegetable Center, Hyderabad (Regional Centre), visited PAU on April 17, 2016 to deliver a lecture on “Healthy Nursery Production of Vegetables.”

- A 24-member delegation of German farmers visited PAU on April 21, 2016 to study agricultural scenario of Punjab.

- Dr V.C. Tomar, Vice-Chancellor, Jawaharlal Nehru Krishi Vishwa Vidhyalaya, Jabalpur and Dr S.K. Rao, Director Research Services, JNKVV visited PAU on April 29, 2016 to interact with senior officials of PAU.

- Three senior scientists from Borlaug Higher Education for Agricultural Research and Development (BHEARD), Michigan State University, USA, visited PAU on May 17, 2016 to explore avenues to fund doctorate level studies of Bangladeshi students at PAU. The delegation was led by Dr Anne Schneller, Co-Director, BHEARD.
- Sh Radha Mohan Singh, Union Minister for Agriculture, visited PAU on May 27, 2016 to highlight national agricultural scenario and schemes, started by the Central Government for the benefit of the farmers.

- A four-member delegation from Ohio State University, USA, visited PAU on May 27, 2016 to develop mutual cooperation between the two institutions.

- An 11-member delegation from Agricultural Ministry of People’s Republic of Angola visited PAU on May 27, 2016 to fortify linkages for the development of agricultural research, teaching and extension in Angola. The delegation was led by Eng. Afonso Pedro Canga, Minister of Agriculture, Angola.

### Trainings and visits abroad

**College of Agriculture**

- Dr Satinder Kaur (School of Agricultural Biotechnology) visited John Innes Centre (JIC), Norwich, United Kingdom, to participate in the training programme on “Renseq Technology for Cloning of Resistance Genes” from July 1 to September 2015.

- Drs P.S. Sandhu, Virendra Sardana, Pushp Sharma, Sarwan Kumar and Pankaj Sharma (Plant Breeding and Genetics) visited Saskatoon, Saskatchewan, Canada, to attend the “14th International Rapeseed Congress” from July 5-9, 2015.

- Dr Ritu Bala (Plant Breeding and Genetics) visited Kenya Agricultural Research Institute (KARI) Research Station, Kenya Njoro, Kenya, for a study on “Standardization of stem rust note taking and evaluation of germplasm with emphasis on emerging threats of yellow rust and leaf rust” from October 12-18, 2015.

- Dr S.K. Chauhan (Forestry and Natural Resources) visited Kasetsart University, Ubon Ratchathani, Thailand, to attend the “3rd Ayeyawadi – Chao Phraya – Mekong Economic Cooperation Strategy (ACMECS) Bioenergy Workshop on Future Development of ACMECS Bioenergy: Regional Plan and Standardization” from December 8-11, 2015.

- Mr Inderjit Yadav (School of Agricultural
Biotechnology) visited Australian Centre for Plant Functional Genomics (ACPFG), Australia, to attend a training programme on "In silico Identification of Candidate Genes Involved in Starch Synthesis in Wheat" from February 1-20, 2016.

- Dr Sandeep Jain (Plant Pathology) visited International Centre for Development Oriented Research in Agriculture, Wageningen, The Netherlands, to attend a training programme from February 29 to March 18, 2016.

- Mr Hira Singh (Vegetable Science) visited Ohio Agricultural Research and Development Centre, Ohio State University, Wooster, USA to participate in the training programme on "Tomato Grafting" from March 13 to September 13, 2016.

- Dr S.S. Kukal (Soil Sciences) visited Bangkok, Thailand, as Advisory Committee Member of Sustainable Rice Platform (UNEP) Fund Raising Strategy Workshop on March 24-25, 2016.

- Dr G.S. Mangat (Plant Breeding and Genetics) visited International Rice Research Institute, Philippines, to attend Hybrid Rice Development Consortium (HRDC) meeting from March 30 to April 1, 2016.

- Dr Asmita Sirari (Plant Breeding and Genetics) visited International Centre for Agricultural Research in the Dry Area (ICARDA), Rabat, Morocco, to attend an International training programme on "Food Legume Breeding" on April 11-12, 2016.

- Dr H.S. Rattanpal (Fruit Science) visited Wageningen University, The Netherlands, to participate in the training programme on "Horticulture Sector Development in Emerging Markets" from May 9-27, 2016.

- Dr Anirudh Thakur (Fruit Science) visited Hebrew University of Jerusalem's Rehovot, Israel, to attend an International training programme on "Bioinformatics and Biotechnology" from May 9 to June 7, 2016.

- Dr Han Ram (Plant Breeding and Genetics) visited Sabanci University, Istanbul, Turkey, to attend a project meeting of Harvest Zinc Collaborative Project from May 22-25, 2016.

- Dr P.K. Chhuneja (Entomology) visited Slovenia and Hungary for exposure and training from May 29 to June 9, 2016.

- Ms Amrinder Kaur (Plant Pathology) visited Centre for Development Innovation, Wageningen, The Netherlands, to attend a training programme from May 30 to June 17, 2016.

- Dr Navneet Kaur (Forestry and Natural Resources) visited the University of Life Sciences, Prague, Czech Republic to present paper at the "7th International Congress on Weed Science" from June 19-25, 2016.

College of Agricultural Engineering and Technology

- Dr V.P. Sethi (Mechanical Engineering) visited Gosling Research Institute of Plant Preservation, University of Guelph, Ontario, Canada, as a guest faculty to deliver a seminar on "New Hydroponics Technologies for Developing Countries" from August 14-23, 2015.

- Dr Manjeet Singh (Farm Machinery and Power Engineering) visited Guangzhou, China, to deliver a keynote address at the "6th Asian Conference on Precision Agriculture" from November 14-23, 2015.

- Er Ritesh Jain (Civil Engineering) and Er Chetan Singla (Soil and Water Engineering) visited UNESCO-IHE Institute for Water Education, Delft, The Netherlands, to attend a training programme on "Modeling of Wastewater Based Plant Systems" from April 18 to May 5, 2016.

- Dr Preetinder Kaur (Processing and Food Engineering) visited Michigan State University, USA, for Post-Doctoral Fellowship from May to August 2016.

College of Basic Sciences and Humanities

- Dr (Mrs) Param Pal Sahota (Microbiology) visited Windsor, Canada, to attend "Ontario Water Conference and Trade Show-16" from May 1-4, 2016.
# Important Events Organised at PAU

## College of Agriculture

<table>
<thead>
<tr>
<th>Event</th>
<th>Organizing/sponsoring agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer School on &quot;Entrepreneurship Development Programme&quot; (July 8-28, 2015)</td>
<td>Department of Extension Education, PAU</td>
</tr>
<tr>
<td>Training programme on &quot;Mendelian Genetics to Molecular Genetics in Relevance to Plant Breeding&quot; (August 5-27, 2015)</td>
<td>Department of Plant Breeding and Genetics, PAU</td>
</tr>
<tr>
<td>Annual Group Meet on &quot;Rabi Pulses (Chickpea &amp; MULLaRP)&quot; and &quot;Brain Storming Meeting on Promotion of Pulses in Indo-Gangetic Plains of India&quot; (August 31 to September 3, 2015)</td>
<td>Department of Plant Breeding and Genetics, PAU</td>
</tr>
<tr>
<td>A 10-day &quot;4th National Training Workshop on Principles and Practices of Direct Seeded Rice&quot; (September 22 to October 1, 2015)</td>
<td>CCS Haryana Agricultural University, Hisar and Punjab Agricultural University, Ludhiana under the aegis of Australian Centre for International Agricultural Research (ACIAR), Australia</td>
</tr>
<tr>
<td>Short course entitled, &quot;Advances in Genetic Improvement in Vegetables through Conventional and Biotechnological Approaches&quot; (January 1-10, 2016)</td>
<td>Department of Vegetable Science, PAU under the aegis of Indian Council of Agricultural Research, New Delhi</td>
</tr>
<tr>
<td>Basic Forest Guard Training (February 1 to March 31, 2016)</td>
<td>Department of Forestry and Natural Resources, PAU and State Forest and Wildlife Preservation, Punjab</td>
</tr>
<tr>
<td>Training programme on &quot;Nursery Production, Crop Management and Post-Harvest Handling of Horticultural Crops&quot; (February 15, 2016)</td>
<td>Department of Fruit Science, PAU</td>
</tr>
<tr>
<td>Training course on &quot;Pre-harvest Factors Affecting Post-harvest Life of Vegetables&quot; (March 3, 2016)</td>
<td>Department of Vegetable Science, PAU</td>
</tr>
<tr>
<td>Basic Beekeeping Training Course (May 2-4, 2016)</td>
<td>Department of Entomology, PAU under the auspices of National Horticulture Mission</td>
</tr>
<tr>
<td>&quot;10th Annual Workshop on Monitoring of Pesticides Residues at National Level&quot; and &quot;24th Annual Workshop of All India Network Project on Pesticide Residues&quot; (May 25-27, 2016)</td>
<td>Department of Entomology, PAU under the aegis of Department of Agriculture Cooperation and Farmers Welfare, Government of India, and Indian Council of Agricultural Research, New Delhi</td>
</tr>
</tbody>
</table>

Agricultural experts releasing a set of publications during Annual Group Meet on "Rabi Pulses (Chickpea & MULLaRP)" and “Brain Storming Meeting on Promotion of Pulses in Indo-Gangetic Plains of India” at PAU.
### College of Agricultural Engineering and Technology

<table>
<thead>
<tr>
<th>Event</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
<td>&quot;Northern Regional Convention for Water Users Associations on Participatory Irrigation Management&quot;</td>
<td>(August 25-26, 2015) Department of Soil and Water Engineering, PAU</td>
</tr>
<tr>
<td>- Training course on &quot;Straw Management and Minimum Tillage Machinery&quot;</td>
<td>(September 8-9, 2015) Department of Farm Machinery and Power Engineering in collaboration with Directorate of Extension Education, PAU</td>
</tr>
<tr>
<td>- Training course on &quot;Machinery and its Safety for Different Farming Operations&quot;</td>
<td>(January 14-15, 2016)</td>
</tr>
<tr>
<td>- Training course on &quot;Custom Hiring of Farm Machinery&quot;</td>
<td>(June 6-7, 2016)</td>
</tr>
<tr>
<td>Seminar on &quot;Up-scaling Energy Efficiency and Sustainable Practices in Agriculture Sector&quot;</td>
<td>(November 3-4, 2015) School of Energy Studies for Agriculture, PAU; Petroleum Conservation Research Association (PCRA) and PHD Chamber</td>
</tr>
<tr>
<td>Training course on &quot;Operation and Maintenance of Submersible Pumps and Electric Motors&quot;</td>
<td>(November 4-6, 2015) Department of Soil and Water Engineering in collaboration with Directorate of Extension Education, PAU</td>
</tr>
<tr>
<td>- Training session on &quot;Careers and Start-ups: Leadership Shows the Way&quot; and &quot;Personality Development of Budding Agricultural Engineers&quot;</td>
<td>(December 7, 2015) Training Unit, College of Agricultural Engineering and Technology, PAU</td>
</tr>
<tr>
<td>- Training session on &quot;Way to go from Campus to Corporate&quot;</td>
<td>(March 2, 2016)</td>
</tr>
<tr>
<td>- In-house training programme T2 on &quot;Agricultural Engineering&quot;</td>
<td>(April 7 to May 23, 2016)</td>
</tr>
<tr>
<td>- Training course on &quot;Sales and Marketing, Dealership Set-up&quot; through video conferencing session by the team of four experts from John Deere, Pune</td>
<td>(May 12, 2016)</td>
</tr>
<tr>
<td>- Training course on &quot;Agro-Processing and Value Addition Machinery&quot;</td>
<td>(December 8-10, 2015) Department of Processing and Food Engineering in collaboration with Directorate of Extension Education, PAU</td>
</tr>
<tr>
<td>- Training course on &quot;Establishment of Agro-Processing Complexes&quot;</td>
<td>(February 9-11, 2016)</td>
</tr>
<tr>
<td>- Training course on &quot;Agro-processing Technologies&quot; for HDOs/ADOs/KVKs</td>
<td>(April 21-22, 2016)</td>
</tr>
<tr>
<td>- Training course on &quot;Establishment of Agro-based Industries at Small Scale Level&quot;</td>
<td>(May 16 to 20, 2016)</td>
</tr>
<tr>
<td>- Training course on &quot;Storage and Processing of Horticultural Products&quot;</td>
<td>(May 25 to 27, 2016)</td>
</tr>
<tr>
<td>Golden Jubilee Alumni Meet</td>
<td>(December 19-20, 2015) Alumni Association, College of Agricultural Engineering and Technology, PAU</td>
</tr>
<tr>
<td>Annual Review Meeting of AICRP on &quot;Farm Implement and Machinery (FIM)&quot;</td>
<td>(January 28-30, 2016) Department of Farm Machinery and Power Engineering, PAU</td>
</tr>
<tr>
<td>Online Video Conference on &quot;Lipid Cane - New Sustainable Bio-Energy&quot;</td>
<td>(February 25, 2016) School of Energy Studies for Agriculture, University of Illinois, USA and College of Agricultural Engineering and Technology, PAU, Ludhiana</td>
</tr>
</tbody>
</table>
College of Basic Sciences and Humanities

<table>
<thead>
<tr>
<th>Event</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;75th Annual Conference of the Indian Society of Agricultural Economics&quot; (November 19-21, 2015)</td>
<td>Department of Economics and Sociology, PAU</td>
</tr>
<tr>
<td>Workshop on &quot;Office Communication Skills&quot; (January 19-25, 2016)</td>
<td>Department of Agricultural Journalism, Languages and Culture, PAU</td>
</tr>
<tr>
<td>Workshop on &quot;Journalistic and Creative Writing Skills&quot; (February 26, 2016)</td>
<td>Department of Microbiology, PAU</td>
</tr>
<tr>
<td>One-day brainstorming session on &quot;Strategies for Fostering Mushroom Production in Punjab&quot; (February 25, 2016)</td>
<td>School of Business Studies, PAU</td>
</tr>
<tr>
<td>Training programme on &quot;Potato Seed Marketing Practices for Potato Seed Growers of Punjab&quot; (June 9-10, 2016)</td>
<td></td>
</tr>
</tbody>
</table>

Agricultural engineers seeing farm machinery during Annual Review Meeting of AICRP on "Farm Implement and Machinery" at PAU.

Dr Baldev Singh Dhillon, PAU VC, addressing the gathering at the Golden Jubilee Alumni Meet of the College of Agricultural Engineering and Technology, PAU.

Agricultural stalwarts releasing a publication during the "75th Annual Conference of the Indian Society of Agricultural Economics" at PAU.
### College of Home Science

<table>
<thead>
<tr>
<th>Event</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation course on &quot;Effective Teaching, Research and Extension&quot;</td>
<td>Department of Home Science Extension and Communication Management, PAU</td>
</tr>
<tr>
<td>(August 18 to 28, 2015)</td>
<td>Department of Human Development, PAU</td>
</tr>
<tr>
<td>- Inter-College Salad Making Competition (September 2, 2015)</td>
<td></td>
</tr>
<tr>
<td>- Inter-School Nutrition Quiz (September 3, 2015)</td>
<td></td>
</tr>
<tr>
<td>- Training course on &quot;Baking Techniques&quot; (November 2 to December 18,</td>
<td></td>
</tr>
<tr>
<td>2015)</td>
<td></td>
</tr>
<tr>
<td>- Training course on &quot;Decorative Icings and Innovative Bakery Products&quot; (December 12-13, 2015)</td>
<td></td>
</tr>
<tr>
<td>- Training course on &quot;Craft Baker&quot; (March 1 to April 22, 2016)</td>
<td></td>
</tr>
<tr>
<td>- Training course on &quot;Fondants and Icings&quot; (March 29, 2016)</td>
<td></td>
</tr>
<tr>
<td>- Short Training Course on &quot;Cooking and Baking&quot; (June 27-July 1, 2016)</td>
<td></td>
</tr>
<tr>
<td>Workshop on &quot;Disability Rehabilitation: Issues and Challenges&quot;</td>
<td>Department of Food and Nutrition, PAU</td>
</tr>
<tr>
<td>(May 12-13, 2016)</td>
<td></td>
</tr>
</tbody>
</table>

### PAU Science Club

<table>
<thead>
<tr>
<th>Event</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Orientation programme for newly admitted postgraduate students of</td>
<td>PAU Science Club</td>
</tr>
<tr>
<td>PAU (August 13, 2015)</td>
<td></td>
</tr>
<tr>
<td>- Interactive session by Dr Harjinder Singh Sandhu and Dr Swaran</td>
<td>PAU Science Club</td>
</tr>
<tr>
<td>Singh Dhaliwal from West Virginia University, USA with PAU faculty</td>
<td></td>
</tr>
<tr>
<td>for collaborative software product (yoCamp) (November 4, 2015)</td>
<td></td>
</tr>
<tr>
<td>- ANVESHAH: Students' Research Convention (North Zone) of Association</td>
<td>PAU Science Club</td>
</tr>
<tr>
<td>of Indian Universities for Undergraduate/Postgraduate students at ICAR-</td>
<td></td>
</tr>
<tr>
<td>National Dairy Research Institute, Karnal (December 28-30, 2015)</td>
<td></td>
</tr>
<tr>
<td>- Talk on &quot;Entry of Nanotechnology in Agricultural Arena&quot; by Dr (Ms)</td>
<td>PAU Science Club</td>
</tr>
<tr>
<td>Madhuri Sharon, Director, Walchand Centre for Research in Nanotechnology and Bio-nanotechnology, Solapur, Maharashtra (December 28-30, 2015)</td>
<td></td>
</tr>
<tr>
<td>- Lecture on &quot;Communication and Presentation Skills&quot; by Dr Priya</td>
<td>PAU Science Club</td>
</tr>
<tr>
<td>Kanwar, Associate Professor, Department of Psychology, University of</td>
<td></td>
</tr>
<tr>
<td>Delhi (February 1-2, 2016)</td>
<td></td>
</tr>
<tr>
<td>- Talk on &quot;Motivational Programme for Attaining Excellence in Science&quot;</td>
<td>PAU Science Club</td>
</tr>
<tr>
<td>by Dr P.K. Chhonkar, a renowned scientist, philanthropist and an Adjunct Faculty, Indian Agricultural Research Institute, New Delhi (February 3, 2016)</td>
<td></td>
</tr>
<tr>
<td>- Lecture on &quot;Addressing Agricultural Challenges through Technology&quot;</td>
<td>PAU Science Club</td>
</tr>
<tr>
<td>by Prof. Garry Fehr, Director, Agriculture Centre of Excellence, University of Fraser Valley, Abbotsford Campus, British Columbia (March 16, 2016)</td>
<td></td>
</tr>
<tr>
<td>Management Development Programme on &quot;Strategies for Enhancing the Performance of Research Managers of Punjab Agricultural University&quot; (April 26-30, 2016)</td>
<td>National Academy of Agricultural Research Management (NAARM), Hyderabad and Education Technology Cell, PAU</td>
</tr>
</tbody>
</table>
The Board of Management in its 276th meeting held on March 28, 2016 approved the budget estimates of Punjab Agricultural University for the year 2016-17 amounting to Rs 57060.68 lakh in respect of 392 schemes in operation. The details of these schemes, budget allocation for research, teaching, extension and for the administrative and miscellaneous activities are as under:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Schemes</th>
<th>Total no. of schemes (2016-17)</th>
<th>Budget estimates (2016-17) (Rs in lakh)</th>
<th>Total no. of schemes (2015-16)</th>
<th>Budget estimates (2015-16) (Rs in lakh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>State Schemes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>Non Plan Agriculture Schemes</td>
<td>13</td>
<td>233,97.75</td>
<td>12</td>
<td>200,46.09</td>
</tr>
<tr>
<td>ii)</td>
<td>Plan Agriculture Schemes</td>
<td>120</td>
<td>218,47.97</td>
<td>119</td>
<td>217,40.94</td>
</tr>
<tr>
<td>2</td>
<td>Rashtriya Krishi Vikas Yojana (RKVY)</td>
<td></td>
<td></td>
<td>1</td>
<td>20.25</td>
</tr>
<tr>
<td>3</td>
<td>ICAR Schemes (including AICRP/ KVK/ Adhoc and Central Assistance)</td>
<td>92</td>
<td>88,58.85</td>
<td>88</td>
<td>85,99.32</td>
</tr>
<tr>
<td>4</td>
<td>UGC Schemes</td>
<td>8</td>
<td>26.65</td>
<td>46</td>
<td>1,19.72</td>
</tr>
<tr>
<td>5</td>
<td>Centrally Sponsored Schemes</td>
<td>72</td>
<td>13,71.98</td>
<td>68</td>
<td>12,34.20</td>
</tr>
<tr>
<td>6</td>
<td>Other Schemes (including National Horticultural Mission/ Ratan Tata Trust/Misc. Schemes/Misc. (Foreign Contribution Schemes)</td>
<td>75</td>
<td>11,00.42</td>
<td>63</td>
<td>13,18.14</td>
</tr>
<tr>
<td>7</td>
<td>Self-financing Schemes</td>
<td>5</td>
<td>4,17.54</td>
<td>5</td>
<td>3,99.41</td>
</tr>
<tr>
<td>8</td>
<td>Revolving Fund Schemes</td>
<td>7</td>
<td>39.52</td>
<td>6</td>
<td>53.58</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>392</td>
<td>570,60.68</td>
<td>408</td>
<td>535,31.65</td>
</tr>
</tbody>
</table>

The Board of Management in its 270th meeting held on March 30, 2015 had approved the budget estimates of Punjab Agricultural University for the year 2015-16 amounting to Rs 53531.65-lakh in respect of 408 schemes in operation. The actual grants received during the financial year 2015-16 were Rs 40619.70 lakh. The University raised money through tuition fee and other sources/services. An amount of Rs 74,64,71 lakh was raised during the year 2015-16.

<table>
<thead>
<tr>
<th>Sources</th>
<th>Grant received (2015-16) (Rs in lakh)</th>
<th>Allocation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Government</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non Plan</td>
<td>13,265.30</td>
<td>32.7</td>
</tr>
<tr>
<td>Plan</td>
<td>16,000.00</td>
<td>39.4</td>
</tr>
<tr>
<td>ICAR Funding*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All India Coordinated Research Project, Krishi Vigyan Kendra and others</td>
<td>7,203.15</td>
<td>17.7</td>
</tr>
<tr>
<td>Central Government Funding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centrally Sponsored Scheme (Govt. of India), University Grants Commission and Rashtriya Krishi Vikas Yojna (RKVY)</td>
<td>2,636.68</td>
<td>6.5</td>
</tr>
<tr>
<td>Foreign Contributions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>194.15</td>
<td>0.5</td>
</tr>
<tr>
<td>Other Funding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misc./UT/Sir Ratan Tata Trust/Navaj Bhai Ratan Tata Trust/National Horticulture Mission Projects</td>
<td>1,320.42</td>
<td>3.2</td>
</tr>
<tr>
<td>Total</td>
<td>40,619.70</td>
<td>100</td>
</tr>
</tbody>
</table>

*Includes Rs 624.81 lakh for strengthening and development of PAU and Rs 78.00 lakh for strengthening of library services.
Allocation of funds for various activities

<table>
<thead>
<tr>
<th>Budget allocation</th>
<th>As per budget estimates 2016-17</th>
<th>As per actual grant received 2015-16</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount (Rs in lakh)</td>
<td>Allocation (%)</td>
</tr>
<tr>
<td>Research</td>
<td>312.56.66</td>
<td>54.8</td>
</tr>
<tr>
<td>Teaching</td>
<td>121.28.24</td>
<td>21.2</td>
</tr>
<tr>
<td>Extension</td>
<td>76,45.69</td>
<td>13.4</td>
</tr>
<tr>
<td>General administration and others</td>
<td>60,30.09</td>
<td>10.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>570,60.68</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

During the year 2014-15, the actual expenditure incurred was 49.66% on research, 23.36% on teaching, 14.31% on extension, and 12.67% on general administration and others.

ESTATE ORGANIZATION

Estate Organization looks after the construction and maintenance of University buildings. A total of 20 projects were completed by the Engineering Unit during the period under report. (Annexure I)

FACULTY PARTICIPATION IN NATIONAL AND INTERNATIONAL EVENTS

The University faculty participated in various national and international seminars, conferences, symposia, workshops, etc. Details are given below:

International participation

<table>
<thead>
<tr>
<th>Name</th>
<th>Events</th>
<th>Date and Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drs Sandeep Singh and H.S Rattanpal (Fruit Science)</td>
<td>&quot;V&quot; International Symposium on Fig&quot; by International Society for Horticultural Science (ISHS), Belgium</td>
<td>August 31 to September 3, 2015 Naples, Italy</td>
</tr>
<tr>
<td>Dr Poonam Sachdev (Food Science and Technology)</td>
<td>&quot;4th KCC 2016 Conference on Chemistry and Life Sciences&quot;</td>
<td>March 20-22, 2016 Kuwait</td>
</tr>
<tr>
<td>Dr Dharminder Pathak (Plant Breeding and Genetics) and Dr Satnam Singh (RRS, Faridkot)</td>
<td>&quot;World Cotton Research Conference-6&quot; by International Cotton Advisory Committee, International Cotton Researchers’ Association</td>
<td>May 2-6, 2016 Goiania, Brazil</td>
</tr>
<tr>
<td>Dr M.S. Bhullar (Agronomy)</td>
<td>&quot;7th International Weed Science Congress&quot; by International Weed Science Society and Czech Weed Science Society</td>
<td>June 19-25, 2016 Prague, Czech Republic</td>
</tr>
</tbody>
</table>

National participation

<table>
<thead>
<tr>
<th>Name of the College</th>
<th>No. of faculty members participated</th>
</tr>
</thead>
<tbody>
<tr>
<td>College of Agriculture</td>
<td>102</td>
</tr>
<tr>
<td>College of Agricultural Engineering and Technology</td>
<td>35</td>
</tr>
<tr>
<td>College of Basic Sciences and Humanities</td>
<td>50</td>
</tr>
<tr>
<td>College of Home Science</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>212</strong></td>
</tr>
</tbody>
</table>
NEW EQUIPMENTS ACQUIRED

New equipments were acquired by constituent colleges of PAU.

<table>
<thead>
<tr>
<th>Instrument/equipment</th>
<th>Cost (in lakh)</th>
<th>Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microplate Reader</td>
<td>20.9</td>
<td>For analyzing SNP markers</td>
</tr>
<tr>
<td>Green House at Keylong Growth Chamber at PAU</td>
<td>16.3</td>
<td>For developing double haploid populations</td>
</tr>
<tr>
<td>Real Time PCR Machine</td>
<td>14.99</td>
<td>For studying expression of different genes</td>
</tr>
<tr>
<td>Gel Documentation System</td>
<td>14.41</td>
<td>For gel image capturing</td>
</tr>
<tr>
<td>IRGA-PS System, Ultra Compact Portable Photosynthesis</td>
<td>13.00</td>
<td>Photosynthesis analyzer</td>
</tr>
<tr>
<td>IRGA-PS</td>
<td>12.15</td>
<td>For measuring photosynthesis, stomatal conductance, leaf temperature etc</td>
</tr>
<tr>
<td>Microwave Digestion System</td>
<td>10.0</td>
<td>For research work of students</td>
</tr>
<tr>
<td>Evos FL Colure Imaging System</td>
<td>9.00</td>
<td>For recording and analyzing PCR profiles</td>
</tr>
<tr>
<td>Freeze Dryer</td>
<td>7.87</td>
<td>For low temperature drying</td>
</tr>
<tr>
<td>Bio Spectrophotometer</td>
<td>7.0</td>
<td>For DNA/RNA analysis</td>
</tr>
<tr>
<td>Canopy Analyzer</td>
<td>6.6</td>
<td>For agro-forestry experiments</td>
</tr>
<tr>
<td>Ultra Deep Freezer</td>
<td>6.5</td>
<td>For long term storage of samples</td>
</tr>
<tr>
<td>Stand Mixer Extruder</td>
<td>5.0</td>
<td>For cold extrusion</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>143.72</strong></td>
<td></td>
</tr>
</tbody>
</table>

NEW LABORATORIES AND INFRASTRUCTURE CREATED AND UPDATED

College of Agriculture

- A conference room and two labs were established by the Department of Food Science and Technology in the Food Industry Centre (FIC) building.
- A Molecular Lab was established by the Department of Fruit Science.
- A plant growth chamber for vernalization and doubled haploid production, and two span field stores were constructed by the Department of Plant Breeding and Genetics.

College of Agricultural Engineering and Technology

- A PG lecture-cum-seminar room and a PG seminar-cum-committee room were established in the Departments of Mechanical Engineering, and Processing and Food Engineering, respectively.
- Infrastructural facilities in the Drawing Hall, Heat Technology Lab and Fluid Mechanics Lab were upgraded with the purchase of new equipment and instruments.
- The B. Tech. Computer Lab and SEEIT Examination Hall in the School of Electrical Engineering and Information Technology (SEEIT) were upgraded.
- A ducting cooling system was installed in the
College of Basic Sciences and Humanities

- A FIST (Funds for Infrastructure Development in Science and Technology) Lab was established in the Department of Zoology.
- The Department of Mathematics, Statistics and Physics purchased Gamma Reference Set, Beta Reference Set, Cathode Ray Oscilscopes and Hand Refractometer. It also fabricated viscometer for honey.

College of Home Science

- The Analytical Lab in the Department of Food and Nutrition was renovated.
- Persian wheel was installed in the Museum of Rural Life of Punjab.
- The College also purchased LED lights, replaced photographs, and repaired electric points, wooden cabinets and dummies in the Museum.
Mohinder Singh Randhawa Library caters to the informational needs of the academia of Punjab Agricultural University (PAU) by keeping pace with digital technologies. It plays a vital role in supporting research, teaching and extension activities of the University. It renders automated services to its users in order to facilitate expeditious, exhaustive, easy and efficient access to the literature. The library made rapid progress and worked effectively during the period under report.

**Membership**

The library registered 2,402 members which include PAU students and staff. In addition, 12,966 books were issued to the library members during this period.

**Documents procured and subscribed**

During this period, the library procured 1,705 books, 305 theses and 334 Compact Discs (CDs). At present, the library is subscribing to 86 print journals (national and international) including 16 print plus online journals, 34 online journals and 12 online databases including 102 e-books. Thus, the total collection of library as on 30-06-2016 stands at 3,97,977.

**Digitization**

The library got 1,135 theses documents digitized which have been uploaded in PAU theses database and are accessible from the library web page.

**Online services**

The library is subscribing to 12 online databases, namely Consortium for e-Resources in Agriculture (CeRA) which provides access to online journals, Krishiprabha (online theses), Mylibrary (e-books), CRCnetBASE (e-books), EBSCO NetLibrary (e-books), ISO standards on Food Products (online standards), Business Source Elite (Bibliographic database and full text journals on Business Management), Commodities Database (Statistical information on agricultural commodities), e-quest (online database of PAU theses), CAB Abstracts (Abstracting database on Agricultural Sciences), Food Science and Technology Abstracts (Abstracting database on Food Science and Technology) and Indiastat.com (statistical information).

**New software purchased**

In order to enhance the quality of research, library has been instrumental in procuring anti-plagiarism software TURNITIN for the University costing Rs 3,40,150/- It aims at checking plagiarism in theses and other related research publications of the University.

**Library web page**

Library web page provides complete information about resources, rules and regulations, services, e-resources, list of print journals, circulars and new additions to library collection. All the e-resources like e-journals, e-books, e-theses, e-standards etc. are accessible campus wide from the web page. Only Indiastat.com database is accessible within the library.

**Library usage**

- Books - 1,73,154; Theses - 40,345; Bound periodicals - 23,780; Current periodicals - 20,606; Abstracts and Indexes - 9,347; Newspapers - 2,382; Reference books - 14,623; Textbooks - 8,738 and Rare books - 2,055.
RESEARCH AND EXTENSION

- The PAU developed and released short duration high yielding rice varieties namely PR 121, PR 122, PR 124 and PR 126 during 2013-2016. Among these, PR 121 emerged as the most popular variety as it occupied 29 per cent of total paddy area in 2016 against 17 per cent area in 2015. Considerable area was also under PR 124, a short duration high yielding variety. The rice variety PR 126 is an early maturing (123 days) variety. Cultivation of this variety besides giving high yield would also save water.

- Area under recommended short duration paddy rice varieties increased from 42 per cent in 2014 to 54 per cent in 2015 and further to 63 per cent in 2016. Along with other technologies, this resulted in bringing down the rate of fall in ground water table.

- The wheat varieties PBW 725 and PBW 677 are resistant to stripe rust and leaf rust; their adoption will help in reducing the disease inoculum load, especially in the areas adjoining submontane regions. Moreover, the chapatti making quality of these varieties is also very good.

- Area under PAU recommended improved wheat varieties increased from 92 per cent in 2014-15 to 96 per cent in 2015-16.

- Gobhi sarson canola variety GSC-7 is highly favoured by the farmers and is being adopted very quickly. This variety meets international canola norms (<2% in erucic acid oil and <30 µ moles glucosinolates per gram defatted meal) for oil and meal quality. RLC-3 is a first canola mustard variety having yield potential of 7.3 q/acre and meets the international standards for canola type. Now, Punjab farmers have options of canola type both in mustard and gobhi sarson.

- Kharif moong variety ML 2056 yields 10.7 per cent higher than the check variety and is resistant to yellow mosaic virus, leading to higher economic returns to the farmers.

- The new variety of Napier Bajra, PBN 346 gives good quality fodder, which will help in improving the milk yield.

- Punjab Gaurav and Punjab Sartaj are the first released indeterminate varieties of tomato for cultivation in poly-net houses under Punjab conditions. Due to their high yield, these varieties are able to compete with commercially released hybrids. Other improved varieties of vegetable crops include cherry tomato (salad purposes) and brinjal (PBHR-41, PBHR-42 and PBHL-4). The PBHL-4 has been identified for Bihar, Uttar Pradesh, Uttarakhand and Punjab.

- Less seeded mutant of Kinnow viz., PAU Kinnow 1, already released for commercial cultivation under Punjab conditions will solve the issue of seediness in Kinnow and improve the processing potential of the variety.

- The University produced around 72,000 q of raw seed of different field crops, out of which, 3,595 q was produced through public-private partnership. About 8,920q of vegetable seed was produced for the farmers of the state. The University also produced 3,18,000 nursery fruit plants for distribution among farmers of Punjab.

- Bud forcing in Kinnow and Kagzi lime nursery plants, a technique which induces early scion bud break and faster growth of nursery plants, will result in early saleability of nursery plants. Wedge grafting in mango will provide an additional method of propagation, which assures better survival of mango grafts. The technology of de-greening of lemon fruits using ethephon will advance the marketing period of lemon, helping farmers to fetch better price for their produce. Recommendation on safer ripening technique of mango fruits will solve the issue of use of harmful chemicals for ripening. Use of citrashine wax on Daisy mandarin will help in improving the appearance and maintaining the fruit quality during transit, storage and marketing for two weeks.

- Drip irrigation and fertigation schedules in
Spring sunflower and turmeric are expected to increase the crop yield by 25 per cent apart from saving 40 per cent of irrigation water and 20 per cent of chemical fertilizers.

- Area under direct seeded rice, a water saving agricultural practice, increased from 79,564 acre in 2014 to 1,02,242 acre in 2015, mainly in Muktsar and Ferozepur districts.

- Use of biofertilizers in major crops is gaining popularity among the farmers of the state. Biofertilizer was sold for 6,000 acre wheat crop in 2015-16. *Consortium, Azorhizobium,* dual wheat biofertilizer application in different crops resulted in crop yield increase by 1-5 per cent apart from improving soil health. Use of *Rhizobium* and PGPR biofertilizer enhances crop yield by 7-13 per cent in different legume crops.

- By creating awareness among the farmers of the state about the use of recommended dosage of nutrients based on crop rotation, the consumption of NPK decreased from 102 kg/acre in 2012-13 to 88.4 kg/acre in 2014-15.

- The green manuring before *basmati* rice with 45-55 days old sunhemp/dhaincha or summer *moong* residues (after picking of pods) is expected to save urea fertilizer to the extent of 90-135 kg/ha.

- The management of fruit fly in mango and plum by fixing of PAU fruit fly traps @16 traps/acre, and control of citrus psylla and aphids by Horticulture Mineral Oil and Dotara sprays have resulted in considerable saving of insecticides in the orchards.

- The new Eucalyptus clones and their fertilizer requirement recommendation would help in enhancing the wood productivity and economic returns of the farmers. The ideal tree-crop combinations, and recommended agronomic and silvicultural practices would ensure higher productivity and income from agro-forestry systems, thus, increasing their adoption at farmers’ fields.

- Web-based Advisory Service to the potato and wheat farmers for the management of late blight and yellow rust will reduce fungicide use and increase net returns of the farmers.

- Modified Happy Seeder (PAU Happy Seeder), developed for efficient paddy straw management (enables normal and early growth of wheat), resulted in less lodging of wheat during this *rabi* season as compared to conventional method of sowing. About 400 farmers approached PAU to adopt direct drilling of wheat in paddy residues on their fields during 2016-17 wheat season.

- Area under paddy residue management technologies such as Happy Seeder sown wheat and Baler is increasing slowly but steadily. The coverage of Happy Seeder increased from 3,700 acre in 2014-15 to 8,025 acre in 2015-16 in Sangrur district (with the joint efforts of PAU and District Administration). Baler covered an area of 29,577 acre in 2015-16 as compared to 11,980 acre in 2014-15. It was primarily concentrated in those areas where paddy straw is used for power generation such as Mansa and Fazilka districts.

- The spraying cost for pre-emergence herbicides with Lucky Seed Drill (Rs 9.20/acre) is 11.5 times lower than the cost (Rs 102/acre) using conventional method. This is expected to reduce the input costs of the farmers.

- The pest surveillance coupled with recommended pest management technologies in south-west districts of Punjab resulted in saving of pesticides worth Rs 29 crore (Rs 2.268/ha).

**E D U C A T I O N**

- The University bagged two coveted Prime Minister Fellowships, two Jawaharlal Nehru Awards, one Monsanto Beachell Borlaug Fellowship and two International Travel Grants, which are testimony to the quality education, being provided by PAU to create a pool of very competent human resource, capable of taking up future agricultural research, education and extension.

- The University has been successful in attracting the rural youth towards agricultural
courses, with rural students constituting 50.8 per cent of the total students in different programmes.

- The trainings provided to the faculty through various summer/winter schools and Centre of Advanced Faculty Training (CAFT) programmes have updated their knowledge and skills, enabling them to address the future challenges in their respective domain in a more competent manner.

**SKILL DEVELOPMENT**

- Due to skill development trainings in subsidiary occupations, 976 new bee keeping units and 165 new units of mushroom production were started by the entrepreneurs. Enhancement in income of such units was about Rs 2,000 per bee box in case of stationary units and Rs 10,000 per unit of 10 q compost in case of mushroom production. Similarly, formation of Self-Help Groups helped in raising income of their members by Rs 1,000-1,500 per month per member in case of hand embroidery and about Rs 5,000 per month per member in case of garment making.

**COMMERCIALIZATION OF TECHNOLOGIES**

- Various technologies generated by the University were also commercialized. These include offering of non-exclusive rights to private company for producing and selling seeds of vegetable crops; licensing the formulation of multigrain flour, multigrain instant porridge; and manufacturing and selling of forced circulation solar dryer.

- Four products and technologies were submitted for patenting. These include Modified PAU Fly Trap, Bacteriological Food Testing Kit, Improvement and Evaluation of Filter for Canal Water Potability, and Microencapsulation of Rosemary Oil on Cotton Fabric for Mosquito Repellency.
# ADMINISTRATION

## BOARD OF MANAGEMENT

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Name and Designation</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Honorary Chairman</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1 | Sh Kaptan Singh Solanki  
Hon'ble Governor, Punjab & Chancellor | 01.07.2015 to 30.06.2016 |
| **Working Chairman** | | |
| 1 | Dr Baldev Singh Dhillon  
Vice Chancellor | 01.07.2015 to 30.06.2016 |
| **Members** | | |
| 1 | Sh Sarvesh Kaushal, IAS  
Chief Secretary to Govt. of Punjab  
Chandigarh | 01.07.2015 to 30.06.2016 |
| 2 | Sh Suresh Kumar, IAS  
Addl. Chief Secretary (Development) to Govt. of Punjab  
Department of Agriculture, Chandigarh | 01.07.2015 to 30.04.2016 |
| | Dr N.S. Kalsi , IAS  
Addl. Chief Secretary (Development) to Govt. of Punjab  
Department of Agriculture, Chandigarh | 01.05.2016 to 30.06.2016 |
| 3 | Sh D.P. Reddy  
Addl. Chief Secretary (Finance) to Govt. of Punjab  
Department of Finance, Chandigarh | 15.06.2015 to 30.06.2016 |
| 4 | Dr Mangal Singh Sandhu  
Director of Agriculture, Punjab  
SCO 83-84, Sector 34-A, Chandigarh | 01.07.2015 to 31.10.2015 |
| | Sh Jasbir Singh Bains  
Director of Agriculture, Punjab  
Kheti Bhawan, Phase - VI, Mohali | 04.05.2016 to 30.06.2016 |
| 5 | Dr R.K. Gupta, Director,  
Central Institute of Post-Harvest Engineering & Technology (CIPHET), PAU Campus, Ludhiana | 01.07.2015 to 30.06.2016 |
| 6 | Dr G.S. Nanda  
H. No.1142, Sector 71  
Mohali-160071 | 01.07.2015 to 30.06.2016 |
| 7 | Dr J. S. Kolar  
35-B, Kitchlu Nagar  
Ludhiana | 01.07.2015 to 03.07.2015 |
<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Name and Designation</th>
<th>Period</th>
</tr>
</thead>
</table>
| 1     | Dr S.S. Gosal  
Former Director of Research, PAU  
Opposite State Bank of India ATM  
Sugandh Vihar, Pakhowal Road, Ludhiana                                                                                                                     | 08.07.2015 to 30.06.2016 |
| 8     | S. Kulwant Singh Ahluwalia  
Village - Chhauni Kalan, P.O. Ram Colony  
Distt. Hoshiarpur                                                                                                                                               | 01.07.2015 to 30.06.2016 |
| 9     | Sh Hardev Singh Riar  
Flat No. 314, Punjab Mandi Board Colony  
Sector 66, Mohali                                                                                                                                               | 01.07.2015 to 30.06.2016 |
| 10    | Dr A.R. Sharma  
Chairman & Managing Director, Ricela Group of Companies  
Saron Road, Dhuri, Distt. Sangrur                                                                                                                               | 01.07.2015 to 30.06.2016 |
| 11    | Smt. Karamjit Kaur Danewalia  
VPO - Danewalia Satkoshi  
Tehsil - Abohar, Distt. Fazilka                                                                                                                                 | 01.07.2015 to 06.05.2016 |
|       | **Secretary**                                                                                                                                                                                                             |                 |
|       | Dr P.K. Khanna  
Registrar                                                                                                                                                                                                            | 01.07.2015 to 30.06.2016 |
### ACADEMIC COUNCIL

<table>
<thead>
<tr>
<th>Designation</th>
<th>Name</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vice Chancellor</td>
<td>Dr Baldev Singh Dhillon</td>
<td>01.07.2015 to 30.06.2016</td>
</tr>
<tr>
<td>Dean, Postgraduate Studies</td>
<td>Dr (Mrs) Neelam Grewal</td>
<td>01.07.2015 to 30.06.2016</td>
</tr>
<tr>
<td>Dean, College of Agriculture</td>
<td>Dr Harvinder Singh Dhilliwal</td>
<td>01.07.2015 to 30.06.2016</td>
</tr>
<tr>
<td>Dean, College of Agricultural Engineering &amp; Technology</td>
<td>Dr Jaskaran Singh Mahal</td>
<td>01.07.2015 to 30.06.2016</td>
</tr>
<tr>
<td>Dean, College of Basic Sciences &amp; Humanities</td>
<td>Dr (Mrs) Gurinder Kaur Sangha</td>
<td>01.07.2015 to 30.06.2016</td>
</tr>
<tr>
<td>Dean, College of Home Science</td>
<td>Dr (Mrs) Jatinder Kishitraria</td>
<td>01.07.2015 to 05.02.2016</td>
</tr>
<tr>
<td>Dean, College of Basic Sciences &amp; Humanities</td>
<td>Dr (Mrs) Gurinder Kaur Sangha</td>
<td>16.02.2016 to 30.06.2016</td>
</tr>
<tr>
<td>Director of Research</td>
<td>Dr Balwinder Singh</td>
<td>01.07.2015 to 31.05.2016</td>
</tr>
<tr>
<td>Director of Extension Education</td>
<td>Dr R. K. Gumber</td>
<td>01.06.2016* to 30.06.2016</td>
</tr>
<tr>
<td>Head, Department of Botany</td>
<td>Dr (Mrs) S.K. Thind</td>
<td>01.07.2015 to 31.01.2016</td>
</tr>
<tr>
<td>Director, School of Business Studies</td>
<td>Dr Sandeep Kapur</td>
<td>09.02.2016 to 12.03.2016</td>
</tr>
<tr>
<td>Head, Department of Microbiology</td>
<td>Dr (Mrs) Param Pal Sahota</td>
<td>15.03.2016 to 30.06.2016</td>
</tr>
<tr>
<td>Head, Department of Family Resource Management</td>
<td>Dr (Mrs) Muninder Sidhu</td>
<td>01.07.2015 to 30.04.2016</td>
</tr>
<tr>
<td>Head, Department of Apparel &amp; Textile</td>
<td>Dr Sandeep Bains</td>
<td>01.05.2016 to 30.06.2016</td>
</tr>
<tr>
<td>Head, Department of Vegetable Science</td>
<td>Dr M.S. Dhaliwal</td>
<td>01.07.2015 to 05.08.2015</td>
</tr>
<tr>
<td>Head, Department of Food Science &amp; Technology</td>
<td>Dr (Mrs) Amarjeet Kaur</td>
<td>26.09.2015 to 30.06.2016</td>
</tr>
<tr>
<td>Head, Department of Farm Machinery &amp; Power Engineering</td>
<td>Dr Gursahib Singh Manes</td>
<td>01.07.2015 to 30.06.2016</td>
</tr>
<tr>
<td>Registrar, Secretary</td>
<td>Dr P.K. Khanna</td>
<td>01.07.2015 to 30.06.2016</td>
</tr>
</tbody>
</table>

* Additional Charge

### OFFICERS OF THE UNIVERSITY

<table>
<thead>
<tr>
<th>Designation</th>
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</thead>
<tbody>
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<tr>
<td>Registrar</td>
<td>Dr P.K. Khanna</td>
<td>01.07.2015 to 30.06.2016</td>
</tr>
<tr>
<td>Director of Research</td>
<td>Dr Balwinder Singh</td>
<td>01.07.2015 to 31.05.2016</td>
</tr>
<tr>
<td>Director of Extension Education</td>
<td>Dr R. K. Gumber</td>
<td>01.06.2016* to 30.06.2016</td>
</tr>
<tr>
<td>Director, Extension Education</td>
<td>Dr Rajinder Singh Sidhu</td>
<td>01.07.2015 to 30.06.2016</td>
</tr>
<tr>
<td>Dean, Postgraduate Studies</td>
<td>Dr (Mrs) Neelam Grewal</td>
<td>01.07.2015 to 30.06.2016</td>
</tr>
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<tr>
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</tr>
<tr>
<td>Dean, College of Basic Sciences &amp; Humanities</td>
<td>Dr (Mrs) Gurinder Kaur Sangha</td>
<td>01.07.2015 to 30.06.2016</td>
</tr>
<tr>
<td>Dean, College of Home Science</td>
<td>Dr (Mrs) Jatinder Kishitraria</td>
<td>01.07.2015 to 15.02.2016 (FN)</td>
</tr>
<tr>
<td>Dean, College of Basic Sciences &amp; Humanities</td>
<td>Dr (Mrs) Gurinder Kaur Sangha</td>
<td>16.02.2015* to 30.06.2016</td>
</tr>
<tr>
<td>Director Students' Welfare</td>
<td>Dr (Mrs) Ravinder Kaur Dhilliwal</td>
<td>01.07.2015 to 30.06.2016</td>
</tr>
<tr>
<td>Librarian</td>
<td>Dr Pritpal Singh Lubana</td>
<td>01.07.2015* to 30.06.2016</td>
</tr>
<tr>
<td>Estate Officer</td>
<td>Dr Vishavjeet Singh Hans</td>
<td>01.07.2015* to 30.06.2016</td>
</tr>
<tr>
<td>Comptroller</td>
<td>Dr Sandeep Kapur</td>
<td>01.07.2015* to 30.06.2016</td>
</tr>
<tr>
<td>Chief Engineer</td>
<td>Dr Jaspal Singh</td>
<td>01.07.2015* to 30.06.2016</td>
</tr>
</tbody>
</table>

* Additional Charge
IMPORTANT DECISIONS OF THE BOARD OF MANAGEMENT

During the period under report, the Board of Management held six meetings (272nd to 277th). The important decisions taken by the Board are as under:

A. Amendment in Statutes

- The Board approved the amendment in Clause 2(a) of Schedule Part-III of Chapter-V of PAU Statutes. C-1/273
- The Board approved the amendment in Clause 2(b) (ii) of Schedule Part-III of Chapter-V of PAU Statutes. C-2/273
- The Board approved the deletion of Schedule Part VI of Chapter V of PAU Statutes. C-1/275
- The Board approved the amendment in Clause 2(a) of Sr. No.2 of Schedule Part-III of Chapter-V of PAU Statutes. C-1/276
- The Board approved the amendment in Clause 2(b), 2(b) (ii) and Note at the end of 2(b) of Sr. No.2 of Schedule Part-III of Chapter-V of PAU Statutes. C-2/276
- The Board approved the amendment in Clause 6(2) and the criteria mentioned in Mode of Selection of Schedule Part-III of Chapter-V of PAU Statutes. C-1/277

B. Concession to Staff

- The Board of Management approved the enhancement of officiating fee for Referees/Assistant Referees/Umpires/Judges/Table Officials invited for the conduct of Inter-College/Inter-Varsity Tournaments/Matches. B-1/274

C. Incentives to Students

- The Board of Management approved to charge summer session fee at half rates of the normal semester fee realized during the 2nd semester of the Academic Session in which a student has got admission. B-2/272

D. Other Decisions

- The Board approved the audited accounts of the University for the year 2013-14. B-1/272
- The Board approved the exchange of 1.5 acre land between PAU and Animal Husbandry Department involving land at PAU Campus, Ludhiana and University Seed Farm, Nabha. C-2/272
- The Board approved the exchange of 400 acres land at Ladhowal Seed Farm of Punjab Agricultural University with the Punjab Land Development and Reclamation Corporation Limited. C-3/272
- The Board noted and appreciated the Establishment of Skill Development Centre for Agriculture at Punjab Agricultural University, Ludhiana. C-4/272
- The Board approved the Establishment of ‘Manjeet S. Chinnan and Lata Mahajan Chinnan Endowment for Promoting Excellence in Academics and Sports at PAU’ and also approved the Establishment of ‘Manjeet Singh Chinnan Distinguished Professor Chair.’ C-5/272
- The Board approved the transfer of 175.1 acres of land by PAU Regional Research Station, Bathinda to Govt. of Punjab for establishment of AIIMS. C-2/274
- Dr G.S. Nanda was nominated as non-official member of the Finance Committee for a period of one year by the Board. C-3/274
- The Board approved the creation and inclusion of the new Revolving Fund Scheme entitled “Food Processing and Business Incubation Centre at Regional Station, Bathinda, RF-7 (PC-3103)” in the University Budget for the year 2015-16. B-1/275
- The Board approved the re-employment of Dr Pardeep Kumar Khanna as Registrar of the University for a period of one year w.e.f 01.03.2016. C-4/275
- The Board approved the Budget Estimates of PAU for the year 2016-17. B-1/276
The Board approved the accounts of the University for the year 2014-15 duly audited by the Examiner, Local Fund Accounts, Punjab, Chandigarh.

B-1/277

IMPORTANT DECISIONS OF THE ACADEMIC COUNCIL

During the period under report, eight meetings (365th to 372nd) of the Academic Council were held. The important decisions taken by the Academic Council during this period are as under:

- Approved the draft of Punjab State Council for Higher Agricultural Education Act 2015.
  Item No. 1/365°

- Approved the institution of scholarship in the name of 'Shri Bal Krishan Vaid Merit Scholarship' for B.Sc. Agri. (Hons) 4-year programme w.e.f. academic year 2016-17.
  C-2/367°

- Approved the institution of 'Dr S.K. Vasal Scholarship' for PG students of the Department of Plant Breeding and Genetics w.e.f. academic year 2015-16. C-3/367°

- Approved the revival of M.Sc. programme in Statistics w.e.f. academic session 2016-17. C-1/368°

- Approved the institution of fellowship in the name of 'Dr S.S. Guraya' for the student securing first position in M.Sc. (Zoology).
  C-7/368°

- Approved the change of name of Fruit Research Station, Gangian (Hoshiarpur) to M.S. Randhawa Fruit Research Station, Gangian (Hoshiarpur).
  C-10/368°

- Approved the institution of fellowship/scholarship at PAU in the name of 'Mrs Jaswant Kaur Bindra,' W/o Dr Onkar Singh Bindra, in the discipline of Entomology from the academic session 2016-17 for Ph.D. and M.Sc. students.
  C-5/369°

- Approved the institution of 'HARSUKH Medal' for the overall best graduate of the College of Agriculture. C-7/369°

- Approved the rechristening of state-of-the-art Biocontrol Lab as 'Dr G.S. Kalkat Biocontrol Laboratories.' C-8/369°

- Approved the rechristening of International Guest House as 'Dr D.S. Athwal International Guest House.' C-9/369°

- Approved the institution of medal in the name of 'Dr Jugraj Singh Dhillon' for the best all round student in Master's programme w.e.f. 2016-17. C-4/371°

- Approved the institution of medal in the name of 'Dr Bhupinder Singh Sekhon' for the student securing first position in M.Sc. (Chemistry). C-5/371°

- Approved the institution of 'Plant Pathology Alumni Medal' along with a cash prize of Rs 25,000/- for students of M.Sc. (Plant Pathology).
  C-6/371°

- Approved the starting of two-year Diploma Course in Agriculture from the academic session 2016-17. Item No. 8/372°

- Approved the starting of two-year Diploma in Agrochemicals w.e.f. 2016-17 at PAU, Institute of Agriculture (Gurdaspur & Bathinda), Regional Research Stations (Faridkot and Abohar) and KVKs (Kapurthala and Amritsar). Item No. 21/372°

PUBLICATIONS

The University scientists published nearly 450 publications which included research papers, books, book chapters, manuals, bulletins etc. Details are given in Annexure II.
## Important projects undertaken by the Engineering Unit:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Projects</th>
<th>Cost (Rs in lakh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction of Bio Control Lab, and renovation of buildings and bathrooms at Regional Research Station, Abhar</td>
<td>65.77</td>
</tr>
<tr>
<td>2</td>
<td>Construction of Experimental Learning Unit for the Department of Clothing and Textile, and Department of Food and Nutrition at PAU, Ludhiana</td>
<td>65.09</td>
</tr>
<tr>
<td>3</td>
<td>Construction of Bio Control Lab at Regional Research Station, Gurdaspur</td>
<td>48.64</td>
</tr>
<tr>
<td>4</td>
<td>Repair/renovation of various buildings at Department of Farm Power and Machinery, PAU, Ludhiana</td>
<td>48.04</td>
</tr>
<tr>
<td>5</td>
<td>Sitting area of VIPs at University playground adjoining athletic tracks and construction of Shooting Range at PAU, Ludhiana</td>
<td>44.59</td>
</tr>
<tr>
<td>6</td>
<td>Construction of Pucca Water Channel and Threshing Floor at University Seed Farm, Nabha</td>
<td>27.78</td>
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<tr>
<td>7</td>
<td>Repair of damaged boundary wall of the University at PAU, Ludhiana</td>
<td>25.30</td>
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<tr>
<td>8</td>
<td>Repair of wood work in Hostel No. 1 at PAU, Ludhiana</td>
<td>23.91</td>
</tr>
<tr>
<td>9</td>
<td>Construction of two 30 sqm, three 80 sqm and one 100 sqm houses at Krishi Vigyan Kendra, Langroya</td>
<td>21.98</td>
</tr>
<tr>
<td>10</td>
<td>Construction of concrete paved road at Jodhpur Farm, Regional Research Station, Bathinda</td>
<td>21.30</td>
</tr>
<tr>
<td>11</td>
<td>Repair and renovation of farm store, school building and other buildings at Regional Research Station, Ballowal Saunkri, district Shaheed Bhagat Singh Nagar</td>
<td>20.36</td>
</tr>
<tr>
<td>12</td>
<td>Repair and renovation of Hostel No.2, repair of geyser room for Girls Hostel, repair and renovation of mess in Hostel No.7 and repair of Girls Hostel and Farm Women Hostel at PAU, Ludhiana</td>
<td>18.49</td>
</tr>
<tr>
<td>13</td>
<td>Renovation of two old stores and construction of seed shed at Regional Research Station, Gurdaspur</td>
<td>16.36</td>
</tr>
<tr>
<td>14</td>
<td>Repair and renovation of Hostel No. 6 at PAU, Ludhiana</td>
<td>15.37</td>
</tr>
<tr>
<td>15</td>
<td>Painting and Plinth protection of UG Hostel of Girls at PAU, Ludhiana</td>
<td>13.96</td>
</tr>
<tr>
<td>16</td>
<td>Repair of wood work and paint in Hostel No. 2 at PAU, Ludhiana</td>
<td>13.94</td>
</tr>
<tr>
<td>17</td>
<td>Construction of boundary wall around SRF Quarters at PAU, Ludhiana</td>
<td>12.98</td>
</tr>
<tr>
<td>18</td>
<td>Repair and renovation of Hostel no.1 at PAU, Ludhiana</td>
<td>12.52</td>
</tr>
<tr>
<td>19</td>
<td>Construction of closed shed for storage of machines for the Department of Farm Machinery and Power Engineering at PAU, Ludhiana</td>
<td>11.99</td>
</tr>
<tr>
<td>20</td>
<td>Repair and renovation of Mess in Hostel No.6 at PAU, Ludhiana</td>
<td>10.43</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Construction of buildings and other facilities</strong></td>
<td><strong>538.8</strong></td>
</tr>
</tbody>
</table>
ANNEXURE II

PUBLICATIONS

The University scientists published nearly 450 publications which included research papers, books, book chapters, manuals, bulletins, etc. Details are given below:

College of Agriculture

Research Papers in Indian and Foreign Journals

- Bhandari K, Siddique K H M, Turner N, Kaur J, Singh S, Aggarwal S K and Nayyar H (2016). Heat stress at reproductive stage disrupts leaf carbohydrate metabolism, impairs reproductive function, and severely reduces...
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- Dar S B and Ram H (2016). Grain yield, nutrient uptake and water use efficiency of wheat (Triticum aestivum) under different moisture regimes, nutrient and hydrogel levels. *Indian J Agron* **61**: 101-104. (NAAS rating 5.00)


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