

## **SECTION-I: PROCEEDINGS OF THE 32<sup>ND</sup> GROUP MEETING**

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The 32<sup>nd</sup> Group Meeting of the All India Coordinated Research Project on Potato [AICRP (Potato)] was organized at the University of Agricultural Sciences, Dharwad from September 20-22, 2014. The programme of the Group Meeting and List of Participants are attached at **Annexure-I** and **Annexure-II**, respectively.

### **INAUGURAL SESSION (September 20, 2014)**

<b>President</b>	: Dr DL Maheshwar, Hon' ble Vice Chancellor, UHS, Bagalkot
<b>Chief Guest</b>	: Dr NK Krishna Kumar, DDG (Horticulture), ICAR, New Delhi
<b>Guests of Honour</b>	: Dr DP Biradar, Hon'ble Vice Chancellor, UAS, Dharwad Dr Bir Pal Singh, Director, CPRI, Shimla
<b>Special Invitees</b>	: Dr KK Singh, Head, Agromet Division, India Meteorological Department, New Delhi Dr BM Khadi, Director of Research, UAS, Dharwad
<b>Rapporteurs</b>	: Drs. Sanjay Rawal (CPRIC, Modipuram) and VK Gupta (CPRIC, Modipuram),

Dr DL Maheshwar, Hon'ble Vice-Chancellor, UHS Bagalkot presided over the inaugural session. Dr J Venkatesh, welcomed all the dignitaries on the dias and the participants of workshop. Dr KK Singh, Head, Agro-met in his address emphasized the importance of agro-meteorology for enhancing and sustaining the crop production. He also showed his keenness for collaborating with CPRI, Shimla for yield forecasting purpose at national level.

Dr PM Govindakrishnan, Project Coordinator thanked the Vice-Chancellors of UHS Bagalkot and UAS, Dharwad for the excellent coordination and cooperation in organizing the workshop. He also pointed out that as evaluation of genotypes and development of agro-technologies is location specific, therefore, generating location specific data by coordinated centres of the state agricultural/horticultural universities is very important.

Dr BP Singh, Director, CPRI, Shimla thanked the organisers for their local support and welcomed all guests and AICRP workers on behalf of the institute. He put his vision of 2050 for potato as a food crop to ascertain nutritional and food security. He put four challenges for AICRP workers, which are as follows:

1. Yield gap analysis for prioritization of constraints in different agro-ecologies and tackling them for higher tuber yields
2. Increase of potato area and productivity at national level
3. Tropicalization of potato crop for non-traditional areas like Karnataka with features of early fast bulking (75-80 days) crop to fit well in potato based cropping systems
4. Healthy seed potato production which is under threat of global environmental changes, where vectors would be more potent.

Dr DP Biradar, Hon'ble Vice-Chancellor, UAS, Dharwad stated that he is committed for better cooperation and coordination between UAS Dharwad and UHS Bagalkot for potato research. He said that it is time to ponder over ways for improving the potato productivity, and asked breeders and agronomists for giving emphasis on this aspect. He appreciated ICAR and particularly CPRI for grooming scientists to become specialists in a single crop like potato. He further said that there is need to work for removing wrong notions among masses about potato crop that it causes obesity. Rather its nutritive advantages are needed to be highlighted. He asked CPRI to support his cause of potato popularisation and enhancement of productivity in Karnataka.

Two software viz. Advisory System for Nitrogen Management in Potato (ASNMP) and Potato Growing Season Descriptor (PGSD) were released on the occasion. Dr PM Govindakrishnan, Project Coordinator explained the functions and the scope of the software and folders containing the details of the software were distributed to the audience.

Honourable Deputy Director General (Horticulture) Dr NK Krishna Kumar informed the house how horticultural crops including potato are going to strengthen the nutritional security as well as the economic security of the farmers. He quoted the example of Regional Committee Meeting recently held at Anand, where eight out of nine awardee farmers were growing horticultural crop with wonderful innovative entrepreneurship. He said that for the first time, horticultural crop production (270 mt) has surpassed the food grain production (260 mt) at national level and potato (45 mt) alone was single largest contributor among vegetable crops (90 mt). He expressed gratitude to Dr BP Singh, Director, CPRI and his team for the development of potato. He urged for demographic discipline as we are facing three dimensional constraints of decreasing water availability, land and challenge of uncertain climate. He said that our food and nutritional demands are increasing and potato is the only crop, which is most efficient in harnessing solar energy into carbohydrates and protein for fulfilling the requirements. He under scored the importance of potato crop and its differential consumption pattern in north and south India where it is more preferred in rural and urban areas, respectively. He also said tropicalization of potato is top priority and deficiency of quality seed is painful for the scientific community. As far as Karnataka is concerned protected technologies (aeroponics, hydroponics etc.) may be adopted for seed production and asked state universities for signing MOUs with CPRI on pattern of PAU Ludhiana for this cause. He warned that if we do not work in coordination then foreign companies are going to give tough competition and imported seed would bring more diseases and pests. He further asked universities to work on burning problems of potato crop through students in their graduate and post-graduate studies and avoid repetitive problems. He asked them to work on Tospovirus, abiotic and biotic stresses and post-harvest losses. He asked the house to take project on organic farming as it is government policy now as issue of pesticide residue is very pertinent now. He emphasized working in team of different discipline for solving complex problems of potato crop and revive the concept of post doctorate. He asked government of Karnataka to have vision of horticulture for 2050. He gave good news to the house that very soon cess fund scheme will resume in ICAR. He asked Dr PM Govindakrishnan, PC, AICRP on Potato to have research activities at Dharwad with joint efforts of both the universities.

Dr DL Maheswar, Hon'ble Vice-Chancellor and president of the session, UHS Bagalkot welcomed all dignitaries and participants of workshop. He thanked all for making the workshop successful. He assured DDG (Horticulture) of working in close collaboration with UAS Dharwad for the cause of potato crop. He told that his priority for this crop is to increase yield, and healthy seed availability for farmers. Another main issue is of climate change. He told his priority of precision farming, TPS technologies and bio-agents.

The session ended with presentation of mementoes to all the dignitaries on dias and formal vote of thanks.

#### **ACTION TAKEN REPORT (September 20, 2014)**

**Chairman** : Dr NK Krishna Kumar, DDG, Horticulture, ICAR, New Delhi  
**Co-Chairman** : Dr BM Khadi, Director of Research, UAS, Dharwad  
**Rapporteurs** : Drs Ravindra Mulge, Prof, KRCCH, Arabhavi (Dharwad), Raj Kumar (Jalandhar) and VK Gupta (Modipuram)

Dr PM Govindkrishnan, Project Coordinator, AICRP (Potato) presented the action taken report on the recommendations of 31<sup>st</sup> Group Meeting held at CPRS, Patna during September 20-22, 2013. The Chairman appreciated the achievements and after thorough discussion the recommendations were developed which are given under Plenary Session.

#### **TECHNICAL SESSION-I: CROP IMPROVEMENT (September 20, 2014)**

**Chairman** : Dr BM Khadi, Director of Research, UAS, Dharwad  
**Co-Chairman** : Dr Bir Pal Singh, Director, CPRI, Shimla  
**Rapporteurs** : Drs Raj Kumar (Jalandhar), VK Gupta (Modipuram) and Prabhudeva Ajappalavara, Asst professor, UHS, Bagalkot

Centre-wise presentations were made by the AICRP's centers located at Bhubaneswar, Deesa, Dharwad, Dholi, Faizabad, Hassan, Hisar, Jalandhar, Jorhat, Kalyani, Kanpur, Kota, Modipuram, Ooty, Pantnagar, Pasighat, Patna, Pune, Raipur, Shillong and Srinagar. This was followed by summary presentation by Dr Vinay Bhardwaj, Acting Head, Division of Crop Improvement, CPRI, Shimla.

Thorough discussions were held on the performance of different hybrids for yield and reaction to diseases as well as performance of germplasm accessions at Dharwad, Hassan and Hisar. Recommendations brought out are given under Plenary Session. Technical programme of Crop Improvement for 2014-2015 was also presented, discussed and finalized in the session. The finalized technical programme is given in Section II.

#### **TECHNICAL SESSION-II: CROP PRODUCTION (September 20, 2014)**

**Chairman** : Dr B Raju, Director of Education, UHS, Bagalkot  
**Co-Chairman** : Dr BC Patil, Head, AICRP Vegetables, RHREC, Dharwad  
**Special Invitees** : Dr KM Indresh, Ex-Head, AICRP (Potato)  
**Rapporteurs** : Drs Sanjay Rawal (CPRIC, Modipuram), SK Singh (CPRS, Patna) and Manoj Raghav (GBPUA&T, Pantnagar)

Centre-wise presentations were made by the AICRP centers located at Bhubaneswar, Deesa, Dharwad, Dholi, Faizabad, Hassan, Hisar, Jalandhar, Jorhat, Kalyani, Kanpur, Kota, Modipuram, Ooty, Pantnagar, Pasighat, Patna, Pune, Raipur and Srinagar. This was followed by summary presentation by Dr VK Dua, Head, Division of Crop Production, CPRI, Shimla.

Recommendations brought out are given under Plenary Session. Technical programme of Crop Production for 2014-2015 was also presented, discussed and finalized in the session. The finalized technical programme is given in Section II.

#### **TECHNICAL SESSION-III: CROP PROTECTION (September 21, 2014)**

**Chairman** : Dr Bir Pal Singh, Director, CPRI, Shimla  
**Co-Chairman** : Dr Lingaraju, Prof & Head, Plant Pathology, UAS, Dharwad  
**Rapporteurs** : Drs MS Gurjar (CPRS, Shillong), Rahul Bakade (CPRS, Patna) and PR Deshmukh (MPKVV, Rahuri)

Centre-wise presentations were made by the AICRP centers located at Bhubaneswar, Deesa, Dharwad, Dholi, Faizabad, Gwalior, Hassan, Hisar, Jalandhar, Jorhat, Kalyani, Kanpur, Kota, Modipuram, Ooty, Pantnagar, Pasighat, Patna, Pune, Raipur, Shillong and Srinagar. This was followed

by summary presentation by Dr Sanjeev Sharma, Acting Head, Division of Plant Protection, CPRI, Shimla.

Recommendations brought out are given under Plenary Session. Technical programme of Crop Protection for 2014-2015 was also presented, discussed and finalized in the session. The finalized technical programme is given in Section II.

#### **TECHNICAL SESSION-IV: PLENARY SESSION (September 21, 2014)**

**Chairman** : Dr BP Singh, Director, CPRI, Shimla  
**Guest of honour** : Dr B Raju, Director of Education, UHS, Bagalkot  
**Co-Chairman** : Dr PM Govindakrishnan, Project Coordinator, AICRP (Potato)  
**Rapporteurs** : Dr SK Singh (CPRS, Patna) and Dr VK Gupta (CPRIC, Modipuram)

Dr PM Govindakrishnan, Project Coordinator (Potato), welcomed the Chairman of the plenary session, Dr BP Singh, Director, CPRI, Shimla; Guest of honour Dr B Raju, Director of Education, UHS, Bagalkot, Co-chairman, dignitaries and participants to the plenary session of Group Meeting.

The proceedings of each session were presented by the PI's of the respective sessions and recommendations brought out in each session were again discussed thoroughly and finalized for implementation. The discipline-wise work plans for 2014-15 were also discussed at length in the plenary session and finalized for conducting trials during 2014-15 at different centers of AICRP (Potato). The finalized recommendations of the different technical session are given below and approved technical programmes are given in Section-II.

#### **RECOMMENDATIONS**

##### **INAUGURAL SESSION AND ACTION TAKEN REPORT**

1. The on line advisory system developed for late blight forecasting and nitrogen management for different agro climatic and edaphic regions needs to be popularised. It was decided that besides online hosting of these tools information should also go to the farmers through other systems like community radio/Director of research/Director of extension of SAUs/KVKs etc. **(Action: Project Coordinator, Director (Research & Extension) of SAU's, All Incharges AICRP centers)**
2. Late blight forecasting model developed for potato need to be validated in other crops like tomato, if possible by identifying collaborators working on other crops. **(Action: Head, Crop Improvement, Project Coordinator and All Incharges AICRP (Potato) centers)**
3. Besides providing advisory about late blight appearance for different regions, the information on the control measures should also be developed. **(Action: Head, Plant Protection)**
4. While giving advisory about nitrogen application through the DSS corresponding potassium requirement should also be informed. **(Action: Project Coordinator)**
5. While recording post-harvest losses in potato besides the quantitative losses, qualitative losses like that resulting from soil borne diseases and cracking should also be considered (Extra mural sources of funding may be explored). **(All AICRP centers)**
6. Vector status of aphid spp. collected in the potato crop is to be ascertained. **(Action: Head, Plant Protection)**
7. Work on micro nutrient requirement should be started in potato crop including seed crop. For this AICRP should become part of micro nutrient network project being run by IIHR, Bengaluru. **(Action: Project Coordinator)**
8. Parameters for degree of heat tolerance should be developed for categorizing as moderate or high etc. **(Action: Project Coordinator)**
9. The areas identified for baby potato production based on weather data should be verified through field experiments. **(Action: Head, Crop Production)**

10. There is need to explore the possibility of growing onion after potato in eastern regions of India. **(Action: Head, Crop Production)**
11. Phosphorus application should be rationalized based on the information on soil phosphorus. For this an experiment should be formulated under AICRP. **(Action: Head, Crop Production)**
12. Recently released Kufri Lalit/ red skin hybrids need to be evaluated in more number of locations. **(Action: Head, Crop Improvement)**
13. Study on organic farming should be started at 2-3 centers. **(Action: Head, Crop Production)**

## **TECHNICAL SESSION-I: CROP IMPROVEMENT**

### **General recommendations**

1. It was emphasized that the raw data should be submitted to the Project Coordinator soon after harvesting. Therefore, it was decided that data from Rabi season crop should be submitted latest by 30<sup>th</sup> April. For Kharif crop, the data should reach the coordinator latest by 30<sup>th</sup> November. **(Action: Project Coordinator and All Incharges AICRP (Potato) centers)**
2. Processing trials for French fries should be harvested only after a minimum period of 110 days. **(Action: All Incharges AICRP (Potato) centers)**
3. Seed of K Himalini should be supplied to Kalyani center from CPRS Jalandhar at harvest for further seed multiplication. **(Action: Head, CPRS, Jalandhar and Incharge, AICRP center Kalyani)**
4. For strengthening regional breeding programme, F1C2 harvest clones should be supplied to Hisar centre from Modipuram, Jalandhar and Patna stations. **(Action: Project Coordinator; Head, Crop Improvement and Concerned AICRP centers viz. Hisar, Modipuram, Jalandhar and Patna)**
5. Breeding material of F1C4 stage should be supplied to Deesa from processing programme and to Bhubaneswar centre from heat tolerance programme. **(Action: Project Coordinator; Head, Crop Improvement Concerned AICRP centers viz. Deesa and Bhubaneswar)**
6. To avoid spoilage of tuber material in transit Pantnagar, Dharwad, Hassan, Hisar and Pune centres should collect tuber material personally from SPU unit, Modipuram. **(Action: Dr VK Gupta, SPU unit, Modipuram and Concerned AICRP centers viz. Pantnagar, Dharwad, Hassan, Hisar and Pune)**
7. Tuber material supplied to different AICRP centres from SPU, Unit, Modipuram should be sorted and repacked before keeping in cold stores. **(Action: All AICRP centers)**
8. Hybrids in on-farm trials should be evaluated in a minimum of 48 m<sup>2</sup> plot. **(Action: Head, Crop Improvement and All AICRP centers).**
9. Varietal evaluation data obtained through trials conducted at different AICRP centers should be compiled for two crop seasons. Three best varieties for each region should be identified and recommended so that state line departments, can place indent for breeder seed accordingly. **(Action: Project Coordinator; Head, Crop Improvement and All AICRP centers).**
10. The controls for various trials of AICRP Crop Improvement trials were revisited and following changes were recommended-
  - i. Kufri Pushkar should be dropped from medium maturing trials being conducted at central, eastern and plateau regions.
  - ii. For eastern plains, Kufri Pukhraj and Kufri Khyati should be used as controls in medium maturing trials.**(Action: Project Coordinator; Head, Crop Improvement and All AICRP centers).**

## **TECHNICAL SESSION-II: CROP PRODUCTION**

### **Recommendation for extension agencies**

1. At Hisar, potato planted on 15<sup>th</sup> September, 30<sup>th</sup> September, 15<sup>th</sup> October & 30<sup>th</sup> October and irrigated through micro sprinklers produced 140, 120, 76 & 41% higher yield over furrow irrigated crop (5.78, 8.36, 11.25 and 17.38 t/ha respectively) with corresponding WUE of 0.077, 0.108, 0.142 and 0.223 t/ha/mm respectively at 75 DAP. At 90 DAP the yield increase was 34, 48, 72, and 58% over furrow irrigated crop yields (16.61, 19.50, 26.67 and 29.49 t/ha respectively) while the WUE was 0.083, 0.114, 0.180 and 0.243 t/ha in 15<sup>th</sup> September, 30<sup>th</sup> September, 15<sup>th</sup> October & 30<sup>th</sup> October planted crop respectively.  
Hence, Irrigation through micro sprinkler at 10 mm CPE is recommended for higher yield and WUE especially in early planted crop in Western Haryana region. **(Action: Project Coordinator; Department of Horticulture/Agriculture, Govt. of Haryana and Incharge, AICRP center Hisar)**
2. At Chhindwara, in medium black soils low in N, Medium in P & K fertility status and neutral pH, incorporation of soybean crop residue sprayed with 2% spray of sodium chloride @ 5t/ha + seed treatment with biofertilizers (1:1 ratio of Azotobacter and Phosphobacteria) @ 5g/kg seed tubers + Vermicompost @ 5 t/ha as soil application before planting gave yields comparable to that under fertilization with 120:100:100 of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O respectively through inorganic fertilizers. Hence this schedule is recommended for Satpura region. **(Action: Project Coordinator; Department of Horticulture/Agriculture, Govt. of Madhya Pradesh and Incharge, AICRP center Chhindwara)**
3. At Pantnagar, Kufri Sadabahar and Kufri Surya, varieties produced significantly high yields upto 150 kg N/ha and is recommended for Tarai region. **(Action: Project Coordinator; Department of Horticulture/Agriculture, Govt. of Uttrakhand and Incharge, AICRP center Pantnagar)**
4. At Dharwad, Kufri Chandramukhi and Kufri Pukhraj, both the varieties produced significantly high yields upto 180 kg N/ha. The response equations were  $y = -7E-05x^2 + 0.0323x + 7.8825$  ( $R^2 = 0.9885$ ) and  $y = -0.0001x^2 + 0.0436x + 8.5575$  ( $R^2 = 0.9886$ ) for Kufri Chandramukhi and Kufri Pukhraj respectively. The economic optima dose of Kufri Chandramukhi and Kufri Pukhraj were 162.31 and 170.11 kgN/ha respectively and hence is recommended for red lateritic soils of Dharwad region. **(Action: Project Coordinator; Department of Horticulture/Agriculture, Govt. of Karnataka and Incharge, AICRP center Dharwad)**
5. At Pune, Kufri Surya, produced significantly high yield upto 150 kg N/ha and hence this dose is recommended for light textured black soils of Pune region. **(Action: Project Coordinator; Department of Horticulture/Agriculture, Govt. of Maharashtra and Incharge, AICRP center Pune)**

### **General recommendation**

1. Experiment on nutrient requirement of newly released varieties should be repeated at Deesa and Jorhat centre for one more year. **(Action: Head, Crop Production and Incharges AICRP Centers Deesa & Jorhat)**
2. Experiment on Performance of different potato cultivars under drip irrigation should be repeated at Deesa centre. **(Action: Head, Crop Production and Incharge AICRP Centers Deesa)**
3. Treatment of furrow irrigation as control and different basal doses of nitrogen in drip irrigation should be incorporated in experiment on performance of different potato cultivars under drip irrigation at Hisar. **(Action: Head, Crop Production and Incharge AICRP Centers Hisar)**
4. Amount of water used for spray should be mentioned in weed control trials along with dose of weedicide. **(Action: All AICRP Centers)**

5. Phyto-toxicity observations, weed species and weed control efficiency should be recorded in experiment on weed management in potato. **(Action: Head, Crop Production and All AICRP Centers)**
6. Comprehensive study should be initiated for minimizing tuber cracking in processing variety Kufri Chipsona-3. **(Action: Head, Crop Production and All AICRP Centers)**
7. Experiment on nutrient requirement of newly released varieties-Kharif and Hills should be repeated at Hassan. **(Action: Head, Crop Production and Incharge AICRP Centers Hassan)**

Chairman concluded the session by giving his valuable comments that the crop production trials and observations recorded by different centres should be uniform. He also suggested that work on precision farming, agro-technology for TPS, tuber quality, fertigation, organic farming and micro-nutrients ought to be carried out under AICRP domain. He showed his concern for decline in potato acreage in Karnataka and suggested for survey work by the state horticultural universities.

### **TECHNICAL SESSION-III: CROP PROTECTION**

#### **Recommendation for extension agencies**

1. Prophylactic spray with mancozeb @ 0.2%, followed by second spray of (fenamidone + mancozeb) @ 0.3% after seven days and a third spray with mancozeb @ 0.2% after seven days of the second spray is recommended for the control of late blight in West Bengal and Eastern Uttar Pradesh under moderate disease pressure. **(Action: Project Coordinator; Department of Horticulture/Agriculture, Govt. of West Bengal & Uttar Pradesh and Incharges, AICRP centers Kalyani, Faizabad & Kanpur)**
2. Biofumigation by incorporating one month old Indian Mustard crop (seed rate 5 kg/ ha) just before the planting of potato crop is recommended for management of black scurf and common scab in Central and Eastern Uttar Pradesh. **(Action: Project Coordinator; Department of Horticulture/Agriculture, Govt. of Uttar Pradesh and Incharges, AICRP centers Faizabad & Kanpur)**

#### **General recommendations**

1. Late blight infected samples should be sent to Head, Plant Protection, CPRI Shimla for mating type identification. **(Action: Head, Plant Protection and All AICRP Centers)**
2. AICRP centres should report any new pathogen observed at their centers to CPRI for confirmation before reporting elsewhere. **(Action: All AICRP Centers)**
3. The black scurf and common scab experiments should be separated and new experiments for management of common scab should be formulated for the region where common scab is an emerging problem especially for Deesa, Raipur and Kanpur. **(Action: Head, Plant Protection and Incharges, AICRP Centers Deesa, Raipur and Kanpur)**
4. Date of planting for the evaluation of germplasm against stem necrosis and PALCV should be planted as per the date of planting of seed crop in respective centres. **(Action: Head, Plant Protection and Incharges, AICRP Centers Chhindwara, Deesa, Gwalior, Hisar and Kota)**
5. In early blight management experiment the treatment of application of nitrogen should be included. **(Action: Head, Plant Protection and Incharges, AICRP Centers Bhubaneswar, Deesa, Pune and Raipur)**
6. In the context of aphid monitoring, date of planting should be the same as normal date of planting of seed crop in sprayed and unsprayed conditions in the respective AICRP centres. **(Action: Head, Plant Protection and All AICRP Centers)**
7. The name of sucking pest experiments should be changed to management of virus vectors. **(Action: Head, Plant Protection)**

8. Thiocloprid may be evaluated alone vis-à-vis one, two, three or four sprays of Imidacloprid and based on the results a spray schedule for seed crop for replacing Imidacloprid should be developed. **(Action: Head, Plant Protection)**
9. Mite management experiments should be repeated for one more year. **(Action: Head, Plant Protection and Incharges, AICRP Centers Modipuram, Hassan & Pune)**

#### **TECHNICAL SESSION-IV: PLENARY SESSION (September 21, 2014)**

Dr BP Singh, Director, CPRI, Shimla chaired the plenary session and Dr PM Govindakrishnan, PC, AICRP on potato co-chaired the session. Dr B Raju, Director of education, UHS Bagalkot was the guest of honour. The recommendations of action taken report, technical session I, II and III were respectively presented by the PC, PIs namely Drs PM Govindakrishnan, Vinay Bhardwaj, VK Dua and Kamlesh Malik. Following decisions were taken up during this session:

1. PC would submit a project on studies of post-harvest losses in terms of quality and quantity in potato crop under ICAR cess fund scheme. **(Action: Project Coordinator)**
2. Tuber samples sent under experiment on processing hybrids should have tubers (6-8 tubers of each clone) of > 50 g size for proper quality traits analysis. **(Action: All AICRP Centers)**
3. Soil and plant samples under agronomic trials may be sent to designated centers for analysis. . **(Action: All AICRP Centers)**
4. Dr Rahul Bakade, Scientist (Plant Protection) will develop experiment on common scab for AICRP on Potato. **(Action: Dr Rahul Bakade, CPRS, Patna)**

The session ended with remarks of the Chairman that ICAR has great expectations from AICRP on Potato and we have to work hard to meet its expectations. He also made the following concluding remarks:

- He hoped that the recommendations brought out in this Group Meeting will be implemented in letter and spirit.
- He suggested experiments on TPS, micronutrients to be included in the technical programme.
- He also suggested studies on post harvest losses to be conducted at selected location.

In the end he congratulated the scientists for the good work done but cautioned that the future is more difficult due to international competition and we have to strengthen ourselves and be vigilant.

The 32<sup>nd</sup> Group Meeting of AICRP (Potato) ended with vote of thanks proposed by Dr PM Govindakrishnan, Project Coordinator (Potato).

## SECTION-II: TECHNICAL PROGRAMME FOR 2014-2015

### SUMMARY OF TRIALS ALLOTTED TO DIFFERENT AICRP (POTATO) CENTERS

Sl. No	Name of the Center	Crop Improvement	Crop Production	Crop Protection	Total
1.	Bhubaneshwar	Genet.4,5,7,8,11,12	Agron.2,5,6,8,9	Path. 2,7,8 Ent.1,3	16
2.	Chhindwara	Genet.4,5,7,8,11,12	Agron. 2,5,6,8,9	Path. 2,6,8 Ent.1,3	16
3.	Deesa	Genet.4,5,7,8,11	Agron.2,4,5,6,8,9	Path. 2,4,5,6,7,8 Ent.1	18
4.	Dharwad	Genet.1,4,6,7,8,11,12,13	Agron. 2,5,6,8,9	Path. 2,8 Ent.1	16
5.	Dholi	Genet.4,5,7,11	Agron.2,3,5,6,7,9,12	Path. 2,8 Ent.1	14
6.	Faizabad	Genet.4,5,7,11	Agron.2,5,6,7,9,10,12	Path.1,2,8,11 Ent.1	16
7.	Gwalior	Genet.4,5,7,11,13	Agron. 7,9	Path. 2,6,8 Ent.1,2	12
8.	Hassan	Genet.1,4,5,6,7,8,9,11,13	Agron. 2,5,6,8,9	Path. 1,2,3,4,8,9,10 Ent.1,4	23
9.	Hisar	Genet.1,2,4,5,7,8,11,14	Agron.2,5,6,9,11,12	Path. 2,4,5,8 Ent.1,2	20
10.	Jalandhar	Genet.4,5,7,11,14	Agron. 5,7,9	Path. 1,2,8,11 Ent.1	13
11.	Jorhat	Genet.1,4,5,7,9,11	Agron. 2,5,6,9,12	Path. 1,2,8 Ent.1	15
12.	Kalyani	Genet.4,5,7,8,11,14	Agron.2,5,6,8,9,10	Path. 1,2,4,8 Ent.1,2	18
13.	Kanpur	Genet.4,5,7,11,14	Agron.5,6,7,9	Path. 1,2,8,11 Ent.1	14
14.	Kota	Genet.4,5,7,11	Agron. 2,5,6,8,9	Path. 1,2,5,6,8 Ent.1	15
15.	Kufri	Genet.2, 6,11	Agron.	Path.	3
16.	Modipuram	Genet.2,4,5,7,8,11,14	Agron. 5,9	Path. 2,8,11 Ent.1,2,4	15
17.	Ooty	Genet.6,10,11	Agron. 9	Path. 1,2,8 Ent.1,5	9
18.	Pantnagar	Genet.4,5,7,11,14	Agron. 5,6,7,9	Path. 1,2,3,8 Ent.1	14
19.	Pasighat	Genet.4,5,7,11	Agron. 2,5,6,9,12	Path. 1,2,8 Ent.1	13
20.	Patna	Genet.4,5,7,9,11,13,14	Agron. 5,9,10	Path. 1,2,3,8,11 Ent.1,2	17
21.	Pune	Genet.4,5,6,7,11,12,13	Agron. 2,5,6,9	Path. 1,2,4,7,8 Ent.1,3,4	19
22.	Raipur	Genet.4,5,7,8,11,12,14	Agron.1,2,5,6,8,9	Path. 2,4,7,8 Ent.1,3	19
23.	Ranichauri	Genet.6,11	Agron. 9	Path.	3
24.	Shillong	Genet.6,9,11,13	Agron. 5,6,9	Path. 1,2,3,8 Ent.1	12
25.	Srinagar	Genet.3,6,7,11,14	Agron. 2,5,6,9	Path. 1,2,3,8 Ent.1	14

## CROP IMPROVEMENT

### GENET. 1: EVALUATION OF GERMPLASM

Location : Dharwad, Hassan, Hisar and Jorhat

#### a) Evaluation for adaptability in Kharif season

Locations: Dharwad and Hassan

Design	:	RBD
Replication	:	2
Plot size	:	5 tubers row
Material	:	100 <i>tuberosum</i> accessions supplied by CPRS, Jalandhar
Controls	:	AICRP-C-13, AICRP-C- 16, AICRP-C- 17, AICRP-C-24

#### Observations to be recorded:

1. Plant emergence (%) at 30 days after planting
2. Foliage senescence (%) at haulms cutting (Rating of canopy for yellowing of leaves 1-10 scale where 1= 10% leaf yellowing and 10= 100% leaf yellowing)
3. Yield per plant (90 days harvest)
4. No. of tubers per plant (90 days harvest)
5. Incidence of any major diseases (final score).

#### b) Evaluation for Bacterial wilt resistance

Location : Hassan

Design	:	RBD
Replication	:	2
Plot size	:	5 tubers row
Material	:	80 wild species clones from CPRIC Modipuram

#### Observations to be recorded:

1. Plant emergence (%) at 30 days after planting.
2. Wilt incidence in each accession at 10 days interval after emergence.
3. Days to wilting

#### c) Evaluation for Potato Apical Leaf Curl Disease (PALCD):

Locations : Hisar

Design	:	RBD
Replication	:	2
Plot size	:	5 tubers row
Material	:	100 germplasm accessions from CPRS Jalandhar
Controls	:	AICRP-C- 5, AICRP-C- 6, AICRP-C- 13, AICRP-C- 14, AICRP-C- 17, AICRP-C- 18, AICRP-C- 19

**Observations to be recorded:**

1. Plant emergence (%) at 30 days after planting
2. Incidence of PALCD at 10 days interval after emergence to haulms cutting
3. No. of tubers per plant (90 days harvest)
4. Yield per plant (90 days harvest)

**d) Evaluation for late blight resistance:**

Locations : Jorhat

Design	:	RBD
Replication	:	2
Plot size	:	10 tubers row
Material	:	100 germplasm accessions from CPRS Jalandhar
Controls	:	AICRP-C- 13, AICRP-C- 23, AICRP-C- 24

**Observations to be recorded:**

1. Plant emergence(%) at 30 days after planting
2. Incidence of LB at 10 days interval after 1<sup>st</sup> appearance of disease.
3. No. of tubers per plant (90 days harvest)
4. Yield per plant (90 days harvest)

**GENET.2: MULTIPLICATION OF GENETIC MATERIAL**

Multiplication of recently introduced hybrids (J/6-182 new early maturing hybrid; MS/8-1148 new medium maturing; MS/8-1565 specialty hybrid and MP/9-723 late blight resistant, medium maturing hybrid; MP/0\*-\*\*, new early processing hybrid; HT/07-1105, WS/05-146, SM/00-120 late blight resistant day-neutral hybrid) and other following hybrids, J/2-14, MS/7-645, PS-05/75, PS/06-24, MP/04-816, SM/00-42 and VMT 5-1, MS/06-819, MS/06-1947 ,PS/06-88, MP/04-578, J/100-152, MS/05-1543, PS/04-05, MS/04-2261, PS/03-02, 2002-P-14, SM/92-338, LBY-17, LBY-15, MP/01-916, HIS/98-55, CP-4054, A/97-29, A/98-98, D-150 and 92-PT-27 (both parents) under AICRP and control varieties including Kufri Himsona and Kufri Shailja will be done at Seed Preparatory Units (SPUs) located at Modipuram and Kufri for supply to the AICRP centers in the plains and hills, respectively.

**GENET.3: REGION SPECIFIC BREEDING PROGRAMMES AT SAU BASED CENTERS**

Sr. No.	AICRP location (s)	Affiliated CPRI centre (s)	Regional/variatal requirements
1	Srinagar	CPRS, Kufri	High yield & Late Blight resistance
2*	Hisar	CPRI Campus Modipuram	Virus resistance, Moderate resistance to late blight and high yield

Besides above,

- F1C2 produce, from Modipuram, Jalandhar and Patna will be shared with the AICRP centre, **Hisar**.
- F1C4 produce, from Modipuram, Jalandhar and Patna will be shared with the AICRP centre, viz., **DES (processing); BHN and RPR** (heat tolerance & red hybrids), besides **PAU Ludhiana** as per the MoU signed.

**GENET.4: ON-FARM TRIAL WITH EARLY AND MEDIUM MATURING HYBRIDS**

Location : All locations in the plains  
 Plot size : 96 m<sup>2</sup> (40 rows of 20 tubers each)  
 Spacing : 60 x 20 cm  
 Cultural practices : As recommended for the region.

**Treatments**

<b>Hybrids:</b>	<b>AICRP-EM-1(early), AICRP-RH-3(red), : 2<sup>nd</sup> year; AICRP-P-1: 1<sup>st</sup> year</b>
<b>Controls:</b>	
Northern plains	AICRP-C-14, AICRP-C-17, AICRP-C-6, AICRP-C-19 & K. Gaurav
Central plains	AICRP-C-14, AICRP-C-17, AICRP-C-16, AICRP-C-6 & K. Garima
Eastern plains	AICRP-C-14, AICRP-C-17, AICRP-C-4, AICRP-C-15 & K. Lalit
Plateau region	AICRP-C-17, AICRP-C-20, AICRP-C-24, AICRP-C-13, AICRP-C-16

**Observations to be recorded:**

1. Seed wt./plot (Kg)
2. Plant emergence (%) at 30 days after planting.
3. Incidence of any major diseases, final score.
4. Tuber rot in the plot (weight) at the time of harvesting.
5. Total and marketable tuber yield (t/ha) with specific gravity at harvest for 60, 75, 90 days crop and at senescence (75% foliage maturity).
6. Date of senescence (75% foliage maturity)
7. Total weight loss after 75 days storage at ambient temperature.
8. Tuber dry matter (%) at 60, 75 and 90 days harvest. Corresponding haulm dry wt. (%) should also be recorded. Samples of both dry tuber wt. and haulm dry wt. should be sent to Patna for 'nutrient requirement estimation'.
9. Meteorological data.
10. Storage losses in heaps (at respective CPRI stations).

**GENET.5: TRIAL WITH TABLE POTATO HYBRIDS (1<sup>st</sup> & 2<sup>nd</sup> year)**

Location : All locations in the plains  
 Design : RBD  
 Replication : 4 (each for 75 & 90 days crop)  
 Plot size : 3.0 m x 2.4 m (5 rows of 12 tubers)

**Treatments**

Zone	Hybrids/Varieties
	<b>AICRP-P-9, AICRP-P-7(old hybrids), AICRP-P-6, AICRP-P-5, AICRP-P-13, AICRP-P-12(new hybrids)</b>
Northern plains	AICRP-C-14, AICRP-C-17, AICRP-C-6, AICRP-C-19 & K. Gaurav
Central plains	AICRP-C-14, AICRP-C-17, AICRP-C-16, AICRP-C-6 & K. Garima
Eastern plains	AICRP-C-14, AICRP-C-17, AICRP-C-4, AICRP-C-15 & K. Lalit
Plateau region	AICRP-C-17, AICRP-C-20, AICRP-C-24, AICRP-C-13, AICRP-C-16

**Observations to be recorded:**

1. Seed wt. per plot (Kg)
2. Plant emergence (%) at 30 days after planting.
3. Foliage senescence (%) at haulms cutting
4. Incidence of any major diseases, final score.
5. Tuber rottage in the plot (weight) at the time of harvesting.
6. Total and marketable tuber yield (t/ha) with specific gravity at harvest at 60, 75, 90 days at harvest and at senescence (75% foliage maturity).
7. Date of senescence (75% foliage maturity)
8. Total weight loss after 75 storage at ambient temperature
9. Mean Canopy Cover<sup>#</sup> at 10 days interval till senescence (75% foliage maturity) with digital camera or by Burstall & Harris (1983) method.
10. Meteorological data.

**Note:**

- An additional replication will be planted to record data on <sup>#</sup> parameter.
- Sufficient tubers should be multiplied and kept to conduct 2<sup>nd</sup> year trial (600-800 tubers for new hybrids) and on-farm trials (3500-4000 tubers for old hybrid) during the next year.

**GENET. 6: TRIAL WITH HILL & KHARIF POTATO HYBRIDS**

Locations	:	Dharwad, Hassan & Pune (Plain <i>Kharif</i> centres) Kufri, Srinagar, Ranichauri, Ooty, Shillong (Hill <i>Kharif</i> centres)
Design	:	RBD
Replications	:	3 each for 75 and 90 days crop
Plot size	:	3.0 m x 2.4 m (5 rows of 12 tubers)
Spacing	:	60 X 20 cm
Cultural practices	:	As recommended for the region.

**Treatments****Plain *Kharif* centres (Dharwad, Hassan & Pune)**

AICRP-P-15	AICRP-C-24	AICRP-C-13	AICRP-C-16
AICRP-C-17	AICRP-C-20		

**Hill *Kharif* centres (Hills)**

AICRP-P-16	AICRP-P-17	AICRP-P-18	AICRP-LB-4
AICRP-C-23	AICRP-C-24	AICRP-C-13	AICRP-C-27 (Ooty only)

**Observations to be recorded:**

1. Seed wt. per plot (Kg)
2. Plant emergence (%) at 30 days after planting.
3. Foliage senescence (%) at haulms cutting
4. Incidence of LB at 10 days interval after 1<sup>st</sup> appearance of disease.
5. Incidence of any major diseases, final score.
6. Tuber rot in the plot (weight) at the time of harvesting.
7. Total and marketable tuber yield (t/ha) with specific gravity at harvest at 75 and 90 days and at senescence (75% foliage maturity).
8. Date of senescence (75% foliage maturity)

9. Total weight loss at 75 days after storage at ambient temperature.
10. Meteorological data.

**Note:**

- No spray of fungicides against late blight incidence
- Sufficient tubers should be multiplied and kept to conduct 2<sup>nd</sup> year trials (3500-4000 tubers) during the next year.
- In case of shortage of tubers, the rows and tubers/row may be adjusted appropriately.

**GENET. 7: TRIAL WITH PROCESSING HYBRIDS**

- A: Hybrids for Chips (2<sup>nd</sup> year)
- B: Hybrids for French Fries

Location : All AICRP centers (particularly of plateau region viz Bhubaneshwar, Pune, Burdwan, Dharwad, Hassan, Srinagar, Hisar)

Design : RBD

Replication : 4

Plot size : 3x3 m (6 rows of 15 tubers)

Spacing : 60 X 20 cm

Cultural practices : As recommended for the region.

**Treatments**

**7A: For Chips**

AICRP-PH-3 (dummy check)	AICRP-P-11	AICRP-C-1	AICRP-C-10 (dummy check)	AICRP-C-8
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**7B: For French Fries**

AICRP-P-4	AICRP-C-8	AICRP-C-11
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**Observations to be recorded:**

1. Seed wt. per plot (Kg)
2. Plant emergence (%) at 30 days after planting.
3. Foliage senescence (%) at haulms cutting
4. Incidence of any major diseases, final score.
5. Tuber rot in the plot (weight) at the time of harvesting.
6. Total and process grade yield (t/ha) at harvest at 60, 75, 90 days and at senescence (75% foliage maturity) **in Trial 7A** and Total and French Fry grade yield (t/ha) at harvest 110 days and at senescence (75% foliage maturity at CPRI Centres: MDP & JAL) **in Trial 7B**.
7. Date of senescence (75% foliage maturity)
8. Total weight loss 75 days after storage at ambient temperature
9. Tuber dry matter (%), chip colour and reducing sugar at 60, 75 and 90 days harvest at selected centres (Jalandhar and Modipuram). Other centres to supply tubers to Modipuram at harvest.
8. Mean Canopy Cover<sup>#</sup> at 10 days interval till senescence (75% foliage maturity) with digital camera or by Burstall & Harris (1983) method.
9. Meteorological data.

**Note:**

- An additional replication will be planted to record data on # parameter.
- Sufficient tubers should be multiplied and kept to conduct 2<sup>nd</sup> year/ on-farm trials (3500-4000 tubers) during the next year.
- In case of shortage of tubers, the rows and tubers/row may be adjusted appropriately.
- In case of shortage of tubers, the rows and tubers/row may be adjusted appropriately.

**GENET.8: ON-FARM TRIAL FOR HEAT TOLERANCE (1<sup>st</sup> year)**

Location : Bhubaneshwar, Chhindwara, Deesa, Kalyani, Raipur, Hisar, Modipuram (**Rabi crop**).  
Dharwad, Hassan & Pune (**Kharif crop**)

Plot size : 96 m<sup>2</sup> (40 rows of 20 tubers each)

Replication : 6

Spacing : 60 x 20 cm

Treatments : **AICRP-C-28**

**Controls****Rabi crop**

Center	Variety
Bhubaneshwar	: K Surya, K Khyati
Chhindwara	: K Surya, K Khyati
Deesa (Ladol)	: K Badshah, K Pukhraj
Kalyani	: K Jyoti
Raipur	: K Surya, K Khyati
Hisar (Karnal)	: K Surya, K Bahar
Modipuram	: K Bahar

**Kharif crop**

Center	Variety
Dharwad	: K Surya, K Laukar, K Himalini
Hassan	: K Surya, K Laukar, K Himalini
Pune	: K Surya, K Laukar, K Himalini

\* including the controls of the region.

Cultural practices : As recommended for the region.

**Observations to be recorded:**

1. Seed wt. per plot (Kg)
2. Plant emergence (%)
3. Plant vigor 60 days after planting (1-5 scale)
4. Foliage senescence (%) at haulms cutting.
5. Total and marketable tuber yield (t/ha) at harvest at 60, 75, 90 days and at senescence (75% foliage maturity).
6. Date of senescence (75% foliage maturity)
7. Tuber rottage in the plot (weight) at the time of harvesting
8. Total weight loss at 75 days after storage at ambient temperature
9. Measure heat tolerance index.
10. Incidence of any major diseases.
11. Tuber dry matter (%) at 60, 75 and 90 days harvest. Corresponding haulm dry wt. (%) should also be recorded. Samples of both dry tuber wt. and haulm dry wt. should be sent to Patna (person to be identified) for 'nutrient requirement estimation'.
12. Meteorological data.
13. Storage losses in heaps (at respective CPRI station)

**Note:**

- Sufficient tubers should be multiplied and kept to conduct on-farm trials (3500-4000 tubers) during the next year.
- In case of shortage of tubers, the rows and tubers/row may be adjusted appropriately.

### GENET.9: EVALUATION OF TPS POPULATION (2<sup>nd</sup> year):

Location : Patna, Jorhat, Hassan and Shillong for seedling transplant crop (2 populations)  
Design : RBD (50x10 cm)  
Plot size : 96/ m<sup>2</sup> (16 rows of 120 seedlings/row each)

#### Treatments

TPS population : AICRP-TPS-2  
Controls : AICRP-TPS-1

#### **Observations to be recorded:**

##### For seedling transplant crop

1. Seedling survival(%), 30 days after transplanting
2. Seedling vigour (30 days after transplanting) on 1-5 scale, 1=V Poor, 5=V Good.
3. Grade-wise tuber yield in 3 grades at 75 days, 90 days and at senescence (75% foliage maturity) after transplanting.
4. Date of senescence (75% foliage maturity)
5. Tuber uniformity (colour and shape, separately) on 1-5 scale 1=V Poor to 5=V Good.
6. Tuber dry matter (%) at 75 and 90 days harvest.
7. Tuber rottage in the plot (weight) at the time of harvesting
8. Total weight loss 75 days after storage at ambient temperature
9. Storage losses in heaps (at respective CPRI station).

**Note:** In case of shortage of tubers, the rows and tubers/row may be adjusted appropriately. Retain sufficient tubers at harvest for next year trial.

### GENET.10: ON-FARM TRIAL WITH HYBRIDS HAVING COMBINED RESISTANCE TO LATE BLIGHT AND CYST NEMATODES (2<sup>nd</sup> year trial)

Location : Ooty  
Plot size : 7.6 m<sup>2</sup> (5 rows of 15 tubers each)  
Spacing : 50 x 20 cm  
Cultural practices : As recommended for the region.

#### Treatments

OS/01-516, OS/01-497	K Swarna, K Neelima, K Jyoti, K Girdhari, K Himalini
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#### **Observations to be recorded:**

1. Seed wt. per plot (Kg)
2. Plant emergence (%) at 45 days after planting.
3. Foliage senescence (%) at haulms cutting
4. Incidence of late blight and cyst nematode.
5. Tuber rottage in the plot (weight) at the time of harvesting.
6. Total and marketable tuber yield (t/ha) at harvest at 75, 90, 120 days and at senescence (75% foliage maturity).
7. Date of senescence (75% foliage maturity)
8. Total weight loss after 75 days storage at ambient temperature

9. Total weight loss after 30 days in the tuber material in big heap (1 to 2 m height) covered by straw etc in field.
10. Tuber dry matter (%) at 75, 90 and 120 days harvest.
11. Meteorological data.
12. Storage losses in heaps (at respective CPRI station)

**GENET.11: VARIETAL EVALUATION TRIAL TO IDENTIFY TOP THREE PROMISING VARIETIES OF THE REGION (repeat)**

Location : All regions.  
 Plot size : 3x3 m (6 rows of 15 tubers)  
 Replication : 4  
 Design : RBD  
 Spacing : 60 x 20 cm  
 Cultural practices : As recommended for the region.

North : (T) : K Jyoti, K Bahar, K Sadabahar, K Gaurav, K Garima, K Pushkar  
 : (C) : K Khyati, K Pukhraj  
 Central : (T) : K Jyoti, K Bahar, K Badshah, K Gaurav, K Garima, K Pushkar, K Surya  
 : (C) : K Khyati, K Pukhraj, K Lauvkar  
 Eastern : (T) : K Jyoti, K Himalini, K Shailja, K Gaurav, K Garima, K Pushkar, K Lalima,  
 : (C) : K Khyati, K Pukhraj, K Ashoka  
 Plateau : (T) : K Jyoti, K Bahar, K Gaurav, K Garima, K Pushkar, K Lauvkar, K Badshah, K  
 Khyati  
 : (C) : K Pukhraj, K Surya, K Ashoka  
 Hills : K Girdhari, K Himalini, K Shailja, K Kanchan, K Megha, K Jyoti (Sprayed), K Jyoti  
 (Unsprayed)

**Observations to be recorded:**

1. Seed wt. per plot (Kg)
2. Plant emergence (%).
3. Plant vigor 60 days after planting (1-5 scale).
4. Foliage senescence (%) at haulms cutting.
5. Total and marketable tuber yield (t/ha) at harvest at 60, 75, 90 days and at senescence (75% foliage maturity).
6. Date of senescence (75% foliage maturity)
7. Tuber rottage in the plot (weight) at the time of harvesting.
8. Total weight loss at 75 days after storage at ambient temperature.
9. Incidence of any major diseases.
10. Tuber dry matter (%) at 60, 75 and 90 days.
11. #Mean Canopy Cover# at 10 days interval till senescence (75% foliage maturity) with digital camera or by Burstall & Harris (1983) method.
12. Meteorological data.

**Note:**

- An additional replication will be planted to record data on # parameter.
- Sufficient tubers of treatments and control varieties will be multiplied at Seed Preparatory Units (SPUs) located at Modipuram and Kufri for supply tubers to the AICRP centers in the plains and hills, respectively during next crop season.

## GENET.12: VARIETAL EVALUATION FOR PRODUCTION OF BABY/ SALAD POTATOES (SPECIALTY POTATO)

Location	: Bhubaneswar, Raipur, Chhindwara, Pune and Dharwad
Plot size	: 3x3 m (6 rows of 15 tubers)
Spacing	: 60 x 20 cm
Cultural practices	: As recommended for the region.
Varieties	: K Himsona, K Shailja, K. Khyati
Controls	: Recommended varieties of the region.

North	: K Khyati, K Pukhraj, K Bahar, K Sadabahar, K Pushkar & K Badshah
Central	: K Khyati, K Pukhraj, K Lauvkar, K Pushkar, K Bahar, K Badshah
Eastern	: K Khyati, K Pukhraj, K Ashoka, K Pushkar, K Jyoti
Plateau	: K Pukhraj, K Surya, K Ashoka, K Pushkar, K Jyoti, K Lauvkar
Hills	: K Girdhari, K Himalini, K Jyoti

### Observations to be recorded:

1. Seed wt. per plot (Kg)
2. Plant emergence (%)
3. Per cent baby tubers (10-25 gm; 25-50 gm and >50 gm) at different dates of harvest.
4. Total and grade-wise yield (t/ha) at harvest at 60, 75, 90 days and at senescence (75% foliage maturity).
5. Date of senescence (75% foliage maturity)
6. Organo-leptic test by about 20 volunteers at harvest at each location.
7. Tuber rottage in the plot (weight) at the time of harvesting
8. Total weight loss at 75 days after storage at ambient temperature
9. Incidence of any major diseases.
10. Tuber dry matter (%) at 60, 75 and 90 days
11. Meteorological data.

### Note:

- Sufficient tubers of treatments and control varieties will be multiplied at Seed Preparatory Units (SPUs) located at Modipuram and Kufri for supply tubers to the AICRP centers in the plains and hills, respectively during next crop season.

## GENET.13: STANDARDIZATION OF TPS TECHNOLOGY.

Location	: Pune, Hassan, Dharwad (Kharif) Patna, Gwalior and Shillong (Rabi)
Plot size	: a) 1.0 x 1.0 m nursery bed for seedling tuber production b) 3.0 x 3.0 m (6 rows of 15 tubers) for seedling tuber crop
Design	: RBD
Cultural practices	: As recommended for the region.
Varieties	: D-150, 92-PT-27 (Both parents)
Controls	: Recommended varieties of the region (ware crop only)

### Treatments

- a) For seedling tuber production: Pune, Dharwad, Gwalior and Patna (Rabi) Shillong (Spring)
  1. Brick bed method
  2. Normal nursery bed method

b) Ware potato production using seedling tubers: Pune, Hassan, Dharwad and Shillong (Kharif) Patna, Gwalior (Rabi)

c) For TPS production: Pune, Dharwad and Shillong (Kharif) Patna (Rabi)

1. Total berries produced
2. 4 berries retained/bunch
3. All flower flushes retained
4. Retaining 1<sup>st</sup> and 2<sup>nd</sup> flower flush

**Observations to be recorded:**

a) For seedling tuber production:

1. No of plant emerged/sqm
2. Seedling vigour (30 days after transplanting) on 1-5 scale, 1=V Poor, 5=V Good.
3. Grade-wise tuber yield in 3 grades at maturity.
4. Tuber uniformity (colour and shape) on 1-5 scale 1=V Poor to 5=V Good.
5. Tuber rottage in the plot (weight) at the time of harvesting
6. Total weight loss after storage at ambient temperature till planting.

b) Ware potato production using seedling tubers

1. Plant emergence (%) at 30 DAP
2. Plant vigor 40 days after planting (1-5 scale) 1=V Poor to 5=V Good.
3. Foliage senescence (%) at haulms cutting.
4. Incidence of any major diseases
5. Total and marketable tuber yield (t/ha) at senescence (75% foliage maturity).
6. Date of senescence (75% foliage maturity)
7. Tuber rottage in the plot (weight) at the time of harvesting.
8. Tuber uniformity (colour and shape) on 1-5 scale 1=V Poor to 5=V Good.
9. Tuber dry matter (%) at harvesting.
10. Organoleptic test (1-5 scale) 1=V Poor to 5=V Good.
11. Meteorological data.

c) For TPS production

1. Average berry weight (Total berries/No of berries produced per plant)
2. 100 TPS weight
3. Germination (%) in lab condition.

**GENET. 14: TRIAL WITH SPECIALTY POTATO HYBRIDS**

Locations	:	Hisar, Jalandhar, Kalyani, Kanpur, Modipuram, Pantnagar, Patna, Raipur and Srinagar
Design	:	RBD
Replications	:	3 each for 75 and 90 days crop
Plot size	:	3.0 m x 2.4 m (5 rows of 12 tubers)
Spacing	:	60 X 20 cm
Cultural practices	:	As recommended for the region.

## **Treatments**

AICRP-P-14	AICRP-C-15	K Sindhuri	K Lalit
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### **Observations to be recorded:**

1. Seed wt. per plot (Kg)
2. Plant emergence (%) at 30 days after planting.
3. Foliage senescence (%) at haulms cutting
4. Incidence of LB at 10 days interval after 1<sup>st</sup> appearance of disease.
5. Incidence of any major diseases, final score.
6. Tuber rot in the plot (weight) at the time of harvesting.
7. Total and marketable tuber yield (t/ha) with specific gravity at harvest at 75 and 90 days and at senescence (75% foliage maturity).
8. Date of senescence (75% foliage maturity)
9. Total weight loss at 75 days after storage at ambient temperature.
10. Organoleptic test (1-5 scale) 1=V Poor to 5=V Good.
11. Meteorological data.

### **Note:**

- No spray of fungicides against late blight incidence
- Sufficient tubers should be multiplied and kept to conduct 2<sup>nd</sup> year trials (3500-4000 tubers) during the next year.
- In case of shortage of tubers, the rows and tubers/row may be adjusted appropriately.

**Controls for various trials of AICRP**  
(Based on decision of AICRP Workshop 2011)

**A. For Trials with early maturing hybrids**

<u>Zone</u>	<u>Control</u>
Northern plains	AICRP-C-14, AICRP-C-17
Central plains	AICRP-C-14, AICRP-C-17, AICRP-C-16
Eastern plains	AICRP-C-14, AICRP-C-17, AICRP-C-4
Plateau region	AICRP-C-17, AICRP-C-20, AICRP-C-24

**B. For Trials with medium maturing hybrids**

<u>Zone</u>	<u>Control</u>
Northern plains	AICRP-C-6, AICRP-C-19 & K. Gaurav
Central plains	AICRP-C-6 & K. Garima
Eastern plains	AICRP-C-14, AICRP-C-17, AICRP-C-15 & K. Lalit
Plateau region	AICRP-C-17, AICRP-C-24, AICRP-C-13, AICRP-C-16

**C. For Trials in hills**

AICRP-C-23, AICRP-C-13 and AICRP-C-24

**D. For Trials with Red Cultures**

AICRP-C-15

**E. For Trials with Processing hybrids**

Early: AICRP-C-1, AICRP-C-10

Med.: AICRP-C-8,

FF: AICRP-C-11, AICRP-C-8

**Ref:**

- Lindsay Burstall and P. M. Harris (1983). The estimation of percentage light interception from leaf area index and percentage ground cover in potatoes. The Journal of Agricultural Science, 100 , pp 241-244 doi:10.1017/S0021859600032676.

## CROP PRODUCTION

### **AGRON.1: INTERCROPPING STUDIES IN POTATO.**

Locations : Raipur  
Design : RBD  
Replication : 3  
Plot-size : Gross: 3.6m x 3.6 m (5 rows of 15 plants)  
Net: 2.4m x 3.2 m

<u>Crop</u>	<u>Variety</u>	<u>Spacing</u>
Potato	K. Pukhraj	60 x 20 cm
Cluster beans	Pusa Navbahar	30 x 7.5 cm
Cabbage	Golden Acre	60 x 60 cm

#### Treatments

T1 : Sole Potato  
T2 : Sole Cluster bean  
T3 : Sole Cabbage  
T4 : Potato+ Cluster bean (1:1 ratio)  
T5 : Potato+ Cabbage (1:1 ratio)  
T6 : Potato+cluster bean (2:1 ratio)  
T7 : Potato+ Cabbage (2:1 ratio)

#### **Observations to be recorded**

- 1 Soil fertility status of the experimental plot before and after experiment (pH, organic carbon and available NPK).
- 2 Per cent emergence at 30 days after planting.
- 3 Incidence of diseases/pests.
- 4 Grade-wise yield of potato tubers (0-25g, 25-50g, 50-75g and >75g) and total yield of other crops (q/ha).
- 5 Economics of various treatments indicating the cost involved and the net gain (Rs/ha)

#### **Note:**

- (1) All calculations should be made with net plot size only.
- (2) Recommended varieties of different crops should be used and same varieties should be used during 2014-15.

### **AGRON.2: NUTRIENT REQUIREMENT OF NEWLY RELEASED POTATO CULTIVARS (Testing/validating of ASNMP).**

Locations : Bhubaneshwar, Chhindwara, Deesa, Dharwad, Dholi, Faizabad, Hassan, Hisar, Jorhat, Kalyani, Kota, Pasighat, Pune, Raipur and Srinagar  
Design : RBD  
Spacing : 60 cm x 20 cm  
Replications : 4 (Four)  
Plot size : Gross: 4.8 m x 3.4 m  
Net : 3.6 m x 3.0 m

## Treatments

### **Recently released potato Varieties:** Varieties to be tested at different AICRPP Centers

	Name of the Center	Varieties
1.	Bhubaneshwar	Kufri Surya
2.	Chhindwara	Kufri Surya
3.	Deesa	Kufri Surya
4.	Dharwad	Kufri Surya
5.	Dholi	Kufri Surya
6.	Faizabad	Kufri Surya and Kufri Sadabahar
7.	Hassan	Kufri Surya, Kufri Girdhari and Kufri Himalini
8.	Hisar	Kufri Surya and Kufri Sadabahar
9.	Jorhat	Kufri Himalini and Kufri Girdhari
10.	Kalyani	Kufri Shailja and Kufri Himalini
11.	Kota	Kufri Surya
12.	Passighat	Kufri Surya
13.	Pune	Kufri Surya
14.	Raipur	Kufri Surya
15.	Srinagar	Kufri Himalini and Kufri Girdhari

### **5 Nitrogen levels (kg/ha):**

N0: 0, N1: 75 kg/ha, N2: 150 kg/ha, N3: 225 kg/ha and N4: 300 kg/ha

### **Observations to be recorded**

1. Initial fertility status of soil (pH, organic carbon, soil texture and available N, P and K).
2. Plant emergence at 30 days.
3. Plant height and number of shoots per plant at 50 days after planting.
4. Yield of tubers in each grade (0-25g, 25-50g, 50-75g and >75g).
5. Nutrient (NPK) removal and the effect on soil fertility behavior, pH, organic carbon, available N, P and K status of soil.
6. Dry matter content of tubers (%) and tuber yield on dry weight basis (kg/ha)
7. Halum yield on dry weight basis (kg/ha)
8. Economics of various treatments indicating the cost involved and the net gain (Rs/ha).

### **Note:**

- a) All calculations should be made with Net plot size only.
- b) Soil, tuber and plant samples to be sent to Head, Division of Crop Production, CPRI, Shimla.
- c) Do not use paper tags in soil samples.

### **AGRON.3: WATER MANAGEMENT IN POTATO UNDER LOW WATER AVAILABILITY CONDITIONS.**

Locations	:	Dholi
Design	:	RBD
Spacing	:	60 cm x 20cm
Replications	:	4
Plot size	:	Gross: 4.8m x 4.0m Net : 3.6m x 3.6m
Varieties	:	Recommended varieties for the area.

**Treatments** (Combinations of irrigation schedules and surface mulching)

**Irrigation schedule**

I<sub>1</sub>: Irrigation at 20 mm CPE  
I<sub>2</sub>: Irrigations at 25 mm CPE  
I<sub>3</sub>: Irrigations at 30 mm CPE  
I<sub>4</sub>: Irrigations at 35 mm CPE  
I<sub>5</sub>: Irrigation at 40 mm CPE  
I<sub>6</sub>: Irrigations at stolon formation, tuber initiation and tuber development stages of varieties used.

**Mulching**

M1: No mulch  
X M2: Mulching with paddy straw or any other locally available organic mulch material @ 5t/ha

**NB:** Recommended fertilizers will be applied and 4-5 cm depth of irrigation depending upon soil texture will be applied as per treatments in all three critical stages.

**Observations to be recorded**

1. Initial fertility status of soil (pH, organic carbon and available N, P and K).
2. Plant emergence at 30 days.
3. Plant height and number of shoots per plant at 50 days after planting.
4. Yield of tubers in each grade (0-25g, 25-50g, 50-75g and >75g).
5. Nutrient (NPK) removal by crop and the effect on soil fertility behavior, pH, organic carbon, available N, P and K status of soil.
6. Amount of water applied in each irrigation under different treatments.
7. Water use efficiency by each treatment under different treatments.
8. Periodical soil moisture content from 0 to 45 cm depth in 15 cm depth-wise interval from different treatments.
9. Data on black scurf and common scab are to be recorded at harvesting.
10. Economics of all the treatments.

**AGRON. 4: PERFORMANCE OF DIFFERENT POTATO CULTIVARS UNDER DRIP IRRIGATION.**

Locations : Deesa

**DEESA**

**SPLIT APPLICATION OF N AND K THROUGH DRIP FERTIGATION IN POTATO**

Spacing : Paired row planting (75 cm between pair and 20 cm between two Plants)  
Plot-size : Gross : 4.0 x 4.0 m; Net : 3.6 x 3.6 m.  
Design : Split-plot  
Treatments : 9

Main plot: Fertigation (N and K level):

- T1: 25% basal + 75% through fertigation at 23, 30, 37, 43, 51, 58 and 65 days after planting  
T2: 50% basal + 50% through fertigation at 23, 30, 37, 43, 51, 58 and 65 days after planting  
T3: Conventional method of planting and irrigation  
T4: 100% through fertigation at 9,16, 23, 30, 37, 43, 51, 58 and 65 days after planting

Sub-plot: Varieties

V1: Kufri Badshah  
V2: Kufri Pukhraj  
V3: Kufri Pushkar

#### **Observations to be recorded**

1. Initial fertility status of soil (pH, organic carbon and available N, P and K).
2. Plant emergence at 30 days.
3. Plant height and number of shoots per plant at 50 days after planting.
4. Yield of tubers in each grade (0-25g, 25-50g, 50-75g and 75g).
5. Nutrient (NPK) removal by crop and the effect on soil fertility behavior, pH, organic carbon, available N, P and K status of soil.
6. Amount of water applied in each irrigation under different treatments.
7. Water use efficiency by each treatment.
8. Black scurf incidence by each treatment.
9. Economics of all the treatments.

#### **AGRON.5: DEVELOP SITE SPECIFIC NPK REQUIREMENTS**

Locations: Bhubaneshwar, Chhindwara, Deesa, Dharwad, Dholi, Faizabad, Hassan, Hisar, Jalandhar, Jorhat, Kalyani, Kanpur, Kota, Modipuram, Pantnagar, Pasighat, Pune, Patna, Raipur, Srinagar and Shillong (Dharwad and Hassan will conduct this experiment in *kharif*)

Replications : Four  
Design : RBD  
Spacing : 60 cm x 20cm  
Replications : 4 (Four)  
Plot size : Gross: 4.8m x 4.0m  
Net: 3.6m x 3.6m

#### **Treatments of N, P, and K fertilizers**

T1 50% RDF of NPK  
T2 100% RDF of NPK  
T3 150% RDF of NPK  
T4 Without N fertilizer (PK)  
T5 Without P (NK)  
T6 Without K (NP)  
T7 Without NPK (Absolute control)

#### **Observations to be recorded:**

1. Yield of tuber
2. Dry matter yield of Potato tuber and haulm
3. Concentration of NPK in haulm and tuber
4. Nutrients uptake by potato and haulm
5. Economics

**Note:** The Initial and final soil samples as well as plant samples may be sent to Dr Manoj Kumar, Head, CPRS, Patna for analysis and compilation of the results.

## **AGRON.6: WEED MANAGEMENT IN POTATO**

Locations: Bhubaneshwar, Chhindwara, Deesa, Dharwad, Dholi, Faizabad, Hassan, Hisar, Jorhat, Kalyani, Kanpur, Kota, Pantnagar, Pasighat, Pune, Raipur, Srinagar and Shillong (Dharwad and Hassan will conduct this experiment in *kharif*)

Replications : 4  
Design : RBD  
Spacing : 60 cm x 20cm  
Replications : 4 (Four)  
Plot size : Gross: 4.8m x 4.0m  
Net: 3.6m x 3.6m

### **Treatments**

T1 : Weedy check  
T2 : Weed free  
T3 : Hand weeding at 30 days and weed free upto maturity  
T4 : Hand weeding at 40 days and weed free upto maturity  
T5 : Hand weeding at 50 days and weed free upto maturity  
T6 : Herbicides (Metribuzin @ 0.75 kg/ha) pre-emergence  
T7 : Herbicides (Metribuzin @ 0.75 kg/ha) as post emergence at 10% of plant emergence

**Note:** Herbicides and dose can be changed by the center but communicate to the PIs and PC Unit)

### **Observation to be recorded**

1. Name and number of (dicot and monocot) weeds
2. Tuber yield (t/ha)
3. % yield loss by most prevalent weeds
4. Dry matter production of weed at 30, 50 and 60 DAP
5. Concentration of NPK in haulm, tuber and weeds
6. Nutrients uptake by potato crop
7. Nutrients uptake by weeds
8. Total nutrient uptake
9. Economics

**Note:** One trial at experimental farm and 2 sites on farmer's fields in potato growing pockets

## **AGRON 7: OPTIMIZING PHOSPHORUS REQUIREMENTS OF POTATO UNDER CURRENT SCENARIO OF P USE BY THE FARMERS.**

Locations : Farmers' field at Faizabad, Dholi, Gwalior, Jalandhar, Kanpur and Pantnagar  
Design : RBD  
Replications : 4  
Plot-size : Minimum 5 rows and 15 plants/row  
Variety : Recommended of the region (most popular variety of the region may be tried)

### **Treatments**

T1 : Farmer's practice  
T2 : Zero P ( control)  
T3 : 30 kg P<sub>2</sub>O<sub>5</sub>/ha

- T4 : 60 kg P<sub>2</sub>O<sub>5</sub>/ha  
T5 : 90 kg P<sub>2</sub>O<sub>5</sub>/ha  
T6 : 120 kg P<sub>2</sub>O<sub>5</sub>/ha

**Observations to be recorded:**

1. Farmers' practice must be defined and reported.
2. Soil fertility status of the experimental field before and after experiment (pH, soil texture, organic carbon, EC and available NPK).
3. Dry matter content and nutrient composition of manure.
4. Final emergence count.
5. Graded and total tuber number and yield (0-25g, 25-50g, 50-75g and >75g).
6. NPK uptake by tubers.
7. Economics of various treatments indicating the cost involved and the net gain (Rs/ha).

**Note:**

1. P to be applied as DAP and balance N requirement to be met through urea.
2. In T2 to T6, recommended NK + FYM should be applied.

**AGRON 8: ROLE OF BORON IN REDUCING TUBER CRACKING IN PROCESSING VARIETY KUFRI CHIPSONA-3**

Locations	:	Bhubaneshwar, Chhindwara, Deesa, Kalyani, Kota and Raipur (Dharwad and Hassan will conduct this experiment in <i>kharif</i> )
Design	:	RBD
Replications	:	4
Plot-size	:	Minimum 5 rows and 15 plants/row
Variety	:	Kufri Chipsona-3

**Treatments (No FYM may be applied in all the treatments)**

- T1 : RDF of NPK only  
T2 : RDF of NPK+2.0 kg B/ha as soil application  
T3 : RDF of NPK+0.1% boric acid as foliar application at 40 DAP  
T4 : RDF of NPK+0.1% boric acid as foliar application in two equal splits at 40 and 60 DAP  
T5 : RDF of NPK + 0.1% boric acid as foliar application in three times at 40, 50 and 60 DAP.

**Observations to be recorded:**

1. Soil fertility status of the experimental field before and after experiment (pH, soil texture, organic carbon, EC and available NPK and B).
2. Final emergence count.
3. Graded and total tuber (including cracked) number and yield (0-40g, 40-100g, 100-150g and >150g) per plot.
4. Number and yield of cracked tubers/plot.
5. Dry matter content of tubers (%) and tuber yield on dry weight basis (kg/ha)
6. Halum yield on dry weight basis (kg/ha)
7. Economics of various treatments indicating the cost involved and the net gain (Rs/ha).

**Note:**

- a) B to be applied as sodium tetraborate. Amount to be calculated to supply 2 kg B/ha.
- a) Soil, tuber and plant samples to be sent to Head, Division of Soil Science, IHR, Bangalore.
- b) Do not use paper tags in soil samples.

## **AGRON 9: RESPONSE OF POTATO TO ZINC APPLICATION**

Locations	:	All centers
Design	:	RBD
Replications (Min.)	:	4
Plot-size (Min.)	:	Minimum 5 rows and 15 plants/row
Variety	:	Recommended of the region (most popular variety of the region may be tried)

### **Treatments (No FYM may be applied in all the treatments)**

T1	:	RDF of NPK
T2	:	RDF of NPK + 1.5kg Zn/ha
T3	:	RDF of NPK + 3.0 kg Zn/ha
T4	:	RDF of NPK + 4.5 kg Zn/ha
T5	:	RDF of NPK + 6.0 kg Zn/ha

### **Observations to be recorded:**

1. Soil fertility status of the experimental field before and after experiment (pH, soil texture, organic carbon, EC and available NPK and Zn).
2. Final emergence count.
3. Graded and total tuber number and yield (0-25g, 25-50g, 50-75g and >75g) per plot.
4. Dry matter content of tubers (%) and tuber yield on dry weight basis (kg/ha)
5. Halum yield on dry weight basis (kg/ha)
6. Economics of various treatments indicating the cost involved and the net gain (Rs/ha).

### **Note:**

- a) Zinc to be applied as zinc sulphate.
- b) Soil, tuber and plant samples to be sent to Head, Division of Soil Science, IHR, Bangaluru.
- c) Do not use paper tags in soil samples.

## **AGRON 10: EVALUATION OF POTATO - TRANSPLANTED ONION SEQUENCE.**

Locations	:	Faizabad, Patna and Kalyani
Design	:	RBD
Replications (Min.)	:	4
Plot-size (Min.)	:	Minimum 5 rows and 15 plants/row
Variety	:	Recommended and popular of the region.

Both the crops to be raised with the recommended package of practices.

### **Treatments: combinations of planting and harvesting dates of potato**

Dates of planting	:	3 (optimum, 10 days before and 10 days after optimum)
Dates of harvesting	:	2 (80 and 90 days after planting)

**Onion is to be transplanted immediately after harvesting of potato.**

**Observations to be recorded:**

1. Final emergence (%) of both the crops.
2. Grade-wise yield of potato tubers (0-25g, 25-50g, 50-75g and >75g) and total yield of onion.
3. Dry matter content and nutrient composition of manure.
4. NPK uptake by potato and onion.
5. Economics of various treatments indicating the cost involved and the net gain (Rs/ha)

**Note:** Onion and potato will be raised under standard package of practices except for date of planting.

**AGRON 11: EFFECT OF DRIP FERTIGATION ON GROWTH AND YIELD OF POTATO.**

Locations	:	Hisar
Design	:	RBD
Replications (Min.)	:	4
Plot-size (Min.)	:	50 m <sup>2</sup>
Variety	:	Recommended and popular of the region.

**Treatments:** N doses (%) of recommended

- T1 : 60%
- T2 : 80%
- T3 : 100%
- T4 : 120%
- T5 : 140%
- T6 : RDF N as basal dose in Furrow irrigation

-- PK should be applied as basal, as recommended.

-- N should be applied 50% as basal and 50% through fertigation in treatments T1 to T5 in 6 equal splits at weekly interval, starting from 21 days of planting.

**Observations to be recorded:**

1. Soil fertility status of the experimental field before and after experiment (pH, soil texture, organic carbon, EC and available NPK).
2. Dry matter content and nutrient composition of manure.
3. Final emergence count.
4. Graded and total tuber number and yield (0-25g, 25-50g, 50-75g and >75g) per plot.
5. NPK uptake by potato.
6. weekly CPE
7. Economics of various treatments indicating the cost involved and the net gain (Rs/ha).

**AGRON. 12: DEVELOPMENT OF POTATO BASED ORGANIC FARMING SYSTEM FOR POTATO**

Locations	:	Dholi, Faizabad, Hisar, Jorhat and Pasighat
Design	:	RBD
Replications	:	4
Plot size	:	Gross : 4.8m x 4.0m Net : 3.6m x 3.6m
<b>Cropping sequence</b>	:	Paddy-Potato OR Maize-Potato [Any sequence as per importance for the region]

**Varieties** : **Potato:** Promising varieties for OF: K Khyati, K garima, K Anand, K Pushkar, K Bahar, K Chipsona-3. Likewise recommended varieties of sequential crop

**Treatments**

- T1 : Absolute control
- T2 : Inorganic practices standard technology
- T3 : Crop residue based: compositing of available cheaper crop/weed residues (like NADEP method) + Crop residue incorporation (Main crop/catch/green manuring/bio-fumigation crop) + biofertilizer (*Azotobacter* and Phosphobacteria) + microbial culture to decompose crop residues
- T4 : T3 + FYM @ 25 t/ha
- T5 : T3 + Vermicompost 7.5 t/ha

**Observations to be recorded**

1. Initial fertility status of the experimental plot (pH, organic carbon & available N, P and K) and fertility status at annual basis.
2. Crop emergence/growth parameters.
3. Yield attributes and yield i.e tubers marketable and non- marketable (<25 g and >25 g) potato of and sequential crops.
4. Nutrient (NPK) removal by component crops and nutrient balance sheet.
5. Quality parameters of economics produce
6. Economics of organic farming, variable cost, gross and net return and B:C ratio.

**Notes**

- Experiments are to be laid out on fixed plots. Organic farming system treatments are to be managed as per NPOP, Ministry of Commerce, GOI, guidelines.
- Quantity of organics/residues should be constant in treatments and recorded.
- Locally available organic inputs should be used to make organic farming economically feasible.

## CROP PROTECTION

### **PATHOLOGY**

**PATH.1:**        **MONITORING OF LATE BLIGHT AND A2 MATING TYPE OF *PHYTOPHTHORA INFESTANS* IN STANDING CROP AND TUBERS AT HARVEST AND AFTER COLD STORAGE.**

Locations:        Faizabad, Hassan\*, Jalandhar, Jorhat, Kalyani, Kanpur, Kota, Ootacamund, Pantnagar, Pasighat, Patna, Pune, Shillong and Srinagar.

**Experimental details:** Plant an area of 0.1 ha with K Chandramukhi/K Bahar or any other recommended late blight susceptible variety at three different dates at each center at an interval of 15 days (early, optimum and late). The crop is not to be sprayed with any fungicide.

**\* One planting date at optimum time.**

#### **Observations to be recorded**

1. Daily metrological data of the year to be uploaded in INDO-BLIGHTCAST model for validation.
2. Use of thermo-hygrographs is important in such studies to find out correlation between late blight appearance and weather data. The graphs may be sent to the Head, Plant Protection, Central Potato Research Institute, Shimla-171 001 (HP) under intimation to the Project Coordinator along with the report.
3. Date of first appearance of disease in the crop.
4. Diseases severity incidence and intensity of late blight in foliage at 7, 14, 21 and 28 days after disease appearance.
5. Incidence of disease in tubers at harvest.
6. Incidence of disease in tubers after cold storage.
7. Send late blight inoculated/infected tuber samples to the Head, Division of Plant Protection, CPRI, Shimla for determining A2 mating type.

**Important:** Tubers showing late blight infection at harvest may be discarded and only apparently healthy tubers sufficient to plant 0.3 ha next year to be cold stored.

**PATH.2:**        **SURVEILLANCE OF IMPORTANT POTATO PESTS IN THE REGION (PEST CAPTURE PLOTS)**

Locations:        All centers (except Kufri and Ranichauri).

**Experimental details:** Plant two sets on an area of 10 m<sup>2</sup> in hills and 20 m<sup>2</sup> in plains of each variety. Use 4-5 commercial varieties of the region. One set is not to be sprayed with any pesticide. Another set may be sprayed against late blight or prevalent devastating pest of the area for allowing the crop to remain green till maturity so that appearance of other pests can be recorded. These plots are used to monitor the appearance of new disease or pest, if any, over the years. The data on incidence of diseases and pests will be recorded in the farmers' fields which can represent the region.

#### **Observations to be recorded**

1. Incidence and intensity of diseases and insect pests (all foliar diseases/wilts/insect pests etc.) occurring on standing crop.

2. Incidence of soil and tuber borne diseases/insect pests recorded at harvest. There should not be any other category. If please specify the insect.
3. For virus only mosaic and leaf roll may be recorded. The infected leaf samples embedded in blotting sheets may be sent to Head, Plant Protection, CPRI, Shimla. While recording the viruses the source of seed should be noted.
4. The common scab incidence should be separated as russet and pitted types.

**PATH.3: SCHEDULING OF FUNGICIDE APPLICATION FOR THE MANAGEMENT OF LATE BLIGHT**

Locations : Hassan, Pantnagar, Patna, Shillong and Srinagar.

Replications : 4 (Four)

**Treatments**

- T1 Prophylactic spray (just at the time of canopy closure) with mancozeb @ 0.2% followed by two more sprays at weekly intervals.
- T2 Prophylactic spray (just at the time of canopy closure) with mancozeb followed by three more sprays at weekly intervals.
- T3 Prophylactic spray (just at the time of canopy closure) with mancozeb followed by cymoxanil + mancozeb @ 0.3% and one more spray with mancozeb.
- T4 Prophylactic spray (just at the time of canopy closure) with mancozeb followed by Fenamidone + mancozeb (Secure/Sectin 50% WG) @ 0.3% and one more spray with mancozeb.
- T5 Prophylactic spray (just at the time of canopy closure) with mancozeb followed by dimethomorph 0.2% + Mancozeb @ 0.3% followed by mancozeb.
- T6 Control.

Varieties: Use one resistant and one susceptible variety of the region.

\* If disease presence is high on additional spray may be given as per treatment and no of spray communicated in the results.

**Observations to be recorded**

1. First appearance of late blight.
2. Further, disease build up at weekly intervals.
3. Yield t/ha.
4. Late blight in tubers (replication-wise no. of tubers and weight) at harvest.

**PATH.4: STUDIES ON RATE OF DEGENERATION**

Locations : Deesa, Raipur, Hassan, Hisar, Kalyani and Pune

Half acre is to be planted with breeder’s seed of predominant variety of the region under low aphid periods following “Seed Plot Technique”. The produce is to be cold stored and planted in next season. Observations are to be recorded on degeneration. This is to be continued for 3-4 years as given below:

2011-2012 Crop season:	Plant Breeder’s Seed received from CPRI. Cold store produce.
2011-2012 Crop season:	Plant cold stored produce of previous year. Cold store produce.
2012-2013 Crop season:	Plant cold stored produce of previous year. Cold store produce.

2013-2014 Crop season: Plant cold stored produce of previous year. Cold store produce.  
2014-2015 Crop season: Plant cold stored produce of previous year. Cold store produce.

**Note:** One plot to be planted with fresh breeder seed every year.

### Varieties

Deesa: Kufri Badshah  
Raipur: Kufri Surya  
Hassan: Kufri Surya  
Hisar: Kufri Bahar  
Kalyani: Kufri Jyoti  
Pune: Kufri Surya

### Observations to be recorded

1. Plant emergence after 30 days and 40 days.
2. Incidence of viral diseases (Mild Mosaic, Severe Mosaic and PLRV) thrice during the crop season i.e. 50, 65, and 80 days after planting.
3. Incidence of tuber borne diseases (black scurf, common scab (Russet and Pitted), brown rot in tubers) [% incidence].
4. Grade-wise yield data (t/ha). (0-25g, 25-50g, 50-75g and >75g).
5. Dates of planting/haulm cutting/harvest.
6. The infected leaf samples embedded in blotting sheets may be sent to Head, Plant Protection, CPRI, Shimla.

### **PATH. 5: EVALUATION OF VARIETIES FOR RESISTANCE AGAINST POTATO APICAL LEAF CURL VIRUS**

Location : Deesa, Hisar and Kota  
Design : RBD  
Replication : 3  
Spacing : 60 X 20 cm  
Plot size : 3.0 m x 2.4 m  
Cultural practices & varieties : As recommended for the area

### Treatments/Varieties

1. Kufri Gaurav
2. Kufri Chipsona-4
3. Kufri Garima
4. Kufri Pukhraj
5. Kufri Bahar
6. Kufri Pushkar
7. Kufri Sutlej
8. Kufri Surya
9. Kufri Sadabahar
10. Kufri Khyati

### Observations to be recorded:

1. Plant emergence (%) at 30 days after planting.
2. Incidence of Potato Apical Leaf Curl Disease, final score
3. Incidence of any other major diseases, final score

4. White flies at 40, 50 and 60 days
5. Diseases indices at 40, 50 and 60 days
6. Total and marketable tuber yield (t/ha)

**\* The infected samples may be sent to Head, Plant Protection, CPRI, Shimla for confirmation.**

**PATH. 6: EVALUATION OF VARIETIES FOR RESISTANCE AGAINST STEM NECROSIS DISEASE**

Location	:	Chhindwara, Deesa, Gwalior and Kota
Design	:	RBD
Replication	:	3
Spacing	:	60 X 20 cm
Plot size	:	3.0 m x 2.4 m
Cultural practices & varieties	:	As recommended for the area

**Treatments/Varieties**

1. Kufri Gaurav
2. Kufri Chipsona-4
3. Kufri Garima
4. Kufri Pukhraj
5. Kufri Bahar
6. Kufri Pushkar
7. Kufri Sutlej
8. Kufri Surya
9. Kufri Sadabahar
10. Kufri Khyati
11. Kufri Anand
12. Kufri Sindhuri

**Observations to be recorded:**

1. Plant emergence (%) at 30 days after planting.
2. Incidence of Stem necrosis, final score
3. Incidence of any other major diseases, final score
4. Thrips population/5 plant at 40, 50 and 60 days
5. Diseases indices at 40, 50 and 60 days
6. Total and marketable tuber yield (t/ha).

**\* The infected samples may be sent to Head, Plant Protection, CPRI, Shimla for confirmation.**

**PATH. 7: MANAGEMENT OF EARLY BLIGHT**

Locations	:	Bhubaneswar, Deesa, Pune and Raipur
Design	:	RBD
Replication	:	4
Spacing	:	60 x 30 cm
Gross plot size	:	6 sq m (5 rows of 10 tubers each)

**Treatments**

- T1 : Control  
 T2 : Three sprays of mancozeb 75WP (0.25%) at 10 days interval\*

- T3 : Three sprays of chlorothalonil 75WP (0.25%) at 10 days interval  
 T4 : Three sprays of hexaconazole 5EC (0.05%) at 10 days interval  
 T5 : First spray of mancozeb 75WP (0.25%), second spray of hexaconazole 5EC (0.05%) and third spray of mancozeb 75WP (0.25%) at 10 days interval  
 T6 : First spray of chlorothalonil 75WP (0.25%), second spray of hexaconazole 5EC (0.05%) and third spray of chlorothalonil 75WP (0.25%) at 10 days interval

**\* Start spraying with first appearance of disease**

**Observations to be recorded:**

1. Incidence and disease severity at 10 days interval
2. Yield at harvest

**PATH. 8: ESTIMATION OF POST HARVEST LOSSES IN POTATO**

**Locations :** All centers

**Observations to be recorded**

**Survey of the losses at different stages as below:**

1. Losses during removal from cold store/country store to planting
2. Losses during harvesting till cold storage (Harvesting → heap making → cold storage)
3. Losses in cold store/country store
4. Losses during disposal (whole saler → retailer → consumer)

**The survey may be conducted at a minimum of 3 sites as per schedule given below.**

**ALL INDIA COORDINATED RESEARCH PROJECT ON POTATO  
 ICAR-CENTRAL POTATO RESEARCH INSTITUTE, SHIMLA-171001  
 (INDIAN COUNCIL OF AGRICULTURAL RESEARCH)**

**Sample Survey for Assessment of Harvest and Post Harvest Losses in Potato  
Losses during harvesting, heap making and left over produce**

**A. Identification:**

S. No.	Particulars	
i	Location (Lat. & Long.)	
ii	State	
iii	District	
iv	Tehsil/Taluk	
v	Block/Mandal	
vi	Village	
vii	Name of the farmer	
viii	Total land holding (ha)	
ix	Area under potato	
x	Date of visit	

**B. Details of potato crop grown by farmer:**

S. No.	Particulars			
i	Variety			

ii	Purpose (seed/ware crop)			
iii	Area under each variety			
iv	Date of planting			
v	Date of harvesting/ heaping			
vi	Method of harvesting			

**C. Losses due to left over of produce from randomly selected plots (5x5m):**

S. No	Particulars	Total wt. in a plot (kg)	Diseased (kg)	Cut/crack (kg)	Bruised (kg)
i	Plot 1				
ii	Plot 2				
iii	Plot 3				
iv	Average wt (kg)				
v	Wt. of good & poor quality potato				

**D. Losses during heaping**

S. No.	Particulars	Total sample wt. (kg)	Diseased(kg)	Cut/crack (kg)	Bruised (kg)
i	Sample 1				
ii	Sample 2				
iii	Sample 3				
iv	Average wt (kg)				
v	Wt. of good& poor quality potato				
vi	Address of cold store				
vii	Date of produce sent to cold store				
viii	Probable date/months of produce taken out from cold store				

**PATH. 9: MANAGEMENT OF BACTERIAL WILT OF POTATO**

Locations : Hassan  
 Design : RBD  
 Replications : Four (4)  
 Plot size : 3m x 2m (5 rows of 10 tubers each)

**Treatments**

Treatment details	Source
T1 : Soil application of <i>Bacillus megaterium</i> @ 5 kg/ha	NBAII, Hebbal, Bangaluru
T2 : Furrow application of <i>Bacillus megaterium</i> @ 5 kg/ha	NBAII, Hebbal, Bangaluru
T3 : Streptomycin sulphate 0.5g/lit in furrow drenching	
T4 : Soil application of <i>Pseudomonas fluorescens</i> @ 5 kg/ha	IIHR, Hesaragatta, Bangaluru
T5 : Bacterinasak (2 Bromo-2 Nitro Propane-1,3,Diol) 0.5g/lit for soil drenching	
T6 : Control	

**Observations to be recorded**

1. Germination (%).
2. Bacterial wilt incidence (%).
3. Tuber infection (%) at harvest to be observed by cutting of tuber.
4. Root knot nematode population before the treatment and at harvest.

## **PATH. 10: MANAGEMENT OF LATE BLIGHT BY USING LEACHATES, BOTANICALS OIL AND BIO AGENTS**

Locations : Hassan  
Design : RBD  
Replications : Four (4)  
Plot size : 3m x 2m (5 rows of 10 tubers each)

### **Treatments**

T1 : Pongamia cake leachates @ 10g/lt  
T2 : Pongamia cake leachates @ 15g/lt  
T3 : Pongamia cake leachates @ 20g/lt  
T4 : Neem cake leachates @ 10g/lt  
T5 : Neem cake leachates @ 15g/lt  
T6 : Neem cake leachates @ 20g/lt  
T7 : Pongamia cake leachates @ 10g/lt + mancozeb @ 2.5g  
T8 : Neem cake leachates @ 20g/lt + mancozeb @ 2.5g  
T9 : Pongamia oil  
T10 : Neem oil  
T11 : Silicon oil  
T12 : Mancozeb @ 0.25%  
T13 : Prophylactic spray (just at the time of canopy closure) with mancozeb followed by cymoxanil + mancozeb @ 0.3% and one more spray with mancozeb  
T14 : Control

### **Observations to be recorded**

1. First appearance of late blight.
2. Further, diseases build up at weekly intervals.
3. Yield t/ha.
4. Late blight in tubers (replication-wise no. of tubers and weight) at harvest.

### **Note:**

Need based spray after canopy closure depending upon diseases pressure and weather condition (Minimum 4 spray)

## **PATH.11: MANAGEMENT OF COMMON SCAB**

Locations : Faizabad, Jalandhar, Kanpur, Modipuram and Patna  
Design : RBD  
Replications : Four (4)  
Plot size : 3m x 2m (5 rows of 10 tubers each)

### **Treatments**

T1 : Untreated diseased tubers (Control)  
T2 : Tuber dip treatment with 3% boric acid for 20 minutes before storage  
T3 : Biofumigation by incorporating one month old Indian Mustard crop (seed rate 5 kg/ ha) just before the planting of potato crop

- T4 : T3 + compost culture to decompose Biofumigant  
T5 : T3 + Tuber dip treatment with 1.5% boric acid for 20 minutes before storage  
T6 : Pyrites @ 2.0 t/ha (soil application)  
T7 : T3 + Pyrites @ 2.0 t/ha

**Varieties: Most common variety of the region**

**Note:** Common scab infected (adequately infected) tubers to be used in the experiment.

**Observations to be recorded**

1. Percent disease incidence (number of tubers infected by common scab).
2. Percent disease index (tuber surface area covered by common scab) following standard methods.

## **ENTOMOLOGY**

### **ENT.1: MONITORING OF APHIDS, *Myzus persicae* AND *Aphis gossypii* IN UNSPRAYED POTATO CROP.**

Locations : All AICRP centers (except Kufri and Ranichauri)  
Plot size : 400 m<sup>2</sup>  
Variety : Recommended for the region

#### **Observations to be recorded**

1. Aphid population per 100 compound leaves at weekly interval soon after the plant emergence till maturity.
2. Weather data i.e., Minimum and Maximum temperature, relative humidity and rainfall.
3. Aphid transmitted virus incidence (visual symptoms and random ELISA test).

#### **Note:**

1. Do not spray pesticide. Record whiteflies population wherever, it is a problem.
2. Samples may be sent to Director, NBAII, Bengaluru and Head, Plant Protection, CPRI, Shimla
3. Planting schedule should be followed as per seed crop.

### **ENT.2: MANAGEMENT OF VECTORS**

Locations : Hisar, Kalyani, Modipuram, Patna and Gwalior  
Date of planting : 10 days earlier than optimum planting time  
Replications : Four  
Plot size : 3 m X 2 m (5 rows of 10 tubers each)  
Design : RBD

#### **Treatments**

- T1 : Control (no pesticide applications).  
T2 : Foliar spray of spiromesifen @96g a.i./ha at the time of whitefly appearance + second spray with thiamethoxam 25WG @125g a.i./ha after 15 days  
T3 : One foliar sprays of thiacloprid 72gm a.i./ha at aphid (*M. persicae*) appearance  
T4 : One foliar spray of thiacloprid 72gm a.i./ha mixed with summer oil@2ml/lit at aphid (*M. persicae*) appearance  
T5 : Two foliar spray of thiacloprid 72gm a.i./ha at 7 days interval starting from aphid (*M. persicae*) appearance  
T6 : T5 + Summer oil @2ml/lit of water at 7 days interval starting from at aphid (*M. persicae*) appearance  
T7 : Three foliar spray of thiacloprid 72gm a.i./ha at 7 days interval starting from aphid (*M. persicae*) appearance  
T8 : T7 + Summer oil @2ml/lit of water at 7 days interval starting from at aphid (*M. persicae*) appearance  
T9 : Three foliar sprays of Summer oil @2ml/lit of water at 7 days interval

Variety : Recommended variety of the area (Breeders' Seed)

#### **Observations to be recorded**

1. Population of Vectors (aphids, whitefly, thrips) before and after the spray at weekly interval on 5 randomly selected plants/plot/treatment/replication.

2. Incidence of apical leaf curl/PLRV/PVY (to be recorded) at 30 days after planting and at 60% senescence.
3. Meteorological data to be recorded throughout the crop period.
4. Yield data to be recorded at normal harvesting time.

### **ENT.3: MANAGEMENT OF SUCKING PEST**

Locations	:	Bhubaneshwar, Chhindwara, Pune and Raipur
Date of planting	:	10 days earlier than optimum planting time
Replications	:	Four
Plot size	:	3 m X 2 m (5 rows of 10 tubers each)
Design	:	RBD

#### **Treatments**

- T1 : Control (no pesticide applications).
- T2 : Foliar spray of spiromesifen @96g a.i./ha at the time of whitefly appearance + second spray with thiamethoxam 25WG @125g a.i./ha after 15 days
- T3 : One foliar sprays of thiacloprid 72gm a.i./ha at aphid (*M. persicae*) appearance
- T4 : One foliar spray of thiacloprid 72gm a.i./ha mixed with summer oil@2ml/lit at aphid (*M. persicae*) appearance
- T5 : Two foliar spray of thiacloprid 72gm a.i./ha at 7 days interval starting from aphid (*M. persicae*) appearance
- T6 : T5 + Summer oil @2ml/lit of water at 7 days interval starting from at aphid (*M. persicae*) appearance
- T7 : Three foliar spray of thiacloprid 72gm a.i./ha at 7 days interval starting from aphid (*M. persicae*) appearance
- T8 : T7 + Summer oil @2ml/lit of water at 7 days interval starting from at aphid (*M. persicae*) appearance
- T9 : Three foliar sprays of Summer oil @2ml/lit of water at 7 days interval

Variety : Recommended variety of the area (Breeders' Seed)

#### **Observations to be recorded**

1. Population of sucking pests before and after the spray at weekly interval on 5 randomly selected plants/plot/treatment/replication.
2. Meteorological data to be recorded throughout the crop period.
3. Yield data to be recorded at normal harvesting time.

### **ENT.4: MANAGEMENT OF MITES**

Locations	:	Modipuram, Hassan, Pune
Replication	:	Five
Plot size	:	3 m X 2 m (5 rows of 10 tubers each)
Design	:	RBD
Variety	:	Recommended variety of the area

#### **Treatments**

- T1 : Control
- T2 : Spray the crop with wettable sulphur @ 4 g/litre of water at the appearance of mites
- T3 : Spray the crop with Emamectin benzoate 5 SG 50g a.i./ha at the appearance of mites
- T4 : Spray the crop with spiromesifen 240 SC @ 48g a.i./ha at the time of appearance of mites

- T5 : Foliar spray with Emamectin benzoate 5 SG 50g a.i./ha at the appearance of mites and second spray with spiromesifen 240 SC @ 48g a.i./ha after 15 days
- T6 : Spray the crop with Abamectin benzoate 1.9 EC @ 12 ml a.i./ha at the appearance of mites
- T7 : Spray the crop with Abamectin benzoate 1.9 EC @ 12 ml a.i./ha at the appearance of mites and second spray with spiromesifen 240 SC @ 48g a.i./ha after 15 days

#### **Observations to be recorded**

1. Mite incidence/treatment/replication on 10 leaves per plot at weekly interval with the first observation before first spray.
2. Meteorological data throughout the crop period to work out the correlation with mite incidence.
3. Yield/treatment/replication at normal harvesting time.

#### **ENT 5: BIOMANAGEMENT OF POTATO CYST NEMATODES**

Location	:	Ooty (Multilocational trials to be conducted in farmers' fields)
Replications	:	4
Plot size	:	2.4 x 2.4m
Design	:	RBD
Variety	:	Kufri Jyoti

#### **Treatments**

- T1 : *Paecilomyces lilacinus* @ 20 kg/ha talc formulation (10<sup>8</sup> spores/g)
- T2 : *Pochonia chlamydosporia* @ 20kg/ha talc formulation (10<sup>8</sup> spores/g)
- T3 : *Trichoderma viride* @ 20kg/ha talc formulation (10<sup>8</sup> spores/g)
- T4 : *Pseudomonas fluorescens* 20kg/ha talc formulation (10<sup>9</sup> cfu/g)
- T5 : Carbofuran @ 2 kg a.i./ha
- T6 : Untreated control

#### **Observations to be recorded**

##### **Nematode:**

1. Initial cyst population in soil before planting
2. Final cyst population in soil after harvest
3. Number of eggs and juveniles per cyst
4. Percent reduction in cyst population in treated plants

##### **Plant:**

1. Per cent germination
2. Plant growth parameters
3. Yield/plot (t/ha)

**ALL INDIA COORDINATED RESEARCH PROJECT ON POTATO****32<sup>nd</sup> GROUP MEETING OF AICRP (Potato)****September 20-22, 2014****VENUE:** University of Agricultural Sciences, Dharwad (Karnataka)**PROGRAMME OF THE MEETING**

<b>SEPTEMBER 20, 2014</b>		
09.30-10.00 hrs	Registration	
<b>INAUGURAL SESSION</b>		
<b>President</b>	Dr DL Maheshwar, Hon'ble Vice Chancellor, UHS, Bagalkot	
<b>Chief Guest</b>	Dr NK Krishna Kumar, DDG, Horticulture, ICAR, New Delhi	
<b>Guests of Honour</b>	Dr DP Biradar, Hon'ble Vice Chancellor, UAS, Dharwad Dr Bir Pal Singh, Director, CPRI, Shimla	
<b>Special Invitees</b>	Dr KK Singh, Head, Agromet Division, India Meteorological Department, New Delhi Dr BM Khadi, Director of Research, UAS, Dharwad	
<b>Rapporteurs</b>	Drs Sanjay Rawal (Modipuram) and VK Gupta (Modipuram)	
10.30 hrs	ICAR Krishi Geet	
10.35 hrs	Welcome with bouquet	
10.40 hrs	Lightning of lamp	All dignitaries
10.45 hrs	Welcome address	Director of Research, UHS, Bagalkot
11.05 hrs	Release of flyer "Advisory System for Nitrogen management in Potato (ASNMP)- A framework for site specific N recommendation"	Dr DL Maheshwar, Hon'ble Vice Chancellor, UHS, Bagalkot
	Release of flyer "Potato Growing Season Descriptor"	Dr DP Biradar, Hon'ble Vice Chancellor, UAS, Dharwad
	Release of Souvenir-abstracts	
	Release of flyer "CPRI - IMD Portal for Forecasting Potato Late Blight"	Dr NK Krishna Kumar, DDG (Hort), ICAR, New Delhi
	Remarks of CPRI-IMD collaboration	Dr KK Singh, Head, Agromet Division, India Meteorological Department, New Delhi
11.35 hrs	Project Coordinator's Report	Dr PM Govindakrishnan, PC, Potato
11.40 hrs	Remarks of the Guest's of Honour	Dr Bir Pal Singh, Director, CPRI, Shimla
		Dr BM Khadi, Director of Research, UAS, Dharwad
		Dr DP Biradar, Hon'ble Vice Chancellor, UAS, Dharwad
12.00 hrs	Inaugural address by Chief Guest	Dr NK Krishna Kumar
12.05 hrs	Presidential Address	Dr DL Maheshwar, Hon'ble Vice Chancellor, UHS, Bagalkot
	Presentation on mementos	to all the delegates
12.15 hrs	Vote of Thanks	Dr KR Naik, Head AICRP (Potato), Dharwad
12.20 hrs	High Tea	
<b>ACTION TAKEN REPORT</b>		
<b>Chairman</b>	Dr NK Krishna Kumar, DDG, Horticulture, ICAR, New Delhi	

<b>Co-Chairman</b>	Dr BM Khadi, Director of Research, UAS, Dharwad	
<b>Rapporteurs</b>	Drs Ravindra Mulge, Prof, KRCCH, Arabhavi (Dharwad), Raj Kumar (Jalandhar) and VK Gupta (Modipuram)	
12.30 hrs	Action Taken Report	Dr PM Govindakrishnan
<b>TECHNICAL SESSION I: CROP IMPROVEMENT</b>		
<b>Chairman</b>	Dr BM Khadi, Director of Research, UAS, Dharwad	
<b>Co-Chairman</b>	Dr BP Singh, Director, CPRI, Shimla	
<b>Rapporteurs</b>	Drs Raj Kumar (Jalandhar), VK Gupta (Modipuram) and Prabhudeva Ajjappalavara, Asst professor, UHS, Bagalkot	
13.00-14.00 hrs	Presentation by each center (3-4 slides presented within 5 minutes) Bhubaneshwar, Chhindwara, Deesa, Dharwad, Dholi, Faizabad, Hassan, Hisar, Jalandhar, Jorhat, Kalyani, Kanpur, Kota, Modipuram, Ooty, Pantnagar, Pasighat, Patna, Pune, Raipur, Shillong and Srinagar.	Scientists from different AICRP centers.
13.30 hrs	Lunch break	
14.30-15.30 hrs	Summary presentation, Discussions and finalization of Technical Programme	Dr Vinay Bhardwaj, Actg Head, Crop Improvement
15.30-15.45 hrs	Tea Break	
<b>TECHNICAL SESSION II: CROP PRODUCTION</b>		
<b>Chairman</b>	Dr B Raju, Director of Education, UHS, Bagalkot	
<b>Co-Chairmen</b>	Dr AK Shukla, PC, AICRP (Micronutrient) Dr BC Patil, Head, AICRP Vegetables, RHREC, Dharwad	
<b>Special Invitees</b>	Dr KM Indresh, Ex-Head, AICRP (Potato)	
<b>Rapporteurs</b>	Drs Sanjay Rawal (Modipuram), SK Singh (Patna) and Manoj Raghav (Pantnagar)	
16.45-18.00 hrs	Presentation by each center (3-4 slides presented within 5 minutes) Bhubaneshwar, Chhindwara, Deesa, Dharwad, Dholi, Faizabad, Hassan, Hisar, Jalandhar, Jorhat, Kalyani, Kanpur, Kota, Modipuram, Ooty, Pantnagar, Pasighat, Patna, Pune, Raipur, Shillong and Srinagar.	Scientists from different AICRP centers.
18.00-19.00 hrs	Summary presentation, Discussions and finalization of Technical Programme	Dr VK Dua, Actg Head, Crop Production
21.00 hrs	Dinner	
<b>SEPTEMBER 21, 2014</b>		
<b>TECHNICAL SESSION III: CROP PROTECTION</b>		
<b>Chairman</b>	Dr BP Singh, Director, CPRI, Shimla	
<b>Co-Chairman</b>	Dr Lingaraju, Prof & Head, Plant Pathology, UAS, Dharwad	
<b>Rapporteurs</b>	Drs MS Gurjar (Shillong), Rahul Bakade (Patna) and PR Deshmukh (Pune)	
09.00-11.00 hrs	Presentation by each center (3-4 slides presented within 5 minutes) Bhubaneshwar, Chhindwara, Deesa, Dholi, Faizabad, Hassan, Hisar, Jalandhar, Jorhat, Kalyani, Kanpur, Kota, Modipuram, Ooty, Pantnagar, Pasighat, Patna, Pune, Raipur, Shillong and Srinagar.	Scientists from different AICRP centers.
11.01-11.15 hrs	Tea Break	
11.16-13.00 hrs	Summary presentation, Discussions and finalization of Technical Programme	Dr Sanjeev Sharma, Actg Head, Crop Protection
13.00 hrs	Lunch break	
<b>TECHNICAL SESSION IV: PLENARY SESSION</b>		
<b>Chairman</b>	Dr BP Singh, Director, CPRI, Shimla	
<b>Guests of Honour</b>	Dr B Raju, Director of Education, UHS, Bagalkot	

<b>Co-Chairman</b>	Dr PM Govindakrishnan, Project Coordinator, AICRP (Potato)
<b>Rapporteurs</b>	Drs SK Singh (Patna), Dr VK Gupta (Modipuram), Gopali, Assoc. Prof, RHREC (Dharwad)
14.00 -15.30 hrs	Presentation of recommendations by the PI's of the respective sessions
15.30 -15.45 hrs	Tea Break
15.45 -17.00 hrs	Discussions and finalization of Proceedings and Technical Programmes of various sessions
17.00-17.15 hrs	Concluding remarks by the Chairman
17.15 hrs	Vote of thanks by Dr PM Govindakrishnan
20.00hrs	Dinner

**ALL INDIA COORDINATED RESEARCH PROJECT ON POTATO****32<sup>nd</sup> GROUP MEETING OF AICRP (Potato)****September 20-22, 2014****VENUE:** University of Agricultural Sciences, Dharwad (Karnataka)**LIST OF PARTICIPANTS**

<b>Sl. No.</b>	<b>Name of Institute/ Organization</b>	<b>Name of participant</b>	<b>Designation</b>
1.	Indian Council of Agricultural Research, New Delhi	1. Dr NK Krishna Kumar	Deputy Director General (Hort. Sciences)
2.	Central Potato Research Institute, <b>SHIMLA</b> (HP)	2. Dr BP Singh	Director, CPRI, Shimla
		3. Dr NK Pandey	Head, Social Sciences
		4. Dr VK Dua	Head, Crop Production
		5. Dr KK Pandey	Head, Seed Technology
		6. Dr Sanjeev Sharma	Actg. Head, Plant Protection
		7. Dr Vinay Bhardwaj	Actg. Head, Crop Improvement
		3.	All India Coordinated Research Project on Potato [AICRP (Potato)], CPRI, <b>SHIMLA</b> (HP)
9. Dr Raja Shankar	Sr Scientist		
10. Mr Dharminder Verma	Sr Technical Officer		
11. Mr Sita Ram	Technician		
4.	International Potato Center (CIP) SW&CA Region, New Delhi	12. Dr MS Kadian	Agronomist
5.	Central Potato Research Institute Campus, <b>MODIPURAM</b> , (UP)	13. Dr SK Kaushik	Joint Director
		14. Dr (Mrs) Kamlesh Malik	Principal Scientist
		15. Dr Sanjay Rawal	Principal Scientist
		16. Dr VK Gupta	Senior Scientist
6.	Central Potato Research Station, <b>KUFRI</b> (HP)	17. Dr Vinod Kumar	Senior Scientist and Acting Head
7.	Central Potato Research Station, <b>JALANDHAR</b> (Punjab)	18. Dr JS Minhas	Head
		19. Dr Raj Kumar	Principal Scientist
8.	Central Potato Research Station, <b>PATNA</b> (Bihar)	20. Dr Manoj Kumar	Head
		21. Dr SK Singh	Principal Scientist
		22. Dr Shambhu Kumar	Senior Scientist
		23. Dr Rahul Bakade	Scientist
9.	Central Potato Research Station, <b>GWALIOR</b> (MP)	24. Dr Satyajit Roy	Head
10.	Central Potato Research Station, <b>SHILLONG</b> (Meghalaya)	25. Dr TK Bag	Head
		26. Mr MS Gurjar	Scientist
		27. Dr SK Yadav	Scientist
11.	Central Potato Research Station <b>OOTACAMUND</b> (Tamil Nadu)	28. Dr EP Venkataslam	Actg. Head
		29. Dr Sudha	Scientist
		30. Dr Aarti Bairwa	Scientist
12.	Orissa University of Agriculture and Technology, <b>BHUBANESHWAR</b> (Orissa)	31. Dr PC Satpathy	Potato Breeder
		32. Mr Debasis Ghosal	Junior Agronomist

13.	JNKVV Regional Agricultural Research Station, <b>CHHINDWARA</b> (MP)	33. Dr SN Singh	Principal Scientist
		34. Dr DN Nandekar	Senior Scientist
14.	Potato Research Station, Sardarkrushinagar Dantiwada Agriculture University, <b>DEESA</b> (Gujarat)	35. Dr RN Patel	Assistant Research Scientist
		36. Dr Sunil Kumar Chongtham	Assistant Research Scientist
15.	University of Horticultural Sciences, <b>DHARWAD</b> (Karnataka)	37. Dr KR Naik	Associate Professor
16.	Rajendra Agricultural University, TCA Campus, <b>DHOLI</b> (Bihar)	38. Dr LM Yadav	Chief Scientist
		39. Dr DK Dewedi	Senior Scientist
		40. Dr Birendra Kumar	Senior Scientist
17.	ND University of Agriculture and Technology, <b>FAIZABAD</b> (UP)	41. Dr SP Pathak	Professor
18.	Argil Research Station, <b>HASSAN</b> (Karnataka)	42. Dr Vishnuvardhana	Associate Professor
		43. Dr PS Prasad	Assistant Professor
19.	CCS Haryana Agricultural University, <b>HISAR</b> (Haryana)	44. Dr KS Baswana	Professor
		45. Dr AK Bhatia	Professor
		46. Dr Anil Gupta	Plant Pathologist
20.	Assam Agricultural University <b>JORHAT</b> (Assam)	47. Dr PC Bhagawati	Principal Scientist
		48. Dr Md Zafar Ullah	Senior Scientist
		49. Dr Mitul Kumar Saikia	Senior Scientist
21.	BC Krishi Vishwa Vidyalaya <b>KALYANI</b> (West Bengal)	50. Dr Ashis Chakraborty	Professor
		51. Dr HIRAK Banerjee	Assistant Professor
22.	CSA University of Agriculture and Technology, <b>KANPUR</b> (UP)	52. Dr Rajiv Khaiwal	Associate Professor
		53. Dr Ramesh Singh	Assistant Professor
23.	MP University of Agriculture and Technology, <b>KOTA</b> (Rajasthan)	54. Dr SK Trivedi	Professor
		55. Dr RK Baghri	Assistant Professor
24.	GB Pant University of Agriculture and Technology, <b>PANTNAGAR</b> (Uttarakhand)	56. Dr Manoj Raghav	Professor
		57. Dr Dhirender Singh	Associate Professor
25.	College of Horticulture and Forestry, <b>PASIGHAT</b> under CAU, (Imphal)	58. Dr VBS Chauhan	Assistant Professor
26.	NARP, Ganesh Khind, <b>PUNE</b> under MPKV (Rahuri)	59. Dr SA More	Junior Scientist
		60. Dr MR Deshmukh	Junior Scientist
27.	IG Krishi Vishwavidhyalaya, <b>RAIPUR</b> (Chhattisgarh)	61. Dr PK Joshi	Senior Scientist
		62. Dr Pravin Kumar Sharma	Scientist
28.	GB Pant University of Agriculture and Technology (Hill Campus), <b>RANICHAURI</b> (Uttarakhand)	63. Dr Akhilesh C Mishra	Associate Professor
29.	SK University of Agricultural Sciences and Technology, <b>SRINAGAR</b> (J&K)	64. Dr Shabir Hussain Khan	Associate Professor
		65. Dr FN Bhat	Junior Potato Agronomist
30	<b>SPECIAL INVITEES</b>	66. Dr DL Maheshwar	Hon'ble Vice Chancellor, UHS, Bagalkot
		67. Dr DP Biradar	Hon'ble Vice Chancellor, UAS, Dharwad
		68. Dr J Venkatesh	Director of Research, UHS, Bagalkot
		69. Dr BM Khadi	Director of Research, UAS, Dharwad
		70. Dr KK Singh	Head, Agromet Division, India Meteorological Department, New Delhi

		71. Dr B Raju	Director of Education, UHS, Bagalkot
		72. Dr Lingaraju	Prof & Head, Plant Pathology, UAS, Dharwad
		73. Dr BC Patil	Head, AICRP Vegetables, RHREC, Dharwad
		74. Dr Ravindra Mulge	Prof, KRCCH, Arabhavi (Dharwad)
		75. Dr Gopali	Assoc. Prof, RHREC (Dharwad)