SECTION-I: PROCEEDINGS OF THE 34TH GROUP MEETING

The 34th Group Meeting of the All India Coordinated Research Project on Potato [AICRP (Potato)] was organized at ICAR-Central Potato Research Institute, Shimla from August 20-22, 2016. The programme of the Group Meeting and List of Participants are attached at **Annexure-I** and **Annexure-II**, respectively.

INAUGURAL SESSION (August 20, 2016)

Chief Guest	:	Dr Trilochan Mohapatra, Secretary DARE & DG, ICAR, New Delhi
Preside over		Dr AK Singh, DDG, Horticulture Sciences, ICAR, New Delhi
Guests of Honour	:	Dr SK Malhotra, Horticulture/Agriculture Commissioner, GOI, New Delhi Sh Sanjay Chauhan, Mayor, Municipal Corporation Shimla Dr T Janakiram, ADG, Horticulture Sciences, ICAR, New Delhi
Rapporteurs	:	Dr's Sanjeev Sharma and Raja Shankar (CPRI, Shimla)

The program started with lighting of the lamp and ICAR song.

Dr SK Chakrabarti, Director, ICAR-CPRI Shimla, welcomed all the dignitaries and participants for gracious presence at the 34thgroup meeting of potato. In his address, he narrated the timeline of different activities occurred at national level in potato improvement in the country since 1949. He acknowledged the contribution of CPRI for enhancing potato production from 1.5 million tonnes to over 45 million tonnes in the country and developing its own seed supply system through seed plot technique. The developments of late blight resistant varieties; diagnostics of viruses including field level diagnostic were appreciated. He also cautioned about the future need of climate resilient cultivars to meet the climate change influenced production deficit, screening technique for larger number of viruses in the country etc to meet the potato production targets in future.

Dr PM Govindakrishnan, PC, AICRP (Potato) presented the Project Coordinator's report. In his report, he highlighted the significant achievements made during the year 2015-16 *viz*. characterization of potato growing regions based on climate using clustering techniques, physiological breeding for enhancing production of potato using LUE and RUE, stability analysis of cultivars released for its wider adaptability, development of DSSs for N, early blight prediction, and the smart potato portal etc.

Dr T Janakiram, ADG (Horticulture Sciences) appreciated the contribution of CPRI in potato research and development and emphasized that because of its tremendous contribution, the institution has been awarded twice the outstanding institution award, once best AICRP award, best Annual Report Award and also several prestigious awards etc. He appreciated the significant achievements made during the year 2015-16 in AICRP (Potato) by bringing out the Annual Report in a concise format along with Potato Technology Portal for easy usage by the scientist and other stakeholders. He also appreciated the institute and AICRP (Potato) for identifying heat tolerant lines for meeting the future climate change scenario in the country. Further, he added the need of technology for minimizing production cost though mechanization and enhancing processing segment in the country.

Shri Sanjay Chauhan, Mayor, Shimla welcomed the delegates to this beautiful city of Shimla and said that the general people of the country remembered Himachal Pradesh due to Kufri potato. He appreciated the significant contribution of CPRI and AICRP (Potato) at national level, establishing world class laboratories in the institute, and also advised the scientists to continue with the same working sprit and zeal in future too.

Dr SK Malhotra, Commissioner, Agriculture and Horticulture, Govt. of India, New Delhi briefed about ongoing research activities and challenges in producing potato to meet the future demand in the country. He also emphasized the need of food and nutritional security in which potato contributes significantly in the country. He narrated that the horticulture production has increased more as compared to the agriculture food grain production, where the top contributors are onion, potato and tomato. He appreciated the efforts of CPRI in developing 'Seed Plot Technique' which is being utilized by OECD countries. He asked the state governments to popularize aeroponic technology developed by CPRI to meet the seed demand in the country. He emphasized the need to develop potato varieties having high micronutrient and water use efficiency, high temperature tolerant varieties, bridging the gap of productivity across the states, exploring the possibilities of potato seed production in non-traditional areas, and cheaper production technology to farming community.

Dr AK Singh, DDG (Extension & Horticulture Sciences) expressed his sincere thanks to the Hon'ble Director General, ICAR for accepting the invitation and to organize the group meeting at ICAR-CPRI, Shimla. He emphasized that nutritional aspect of potato should be given top priority. Besides, there is need to develop more disease resistant varieties. He also insisted to develop seed production chain at farmer level by identifying potential KVKs for potato seed production.

Dr Trilochan Mohapatra, Director General, ICAR, New Delhi, appreciated the significant achievements of CPRI and AICRP (Potato) for implementing need based research which has been reflected in the country's potato production in the ascending order throughout. He emphasized on the need of market driven varietal development to meet the consumers demand as it varies from region to region not only in terms of yield but also on tuber shape, size and other quality basis. He also insisted that AICRP (Potato) centres should be utilized for climate change studies by formulating a strong research programs rather than only testing of technologies alone. He further added that we should make use of genetic background for nutrient use efficiency besides using liquid fertilizers. He also insisted on use of aeroponic technology for production of entire quantity of seed potatoes. He also highlighted the importance of small RNAs to reduce the pathogen dynamism of *Phytophthora infestans*, the causal agent of late blight. He also emphasized that research should be focused on diploid potato to enhance yield, and biofortification of potato products by utilizing genotypes. He also felt the need to strengthen the development of agri entrepreneurship in potato after hearing from Punjab entrepreneurs about aeroponic technology. He further added that videos of success stories should be made and put on the institute's website as well as on ICAR's website. He also emphasized the need of AICRP centres to be involved in hybridization of potato for developing varieties for its location specific demands. He also suggested that there is need to look at the opportunities for growing Indian potato varieties in different countries. Award may be instituted for best performing AICRP centers and student and innovative research may be encouraged in SAU's. He appreciated the systematic and concise preparation of annual report using multi location data and bringing out technical bulletins which is a eye opener for other AICRP's also in future.

Dr NK Pandey, Head, Division of Social Sciences, CPRI Shimla presented the vote of thanks to all the dignitaries and participants.

ACTION TAKEN REPORT (August 20, 2016)

Chairperson	**:**	Dr T Janaki Ram, ADG (Horticulture Science), ICAR, New Delhi
Co-Chairperson	**:**	Dr SK Chakrabarti, Director, ICAR-CPRI, Shimla
Rapporteurs	**:**	Dr's VK Gupta (CPRIC, Modipuram), EP Venkatasalam (CPRS, Ooty) and Raja Shankar (CPRI, Shimla)

Dr PM Govindakrishnan, Project Coordinator, AICRP (Potato) presented the action taken report on the recommendations of 33rd Group Meeting held at GB Pant University of Agriculture and Technology, Pantnagar from September 19-21, 2015. The Chairman appreciated the achievements and after thorough discussions the recommendations were developed which are given under Plenary Session.

TECHNICAL SESSION-I: CROP IMPROVEMENT (August 20, 2016)

Chairperson	**:**	Dr KR Dhiman, Ex VC, YSPUH&F, Nauni, Solan, Himachal Pradesh
Co-Chairperson	**:**	Dr Manish Das, Principal Scientist, Horticulture Sciences, ICAR, New Delhi
Rapporteurs	**:**	Dr's Vinod Kapoor (CPRS, Kufri), VK Gupta (CPRIC, Modipuram) and Raj Kumar (CPRS, Jalandhar)

A summary presentation on achievement in Potato Improvement was presented 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. Recommendations brought out are given under Plenary Session. Technical programme of Crop Improvement trials for 2016-17 was also presented, discussed and finalized in the session. The finalized technical programme is given in Section II.

TECHNICAL SESSION-II: CROP PRODUCTION (August 21, 2016)

Chairperson	**:**	Dr T Janakiram, ADG, Horticulture Sciences, ICAR, New Delhi
Co- Chairperson	**:**	Dr James George, Director, ICAR-CTCRI, Trivandrum
Rapporteurs	**:**	Dr Sanjay Rawal (CPRIC, Modipuram), Dr SP Singh (CPRS, Gwalior) and Dr SK Yadav (CPRS, Patna)

A summary presentation on achievement in Potato Production was presented 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 2016-17 was also presented, discussed and finalized during the session. The finalized technical programme is given in Section II.

TECHNICAL SESSION-III: CROP PROTECTION (August 21, 2016)

Chairperson	**:**	Dr SK Chakrabarti, Director, ICAR-CPRI, Shimla
Co- Chairperson	**:**	Dr RC Upadhayay, Pr Scientist (Plant Pathology), ICAR-DMR, Solan
Rapporteurs	**:**	Dr Kamlesh Malik (CPRIC, Modipuram), Dr RP Singh (Pantnagar) and Dr R Sudha (CPRS, Ooty)

A summary presentation on achievement in Crop Protection was presented by Dr Sanjeev Sharma, Head, Division of Plant Protection, CPRI, Shimla.

Recommendations brought out are given under Plenary Session. Technical programme of Crop Protection for 2016-17 was also presented, discussed and finalized in the session. The finalized technical programme is given in Section II.

TECHNICAL SESSION-IV: PLENARY SESSION (August 22, 2016)

Chairperson	**:**	Dr T Janakiram, ADG, Horticulture Sciences, ICAR, New Delhi
Co- Chairperson	:	Dr SK Chakrabarti, Director, CPRI, Shimla
Rapporteurs	**:**	Dr's Jagdev Sharma (CPRI, Shimla), Sanjay Rawal and SK Luthra (CPRIC, Modipuram)

Dr PM Govindakrishnan, Project Coordinator (Potato), welcomed the Chairperson of the plenary session Dr T Janakiram, ADG, Horticulture Sciences, ICAR, New Delhi and Co-Chairperson Dr SK Chakrabarti, Director, CPRI, Shimla, 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 2016-17 were also discussed at length in the plenary session and finalized for conducting trials during 2016-17 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

1. Establishing linkage with state governments to popularize aerophonics technology developed by CPRI to meet the seed demand (**Action: Head, Division of Seed Technology)**
2. Establishing linkage for seed production and supply chain system in the country using KVK's (**Action: Head, Division of Seed Technology and Head, Division of Social Sciences).**
3. Research on Small RNA technology to minimize faster evolution of late blight, and diploid breeding for F1 hybrids, biofortification and displaying success stories of technology of farmers at website (**Action: Heads, Division of Crop Improvement/Crop Protection/Post harvest/ Social Sciences**)
4. Involvement of AICRP centres in hybridization of potato for developing varieties for location specific demand (**Action: Project Coordinator and All AICRP centres**).
5. Develop climate resilient cultivars to meet the climate change influenced production deficit, cheaper and farmer friendly screening technique for larger number of viruses (**Action: Heads, Division of Crop Improvement, Crop Production and Crop Protection**)

ACTION TAKEN REPORT

1. Region specific ready reckoner (DSS) in local languages should be made available to potato growers for deciding nitrogen doses. **(Action: Project Coordinator and Incharges, All AICRP centers)**
2. Activity of mapping zinc deficient potato growing areas should be completed. **(Action: Project Coordinator and Head, Crop Production)**
3. Possibility of onion after potato needs to be worked out at Burdwan with the help of NHRDF and ICAR- Indian Institute on Onion and Garlic. **(Action: Project Coordinator, Director, ICAR-** Indian Institute on Onion & Garlic **and Incharge, AICRP Kalyani centers)**
4. Tuber quality parameters in nitrogen experiments should be studied. **(Action: Project Coordinator and Head, Crop Production)**
5. Recommendations of AICRP are to be communicated to SMD, ICAR for further communication to the Line departments in different states. **(Action: Project Coordinator)**

6. Copy of group meeting proceedings and action taken report may be communicated to all centres at the earliest. **(Action: Project Coordinator)**

TECHNICAL SESSION-I: CROP IMPROVEMENT

General recommendations

1. Quality parameters already developed for baby potato should be included in the technical programme of baby potato trials. **(Action: Head, Crop Improvement)**
2. With reference to regional breeding at Srinagar, it was decided that F_1C_3 or onward tuber material from late blight resistance breeding project will be supplied to Srinagar. **(Action: Head, Crop Improvement)**
3. Few centres requested for additional trials viz., Bhubaneswar center to allot trials on cut seed potato and bacterial wilt evaluation, Dharwad center for additional trials for Rabi season and Hisar center for additional baby potato trial. These trials will be allotted as per the seed availability and the cut seed potato trials will be allotted by Crop Protection/Crop Production. **(Action: Project Coordinator; Head, Crop Protection and Head, Crop Production)**

Specific recommendations

1. The advanced hybrid, OS/01-497 developed at CPRS, Ooty possessing combined resistance to late blight and cyst nematode should be considered for release at institute level subject to the confirmation of late blight resistance by a committee during ensuing summer season at Ooty. **(Action: Director, CPRI and Head, Crop Improvement)**
2. The advanced table potato hybrid, MS/06-1947 proposed for release may be evaluated for one more year so as to generate data involving latest control, Kufri Mohan (or Kufri Garima) and local controls. **(Action: Project Coordinator and Head, Crop Improvement)**
3. Promising red advanced hybrid, PS/06-88 proposed for release may be evaluated for one more year along with the latest release Kufri Lalit and other red skinned varieties for quality parameters (e.g. beta carotene and anthocyanin). **(Action: Project Coordinator and Head, Crop Improvement)**
4. The CPRI-CIP advanced hybrid, CP-4054 proposed for release may be evaluated for one more year to generate data from more locations of similar agro-ecologies. Data on virus resistance (PVX, PVY) also needs to be confirmed. **(Action: Project Coordinator and Head, Crop Improvement)**

Dr KR Dhiman, Chairperson of the session appreciated the clustering work done by the institute for redefining the potato agro-ecologies in the country. He emphasized that these results will have lasting effect on potato multi-location testing. Co-chairman, Dr Manish Das, praised the institute for good work and desired that physiological breeding should be made priority in future and ideal ideotype needs to be identified.

TECHNICAL SESSION-II: CROP PRODUCTION

Recommendation for extension agencies

1. Application of 150 kg N/ha for Kufri Surya at Chindwara, Deesa, Pasighat & Jalandhar and 225 kg N/ha at Faizabad, Hisar, Kota and Raipur is recommended for optimum yield. **(Action: Project Coordinator; Department of Horticulture/Agriculture, Govt. of Madhya Pradesh, Gujarat, Arunachal Pradesh, Punjab, Uttar Pradesh, Haryana, Rajasthan & Chhattisgarh and Incharge's, AICRP Chindwara, Deesa, Pasighat, Jalandhar, Faizabad, Hisar, Kota and Raipur center)**

2. Drip irrigation produced higher tuber yield over furrow irrigation at all nitrogen levels and 80% of recommended N produced highest tuber yield thus saved 20% of N. Hence, 80% of nitrogen dose is recommended for drip irrigated potato crop for Hisar region of Haryana. **(Action: Project Coordinator; Department of Horticulture/Agriculture, Govt. of Haryana and Incharge, AICRP Hisar center)**
3. Application of boron increased yield significantly, hence, 2.0 kg B/ha as soil application at Chhindwara and Kalyani, and 0.1% boric acid as foliar application at 40 DAP at Kota is recommended. **(Action: Project Coordinator; Department of Horticulture/Agriculture, Govt. of Madhya Pradesh, West Bengal & Rajasthan and Incharge's, AICRP Chindwara, Kalyani & Kota center)**

General recommendation

1. One treatment as per local recommendation should be added in "Optimizing phosphorus requirements of potato under current scenario of P use by the farmers" for optimizing phosphorous doses. **(Action: Head, Crop Production and all AICRP centers)**
2. The experiment "Role of boron in reducing tuber cracking in processing variety Kufri Chipsona-3" is to be extended to hot spot locations in the states of Punjab, UP and MP. **(Action: Head, Crop Production and all AICRP centers)**
3. Institute should submit treatments after approval of IRC as in the case of Crop Improvement. **(Action: Director, CPRI, Shimla and Head, Crop Improvement)**
4. Economic aspect should be taken into consideration before giving the recommendations of nitrogen in different regions. **(Action: Head, Crop Production and all AICRP centers)**

Chairperson 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 popular crops and their varieties of the regions should be selected for inter-cropping experiments and initial soil analysis should be done before starting of nutrient management experiments. Co-chairperson suggested that the technology package developed by the Institute and approved by the Institute Research Council should be passed for multi-location testing under AICRP. Macro and micro- nutrient trials may be conducted in combinations in place of separate experiments for individual nutrient and factors responsible for tuber cracking other than Boron viz., soil, physiological and others factors should be identified.

Dr PM Govindakrishnan, Project Coordinator thanked Chairperson, Co-Chairperson and the house for fruitful discussion, valuable suggestions and relevant recommendations for improving the programme of crop production division.

TECHNICAL SESSION-III: CROP PROTECTION

Recommendation for extension agencies

1. Spray with chlorothalonil @0.2% at the time of appearance of early blight followed by hexaconazole 5EC (0.05%) and third spray of chlorothalonil 75WP (0.25%) at 10 days interval is recommended for the management of early blight in Maharashtra state (recommendation emerged from AICRP, Pune). **(Action: Project Coordinator; Department of Horticulture/Agriculture, Govt. of Maharashtra and Incharge AICRP Pune center)**
2. Foliar spray of Spiromesifen 240 SC @ 48 g a.i. @ 1.00 ml per litre of water at the time of appearance of broad mite is recommended for its management in Maharashtra state. Number of spray may be increased depending upon the severity of mite infestation (recommendation

emerged from AICRP, Pune). **(Action: Project Coordinator; Department of Horticulture/Agriculture, Govt. of Maharashtra and Incharge AICRP Pune center)**

3. Forecasting model has been developed for prediction of early blight and may be used for issue of agro-advisories.
4. Stem necrosis disease severity was found less (<10%) in six varieties namely Kufri Chipsona-4, Kufri Sadabahar, Kufri Gaurav, Kufri Surya, Kufri Khyati and Kufri Anand at Kota. **(Action: Project Coordinator; Department of Horticulture/Agriculture, Govt. of Rajasthan and Incharge AICRP Kota center)**

General recommendations

1. Sufficient number of late blight infected samples (Minimum 25) should be collected at the end of the season when crop damage is >70% and sent to Head, Plant Protection, ICAR-CPRI Shimla for mating type identification. **(Action: Head, Crop protection and all AICRP centers)**
2. Late blight data should also be recorded for stem blight in addition to foliar and tuber blight. **(Action: All AICRP centers)**
3. The new pathogen of potato should not be reported from the AICRP centres or farmers field, without proper discussion with scientist of CPRI. **(Action: All AICRP centers)**
4. Every centre should supply virus infected samples to Head, Plant Protection, ICAR-CPRI Shimla for identification of new strains of viruses. **(Action: All AICRP centers)**
5. Spray of urea (1%) should be integrated with 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 for early blight management trial. **(Action: Head, Crop Protection and Incharge's AICRP Bhubaneswar, Deesa & Pune centers)**
6. Cost benefit ratio should be worked out while making the recommendations. **(Action: Head, Crop protection and all AICRP centers)**
7. In late blight management trial at Hassan, treatment should be revised and trial should be conducted for one more season. **(Action: Head, Crop protection)**

TECHNICAL SESSION-IV: PLENARY SESSION (August 22, 2016)

Dr T Janakiram, ADG, Horticulture Sciences, ICAR, New Delhi chaired the plenary session and Dr SK Chakrabarti, Director, ICAR-CPRI, Shimla co-chaired the session. The recommendations of action taken report, technical session I, II and III were respectively presented by PIs. Following decisions were taken up during this session:

1. Proposal of variety release of advance hybrids may be scrutinized before presentation by a committee and only complete proposals may be allowed to be present. **(Action: Director, ICAR-CPRI, Shimla and Head, Crop Improvement)**
2. Kufri Mohan and Kufri Garima will be the control for evaluating advance hybrid MS/06-1947 in coming crop season at 4-5 AICRP centres. **(Action: Head, Crop Improvement)**
3. Scale of tuber cracking for recording observations on cracking is to be provided for AICRP centres in AGRON 5 (Tuber cracking trial). **(Action: Head, Crop Production)**
4. CO_2 balance sheet should be prepared for recommended technologies under Crop Production. **(Action: Head, Crop Production)**
5. Reframe recommendation 1 as it is developed for Maharashtra and the name of AICRP Maharashtra is to be included. **(Action: Head, Crop Protection)**
6. Recommendation 3 is specific for Hassan, Karnataka and AICRP Hassan is to be included. **(Action: Head, Crop Protection)**
7. A letter from DDG (Horticulture) has to be sent to VC, UAS, Dharwad for providing funds to conduct potato trials in rabi season. **(Action: Project Coordinator)**

8. Video conference facilities may be developed as ICAR have funds under ICT. **(Action: Director, CPRI, Shimla)**
9. WhatsApp group of all AICRP centres is needed to be created for sending symptoms on diseases and other information. **(Action: Project Coordinator and All AICRP centers)**

Chairperson Dr T Janakiram, ADG, Horticulture Sciences, concluded the session by giving his valuable comments. He assured the house that potato crop is top priority of the SMD and he will take personal attention for making this group stronger. Rating of AICRP centres may be done as followed in other groups and three best performing AICRP Centres may get some incentives. Requirements of Central Variety Release Committee (CVRC) may be considered critically before making variety release proposal by the breeders. A review committee has been formed to scrutinize the work of AICRP groups, so, all have to be sincere to their work and focused so as to deliver achievements. AICRP Centers should interact and collaborate to complement each other for better output.

Dr SK Chakrabarti, Director, ICAR-CPRI, Shimla co-chaired the session and he suggested that proceeding recommendations should be followed in letter and spirit, and sincerity should be there in working. The AICRP unit should be contacted in case of any doubt. Every project of AICRP should have a project leader for faster compilation and documentation. 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.

Dr PM Govindakrishnan thanked Chairperson, Co-Chairperson and the house for fruitful discussion, valuable suggestions and relevant recommendations for improving the working of AICRP (Potato).

The 34th Group Meeting of AICRP (Potato) ended with vote of thanks proposed by Dr PM Govindakrishnan, Project Coordinator (Potato).

SECTION-II: TECHNICAL PROGRAMME FOR 2016-2017

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.4,5,7,8,9,10,13, 14,16,17,18	Agron.2,3,6,9	Path. 2,5	Ent.1,2	19
2.	Chhindwara	Genet. 4,5,7,8,9,10,13, 14,17,18	Agron.3,6,9	Path. 2	Ent. 1,2	16
3.	Deesa	Genet. 4,5,7,8,9,10,13, 17	Agron.3,6,9,10	Path. 2,4,5	Ent. 1,2	17
4.	Dharwad	Genet.1,4,5,6,7,8,9,10, 13, 14,15,18	Agron.2,3,6,9	Path. 2	Ent. 1	18
5.	Dholi	Genet. 4,5,7,8,13	Agron.2,3,4,6,8,9	Path.1,2,3,6	Ent. 1,2	17
6.	Faizabad	Genet. 4,5,7,8,9,10,13, 17	Agron.2,4,6,7,8,9	Path.1,2,3,6	Ent. 1	19
7.	Gwalior	Genet.4,5,7,8,9,10,13, 15,17	Agron.2,3,4,5,6,8, 9	Path. 2	Ent. 1	18
8.	Hassan	Genet.1,4,5,6,7,8,9,10, 11,13,15	Agron.2,3,6,9	Path.1,2,3,4	Ent.1,2,4	22
9.	Hisar	Genet.1,3,4,5,7,8,9,10, 13,16,17	Agron.2,3,6,8,9,11 ,12	Path. 2,4	Ent. 1	21
10.	Jalandhar	Genet. 4,5,7,8,9,10,13, 16	Agron.3,4,5,6,9	Path.1,2,3,6	Ent. 1	16
11.	Jorhat	Genet.1,4,5,7,8,11,13	Agron.2,3,6,8,9	Path. 1,2	Ent. 1	15
12.	Kalyani	Genet. 4,5,7,8,9,10,13, 16	Agron.2,3,6,7,9,13	Path.1,2,3,4	Ent. 1,2	20
13.	Kanpur	Genet. 4,5,7,8,9,10,13, 16	Agron.4,5,6,9	Path. 1,2,6	Ent. 1	16
14.	Kota	Genet. 4,5,7,8,9,10,13, 17	Agron.3,6,9	Path. 1,2	Ent. 1	14
15.	Kufri (Shimla)	Genet.2,6,13	--		Ent. 1,3	5
16.	Modipuram	Genet.2,4,5,7,8,9,10,13 ,16,17	Agron.5,6,9	Path. 2,6	Ent. 1,2	17
17.	Ooty	Genet. 6,12,13	Agron.3,6,8	Path. 1,2	Ent.1,3,4 ,5	12
18.	Pantnagar	Genet.4,5,7,8,9,10,13, 16	Agron.3,4,6,9	Path. 1,2,3	Ent. 1	16
19.	Pasighat	Genet. 4,5,7,8,13	Agron.3,6,8,9	Path. 1,2	Ent. 1	12
20.	Patna	Genet.4,5,7,8,11,13,15, 16	Agron.2,3,5,6,7,9	Path. 1,2,3,6	Ent. 1,2	20
21.	Pune	Genet.4,5,6,7,8,9,10,13 ,14,15,17,18	Agron.2,3,6,9	Path.1,2,4,5	Ent.1,2,4	23
22.	Raipur	Genet.4,5,7,8,9,10,13, 14,16,17,18	Agron.1,3,6,9,14	Path. 2,4	Ent.1,2	20
23.	Ranichauri	Genet. 6,13	--	--		2
24.	Shillong	Genet. 6,11,13,15	Agron.6,9	Path. 1,2,3	Ent. 1,3	11
25.	Srinagar	Genet.3,6,7,8,13,16	Agron.2,6,8,9,15	Path. 1,2,3	Ent. 1	15

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 *tuberosum* 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 1st 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, 2 early maturing (J/8-85 and J/8-91), 1 medium maturing (MS/10-1529), 1 heat tolerant (HT/07-1329), 2 red skin (PS/07-07 and PS/09-9), 1 processing (MP/09-28), 1 with combined resistance to LB and PCN (OS/07-14) and 2 nutrient and water stress tolerant hybrids (J/93-38 and J/92-167). Other hybrids viz., J/7-5, J/7-15, J/7-37, J/6-182, J/2-14, MS/9-2196, MS/7-645, PS/07-07, PS/09-18 (white)PS-05/75, PS/06-24, MP/04-816, MS/06-819, MS/06-1947, MS/8-1148, MS/8-1565, PS/06-88, MP/08-1900, MP/04-578, MP/9-723, MP/0*-**, HT/07-1105, SM/00-120, SM/00-42, VMT5-1. WS/05-146, J/100-152, PS/04-05, PS/8-31, MS/04-2261, PS/03-02, 2002-P-14, MP/01-916, D-150 and 92-PT-27 (both parents) under AICRP and control varieties 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/varietal 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).
- F1C3 produce, from Modipuram will be shared with the AICRP centre, Srinagar (late blight resistant hybrids).

GENET.4: ON-FARM TRIAL WITH EARLY AND MEDIUM MATURING HYBRIDS
[Nodal Scientist: Dr SK Luthra, CPRIC, Modipuram]

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

Treatments

Hybrids	**AICRP-P-9, AICRP-P-7(2nd year); AICRP-P-12 (1st year)**
Controls	
Northern plains	AICRP-C-14, AICRP-C-17, AICRP-C-6, AICRP-C-19 & K Gaurav, K Mohan, K Lalit, K Lalima, K Garima
Central plains	AICRP-C-14, AICRP-C-17, AICRP-C-16, AICRP-C-6 & K Garima, K Mohan, K Lalit, K Lalima
Eastern plains	AICRP-C-14, AICRP-C-17, AICRP-C-4, AICRP-C-15 & K Lalit, K Mohan, K Jyoti
Plateau region	AICRP-C-17, AICRP-C-20, AICRP-C-24, AICRP-C-13, AICRP-C-16, K Mohan, K Lalit, K Lalima

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. Tubers rot in the plot (weight) at the time of harvesting.
5. Foliage senescence and total & marketable tuber yield (t/ha) at 60, 75, 90 days crop and at senescence (75% foliage maturity)*.
6. Tuber dry matter (%) at 60, 75, 90 and senescence. Corresponding haulm dry wt. (%) should also be recorded. Final haulms weight (Fresh weight and dry weight) is to be recorded at start of senescence. Dry matter estimation in tuber should be done within a week after harvest.
7. Meteorological data.
8. Total weight loss after 75 days storage at ambient temperature.
9. Storage losses in heaps (at respective CPRI stations).

*** If 75% foliage senescence is earlier to any of the harvest dates mentioned then its date should be recorded and final harvest recorded at that date.**

GENET.5: TRIAL WITH TABLE POTATO HYBRIDS (1st & 2nd year)
[Nodal Scientist: Dr Raj Kumar, CPRS, Jalandhar]

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

Hybrids	**AICRP-P-20, AICRP-P-22 (2nd year), AICRP-P-15, AICRP-P-30, AICRP-P-27, AICRP-P-29, AICRP-P-31, AICRP-P-26, AICRP-P-28 (1st Year)**
Controls	

Northern plains	AICRP-C-14, AICRP-C-17, AICRP-C-6, AICRP-C-19 & K Gaurav, K Mohan, K Lalit, K Lalima, K Garima
Central plains	AICRP-C-14, AICRP-C-17, AICRP-C-16, AICRP-C-6 & K Garima, K Mohan, K Lalit, K Lalima
Eastern plains	AICRP-C-14, AICRP-C-17, AICRP-C-4, AICRP-C-15 & K Lalit, K Mohan, K Jyoti
Plateau region	AICRP-C-17, AICRP-C-20, AICRP-C-24, AICRP-C-13, AICRP-C-16, K Mohan, K Lalit, K Lalima

Observations to be recorded:

1. Seed wt. per plot (Kg)
2. Plant emergence (%) at 30 days after planting.
3. Incidence of any major diseases, final score.
4. Tuber rottage in the plot (weight) at the time of harvesting.
5. Foliage senescence and total & marketable tuber yield (t/ha) at 60, 75, 90 days crop and at senescence (75% foliage maturity)*.
6. Tuber dry matter (%) at 60, 75, 90 and senescence. Corresponding haulm dry wt. (%) should also be recorded. Final haulms weight is to be recorded at start of senescence. Dry matter estimation in tuber should be done within a week after harvest.
7. Total weight loss after 75 storage at ambient temperature
8. Mean Canopy Cover[#] at 10 days interval till senescence (75% foliage maturity) with digital camera or by Burstall & Harris (1983) method (Grid method).
9. Meteorological data.

*** If 75% foliage senescence is earlier to any of the harvest dates mentioned then its date should be recorded and final harvest recorded at that date.**

Note:

- An additional replication will be planted to record data on [#] Mean Canopy Cover.
- Sufficient tubers should be multiplied and kept to conduct 2nd 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 (2nd year)
[Dr Vinay Bhardwaj, Head, Crop Improvement]

Locations	:	Dharwad, Hassan & Pune (Plain *Kharif* centres) Kufri, Srinagar, Ranichauri, Ooty, Shillong (Hill *Kharif* 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

Hybrids	**AICRP-P-16**	**AICRP-P-17**	**AICRP-P-18**	**AICRP-LB-4**	
Controls for Kharif	AICRP-C-24	AICRP-C-13	AICRP-C-16	AICRP-C-17	AICRP-C-20
Controls for Hills	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. Incidence of LB at 10 days interval after 1st appearance of disease.
4. Incidence of any major diseases, final score.
5. Tuber rot in the plot at the time of harvesting (by weight and numbers).
6. Foliage senescence and total & marketable tuber yield (t/ha) at 60, 75, 90 days crop and at senescence (75% foliage maturity)*.
7. Tuber dry matter (%) at 60, 75, 90 and senescence. Corresponding haulm dry wt. (%) should also be recorded. Final haulms weight is to be recorded at start of senescence. Dry matter estimation in tuber should be done within a week after harvest.
8. Total weight loss at 75 days after storage at ambient temperature.
9. Meteorological data.

*** If 75% foliage senescence is earlier to any of the harvest dates mentioned then its date should be recorded and final harvest recorded at that date.**

Note:

- No spray of fungicides against late blight incidence
- Sufficient tubers should be multiplied and kept to conduct 2nd 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 [Nodal Scientist: Dr VK Gupta, CPRIC, Modipuram]

Location	:	All AICRP centers
Design	:	RBD
Replication	:	4 for 75, 90 and 110 days
Plot size	:	3x3 m (6 rows of 15 tubers)
Spacing	:	60 X 20 cm
Cultural practices	:	As recommended for the region.

Treatments

Hybrids	**AICRP-P-11, AICRP-P-19 (2nd year); AICRP-P-33 (1st year)**
Controls	AICRP-C-1, AICRP-C-8, AICRP-C-10, AICRP-PH-3, AICRP-C-20

Observations to be recorded:

1. Seed wt. per plot (Kg)
2. Plant emergence (%) at 30 days after planting.
3. Incidence of any major diseases, final score.
4. Tubers rot in the plot (weight) at the time of harvesting.
5. Foliage senescence and total & process grade yield (t/ha) at 75, 90, 110 days and at senescence (75% foliage maturity)*.
6. Total weight loss 75 days after storage at ambient temperature
7. Tuber dry matter (%), chip colour and reducing sugar at 75, 90 and 110 days harvest at selected centres (Jalandhar and Modipuram). **Other centers to supply 5-8 tubers to Jt Director, CPRIC, Modipuram immediately after harvest.**

8. Mean Canopy Cover[#] at 10 days interval till senescence (75% foliage maturity) with digital camera or by Burstall & Harris (1983) method (Grid method).
9. Meteorological data.

*** If 75% foliage senescence is earlier to any of the harvest dates mentioned then its date should be recorded and final harvest recorded at that date.**

Note:

- **Nitrogen and Potash Fertilizers should be 1.5 times of the recommended dose of table potato (for 90 and 110 days trial)**
- An additional replication will be planted to record data on [#] Mean Canopy Cover.
- Sufficient tubers should be multiplied and kept to conduct 2nd 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.

GENET. 8: ON-FARM TRIAL WITH PROCESSING HYBRIDS [Nodal Scientist: Dr VK Gupta, CPRIC, Modipuram]

Location	:	All AICRP centers
Design	:	On-farm for 90 and 110 days
Plot size	:	96 m^2 (40 rows of 20 tubers each)
Spacing	:	60 X 20 cm
Cultural practices	:	As recommended for the region.

Treatments

Hybrids	**AICRP-P-4 (2nd year); AICRP-P-24 (1st year)**
Controls	AICRP-C-1, AICRP-C-8, AICRP-C-10, AICRP-C-11

Observations to be recorded:

1. Seed wt. per plot (Kg)
2. Plant emergence (%) at 30 days after planting.
3. Incidence of any major diseases, final score.
4. Tubers rot in the plot (weight) at the time of harvesting.
5. Foliage senescence and total & French fry grade yield (t/ha) at 90 & 110 days and at senescence (75% foliage maturity)***.**
6. Total weight loss 75 days after storage at ambient temperature
7. Tuber dry matter (%), French fry colour and reducing sugar at 90 and 110 days harvest at selected centres (Jalandhar and Modipuram). **Other centres to supply 5-8 tubers to Jt Director, CPRIC, Modipuram immediately after harvest.**
8. Mean Canopy Cover[#] at 10 days interval till senescence (75% foliage maturity).
9. Storage losses in heaps (at respective CPRI stations).
10. Meteorological data.

*** If 75% foliage senescence is earlier to any of the harvest dates mentioned then its date should be recorded and final harvest recorded at that date.**

Note:

- **Nitrogen and Potash Fertilizers should be 1.5 times of the recommended dose**
- An additional replication will be planted to record data on [#] Mean Canopy Cover.

- Sufficient tubers should be multiplied and kept to conduct 2nd 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.

GENET.9: TRIAL FOR HEAT TOLERANCE [Nodal Scientist: Dr VK Gupta, CPRIC, Modipuram]

Location : Bhubaneshwar, Chhindwara, Deesa, Faizabad, Gwalior, Jalandhar, Kanpur, Kalyani, Pantnagar, Raipur, Hisar, Modipuram, Kota **(*Rabi* crop**).
Dharwad, Hassan & Pune (***Kharif*** crop)

Design : RBD

Replication : 4 (each for 75 & 90 days crop)

Plot size : 3.0 m x 2.4 m (5 rows of 12 tubers)

Spacing : 60 x 20 cm

Treatments

Hybrids : **AICRP-P-23 (2nd year), AICRP-P-25 (1st year)**

Controls

		Rabi* crop			***Kharif* crop***
Center	**:**	**Variety**	**Center**	**:**	**Variety**
Bhubaneshwar	:	K Surya, K Khyati	Dharwad	:	K Surya, K Lauvkar, K Himalini
Chhindwara	:	K Surya, K Khyati	Hassan	:	K Surya, K Lauvkar, K Himalini
Deesa	:	K Badshah, K Pukhraj, K Surya	Pune	:	K Surya, K Lauvkar, K Himalini
Faizabad	:	K Surya, K Khyati			
Gwalior	:	K Surya, K Khyati			
Jalandhar	:	K Surya, K Khyati			
Kanpur	:	K Surya, K Khyati			
Kalyani	:	K Surya, K Jyoti, K Khyati			
Pantnagar		K Surya, K Khyati			
Raipur	:	K Surya, K Khyati			
Hisar	:	K Surya, K Bahar			
Modipuram	:	K Surya, K Bahar			

*** 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 and total & marketable tuber yield (t/ha) at 75 & 90 days and at senescence (75% foliage maturity)*.
5. Tuber rottage in the plot (weight) at the time of harvesting
6. Total weight loss at 75 days after storage at ambient temperature.
7. Incidence of any major diseases.
8. Tuber dry matter (%) at 75 and 90 days harvest. Corresponding haulm dry wt. (%) should also be recorded. Dry matter estimation in tuber should be done within a week after harvest.
9. Meteorological data.
10. Storage losses in heaps (at respective CPRI station)

*** If 75% foliage senescence is earlier to any of the harvest dates mentioned then its date should be recorded and final harvest recorded at that date.**

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.10: ON FARM TRIAL FOR HEAT TOLERANCE [Nodal Scientist: Dr VK Gupta, CPRIC, Modipuram]

Location : Bhubaneshwar, Chhindwara, Deesa, Faizabad, Gwalior, Jalandhar, Kanpur, Kalyani, Pantnagar, Raipur, Hisar, Modipuram, Kota **(*Rabi* crop**). Dharwad, Hassan & Pune (***Kharif*** crop)

Design : RBD

Plot size : 96 m^2 (5 rows of 12 tubers)

Spacing : 60 x 20 cm

Treatments

Hybrids : **AICRP-C-28**

Controls

		Rabi* crop			***Kharif* crop***
Center	**:**	**Variety**	**Center**	**:**	**Variety**
Bhubaneshwar	:	K Surya, K Khyati	Dharwad	:	K Surya, K Lauvkar, K Himalini
Chhindwara	:	K Surya, K Khyati	Hassan	:	K Surya, K Lauvkar, K Himalini
Deesa	:	K Badshah, K Pukhraj, K Surya	Pune	:	K Surya, K Lauvkar, K Himalini
Faizabad	:	K Surya, K Khyati			
Gwalior	:	K Surya, K Khyati			
Jalandhar	:	K Surya, K Khyati			
Kanpur	:	K Surya, K Khyati			
Kalyani	:	K Surya, K Jyoti, K Khyati			
Pantnagar		K Surya, K Khyati			
Raipur	:	K Surya, K Khyati			
Hisar	:	K Surya, K Bahar			
Modipuram	:	K Surya, K Bahar			

*** 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 and total & marketable tuber yield (t/ha) at 75, 90 days and at senescence (75% foliage maturity)*.
5. Tuber rottage in the plot (weight) at the time of harvesting
6. Total weight loss at 75 days after storage at ambient temperature.
7. Incidence of any major diseases.
8. Tuber dry matter (%) at 75 and 90 days harvest. Corresponding haulm dry wt. (%) should also be recorded. Dry matter estimation in tuber should be done within a week after harvest.
9. Meteorological data.

10. Storage losses in heaps (at respective CPRI station)

*** If 75% foliage senescence is earlier to any of the harvest dates mentioned then its date should be recorded and final harvest recorded at that date.**

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.11: ON FARM EVALUATION OF TPS POPULATION (2nd year) [Nodal Scientist: Dr Shambhu Kumar, CPRS, Patna]

Location : Patna, Jorhat, Hassan and Shillong for seedling transplant crop (2 populations)
Design : RBD (50x10 cm)
Plot size : 96/ m^2 (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 at 75 days, 90 days and at senescence (75% foliage maturity) after transplanting.
4. Tuber uniformity (colour and shape, separately) on 1-5 scale 1=V Poor to 5=V Good.
5. Tuber dry matter (%) at 75 and 90 days harvest.
6. Tuber rottage in the plot (weight) at the time of harvesting
7. Total weight loss 75 days after storage at ambient temperature
8. 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.12: ON-FARM TRIAL WITH HYBRIDS HAVING COMBINED RESISTANCE TO LATE BLIGHT AND CYST NEMATODES (2nd year trial) [Nodal Scientist: Dr Sudha, CPRS, Ooty]

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

Treatments

Hybrids	Controls
OS/01-516, OS/01-497	K Swarna, K Neelima, K Jyoti, K Girdhari, K Himalini

Observations to be recorded:

1. Seed wt. per plot (Kg)
2. Plant emergence (%) at 45 days after planting.
3. Incidence of late blight and cyst nematode.
4. Tuber rottage in the plot (weight) at the time of harvesting.
5. Foliage senescence and total & marketable tuber yield (t/ha) at 75, 90, 120 days and at senescence (75% foliage maturity)*.
6. Total weight loss after 75 days storage at ambient temperature
7. Total weight loss after 30 days in the tuber material in big heap of rejected tubers(1 to 2 m height) covered by straw etc in field.
8. Tuber dry matter (%) at 75, 90 and 120 days harvest.
9. Meteorological data.
10. Storage losses in heaps

*** If 75% foliage senescence is earlier to any of the harvest dates mentioned then its date should be recorded and final harvest recorded at that date.**

GENET.13: 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 Himalini, 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 and total & marketable tuber yield (t/ha) at 60, 75, 90 days and at senescence (75% foliage maturity)*.
5. Tuber rottage in the plot (weight) at the time of harvesting.
6. Total weight loss at 75 days after storage at ambient temperature.
7. Incidence of any major diseases.
8. Tuber dry matter (%) at 60, 75 and 90 days.
9. Mean Canopy Cover[#] at 10 days interval till senescence (75% foliage maturity) with digital camera or by Burstall & Harris (1983) method.
10. Meteorological data.

*** If 75% foliage senescence is earlier to any of the harvest dates mentioned then its date should be recorded and final harvest recorded at that date.**

Note:

- An additional replication will be planted to record data on #Mean Canopy Cover.

GENET.14: VARIETAL EVALUATION FOR PRODUCTION OF BABY/SALAD POTATOES (SPECIALTY POTATO) [Nodal Scientist: Dr VK Gupta, CPRIC, Modipuram]

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	**:**	**Phulwa, K Himsona, K Shailja, K Khyati, MP/16-b**
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. Foliage senescence and total & grade-wise yield (t/ha) at 60, 75, 90 days and at senescence (75% foliage maturity).
5. Organo-leptic test by about 20 volunteers at harvest at each location.
6. Tuber rottage in the plot (weight) at the time of harvesting
7. Total weight loss at 75 days after storage at ambient temperature
8. Incidence of any major diseases.
9. Tuber dry matter (%) at 60, 75 and 90 days
10. Meteorological data.

*** If 75% foliage senescence is earlier to any of the harvest dates mentioned then its date should be recorded and final harvest recorded at that date.**

GENET.15: STANDARDIZATION OF TPS TECHNOLOGY [Nodal Scientist: Dr Shambhu Kumar, CPRS, Patna]

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)

<u>Treatments</u>

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: **Patna (Rabi)**

   1. Total berries produced
   2. 4 berries retained/bunch
   3. All flower flushes retained
   4. Retaining 1st and 2nd 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.
7. Calculating C:B ratio

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. Tuber rottage in the plot (weight) at the time of harvesting.
7. Tuber uniformity (colour and shape) on 1-5 scale 1=V Poor to 5=V Good.
8. Tuber dry matter (%) at harvesting.
9. Organoleptic test (1-5 scale) 1=V Poor to 5=V Good.
10. 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. 16: ON-FARM TRIAL WITH SPECIALTY POTATO HYBRID [Nodal Scientist: Dr Shambhu Kumar, CPRS, Patna]

Locations	:	Hisar, Jalandhar, Kalyani, Kanpur, Modipuram, Pantnagar, Patna, Raipur and Srinagar
Plot size	:	**96 m^2** (40 rows of 20 tubers each)
Spacing	:	60 X 20 cm
Cultural practices	:	As recommended for the region.

Treatments

AICRP-P-14	K Lalima	K Sindhuri	K Lalit

Observations to be recorded:

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

*** If 75% foliage senescence is earlier to any of the harvest dates mentioned then its date should be recorded and final harvest recorded at that date.**

Note:

- No spray of fungicides against late blight incidence
- Sufficient tubers should be multiplied and kept to conduct 2nd 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.17: EVALUATION OF WATER STRESS TOLERANT HYBRID (2nd YEAR). [Nodal Scientist: Dr Name Singh, CPRIC, Modipuram]

Locations	**:**	Bhubaneswar, Deesa, Faizabad, Gwalior, Hisar, Kota, Raipur, Modipuram
Design	:	Split-plot design
Replications	:	4 each for 75 and 90 days crop
Plot size (Gross)	:	4.2 m x 3.4 m
Plot size (Net)	**:**	3.0 m x 3.0 m
Total plots	:	4 x 2 x 4 = 32
Spacing	:	60 X 20 cm

Treatments : a). Main-plot treatments : Irrigation levels – Four

Treatment A: Gwalior, Hisar, Modipuram
Treatment B: Bhubaneswar, Deesa, Faizabad, Kota, Raipur

A I_1 : 2.5 IW : CPE ratio (6, adequate irrigations)
I_2 : 2.0 IW : CPE ratio (5, sub-optimal irrigations)
I_3 : 1.5 IW : CPE ratio (4, irrigations at critical stages *viz.* SF, TI, ETES & LTES)
I_4 : I_3 + paddy straw mulch @ 5 t/ha at planting

OR

B I_1 : Irrigation at 20 mm CPE (6, adequate irrigations)
I_2 : Irrigation at 25 mm CPE (5, sub-optimal irrigations)
I_3 : Irrigation at 30 mm CPE (4, irrigations at critical stages *viz.* SF, TI, ETES & LTES)
I_4 : I_3 + paddy straw mulch @ 5 t/ha at planting

Note : Depth of irrigation = 50 mm. The first irrigation at 7-10 days after planting should be given to all the plots, thereafter, irrigation treatments will be started.

b). Sub- plot treatments: Potato varieties – Three

V1 : **AICRP-P-21 (2nd year)**
V2 **AICRP-P-32 (1st year)**
V3 : K. Sindhuri, K Pukhraj, K Jyoti or Recommended variety for the respective area (control)

Observations to be recorded:

1. Initial fertility status of the soil (p^H, Organic carbon and available N, P & K).
2. Plant emergence at 30 days.
3. Plant growth, number of shoots and leaves per plant at 60 days after planting.
4. Yield and number of tubers in each grade (0-25 g, 25-75 g and above 75 g)
5. Nutrient (N P K) removal by the crop.
6. Amount of water applied in each irrigation under different treatments.
7. Periodical soil moisture observations (at stolon formation, tuber initiation & bulking stage) from 0 to 45 cm depth in 15 cm depth-wise from different treatments.

Note:

- No spray of fungicides against late blight incidence
- Sufficient tubers should be multiplied and kept to conduct 2nd year/ on-farm trials (3500-4000 tubers for old hybrid) during the next year.

GENET.18: STANDARDIZATION OF PRODUCTION TECHNOLOGY OF BABY POTATOES [Nodal Scientist: Dr Sanjay Rawal, CPRIC, Modipuram]

Location	:	Bhubaneswar, Raipur, Chhindwara, Pune and both *kharif* and *Rabi in* Dharwad
Plot size	:	3x3 m (6 rows of 15 tubers)
Spacing	:	60 x 20 cm
Cultural practices	:	As recommended for the region.
Varieties	:	V1: K. Khyati, V2: K Pukhraj (or as recommended for the region)

Treatments

Variety	Seed size	Fertilizers	Irrigation
V1	S_1: Large size	F_1: 100% RDF	I_1: 20mm CPE
	S_2: Medium size	F_2: 75% RDF	I_2: 30mm CPE
V2	S_1: Large size	F_1: 100% RDF	I_1: 20mm CPE
	S_2: Medium size	F_2: 75% RDF	I_2: 30mm CPE

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. Foliage senescence and total & grade-wise yield (t/ha) at 60, 75, 90 days and at senescence (75% foliage maturity)*.
5. Organo-leptic test by about 20 volunteers at harvest at each location.
6. Tuber rottage in the plot (weight) at the time of harvesting
7. Total weight loss at 75 days after storage at ambient temperature
8. Incidence of any major diseases.
9. Tuber dry matter (%) at 60, 75 and 90 days
10. Meteorological data.

*** If 75% foliage senescence is earlier to any of the harvest dates mentioned then its date should be recorded and final harvest recorded at that date.**

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

A. For Trials with early maturing hybrids

Zone	Control
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

Zone	Control
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
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 and K Lalit

E. For Trials with Processing hybrids

Early: AICRP-C-1. AICRP-C-10
Med.: AICRP-C-8
FF: AICRP-C-11, AICRP-C-8

CROP PRODUCTION

Note: Unless specified, only the recommended variety of the region should be used and should not be changed over different years

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

Crop	Variety	Spacing
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 (t/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 2016-17.

AGRON.2: NITROGEN REQUIREMENT OF NEWLY RELEASED POTATO CULTIVARS (Testing/validating of ASNMP). [Nodal Scientist-Dr SP Singh, CPRS, Gwalior]

Locations : Bhubaneshwar, Dharwad, Dholi, Faizabad, Gwalior, Hassan, Hisar, Jorhat, Kalyani, Patna, Pune 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.	Dharwad	Kufri Surya
3.	Dholi	Kufri Surya
4.	Faizabad	Kufri Surya and Kufri Sadabahar
5.	Gwalior	Kufri Surya
6.	Hassan	Kufri Surya, Kufri Girdhari and Kufri Himalini
7.	Hisar	Kufri Surya and Kufri Sadabahar
8.	Jorhat	Kufri Himalini and Kufri Girdhari
9.	Kalyani	Kufri Shailja and Kufri Himalini
10.	Patna	Kufri Surya
11.	Pune	Kufri Surya
12.	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 (tuber+haulm) 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 (dried samples) to be sent to Dr SP Singh, CPRS, Gwalior.
c) Do not use paper tags in soil samples.

AGRON.3: DEVELOP SITE SPECIFIC NPK REQUIREMENTS [Nodal Scientist-Dr SK Yadav, CPRS, Patna]

Locations: Bhubaneshwar, Chhindwara, Deesa, Dharwad, Dholi, Gwalior, Hassan, Hisar, Jalandhar, Kalyani, Kota, Ooty, Pantnagar, Pasighat, Pune, Patna and Raipur (Dharwad and Hassan will conduct this experiment in *kharif*)

Replications : Four
Design : RBD
Spacing : 60 cm x 20cm
Replications : 4 (Four)

Plot size : Gross: 4.8 m x 4.0 m
Net: 3.6 m x 3.6 m

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. 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 (tuber+haulm) 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 & haulm yield on dry weight basis (kg/ha)
7. Concentration of NPK in haulm & tuber
8. Nutrient uptake by tuber and haulm
9. 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 (dried samples) to be sent to Dr SK Yadav, CPRS, Patna.
c) Do not use paper tags in soil samples.

AGRON 4: 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)

Treatments

T1 : Farmer's practice (to be explained)
T2 : Zero P (control)
T3 : 30 kg P_2O_5/ha
T4 : 60 kg P_2O_5/ha
T5 : 90 kg P_2O_5/ha
T6 : 120 kg P_2O_5/ha
T7 : Recommended dose of the region

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 T7, recommended NK + FYM should be applied.

AGRON 5: ROLE OF BORON IN REDUCING TUBER CRACKING IN PROCESSING VARIETY KUFRI CHIPSONA-3

Locations	:	Jalandhar, Modipuram, Gwalior, Kanpur and Patna
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. **(Only more than 1 cm long crack to be considered)**
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, IIHR, Bangaluru.
b) Do not use paper tags in soil samples.

AGRON 6: 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, IIHR, Bangaluru.
c) Do not use paper tags in soil samples.

AGRON 7: EVALUATION OF POTATO - TRANSPLANTED ONION SEQUENCE.
[Nodal Scientist- Dr Sanjib Kumar Das BCKV, Kalyani]

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. 8: DEVELOPMENT OF POTATO BASED ORGANIC FARMING SYSTEM
[Nodal Scientist-Dr AK Bhatia, CCSHAU, Hisar]

Locations	:	Dholi, Faizabad, Gwalior, Hisar, Jorhat, Ooty, Pasighat and Srinagar
Design	:	RBD
Replications	:	4
Plot size	:	Gross : 4.8m x 4.0m Net : 3.6m x 3.6m
Cropping sequence	:	Paddy-Potato OR Maize-Potato [Any sequence as per importance for the region]
Varieties	:	Promising varieties of the region: K Khyati, K Garima, K Anand, K Pushkar, K Bahar, K Chipsona-3. [K Swarna, K Neelima, for Ooty only] 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 total, non-marketable and marketable (<25 g and >25 g) of potato and sequential crops.
4. Nutrient (NPK) removal by component crops and nutrient balance sheet.
5. Quality parameters of economic produce
6. Economics- variable cost, gross and net return and B:C ratio.
7. Diseases development.

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.
- Pest and diseases should be managed culturally or through approved chemicals for organic farming.

AGRON. 9: DEVELOPMENT OF MICRONUTRIENT FORMULATION FOR POTATO

Locations	:	Bhubaneshwar, Chhindwara, Deesa, Dharwad, Dholi, Faizabad, Gwalior, Hassan, Hisar, Jalandhar, Jorhat, Kalyani, Kanpur, Kota, Modipuram, Pantnagar, Pasighat, Pune, Patna, Raipur, Srinagar and Shillong (Dharwad, Hassan, Srinagar and Shillong will conduct this experiment in *kharif*)
Design	:	RBD
Replications	:	4
Plot size	:	Gross : 4.8m x 4.0m Net : 3.6m x 3.6m
Variety	:	Recommended varieties of the area

Treatments

T1	:	Recommended fertilization practices followed in the region
T2	:	T1+ Foliar spray of boron as per details given below
T3	:	T1+ Foliar spray of zinc as per details given below
T4	:	T1+ Foliar spray of zinc + boron as per details given below
T5	:	T1 + Foliar vegetable special of IIHR, Three sprays at different growth stages
T6	:	T1 + Potato Specific nutrient formulation, Three sprays at different growth stages

Spray schedule: Spray schedule is common to all the treatments

First spray	:	Plant establishment stage(Vegetative growth stage)
Second spray	:	Tuber initiation stage
Third spray	:	Tuber bulking stage

If the duration of variety exceeds 80 days then one more spray can be given between second and third stage of the crop

Spray concentrations: Foliar vegetable special of IIHR @ 5 grams per litre with pH adjustment to 6.2-6.5 using either citric acid or lime juice and suitable sticker

Potato Specific nutrient formulation @ 4 grams per litre with pH adjustment to 6.2-6.5 using either citric acid or lime juice and suitable sticker

For boron alone treatment: Use boric acid at 50ppm concentration (50mg per litre).

For zinc alone treatment: Use $ZnSO_4.7H_2O$ at 150ppm concentration (150mg per litre). Adjust the pH to 6.2 to 6.5 using citric acid/ lime juice or sodium hydroxide as the case may be.

Observations to be recorded:

1. Soil samples should be collected before application of FYM and basal fertilizer application
2. Final emergence count.
3. Grade-wise (0-25g, 25-50g, 50-75g and >75g) tuber number (no/ha) and yield (t/ha) 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) at the start of senescence
6. Tuber uniformity (colour and shape) on 1-5 scale 1=V Poor to 5=V Good.
7. Photographic documentation of treatment differences at different stages of the crop.
8. Standard potato quality parameters followed by the AICRP
9. Economics of various treatments indicating the cost involved and the net gain (Rs/ha)

Note:

a) Soil, tuber and plant samples (dried) to be sent to Dr AN Ganeshamurthy, Division of Soil Science, IIHR, Bengaluru.
b) Do not use paper tags in soil samples.

AGRON. 10: POTASSIUM REQUIREMENT OF POTATO UNDER DIFFERENT IRRIGATION METHODS

Location	:	Deesa
Design	:	Split-Split Plot Design
Spacing	:	75 cm x 20 cm (paired row)
Replications	:	3 (three)
Plot size	:	Gross: 4.5 m x 4 m
		Net : 3.6 m x 3.6 m
Variety	:	Kufri Pukhraj (Most popular variety of the region)

Treatments

Main plot: Irrigation methods

M_1: Drip irrigation
M_2: Furrow irrigation

Sub-plot: KSB treatment

K_1: No treatment of KSB (Potassium solubilizing bacteria)
K_2: Treatment with KSB (tuber treatment)

Sub-sub-plot: K levels

S_1: 140 kg K_2O/ha
S_2: 210 kg K_2O/ha
S_3: 280 kg K_2O/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. Haulm yield on dry weight basis (kg/ha)
8. Economics of various treatments indicating the cost involved and the net gain (Rs/ha).
9. Incidence of disease

AGRON 11: EFFECT OF METHODS OF IRRIGATION THROUGH MICRO-SPRINKLERS AND DATE OF PLANTING ON POTATO VARIETY CV. KUFRI SURYA

Location	:	Hisar
Design	:	Split Plot
Replication	:	4 (Four)
Spacing (cm)	:	60 x 20
Variety	:	Kufri Surya
Recommended dose of N: P: K (kg/ha)	:	150:50:100

Treatments:

A. Main plot treatment

Irrigation methods: Two

i) Furrow irrigation (20 mm CPE)
ii) Micro-sprinkler (100% of 10 mm CPE)

Crop duration: Two

i) 75 days crop
ii) 90 days crop

B. Sub plot treatment

Dates of planting: Four

i) 1st September
ii) 15th September
iii) 30th September
iv) 15th October

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. Final emergence count.
3. Graded and total tuber number and yield (0-25g, 25-50g, 50-75g and >75g) per plot.
4. NPK uptake by potato.
5. Economics of various treatments indicating the cost involved and the net gain (Rs/ha).

AGRON 12: PERFORMANCE OF POTATO CULTIVARS UNDER DRIP IRRIGATION

Location	:	Hisar
Design	:	RBD
Replication	:	4 (Four)
Spacing (cm)	:	60 x 20
Recommended dose of N: P: K (kg/ha)	:	150:50:100
Date of planting	:	20th October
Varieties	:	Four

Treatments:

1. Crop duration: Two

i) 75 days crop
ii) 90 days crop

2. Varieties : Four

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. Final emergence count.
3. Graded and total tuber number and yield (0-25g, 25-50g, 50-75g and >75g) per plot.
4. NPK uptake by potato.
5. Economics of various treatments indicating the cost involved and the net gain (Rs/ha).

AGRON 13: EFFECT OF SPACING, FERTILITY LEVELS AND DATES OF HAULM CUTTING ON QUALITY SEED GRADE TUBER PRODUCTION OF POTATO

Locations	:	Kalyani
Design	:	Split plot
Spacing	:	As per treatments
Replications	:	4 (Four)
Plot size	:	Gross: 4.8 m x 3.4 m
		Net : 3.6 m x 3.0 m
Variety	:	

Treatments

A. Spacing- 2 levels

60cm X 20cm
60cm X 15cm

B. Fertility – 3 Levels

100% RDF of NPK+ 0.1% boric acid as foliar application in three times at 40, 50 and 60 DAP
75% RDF of NPK+ 0.1% boric acid as foliar application in three times at 40, 50 and 60 DAP
50% RDF of NPK+ 0.1% boric acid as foliar application in three times at 40, 50 and 60 DAP

C. Date of haulm cutting

75 days after planting
90 days after planting

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 DAP.
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. Halum yield on dry weight basis (kg/ha) to be recorded at start of senescence
7. Economics of various treatments indicating the cost involved and the net gain (Rs/ha)

AGRON 14: EFFECT OF PLANT GROWTH REGULATOR ON TUBER YIELD OF POTATO

Location : Raipur

Treatments:

A. Methods of PGR application,

1. M1 (Seed treatment) and
2. M2 (Spray treatment) and

B. Levels of plant growth regulators

1. T1 : (control) Plain water spray
2. T2 : (GA_3 25 ppm)
3. T3 : (GA_3 50 ppm)
4. T4 : (IBA 100 ppm) and
5. T5 : (IBA 200 ppm)PGR

Application of PGR by spraying to leaf at early (30 DAT) and late (60 DAT) stages.
Variety: Kufri Pukhraj, Kufri Khyati or Kufri Surya

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 DAP.
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. Halum yield on dry weight basis (kg/ha) to be recorded at start of senescence
7. Economics of various treatments indicating the cost involved and the net gain (Rs/ha)

AGRON 15: STUDIES ON MULCHING IN POTATO UNDER RAINFED CONDITIONS.

Location : Srinagar
Design : RBD

Treatments:

1. Black polythene mulch
2. Transparent mulch
3. Silver color mulch
4. Pine needle mulch (10 t/ha)
5. Straw mulch (10 t/ha)
6. FYM as mulch (15 t/ha)
7. Control

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 DAP.
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. Halum yield on dry weight basis (kg/ha) to be recorded at start of senescence
7. Soil temperature (at 10 days interval)
8. Soil moisture content (at 10 days interval)
9. Economics of various treatments indicating the cost involved and the net gain (Rs/ha)

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 [Nodal Scientist-Dr Sanjeev Sharma, CPRI, Shimla]

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Locations: Dholi, 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 Kufri Chandramukhi/Kufri 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 meteorological data of the year to be uploaded in INDO-BLIGHTCAST model for validation.
2. Date of first appearance of disease in the crop.
3. Disease severity of late blights in foliage and stem at 7, 14, 21 and 28 days after disease appearance (As per SOPs supplied).
4. Incidence of disease in tubers at harvest.
5. Incidence of disease in tubers after cold storage.
6. Send late blight inoculated/infected tuber samples to the Head, Division of Plant Protection, ICAR-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) [Nodal Scientist-Dr Ravinder Kumar, CPRI, Shimla]

Locations: All centers (except Kufri and Ranichauri).

Experimental details: Plant two sets on an area of 10 m^2 in hills and 20 m^2 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.

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 recorded at harvest.
3. Incidence of individual virus may be recorded. The infected leaf samples embedded in blotting sheets may be sent to Head, Plant Protection, ICAR-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 [Nodal Scientist-Dr Sanjeev Sharma, CPRI, Shimla]

Locations **:** Dholi, Faizabad**,** Hassan, Jalandhar, Kalyani, Pantnagar, Patna, Shillong and Srinagar.

Replications **:** 5 (Five)

Treatments

T1 : Prophylactic spray (just at the time of canopy closure) with chlorothalonil @ 0.25% followed by two more sprays at weekly intervals.
T2* : Prophylactic spray (just at the time of canopy closure) with chlorothalonil @ 0.25% followed by cymoxanil/dimethomorph/fenamidone+mancozeb @ 0.3% and one more spray with chlorothalonil @ 0.25% .
T3 : Prophylactic spray (just at the time of canopy closure) with mancozeb @0.2% followed by dimethomorph/fenamidone/cymoxanil + mancozeb @ 0.3% followed by mancozeb.
T4 : Control.

* Choose best fungicide as per the recommendation for particular location

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

Note: If disease pressure is high, additional sprays may be given as per treatment to achieve the desire control and number of sprays may be communicated in the results.

Observations to be recorded

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

PATH.4: STUDIES ON SEED DEGENERATION [Nodal Scientist-Dr Baswaraj Raigond,CPRI, Shimla

Locations : Deesa, Raipur, Hassan, Hisar, Kalyani and Pune
Replications : 5
Design : RBD
Viruses : PLRV, PVY, PALCV, Mild and Severe Mosaic
Varieties

Deesa		Kufri Badshah, Kufri Khyati*
Raipur		Kufri Surya,Kufri Khyati
Hassan		Kufri Surya, Kufri Khyati
Hisar		Kufri Bahar, Kufri Khyati
Kalyani		Kufri Jyoti, Kufri Khyati
Pune		Kufri Surya, Kufri Khyati

* Kufri Khyati is a common variety in all the locations for comparison.

Treatments

T1 : Fresh breeder seed every year
T2 : Previous seed produce using seed plot techniques
T3 : Previous seed produce without seed plot techniques

Observations to be recorded

1. Initial source of seed should be same for all centers–virus free seed materials & seed with primary infection.
2. Plant emergence after 30 days and 40 days.
3. Experiments should be carried out without insecticides spray in all the centers.
4. Observation should be made uniformly at 45, 60 & 75 days after planting in all the centers visually and also through further confirmation using lab diagnostic techniques.
5. Sampling for virus testing – uniform number of random samples covering the whole plot should be tested in all the centers. Example: ten samples from each variety/each plot.
6. Information on other tuber borne pathogens and late blight incidence. Proper management practice for late blight incidence (Fungicide spray etc.,)
7. Information on temperature, rainfall and vector incidence (whiteflies, aphids and thrips etc) should be recorded in all the centers.
8. The rate of increase in virus incidence and reduction in yield should be compared with previous years i.e. results should be presented always in comparison to previous years and comparison should also be made between the AICRP centers.
9. The infected leaf samples embedded in blotting sheets may be sent to Head, Plant Protection, CPRI, Shimla.
10. Dates of planting/haulm cutting/harvest.

PATH.5: MANAGEMENT OF EARLY BLIGHT [Nodal Scientist-Dr Sanjeev Sharma, CPRI, Shimla]

Locations : Bhubaneswar, Deesa and Pune
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 : Spray of urea (1%) + mancozeb @0.25% at 40-45 days crop age and repeat at 8-10 days interval
T3 : Spray of urea (1%) + mancozeb @0.25% at 40-45 days crop age and repeat at 8-10 days interval followed by one more spray of mancozeb
T4 : 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

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

Observations to be recorded:

1. Disease severity at 10 days interval
2. Yield at harvest (t/ha)

PATH.6: MANAGEMENT OF COMMON SCAB [Nodal Scientist-Dr Vinay Sagar, CPRI, Shimla]

Locations	:	Dholi, 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, WHITEFLIES, THRIPS HOPPERS AND MITES IN UNSPRAYED CROP [Nodal Scientist-Dr J Sridhar, CPRI, Shimla]

Aphid species	:	*Myzus persicae* and *Aphis gossypii*
Whiteflies	:	*Bemisia tabaci*
Thrips	:	*Thrips palmi*
Hoppers	:	*Empoasca devastans*
Mites	:	*Polyphagotarsonemus latus*
Locations	:	All AICRP centers (except Ranichauri)
Plot size	:	4.0 X 5.0 m^2 (6 plots)
Variety	:	Recommended for the region

Observations to be recorded

1. Aphid population to be recorded per 100 compound leaves (top, middle and bottom leaves of 34 plants) at weekly intervals soon after plant emergence till harvest.
2. Whiteflies and leafhoppers populations may be counted on three fully expanded compound leaves (top, middle and bottom) per plant in 10 fixed plants in each plot at weekly intervals. Data on whiteflies may preferably be recorded in the early morning hours when the whitefly activity is very low.
3. Thrips population may be recorded and counted at weekly intervals by shaking 10 fixed (tagged) plants/plot so that the thrips fall onto sticky traps.
4. First appearance of mites and buildup of infestation over a period of time is to be recorded (Scale for mite damage is presented below).
5. Meteorological data to be recorded during crop period.
6. Incidence of viruses (no. of plants with viral symptoms/ total no. of plants observed).

Note:

Insect samples (aphids, whiteflies, leaf hoppers, thrips and mites) may be collected into cryo-vials containing 70% alcohol separately using fine camel hair brush (cryo-vials shall be provided). The vials may be packed carefully and sent to Head, Division Plant Protection, ICAR-CPRI, Shimla for their identification at species level and also to determine their viruliferous nature under intimation to Project Coordinator (Potato). The insect photographs are presented below for their visual identification. The observations on insect population at weekly intervals may be recorded as per standard week (Data sheet will be provided).

Aphid Nymph

Adult Aphid

Whiteflies

Leaf hopper

Thrips

Mite

1-20%(5)

21-40%(4)

41-60% (3)

61-80% (2)

>80% (1)

Scale for rating mite infestation: 5- Low infestation; 1- Severe infestation

ENT 2: USE OF PARTICLE FILM TECHNOLOGY FOR THE MANAGEMENT OF APHIDS AND WHITEFLIES IN POTATO [Nodal Scientist-Dr J Sridhar, CPRI, Shimla]

Locations	:	Bhubaneswar, Deesa, Dholi, Chhindwara, Hassan, Kalyani, Modipuram, Patna, Pune and Raipur
Design	:	RBD
Replications	:	Four
Plot size	:	4.0 m X 4.8 m (8 rows of 20 tubers each)
Date of planting	:	Planting date recommended for the region
Application of insecticide	:	First spray at the time aphid appearance followed by second spray after a fortnight.
Kaolin application	:	3 sprays starting from 30 DAP at 15 days interval.

Treatments details

Treatments		**Mulching**
T_1 : Control T_2 : Imidacloprid 17.8SL @0.03% T_3 : Kaolin @1.25% T_4 : Kaolin @2.5% T_5 : Kaolin @3.75%	X	M_0: No mulch M_1: Mulching with black polythene

Variety : Recommended variety of the area (Good quality Seed)

Observations to be recorded

1. Aphid population to be recorded per 100 compound leaves at weekly intervals soon after plant emergence till harvest as in Ent 1.
2. Whiteflies and leafhoppers population may be counted on three fully expanded compound leaves per plant in 10 fixed plants in each plot at weekly intervals. Data on whiteflies may preferably record in the early morning hours when the whitefly activity is very low as per procedure in Ent 1.
3. Incidence of viruses (no. of plants with viral symptoms/ total no. of plants observed).
4. Meteorological data to be recorded during crop period.
5. Yield data to be recorded at normal harvesting time.

ENT 3: BIOLOGICAL CONTROL OF SOIL PESTS IN POTATO [Nodal Scientist-Dr Priyank Mahatre, CPRS, Ooty]

Locations	:	Shimla, Shillong and Ooty
Design	:	RBD
Replications	:	Five
Plot size	:	4.0 m X 4.8 m (8 rows of 20 tubers each)
Date of planting	:	Planting date recommended for the region
Variety	:	Recommended variety of the area (Breeders' Seed)

Treatments

T1 **:** Untreated control
T2 **:** EPN formulation
T3 **:** *Metarhizium anisopliae*
T4 **:** Chlorpyriphos20EC@0.02% (standard control)

Note: Two applications in total crop period. First application at the time of sowing and second application during weeding time (30 days after sowing).

Observations to be recorded

1. Incidences of healthy root grubs in different treatments at monthly intervals during trial period.
2. Percent tuber and plant damage due to white grubs and cutworms respectively in different treatments. Weight of infected tubers may be recorded.
3. Yield to be recorded in different treatments.
4. Soil samples at 45 days after planting from Shimla and Shillong may be sent to Head, Plant Protection under intimation to Project Coordinator (Potato) for analysis.

ENT 4: MANAGEMENT OF POTATO TUBER MOTH USING BIOLOGICAL CONTROL AGENTS IN STORES [Nodal Scientist-Dr Anuj Bhatnagar, CPRIC, Modipuram]

Locations	:	Hassan, Pune and Ooty
Design	:	CRD
Replications	:	Five
Plot size	:	4.0 m X 4.8 m (8 rows of 20 tubers each)
Variety		Recommended variety of the area
Date of planting	:	Planting date recommended for the region
Method	:	The tubers will be dipped in insecticidal solution for 20 minutes and shade dried before storage. These treated tubers will be kept in stores and observed for tuber moth infestation and damage (per cent) over a period of time.

Treatments

T1	**:**	Untreated control
T2	**:**	Dip treatment of tubers with neem oil @1%
T3	**:**	Dip treatment of tubers with neem oil @2%
T4	**:**	Dip treatment of tubers with Bt formulation @1%
T5	**:**	Dip treatment of tubers with Bt formulation @2%
T6	**:**	Dip treatment of tubers with CSR bio formulation

Observations to be recorded

1. Tuber damage due to PTM larvae over a period of time to be recorded.
2. Meteorological data to be recorded.

ENT 5: BIOMANAGEMENT OF POTATO CYST NEMATODES [Nodal Scientist-Dr Aarti, CPRI, Shimla]

Location	:	Ooty (Multilocation 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 (10^8 spores/g)
T2	**:**	*Pochonia chlamydosporia* @ 20kg/ha talc formulation (10^8 spores/g)
T3	**:**	*Trichoderma viride* @ 20kg/ha talc formulation (10^8 spores/g)

T4 : *Pseudomonas fluorescens* 20kg/ha talc formulation (10^9cfu/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)

ANNEXURE-I

ALL INDIA COORDINATED RESEARCH PROJECT ON POTATO

34th GROUP MEETING OF AICRP (Potato)

August 20-22, 2016

VENUE: ICAR-Central Potato Research Institute, Shimla

PROGRAMME OF THE MEETING

AUGUST 20, 2016		
08.30-9.30 hrs	Registration	
INAUGURATION SESSION		
Chief Guest	Dr Trilochan Mohapatra, Secretary DARE & DG, ICAR, New Delhi	
Preside over	Dr AK Singh, DDG, Horticulture Sciences, ICAR, New Delhi	
Guest of honour	Dr SK Malhotra, Horticulture/Agriculture Commissioner, GOI, New Delhi Sh Sanjay Chauhan, Mayor, MC Shimla Dr T Janakiram, ADG, Horticulture Sciences, ICAR, New Delhi	
Rapporteurs	Dr's Sanjeev Sharma and Raja Shankar (Shimla)	
10.00 to 11.30 hrs	ICAR Song	
	Lighting the lamp	All dignitaries
	Welcome	
	Introductory remarks	Dr SK Chakrabarti
	Project Coordinator's Report	Dr PM Govindakrishnan
	Release of Publications	
	Launching of Smart Potato Portal	
	Remarks of the Guest of Honour	Dr SK Malhotra, Horticulture/Agriculture Commissioner, GOI, New Delhi
		Sh Sanjay Chauhan, Mayor, MC Shimla
		Dr T Janakiram, ADG, Horticulture Sciences, ICAR, New Delhi
	Presidential Address	Dr AK Singh, DDG, Horticulture Sciences, ICAR, New Delhi
	Address by Chief Guest	Dr Trilochan Mohapatra, Secretary DARE & DG, ICAR, New Delhi
	Vote of Thanks	Dr NK Pandey
	National Anthem	
	High Tea	

AUGUST 20, 2016		
TECHNICAL SESSION I: CROP IMPROVEMENT		
Chairman	Dr KR Dhiman, Ex VC, YSPUH&F, Nauni, Solan	
Co-Chairman	Dr Manish Das, Pr Scientist, ICAR, New Delhi	
Rapporteurs	Dr's Vinod Kapoor (CPRS, Kufri), VK Gupta (CPRIC, Modipuram) and Raj Kumar (CPRS, Jalandhar)	
14.30-18.30 hrs	Summary presentation, Discussions and finalization of Technical Programme	Dr. Vinay Bhardwaj, Actg Head, Crop Improvement
	Discussion of results and clarification of each center	Scientists from different AICRP centers.
16.00-16.15 hrs	Tea Break	
AUGUST 21, 2016		
ACTION TAKEN REPORT		
Chairman	Dr Janakiram, ADG, Horticulture Sciences, ICAR, New Delhi	
Co-Chairman	Dr SK Chakrabarti, Director, ICAR-CPRI, Shimla	
Rapporteurs	Dr's VK Gupta (CPRIC, Modipuram), EP Venkatasalam (CPRS, Ooty) and Raja Shankar (CPRI, Shimla)	
09.00 hrs-09.30 hrs	Action Taken Report	Dr PM Govindakrishnan
09.30hrs– 11.00 hrs	**CONTINUATION OF TECHNICAL SESSION I: CROP IMPROVEMENT**	
11.00hrs– 11.30 hrs	TEA BREAK	
TECHNICAL SESSION II: CROP PRODUCTION		
Chairman	Dr T Janakiram, ADG, Horticulture Sciences, ICAR, New Delhi	
Co-Chairman	Dr James George, Director, CTCRI, Trivandrum	
Rapporteurs	Dr Sanjay Rawal (CPRIC, Modipuram), Dr SP Singh (CPRS, Gwalior) and Dr SK Yadav (CPRS, Patna)	
11.30 hrs-14.00 hrs	Summary presentation, Discussions and finalization of Technical Programme	Dr VK Dua, Head, Crop Production
	Discussion of results and clarification of each center	Scientists from different AICRP centers.
14.00 hr	Lunch Break	
TECHNICAL SESSION III: CROP PROTECTION		
Chairman	Dr SK Chakrabarti, Director, CPRI, Shimla	
Co-Chairman	Dr RC Upadhayay, Pr Scientist, DMR, Solan	
Rapporteurs	Dr Kamlesh Malik (CPRIC, Modipuram), Dr RP Singh (Pantnagar) and Dr R Sudha (CPRS, Ooty)	
14.30-16.00 hr	Summary presentation, Discussions and finalization of Technical Programme	Dr. Sanjeev Sharma, Actg. Head, Crop Protection
	Discussion of results and clarification of each center	Scientists from different AICRP centers.
16.00-16.15 hrs	Tea break	
16.15-18.00	Discussions and finalization of Technical Programme of all disciplines	All PI's & AICRP Participants

AUGUST 22, 2016	
TECHNICAL SESSION IV: PLENARY SESSION	
Chairman	Dr T Janakiram, ADG, Horticulture Sciences, ICAR, New Delhi
Co-Chairman	Dr SK Chakrabarti, Director, CPRI, Shimla
Rapporteurs	Dr's Jagdev Sharma (CPRI, Shimla), Sanjay Rawal and SK Luthra (CPRIC, Modipuram)
10.00 -11.30 hrs	Presentation of recommendations by the PI's of the respective sessions
11.30 -12.30 hrs	Discussions and finalization of Proceedings and Technical Programmes of various sessions
12.30-12.45 hrs	Concluding remarks by the Chairman & Co-Chairman
12.50 hrs	Vote of thanks by Dr PM Govindakrishnan
13.00 hrs	Lunch Break

ANNEXURE-II

ALL INDIA COORDINATED RESEARCH PROJECT ON POTATO

34th GROUP MEETING OF AICRP (Potato)

August 20-22, 2016

VENUE: ICAR-Central Potato Research Institute, Shimla

LIST OF PARTICIPANTS

Sl. No.	Name of Institute/ Organization	Name of participant	Designation
1.	Indian Council of Agricultural Research, New Delhi	1. Dr AK Singh	Deputy Director General (Horticulture Sciences)
		2. Dr T Janakiram	Assistant Director General (Horticulture Sciences)
		3. Dr Manish Das	Principal Scientist, Division of Horticulture Sciences
2.	Central Potato Research Institute, **SHIMLA** (HP)	4. Dr SK Chakrabarti	Director
		5. Dr VK Dua	Head, Crop Production
		6. Dr Vinay Bhardwaj	Actg. Head, Crop Improvement
		7. Dr Sanjeev Sharma	Actg. Head, Crop Protection
		8. Dr NK Pandey	Head, Social Sciences
		9. Dr Brajesh Singh	Head, CPB&PHT
		10. Dr RK Singh	Head, Seed Technology
		11. Dr Sridhar Jandrajupalli	Scientist
3.	All India Coordinated Research Project on Potato [AICRP (Potato)], CPRI, **SHIMLA** (HP)	12. Dr PM Govindakrishnan	Project Coordinator
		13. Dr Raja Shankar	Sr Scientist
		14. Mr Dharminder Verma	ACTO
		15. Mrs Nirmala Chauhan	LDC
		16. Mr Sita Ram	Technician
4.	International Potato Center (CIP) SW&CA Region, New Delhi	17. Dr MS Kadian	Agronomist
5.	Central Potato Research Institute Campus, **MODIPURAM**, (UP)	18. Dr Devedra Kumar	Actng. Joint Director
		19. Dr Name Singh	Principal Scientist
		20. Dr (Mrs) Kamlesh Malik	Principal Scientist
		21. Dr Sanjay Rawal	Principal Scientist
		22. Dr SK Luthra	Principal Scientist
		23. Dr VK Gupta	Principal Scientist
6.	Central Potato Research Station, **KUFRI (**HP)	24. Dr Vinod Kumar	Principal Scientist and Acting Head
7.	Central Potato Research Station, **JALANDHAR** (Punjab)	25. Dr JS Minhas	Head
		26. Dr Raj Kumar	Principal Scientist
		27. Dr Prince	Scientist (Agronomy)
8.	Central Potato Research Station, **PATNA** (Bihar)	28. Dr Manoj Kumar	Head
		29. Dr Shambhu Kumar	Principal Scientist
		30. Dr SK Yadav	Scientist
9.	Central Potato Research Station, **GWALIOR** (MP)	31. Dr Satyajit Roy	Head
		32. Dr SP Singh	PS, Agronomy

		33. Murlidhar Sadawarti	Scientist (SS)
10.	Central Potato Research Station, **SHILLONG** (Meghalaya)	34. Dr Bapi Das	Scientist
		35. Sh Pradeep Kumar	Scientist
11.	Central Potato Research Station **OOTACAMUND** (Tamil Nadu)	36. Dr EP Venkataslam	Actg. Head
		37. Dr Sudha	Scientist
		38. Dr Divya K Laxmanan	Scientist
12.	Orissa University of Agriculture and Technology, **BHUBANESHWAR** (Orissa)	39. Dr Ashok Kumar Mishra	Potato Breeder
		40. Mr Debasis Ghosal	Junior Agronomist
13.	JNKVV Regional Agricultural Research Station, **CHHINDWARA** (MP)	41. Dr DN Nandekar	Senior Scientist
14.	Potato Research Station, Sardarkrushinagar Dantiwada Agriculture University, **DEESA** (Gujarat)	42. Dr RN Patel	Plant Breeder
		43. Dr Sunil Kumar Chongtham	Agronomist
		44. Sh JK Patel	Plant Pathologist
15.	University of Agricultural Sciences, **DHARWAD** (Karnataka)	45. Dr PR Dharmatti	Professor
16.	Rajendra Agricultural University, TCA Campus, **DHOLI** (Bihar)	46. Dr LM Yadav	Chief Scientist
		47. Dr DK Dewedi	Senior Scientist
		48. Dr Birendra Kumar	Senior Scientist
17.	ND University of Agriculture and Technology, **FAIZABAD** (UP)	49. Dr AP Singh	Technical Assistant
		50. Dr RK Srivastava	Technical Assistant
18.	UHS, Bagalkot Horticultural Research and Extension Station, Somanahallikaval, **HASSAN** (Karnataka)	51. Dr H Amarananjundeswara	Associate Professor
		52. Dr PS Prasad	Assistant Professor
19.	CCS Haryana Agricultural University, **HISAR** (Haryana)	53. Dr AK Bhatia	Principal Scientist
		54. Dr Anil Gupta	Plant Pathologist
		55. Dr VPS Panghal	
20.	Assam Agricultural University **JORHAT** (Assam)	56. Dr PC Bhagawati	Principal Scientist
		57. Dr Md Zafar Ullah	Senior Scientist
		58. Dr Mitul Kumar Saikia	Senior Scientist
21.	BC Krishi Vishwa Vidyalaya **KALYANI** (West Bengal)	59. Dr Ashis Chakraborty	Associate Professor
		60. Dr Anirban Sarkar	Assistant Professor
		61. Dr Sanjib Kumar Das	Assistant Professor
22.	CSA University of Agriculture and Technology, **KANPUR** (UP)	62. Dr UC Mishra	Agronomist
		63. Dr Ramesh Singh	Assistant Professor
23.	Agriculture University, **KOTA** (Rajasthan)	64. Dr BL Nagar	Assistant Professor
24.	GB Pant University of Agriculture and Technology, **PANTNAGAR** (Uttarakhand)	65. Dr Manoj Raghav	Professor
		66. Dr RP Singh	Professor
		67. Dr Dhirender Singh	Professor

25.	College of Horticulture and Forestry, **PASIGHAT** under CAU, (Imphal)	68. Dr SD Warade	Professor
26.	NARP, Ganesh Khind, **PUNE** under MPKV (Rahuri)	69. Dr MR Deshmukh	Junior Scientist
		70. Dr SA More	Junior Scientist
27.	IG Krishi Vishwavidhyalaya, **RAIPUR** (Chhattisgarh)	71. Dr PK Joshi	Senior Scientist
		72. Dr Pravin Kumar Sharma	Scientist
28.	SK University of Agricultural Sciences and Technology, **SRINAGAR** (J&K)	73. Dr Shabir Hussain Khan	Associate Professor
		74. Dr Faheema Mustaq	Potato Agronomist
30	**SPECIAL INVITEES**	75. Dr SK Malhotra	Horticulture/Agriculture Commissioner, GOI, New Delhi
		76. Dr KR Dhiman	Ex VC, YSPUH&F, Nauni, Solan
		77. Dr James George	Director, CTCRI, Trivandrum
		78. Dr RC Upadhyay	Principal Scientist, DMR, Solan
		79. Dr Baxla	Pr Scientist, IMD, New Delhi
		80. Dr KS Verma	YSPUH&F, Nauni, Solan
31	**Representatives from private sector**	81. Dr Sri Jyotirmoy Guha	Director, GMS Agri. Tech. Pvt. Ltd.
		82. Dr Supravo Gupta	Consultant, GMS Agri Tech.Pvt.Ltd.
		83. Dr S Nandi	Scientific Officer, Krishi Rasayan Group Kolkata
		84. Dr Susheel Sankhyan	PepsiCo India Holding Pvt. Ltd.
		85. Dr SP Singh	Technico Agri Sciences Ltd.
		86. Dr Neeraj kumar	Technico Agri Sciences Ltd.