MAJOR RECOMMENDATIONS

CROP IMPROVEMENT

1. Recommended the release of A-7416 and C-3804 advanced hybrids as varieties. A-7416 is early in maturity and is suitable for both *rabi* and *kharif* seasons in the Deccan plateau. C-3804 combines frost tolerance with good keeping quality in ordinary stores at room temperatures and gives high yields in the tarai areas. (1971)
2. Confirmed the superiority of newly released variety Kufri Jyoti as an early maturing variety with consistently high yields and high degree of field resistance to late blight both in the foliage and in the tubers, and recommended it for potato growing areas in the northern hills in HP and UP where late blight is an annual feature. (1972)
3. Kufri Chandramukhi was recommended as an ideal variety for multiple cropping in plains of India. For raising of seed or a main season crop, it should be given prophylactic sprays with Mancozeb (2 kg/ha) against late blight. (1973)
4. On the basis of dry matter content and yield, the culture JF-4870 is recommended for release from among the four hybrids viz., JF-4870, JF-4841, JF-303 and EM/H-1603. (1978)
5. Hybrid E-3797 recommended for release under the name Kufri Bahar. (1979)
6. Three new cultivars recommended for release by CVRC. They are (i) Kufri Sherpa: resistant to wart and late blight gives good yields in Darjeeling hills and plains of West Bengal also suitable for NE hills and plains; (ii) Kufri Himalini: possesses high resistance to late blight and gives higher yield than Kufri Jyoti in the hill areas particularly in the North eastern hills, and (iii) Kufri Lalima: suitable for UP, Bihar, West Bengal, and Orissa where red tubers are preferred. Being a medium maturing cultivar, Kufri Lalima matures earlier than Kufri Sindhuri, hence fits better in the multiple cropping system. (1981)
7. SON-110: Suitable for Nilgiri and Kodaikanal hills, where cyst nematodes and late blight are major problems. It possesses resistance to both of them and gives about 30% higher yield than the commercial cultivar. (1985)
8. E-4486: A main crop culture, produces high yields and has wide adaptability in the Indo-Gangetic plains particularly in Haryana, UP, Bihar and West Bengal also in Gujarat and MP; gives very good yields in areas where growing period is slightly longer; produces white, round-oval tubers of medium to large size. (1985)
9. JH-222: Suitable for Punjab, Haryana, UP, Bihar, MP and northern plateau regions; medium early in maturity, has a fast bulking rate and produces regular medium size tubers of white colour and pale yellow flesh, possesses a fair level of resistance to late blight, does not suffer from early blight and phoma diseases in the field; shows slow rate of degeneration; possesses good keeping quality; suitable for chipping. (1985, 1990)
10. JI-5857: Recommended for release for Punjab, Haryana, UP, Bihar and Madhya Pradesh. Appropriate simultaneous action for priority multiplication of disease-free stocks of this hybrid may be taken up by CPRI. (1991)
11. It was recommended that the following 17 varieties may be de-notified by CVRC.

Kufri Alankar, Kufri Chamatkar, Kufri Dewa, Kufri Jeevan, Kufri Khasigaro, Kufri Kisan, Kufri Kuber, Kufri Kumar, Kufri Kundan, Kufri Muthu, Kufri Naveen, Kufri Neela, Kufri Neelamani, Kufri Red, Kufri Safed, Kufri Sheetman and Kufri Sherpa. (1991)

12. HPS-I/13 and TPS C3 : It was recommended that two TPS families which have shown high yield in trials in Bihar, MP and Gujarat should be released so that a beginning could be made to introduce TPS technology of crop production in the identified priority areas. (1991)
13. The hybrids PJ-376 and JEX/C-166 were recommended for release. The former culture is suitable for early crop in the entire Indo-Gangetic plains and yields about 23-28 t/ha at 75 days, whereas, the latter is suitable as a main crop variety in the states of Punjab, Haryana, Uttar Pradesh, Rajasthan, Bihar, Madhya Pradesh and West Bengal and yields on an average 30 t/ha at 90 days harvest. The proformae for their release will be submitted by the CPRI for consideration of the Central Variety Release Committee. (1993)
14. NW/E hills are in urgent need of a variety to replace Kufri Jyoti, released in 1964 which has now become susceptible to late blight. Hybrid SM/85-45 was recommended for early release to replace Kufri Jyoti. The yield potential of this hybrid is about 26 t/ha as against 18 t/ha of Kufri Jyoti. The hybrid is suitable for entire hilly region. (1997)
15. In view of better yield performance of the hybrid D/79-56 than presently popular varieties, viz., Kufri Swarna and Kufri Jyoti in southern hills, and its resistance to cyst nematodes and late blight, this hybrid was recommended for release. The yield potential of D/79-56 is about 33 t/ha in nematode infested soils as against 20 t/ha of Kufri Swarna and 15 t/ha of Kufri Jyoti. In nematode free soils, it yields about 39 t/ha as against 24 t/ha of Kufri Swarna and 23 t/ha of Kufri Jyoti. The hybrid D/79-56 is recommended for southern hills. (1997)
16. Four hybrids suitable for processing were introduced for evaluation of tuber dry matter and chip colour. Of these, two hybrids, viz., MP/90-83 and MP/91-G have consistently performed well at Modipuram during 1993-1997 and at Patna during 1996-97. Both these hybrids gave 2-4% higher tuber dry matter and excellent chip colour with yield at par with Kufri Jyoti, the popular variety used for chipping. In view of the immediate requirement of the processing industry and recommendations of QRT & RAC, these two hybrids were recommended for an early release. The hybrids MP/90-83 and MP/91-G have given 21.5% tuber dry matter on an average as against 18.7% of Kufri Jyoti. These hybrids are suitable for western UP and Bihar states. The yield potential of these hybrids is about 32.5 t/ha as against 31.6 t/ha of Kufri Jyoti. Both of these hybrids possess a high degree of resistance to late blight. (1997)
17. TPS population 92-PT-27 allows TPS production in the plains without the use of additional light. The yield of this population is better than the standard variety in the eastern region. It produces more uniform tubers and better marketable yield than the existing TPS populations. This population was recommended for release for commercial cultivation in eastern regions. (2001)
18. Hybrid PS/F-220 consistently showing resistance to potato stem necrosis (PSND) at Kota, a hot spot for the disease, is recommended for registration as elite germplasm line with NBPGR, New Delhi and for future use as a parental line in breeding programme. (2003)

19. The following hybrids were recommended for release after multilocation testing under AICRP (Potato).

Hybrid	Year	Characteristics
JW-160 (Kufri Pushkar)	2003	A high yielding medium maturing white tuber hybrid having field resistance to late blight and excellent keeping quality under ambient storage conditions is suitable for cultivation in plains and plateau regions of the country.
MS/92-2105 (Kufri Arun)	2003	A red skinned high yielding hybrid with oval attractive tubers having field resistance to late blight is identified for cultivation in the Indo-gangetic plains and suitable for replacement of late blight susceptible varieties K. Sindhuri and K. Lalima.
SM/87 -185 (Kufri Shailja)	2003	A late blight resistant white tuber hybrid having higher tuber dry matter and better keeping quality over cv. K. Giriraj for cultivation in hilly regions of the country so as to avoid mono culture of K. Giriraj following breakdown of resistance to late blight in K. Jyoti.
HT/92-621 (Kufri Surya)	2003	A white flesh, heat tolerant hybrid suitable for cultivation under early planting conditions in the northern plains and warmer areas of the country having resistance to leafhopper and mites. In addition the hybrid is having high dry matter and is suitable for processing as French fries.
MP/97-583 (Kufri Chipsona-3)	2005	Based on the performance over locations and processing quality (assessed by M/s. Frito-Lay), the hybrid MP/97-583 has been found to have high yield, high tuber dry matter and excellent chip color. It also produces acceptable quality chips after storage at 10-12^{o}C up to 180 days and produces more processing grade tubers than the existing varieties K. Chipsona-1 and K. Chipsona-2. This hybrid is recommended for release in Indo-Gangetic plains, Kota and Indore region, under the name Kufri Chipsona-3.
SM/91-1515 (Kufri Himalini)	2005	Based on the overall performance over locations and better resistance to late blight than all available varieties, good tuber shape and no tuber cracking, release of this hybrid for cultivation in north western and north-eastern hills of the country was recommended.
J/93-86 (Kufri Khyati)	2007	Early maturing white tuber hybrid with moderate resistance to late blight. This hybrid yields higher than existing early cultivars both at 60 and 75 days after planting. This hybrid was recommended for entire Indian plains.
SM/93-237 (Kufri Girdhari)	2007	Medium maturing white tuber hybrid with high level of resistance to late blight. It yields higher than existing cultivars for hills. This hybrid was recommended for all Indian hills.

OS/93-D-204 (Kufri Neelima)	2009	Medium maturing hybrid resistant to late blight and both the species of cyst nematodes and is suitable for cultivation in Nilgiri hills of Tamil Nadu. It was recommended for release under the name Kufri Neelima.
MP/98-71 (Kufri Frysona)	2009	Medium maturing hybrid with high dry matter and is suitable for processing into French fries. It was recommended for release as variety for cultivation in Uttar Pradesh, Haryana, Punjab and West Bengal under the name Kufri Frysona.
MS/99-1871 (Kufri Garima)	2011	Medium maturing hybrid was recommended for release for Indo-gangetic plains and plateau region because it yielded 8-20% higher than Kufri Bahar & 6-38% higher than Kufri Jyoti, the local checks and has moderate level of resistance to late blight. It has yellow skin, oval tubers with shallow eyes.
JX-576 (Kufri Gaurav)	2011	Medium maturing hybrid was recommended for release for northern plains because it yielded 10% higher than Kufri Pukhraj and is nutrient use efficient with 10-26% higher agronomic use efficiency. It is moderately resistant to late blight and has white, oval tubers with fleet eyes.
2001-P-55 (Kufri Lalit)	2013	A medium maturing variety producing medium tall, erect, compact plant canopy. This variety is moderately resistant to late blight and has good keeping quality. It is easy to cook, texture waxy, pleasant flavour, acceptable taste and free from after-cooking discoloration. It can replace other red skinned varieties like Kufri Arun, Kufri Sindhuri & Kufri Lalima and recommended for release under the name Kufri Lalit.
MS/5-1543 (Kufri Mohan)	2015	A white cream skin and oval tuber, high yielding medium maturing advanced hybrid, MS/5-1543 having moderate resistance to late blight with good keeping quality is recommended for cultivation in Indo-Gangetic (Northern and Eastern) plains of India.
MS/06-1947 (Kufri Ganga)	2017	Medium maturing (75-90 days), high yielding (35-40 t/ha), white skinned advanced table potato hybrid MS/06-1947 is recommended for release as a new variety for North Indian plains. It produces attractive white-cream ovoid uniform tubers with shallow eyes and white-cream flesh. It possesses field resistance to late blight, good keeping/culinary quality.
MS/08-1565 (Kufri Neelkanth)	2017	First ever, purple skinned, medium maturing (75-90 days) with higher anthocyanin/carotenoids content and high yielding (35-38 t/ha) advanced potato hybrid MS/08-1565 is recommended for release as a new variety for North Indian plains. It produces attractive purple coloured ovoid uniform tubers with shallow eyes and yellow flesh. It

		possesses field resistance to late blight, good keeping/culinary quality.
CP-4054 (Kufri Lima)	2017	Advanced table potato hybrid CP-4054 developed under ICAR-CIP collaboration is recommended for release as a new variety for North Indian plains with yield potential of 15-20 t/ha under heat stress and 30-35 t/ha under 15-20 days early planting condition. It produces attractive white-cream ovoid uniform tubers with shallow eyes and white-cream flesh. It possesses tolerance to hopper and mite burn, good keeping and culinary quality.
OS/01-497	2017	The advanced medium maturing (110-120 days) hybrid, OS/01-497 developed at CPRS, Ooty possessing combined resistance to late blight and cyst nematode having yield potential of 30-35 t/ha is recommended for state release as new variety for The Nilgiri hills of Tamilnadu.

CROP PRODUCTION

1. The large sized tubers from otherwise healthy crop can be cut into 50 g pieces with minimum two eyes in each piece and used as seed. The cut tubers may be treated with Mancozeb or Difolatan (500 g in 250 litre water for 10 min.), kept in basket to drain out the excess solution and covered with wet gunny bag for 24 hrs. for suberization of cut surface. The suberized seed potatoes may then be planted after one or two days. The cost of the treatment may come to Rs.5/- for treating 100 kg seed tubers. (1972, 1973)
2. The beneficial effects of mulching on the early crop, when temperatures are high, have been established. The practice is also advantageous in that it would economise on water use, control the weeds, improve the response to phosphate, and help in germination in the cut seed potatoes after treatment with Mancozeb particularly when freshly harvested seed is used after breaking dormancy in early part of autumn. (1972)
3. The performance of hill seed used for planting by the middle of November is generally improved by the use of thiourea and GA for breaking tuber dormancy. This practice is recommended in Karnataka, West Bengal, Orissa and Maharashtra, where the potatoes are planted in November. (1974)
4. Mulching with paddy straw, paddy husk, maize and Dhaincha stalks consistently increase the yield of early crop. This practice economizes on the use of water and also reduces weed infestation. (1974)
5. Pre-emergence herbicides like Nitrofen, Alachlor and Simazine in areas where potato is not followed by wheat, and post-emergence herbicides like Paraquat and Propanil effectively control weeds in potato crop. This recommendation is of significance for raising seed crop as it can reduce spread of mechanically transmitted viruses. (1974, 1976, 1977)
6. Seed potatoes from cold storage from the northern states are as good or even superior to hill seed for raising winter crop in peninsular India, Orissa and West Bengal. Efficacy of hill seed which may be partially dormant at the time of planting in the above region could be improved through treatment with dormancy breaking chemicals. (1976)

7. Seed potatoes need light irrigation (5 cm deep) at frequent intervals (15-20 mm cumulative pan evaporation) at Jalandhar and Kanpur. The intervals between irrigations could, however, be increased with the use of mulch especially during the pre-emergence period. (1976)
8. In case of main crop varieties and crops raised for table purposes, split application of N, half each at planting time and earthing up should be practised for getting maximum yields. (1977)
9. For obtaining maximum yields, medium plant population of about 67,000 plants/ha with a seed size of 4.5-5.5 cm diameter is recommended. (1979)
10. Use of FYM in the potato crop @ 300 q/ha can meet the nitrogen requirement of rotational crop grown after potato. (1979)
11. Use of Alachlor @ 3.0 l/ha, Nitrofen @ 4.0 l/ha and Patoran @ 2.5 kg/ha is effective in controlling weeds. (1981)
12. The optimum intra-row spacings for small (25 g), medium (50 g) and large size tubers (100 g) are 15, 20 and 30 cm respectively when inter row spacing is kept at 60 cm. (1983)
13. Soaking of seed tubers in a solution of 3% single super phosphate + 0.5% urea + 0.2% Mancozeb for 4 hours in combination with soil application of 50 kg P_2O_5 /ha can meet the full phosphate requirements of the potato crop in P deficient soils. The tubers should be dried before planting. (1983)
14. Whole tubers were found to be more productive than cut tubers to increase plant population per unit area. Hence, whole tubers may be used for planting the crop. (1989)
15. It was recommended that 25-50 g seed tubers may be used @ 30 to 37.5 q/ha for planting potato crop. (1989)
16. Potato can be successfully intercropped with wheat at Ranchi and onion for seed at Hisar. (1989)
17. It was recommended that herbicides Metribuzin (Sencor) as pre-emergence @ 1 kg/ha or Paraquat (Gramaxone) @ 2.0 lt./ha as post-emergence (when only 2-5 % crop emergence is recorded) may be applied to control weeds in potato crop. (1989)
18. At Hisar, second to third week of October and at Kota last week of October to first week of November were found to be the best time for planting potato. These periods were recommended for adoption in respective areas. (1991)
19. The optimum seed rates for JH-222 for 15, 30 and 45 g seed tubers should be 20, 25 and 30 q/ha, respectively. The optimum seed rate for variety Kufri Badshah should be 22.5, 30.0 and 37.5 q/ha respectively. (1991)
20. The optimum fertilizer requirements for the potato crop at Kanpur (central UP), Kota (western Rajasthan) and Deesa (North Gujarat) were found to be as under:

Location	Variety	Fertilizer (kg/ha)		
		N	**P_2O_5**	**K_2O**
Kanpur	Kufri Badshah	100	100	100
Kota	Kufri Bahar	128	100	100
Deesa	Kufri Badshah	240	200	150

It was recommended that above fertilizer doses should be used in respective regions for obtaining high crop yields. (1991)

21. When urea is to be used as a source of nitrogen in potato crop, the application of half the recommended nitrogen dose should be applied by broadcasting on moist soil followed by tillering and planking of the field 2-3 days before planting. The remaining half dose of urea should be applied as top dressing at earthing up time followed by light irrigation next day. (1991)
22. At Faizabad, use of 50% of recommended seed rate (i.e. 15 q/ha and 50% of recommended fertilizer dose (i.e. 75 kg N, 40 kg P_2O_5 and 50 kg K_2O) gave maximum net returns from the potato crop, while at Ranchi, 75% of the recommended seed rate (i.e. 30 q/ha) and full fertilizer dose (150 kg N, 80 kg P_2O_5 and 100 kg K_2O) were found economical. These were recommended for potato production under low input conditions. (1991)
23. At Kanpur (central UP) intercropping of potato with linseed (oil seed) was found to be compatible and remunerative. Intercropping of this crop is recommended for the region to get high returns per unit area. (1991)
24. Following potato based crop sequences were found to be most remunerative and were recommended for adoption in respective regions. (1991)

Centre/Region	Rotation
Chhindwara (Satpura plateau)	Potato – Okra – Soybean
Deesa (northern Gujarat)	Potato – Bajra – Groundnut
Hisar (Haryana)	Potato – Tomato – Okra
Jorhat (Assam plains)	Potato – Moong – Paddy (Transplanted)
Kanpur (central UP)	Potato – Bajra – Groundnut
Ranchi (Chhota Nagpur)	Potato – Moong – Paddy

25. Fluchloralin (Basalin) @ 1 kg a.i./ha as pre-planting and Oxyflurofen (Goal) @ 0.15 kg a.i./ha as pre-emergence were found to be effective herbicides and were recommended for weed control in potatoes. (1991).
26. For getting high yields in Deesa (North Gujarat), the potato crop should be planted in the first fortnight of November using 300 kg N/ha. If the planting is delayed by another 10 days the N should be applied @ 240 kg/ha. (1993).
27. Inter cropping of mustard with potato (one row of mustard after every third row of potato) may be practiced in eastern UP to get better returns than from the pure crops of mustard and potato. This will fetch about Rs.3000 per ha more than from the pure mustard crop and about Rs.4,600 per ha more than the pure potato crop. (1993)
28. Inter cropping of onion (for bulb) and potato, when onion is planted in furrows between two potato rows, can be practiced in Satpura plateau to get better returns than from the pure crops of onion and potato. The inter cropping will fetch about Rs.10,500 per ha more than from the pure potato crop and about Rs.2,000 per ha more than pure onion crop. (1993)
29. It was recommended that in Punjab, the potato crop should be planted during first fortnight of October for getting highest yield as well as net returns. It holds good for JH-222 which should be fertilized with 240 kg N/ha. (1995)
30. At Kota, the potato crop should be planted in the 1st week of November and fertilized (Kufri Badshah) with 150 kg N/ha, in the first week of November in Orissa and fertilized

(Kufri Chandramukhi) with 120 kg N/ha and in the first fortnight of January in Palampur area of HP and fertilized (Kufri Jyoti) with 200 kg N/ha was found optimum. (1995)

31. At Jorhat 30 g seed size planted at the rate of 20 q/ha was found more economical than 40 g seed size. (1995)
32. At Palampur (HP), potato (spring)-maize-radish system was found to be highly economical than any other systems tried and was recommended for adoption in the region. (1995)
33. In the potato-okra-soybean system in Satpura plateau it was recommended that the potato should be fertilized with recommended dose of NPK and the crops following potato i.e. okra and soybean should be fertilized with 50% dose of recommended NPK. (1995)
34. It was recommended that in Satpura plateau region the TPS crop from transplanted seedlings should be fertilized with recommended NPK dose (120:100:100 kg/ha and the seedlings should be transplanted on flat bed, rather than on the ridges. However, both in Satpura plateau and the tarai region of UP the crop raised from seedling tubers should be fertilized with 150% of recommended dose using 10g size of seedling tubers for getting economical returns. (1995)
35. In the event of shortage of potassium fertilizer at the time of planting potato crop, it split application @ half at planting and remaining half at earthing up can be adopted. However, in general, the full dose of potash should be applied at the time of planting is preferable. (1997)
36. Potato-jute-paddy sequence in Kalyani area of West Bengal in view of its giving higher net returns over wheat-jute-paddy system is recommended. In this system, variety Kufri Badshah was used for potato, JRO-524 for jute and IET/47-56 of paddy. (1997)
37. In the Satpura region of Madhya Pradesh, inter- cropping of maize (after every row of potato with full N and half of PK at potato planting) in *rabi* along with potato given optimum doses of NPK is recommended. This system will give additional returns to the farmers over sole crop of maize. (1997)
38. In Jalandhar area of Punjab, the net gains from potato production can be enhanced with increase in fertilizer dose from 100 to 150% of recommended dose and reducing the seed size from 35-40 g to 25-30 g in variety Kufri Badshah by keeping the seed rate from 15 to 30 q/ha. (1997)
39. At Deesa, Faizabad and Hisar, for obtaining good yields from the TPS crop raised from seedling tubers it may be fertilized with higher fertilizer dose (1.5 times higher than that recommended for the tuber crop) was recommended. However, at Pantnagar, Chhindwara and Kalyani the TPS crop raised from seedling tubers may be fertilized with the same NPK dose as recommended for tuber crop. (1997)
40. Green manuring with Dhaincha in green manure-potato-bottlegourd sequence at Hisar was found beneficial not only in increasing the potato production but also gave more remunerative returns from the system. It is, therefore, recommended that the above potato based system may be popularized with Dhaincha as green manure with optimal recommended doses of fertilizers to each crop in the system as followed in Hisar area. (1999)
41. The potato based cropping system of potato-rice (summer)-rice (*kharif*) in Assam plains was not only found more remunerative than potato-moong-rice system, but it also saved on application of fertilizer. In this system, summer rice (second crop) grown after potato required 50% N only while *kharif* rice (3rd crop) required optimum NPK application

compared to application of optimal dose of NPK to all the three crops in potato-moong-rice system. The above potato based cropping system is, therefore, recommended for adoption in the Assam plains. (1999)

42. For both the transplanted and seedling crops raised from true potato seed (TPS), application of 200 kg N, 100-150 kg P_2O_5 and 120-180 kg K_2O/ha is recommended for Bhubaneshwar, Jorhat, Chhindwara, Deesa, Faizabad and Dharwad areas. However, the yield potential of transplanted seedling crop will be lower than the seedling tuber crop. (1999)
43. Following potato, wheat and rice varieties were identified and recommended for cultivation in rice-potato-wheat system at Jalandhar (Punjab), Hisar (Haryana), Modipuram (Western UP), Faizabad (Eastern UP) and Patna (Bihar). (2001)

Location/Region	Potato	Wheat	Rice
Jalandhar (Punjab)	K. Pukhraj	PB-373	PR-106
Hisar (Haryana)	K. Ashoka	PB-373	Gobind
Modipuram (Western UP)	K. Pukhraj	PBW-226	Saket
Faizabad (Eastern UP)	K. Ashoka	Malviya-234	Narendra-97
Patna (Bihar)	K. Ashoka	PBW-226	Proagro-6107

47. At Deesa, potato-groundnut-til was better than potato-bajra-groundnut in term of productivity. Potato and bajra should be fertilized with optimum NPK, while groundnut needs only half NPK. (2001)
48. In potato-onion-groundnut and potato-wheat-cowpea systems at Jalandhar, it was found that crop residue incorporation of each crop to the succeeding crop could economize on NPK by 50% in both the succeeding crops after potato. In potato-onion-groundnut system, both potato and onion should be fertilized with optimum NPK while groundnut with half NPK. In potato-wheat-cowpea system, potato should be fertilized with optimum NPK while succeeding crops of wheat with full N and cowpea with half NPK. (2001)
49. For maximizing yield of potato, doses of NPK need to be revised upwardly by 50% of the existing recommended doses at Jalandhar, Modipuram, Patna. Faizabad. Deesa. Chhindwara, Hisar, Kota and Dholi. (2001)
50. For maximizing the number of seed sized tubers, crop should be planted at 60 x 10/15cm spacing and be raised with 150 kg N, 150 kg P_20_5 and 80 kg K_20/ha and haulm be cut at 80 days. About 80% of the produce was upto 40 g size at Hisar. Pantnagar, Faizabad, Deesa, Kota. Bhubaneshwar, Chhindwara, Jalandhar and Patna. The number of tubers produced by following this agro-technique was 40 % higher than those produced by seed plot technique. (2001)
51. Intercropping of potato + garlic in the ratio of 1:1 at Ranichauri in Uttarakhand and Srinagar in J&K and in the ratio of 1:2 at Dharwad in Karnataka was found profitable. It is recommended that the above practices may be adopted for better economic returns to the farmers in comparison to growing sole crop of potato and garlic. (2003)
52. Northern Gujarat is an important potato growing area in the country. Maximum tuber yield as well as net returns were obtained with fertilization of the crop with 275 kg N, 137.5 kg P_20_5 and 275 kg K_20/ha along with 25 tonne FYM/ha. It is, therefore,

recommended that the above dose of inorganic and organic fertilizers may be applied for getting better returns from potato crop in the state. (2003)

53. Seed is the most important and expensive component in potato cultivation and accounts for 40-60% of the cost of cultivation. Studies conducted at many centres in the plains concluded that the seed crop should be planted at 60 cm x 10/15 cm spacing and haulm cutting should be done at 70/80 days after planting for maximizing the number of seed size tubers (upto 40g size). (2003)
54. It is recommended that potato based cropping system i.e. paddy-potato-okra, which gave higher productivity and net returns at Kalyani (West Bengal) may be adopted in West Bengal. (2003)
55. Maximum tuber yield as well as net return were obtained from fertigation of potato crop with 187.5 kg N; 125 kg P_20_5 and 125 kg K_20/ha + 25 tonne FYM/ha at Kota (Rajasthan). It is, therefore, recommended that the above dose of inorganic and organic fertilizers may be applied for better returns from potato crop in the southern Rajasthan. (2003)
56. For economizing on N and P input it is recommended that potato tubers should be soaked in a solution containing 1 % each of urea and sodium bicarbonate along with seed treatment with Azotobacter + Phosphobacteria and application of 75% recommended dose of N and P. (2005)
57. In rice-potato-wheat crop sequence, it is recommended that harvesting of potato (cv. Kufri Pukhraj) should be done at 90 days after planting and 100% N recommended dose should be applied to wheat with full nutrients to potato and rice in Western UP. A growing period of 90 days for potato is recommended for achieving optimum yields in Indo-Gangetic plains. (2005)
58. The crop sequences viz., rice-potato-okra at Bhubaneshwar in Orissa and blackgram-potato-okra at Jorhat in Assam recommended for higher productivity and net returns. (2005)
59. In Orissa at Bhubaneshwar, rice-potato-okra is the most profitable crop sequence followed by rice-potato-jute while in Dharwad areas of Karnataka, potato-beans is the most profitable crop sequence followed by potato-sorghum. (2007)
60. In Gujarat (Deesa area) only 75% recommended doses of nutrients through inorganic sources are needed for bajra in potato-bajra crop sequence, when residue incorporation of all the crops + biofertilizers along with 100% recommended doses of NPK in the form of inorganic fertilizers is applied to potato. (2007)
61. At Faizabad in Uttar Pradesh, in rice-potato-wheat crop sequence, application of 100% recommended doses of NPK through inorganic fertilizers along with 20 t FYM /ha to potato and only 75% recommended dose of nutrients to wheat grown after potato is required, while subsequent rice crop needed 100% recommended dose of nutrients in the sequence. (2007)
62. At Hisar in Haryana, in potato-bottle gourd crop sequence, application of 20 t FYM/ha along with incorporation of crop residues and use of biofertilizers to potato is needed while subsequent bottle gourd requires only 75% recommended dose of nutrients. (2007)
63. At Modipuram in western Uttar Pradesh in potato-green gram sequence, application of 100% recommended dose of N + 20 t FYM/ha gave higher yield of potato, while subsequent green gram in the sequence requires only 75% recommended doses of nutrients after this treatment. (2007)

64. In Dharwad area of Karnataka 20th -30th June is the optimum planting time for potato (varieties Kufri Jawahar and Kufri Surya) for getting higher yields and economic returns. (2007)
65. At Chhindwara, Hassan, Hisar, Kalyani, Ooty and Patna, the dose of P could be reduced to 75% with the use of phosphobacteria. (2007)
66. For Dharwad and adjoining areas of Karnataka *kharif* potato-*rabi* sorghum crop sequence is recommended for higher productivity and profitability with 20 t/ha FYM and 100% of recommended doses of NPK fertilizers to potato crop. (2009)
67. For Kalyani and adjoining areas (West Bengal) in potato-okra-paddy cropping sequence, application of FYM @ 20 t/ha and 100% recommended doses of NPK to potato and 50% of recommended doses of NPK to okra and 75% recommended dose of NPK to paddy is recommended for higher productivity and net return of the system. (2009)
68. Potato + garlic intercropping system in 1:1 ratio with 100% recommended doses of NPK fertilizers to both the crops is recommended for Chhindwara and adjoining areas of Madhya Pradesh. (2009)
69. For Kota and adjoining areas of Rajashtan, potato + *methi* (every fourth row of potato replaced by two rows of *methi* at 30 cm spacing) is recommended for higher productivity and net returns. (2009)
70. At Faizabad intercropping of potato with garlic in 3:1 ratio with recommended doses of NPK for both the crops is recommended to get better net returns. (2009)
71. At Deesa 75% recommended dose of NPK (Full dose of P & K and half dose of N as basal and remaining half dose of N applied at 30, 37, 44 and 51 days after planting) through drip fertigation is recommended as it saved 25% NPK fertilizers as well as increased the potato productivity. The drip system should be operated for 45 minutes during November to January and 65 minutes during February to March at alternate days with the discharge rate of 4 litres per hour. (2009)
72. Irrigation at 25-30 mm CPE and mulching with paddy straw or any other locally available organic mulch material @ 5 t/ha is recommended for higher yield of potato and net returns. (2009)
73. The Potato + Onion intercropping system in 1:1 ratio is recommended for Dharwad region of Karnataka for *kharif* season. (2011)
74. Potato (Kufri Pukhraj) should be harvested at 70 days after planting to grow wheat (cv.Lok-1) for higher productivity and net returns in Chhindwara region of Madhya Pradesh. (2011)
75. Irrigation at 25 mm CPE and mulching with paddy straw @ 5 t/ha is recommended for higher yield of potato and net returns in Chhattisgarh state. (2011)
76. Micro- sprinkler irrigation in cv. Kufri Bahar and Kufri Badshah at three days interval from October to November, four days interval in December and at five days interval till harvest of the crop is recommended for Hisar region of Haryana. (2011)
77. At Hisar in Haryana, Kufri Bahar & Kufri Pushkar varieties are recommended up to 20 days early planting while Kufri Bahar & Kufri Pukhraj varieties are recommended for late planting up to 20 days than the planting date of 20th October. (2012)
78. At Deesa in Gujarat, Kufri Chipsona-III & Kufri Surya varieties are recommended for early as well as late up to 20 days than the planting date of 15th November. (2012)

79. At Raipur in Chhattisgarh, Kufri Ashoka & Kufri Jawahar varieties are recommended for up to 20 days early planting while Kufri Pukhraj & Kufri Ashoka varieties are recommended for late planting up to 20 days than the planting date of 7th November. (2012)
80. At Kota in Rajasthan, Kufri Badshah & Kufri Jawahar varieties are recommended for early planting up to 20 days while K. Badshah, Kufri Bahar & Kufri Pukhraj varieties are recommended for late planting up to 20 days than the planting date of 30th October. (2012)
81. At Patna in Bihar, Kufri Ashoka, Kufri Pukhraj & Kufri Pushkar varieties are recommended for early planting up to 20 days while Kufri Ashoka & Kufri Pukhraj varieties are recommended for late planting up to 20 days than the planting date of 10th November. (2012)
82. At Pasighat in Arunachal Pradesh, Kufri Chandramukhi, Kufri Ashoka, Kufri Pukhraj & Kufri Pushkar varieties are recommended for early planting up to 20 days while; Kufri Chandramukhi & Kufri Ashoka varieties are recommended for late planting up to 10 days and Kufri Pukhraj & Kufri Pushkar are recommended for late planting up to 20 days than the planting date of 15th November. (2012)
83. At Jorhat in Assam, Kufri Megha & Kufri Pukhraj varieties are recommended for early as well as late planting up to 20 days whereas Kufri Ashoka variety is recommended for late planting only up to 10 days as compared to planting date of 15th November. (2012)
84. At Pantnagar in Uttarakhand, Kufri Pukhraj & Kufri Badshah varieties are recommended for early planting up to 20 days while Kufri Jawahar, Kufri Pukhraj & Kufri Badshah varieties are recommended for late planting up to 10 days than the planting date of 1st November. (2012)
85. At Bhubaneswar in Odisha, Kufri Ashoka, Kufri Jyoti & Kufri Pukhraj varieties are recommended for early as well as late planting up to 20 days than the planting date of 15th November. (2012)
86. Growing of potato (variety Kufri Pukhraj) with onion (variety Bellary Red) in 1:1 ratio intercropping with 100: 75 and 100 kg N, P_2O_5 and K_2O/ha is recommended for rainfed crop for higher productivity in Dharwad area of North Karnataka. (2012)
87. At Srinagar in Jammu & Kashmir, intercropping of potato (variety Shalimar Potato-I) with French bean (variety French yellow) in the ratio of 2:1 (after two rows of potato, one row of French bean) is recommended for higher profit in Kashmir valley. (2012)
88. Black gram-potato-green gram crop sequence is recommended for high yield as well as returns in Kanpur region of central part of Uttar Pradesh. (2013)
89. In potato-rice-rice cropping system at Kalyani in West Bengal, potato crop (Variety Kufri Jyoti) should be fertilized with 100% recommended dose of fertilizers (RDF) (200 kg N + 150 kg P_2O_5 + 150 kg K_2O /ha) for getting higher tuber yield and higher return. Other rotational crops *(kharif* and *boro* paddy) should also be fertilized with their respective RDF (60 kg N + 30 kg P_2O_5 + 30 kg K_2O /ha for *kharif* paddy and 120 kg N + 60 kg P_2O_5 + 60 kg K_2O /ha for *boro* paddy). (2013)
90. Application of 80 kg Ca/ha at the time of planting is recommended for higher tuber yield, net returns and B:C ratio. Calcium application also decreases the number of skin damaged tubers and improved the dry matter content at Kalyani (Hooghly District) in West Bengal and Jorhat in Assam. (2013)
91. Potato cultivars Kufri Pukhraj, Kufri Bahar and Kufri Ashoka should be fertilized with 125% recommended dose of N+100% P and K (250 kg N+150 kg P_2O_5 +150 kg K_2O /ha) in Kalyani (Hooghly District) of West Bengal. (2013)

92. Irrigation through micro sprinkler at 10 mm CPE is recommended for higher yield and WUE especially in early planted crop in Western Haryana region. (**2014)**
93. At Chhindwara, in medium black soils low in N, Medium in P & K fertility status and neutral pH, incorporation of soybean crop residue sprayed with 2% spray of sodium chloride @ 5t/ha + seed treatment with biofertilizers (1:1 ratio of Azotobacter and Phosphobacteria) @ 5g/kg seed tubers + Vermicompost @ 5 t/ha as soil application before planting gave yields comparable to that under fertilization with 120:100:100 of N, P_2O_5 and K_2O respectively through inorganic fertilizers. Hence this schedule is recommended for Satpura region. (**2014)**
94. The optimum dose of N for different varieties for different regions were worked out and recommended to the line departments as in table below. (**2014)**

Location	Variety	Optimum N dose
Pantnagar in Uttrakhand	Kufri Sadabahar and Kufri Surya	150 kg N/ha
Dharwad in Karnataka	Kufri Chandramukhi and Kufri Pukhraj	180 kg N/ha
Pune in Maharashtra	Kufri Surya	150 kg N/ha

95. The optimum dose of N for different varieties for different regions were worked out and recommended to the line departments as in table below. **(2015)**

Location	Variety	Optimum N dose
Jorhat in Assam	Kufri Himalini	225 kg N/ha
	Kufri Girdhari and Kufri Jyoti	150 kg N/ha
Deesa in Gujarat	Kufri Surya	150 kg N/ha
Faizabad in Uttar Pradesh	Kufri Surya and Kufri Sadabahar	150 kg N/ha
Kalyani in West Bengal	Kufri Himalini and Kufri Shailja	150 kg N/ha

96. Significantly higher potato tuber yield was recorded with mulching. Irrigations at 20 mm CPE mulching with paddy straw @ 5 t/ha gave highest yield which was at par with irrigations at 25 and 30 mm CPE under mulching conditions. WUE and net returns were also higher with this treatment. Hence, application of paddy straw mulch @ 5 t/ha and irrigation at 30 mm CPE is recommended for Dohli. (**2015)**
97. There was no significant difference in the mean yield of different cultivars [Kufri Badshah (44.4 t/ha), Kufri Pukhraj (45.8 t/ha) and Kufri Pushkar (44.9 t/ha)]. All the drip irrigation fertigation treatments were significantly superior over conventional method and were equally effective in terms of tuber yield and water use efficiency. Hence application of N and K, 100% through ferigation is recommended for Deesa. (**2015)**
98. Metribuzin @ 0.75 kg/ha either as pre-emergence or as post-emergence at 10% plant emergence was equally effective and comparable to manual hand weeding to control the weeds in the potato across the locations. Hence, application of Metribuzin @ 0.75 kg/ha either as pre- emergence or as post-emergence at 10% plant emergence can be recommended for effective weed control in potato for Dholi, Faizabad, Jorhat, Kalyani, Kanpur, Kota, Pantnagar, Raipur and Shillong. (**2015)**
99. 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. (**2016)**

100. 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. (**2016)**

101. 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. (**2016)**

102. At Srinagar, Kufri Himalini and Kufri Girdhari should be fertilized with 225 kg N per ha along with 100 percent of the recommended P&K doses. The recommendation should be communicated to line department along with exact doses of N, P and K. **(2017)**

103. Application of Zn @ 1.5 kg/ha for Bhubaneswar, Pantnagar & Pune; @ 3 kg/ha for Chhindwara, Kalyani, Patna, Raipur & Pasighat; @ 4.5 kg/ha for Dholi, Hisar, Jorhat & Kanpur and @ 6.0 kg/ha for Faizabad may be recommended. **(2017)**

CROP PROTECTION

1. The crop raised with susceptible cultivars in North Indian hills may be sprayed with Bordeaux mixture (5:5:50) for controlling late blight. The first spraying may be given 10-15 days before the normal time of appearance of late blight or earlier, if weather becomes wet. The subsequent sprays may be given at 10-day intervals giving in all 5 to 7 sprays. (1972)
2. For controlling black scurf, tuber treatment with OMC (0.5% solution for 10 min.) and soil application of saw dust (25 q/ha) or PCNB alone (30 kg/ha) is recommended. Saw dust is to be applied about three weeks before planting. Normal dose of fertilizers to be applied to the crop. This treatment will also take care of common scab. (1974)
3. For preventing decay of cut seed tubers, the seed pieces may be treated with Mancozeb (0.2% sol.) or Captafol 80 WP (0.25% sol.) for 10 minutes or Banoyl (500 ppm) for 30 min. before planting. (1974, 1976)
4. For late blight in the hills, Triphenyl-tin-acetate or Captafol 80 WP (2.5 kg/ha) may be sprayed. A sticker (Triton AE 0.1%) should be used with the sprays. In the plains, Mancozeb (2.0 kg/ha), Triphenyl-tin-acetate (1.0 kg/ha) or Copper oxychloride (2.5 kg/ha) sprays are effective against late blight. (1976)
5. For controlling early blight in the hills, Bordeaux mixture or Triphenyl-tin-acetate is suitable, whereas, in the plains Mancozeb, Triphenyl-tin-acetate and Captafol are effective. (1976)
6. Cutworms are effectively controlled by application of Aldrin 30 EC @ 6.0 l/ha. (1977)
7. Application of Carbaryl 50 WP @ 2 kg/ha is effective against cutworms. (1977)
8. Kelthane 18 EC applied @ 2.0 l/ha is effective in controlling mites. (1977)
9. Application of Carbaryl 50 WP @ 2.5 kg/ha or Quinalphos 25 EC @ 1.5 l/ha checks the incidence of PTM. Carbaryl also controls *Epilachna* and other defoliating insects. (1977)
10. Three to four sprays of Mancozeb in the plains and 5-6 sprays in the hills @ 2.0 kg/ha in 1000 lit. water are effective in controlling the foliar diseases, specially late blight and early blight. (1981)
11. Dipping potato seed tubers in 1.0% solution of acetic acid + 0.05% solution of zinc sulphate for 15 min. is effective in controlling black scurf. (1981)

12. Application of Aldicarb 10 G or Carbofuran 30 @ 2-3 kg a.i./ha half each at planting time and earthing up is effective against potato cyst nematode and root knot nematode. (1981, 1985)
13. For controlling early and late blights of potato, sprays of copper fungicides in the hills and Mancozeb in the plains are recommended at regular intervals. (1983)
14. The incidence of common scab can be reduced by treating seed tubers with OMC solution @ 0.25% for 30 minutes before storage. (1983)
15. Application of Phorate 10 G @ 1.0 kg (a.i.) and systemic insecticides like Methyl demeton, Dimethoate and Monocrotophos recommended in seed crop against aphids. (1983)
16. Spraying of 0.1% Methyl-demeton is recommended to check shoot borer damage. (1983)
17. For the control of cutworm Endosulfan 5% dust @ 25 kg/ha or Chlorpyriphos 20 EC @ 0.5 kg a.i./ha are recommended. (1983)
18. Where potato tuber moth is a problem as in Maharashtra, dusting of seed potatoes during storage with Quinalphos @ 250 g/q of potato seed is recommended. (1983).
19. For the control of tuber borne inoculum of common scab and black scurf, seed tubers should be dipped in 3% boric acid (pharmaceutical grade) solution for 30 minutes. The same solution may be used for 20 dips. (1987)
20. For the control of brown rot and bacterial wilt through cultural practices, seed tubers should be obtained from a bacterial wilt and brown rot free crop, preferably from area free from disease. Stable bleaching powder @ 12 kg/ha should be mixed with fertilizer and applied in furrows at planting time. After harvest, the field should be ploughed and exposed to summer temperatures during May and June in the plains and winter temperatures in December and January in this hill. Early planting latest by third week of February and early harvesting latest by third week of June should be adopted in the hills. (1989)
21. For the control of late blight a spray of Metalaxyl + Mancozeb (0.25%) should be given to the crop on the appearance of disease, followed by a second spray at 15-day interval in the hills. Thereafter, Mancozeb sprays starting after 15 days should be given at 7 to 10 day intervals depending upon the prevailing weather conditions. (1991)
22. The spraying of tubers with boric acid (3%) is as effect as boric acid or OMC dip treatment of tubers. The cost of treating one quintal tubers with boric acid spray is Rs.18/- as against Rs.48/- for boric acid dip treatment and Rs.20/- with OMC dip treatment. Boric acid spray treatment of tubers after harvest and before cold storage is, therefore, recommended for the control of tuber borne diseases. (1993)
23. It was found that if the seed of cv. Kufri Jyoti and Kufri Badshah maintained following the seed plot technique viz. (a) application of thimet @ 10 kg/ha at planting and (b) haulm cutting when the aphid population reaches critical level of 20 aphids per 100 compound leaves, it did not show significant degeneration for 3 years at Kalyani. It is, therefore, recommended to the farmers of West Bengal that they can keep their seed healthy through seed plot technique for 3 years. (1993)
24. It was found that if the seed maintained following the seed plot technique viz. a) application of thimet @ 10 kg/ha at planting and b) haulm cutting when the aphid population reaches critical level of 20 aphids per 100 compound leaves, the variety Kufri Chandramukhi, showed significant degeneration after 3 years whereas, that of cvs. Kufri Bahar and Kufri Badshah did not show any yield reduction even in 4 years. It is, therefore,

recommended to the farmers in Gujarat that they can keep their seed of cv. Kufri Chandramukhi, for at least 3 years and that of cvs. Kufri Bahar and Kufri Badshah for 4 years. (1993)

25. For reducing the incidence of stem necrosis disease planting of the main potato crop during optimum planting period i.e. during first fortnight of November in Rajasthan and Madhya Pradesh is recommended. However, in early planted crop (October) three sprays of monocrotophos 40 EC @ 1 ml/lt. at interval of 15 days are recommended for effectively reducing incidence of the disease. (1995)
26. Application of two sprays of metalaxyl + mancozeb combination @ 0.25% at 15 days interval followed by weekly sprays of mancozeb @ 0.2% is recommended for the control of late blight in the hills. For Punjab region, application of one spray of metalaxyl + mancozeb combination @ 0.25% followed by mancozeb spray at 10 day interval is recommended. For other regions use of mancozeb alone @ 0.2% is recommended. (1995)
27. For the management of late blight in Faizabad region varieties K. Lalima and K. Jawahar, should be sprayed with metalaxyl based fungicide (8 per cent metalaxyl, @ 2.5 kg/ha immediately after the appearance of the disease. K. Sutlej does not require any fungicide application. (1999)
28. Bio agents namely *B. cereus* and *B. subtilis* have given consistently significant control of bacterial wilt and significant increase in tuber yield at Hassan. They may be recommended for field use against bacterial wilt control in Karnataka. (2001)
29. New and safer pesticides i.e. imidacloprid and thiomethophos are recommended to replace methyl-demeton/monocrotophos and phorate for control of potato pests such as whiteflies, aphids, cutworm & white grubs. (2003)
30. In view of promising results in the control of black scurf disease in potato it is recommended that *Trichoderma viride* a known bio-agent now available commercially may be used extensively for its management. (2003)
31. Regular pests of potato like *Agrotis* sp., jassids etc. can be managed by the trap/barrier crops. Marigold and castor are some of the important barrier crops for *Heliothis* sp. It is recommended that these trap/barrier crops may be used for the management of above pests. (2003)
32. Following IDM schedules were recommended for the management of major potato diseases in the respective regions. (2005)

Area	Treatment	Disease
Haryana (Hisar area)	Seed treatment with boric acid (3%), 1 foliar spray of mancozeb 0.2% and 2 foliar sprays of Methyl-demeton (metasystox 25 EC) 0.03 % conc.	Black scurf, viruses, sooty mould
Tarai region of Uttarakhand, Eastern UP and Bihar	Seed treatment with boric acid (3%) and 2 foliar sprays each of mancozeb 0.2% and Methyl-demeton (metasystox 25 EC) 0.03% conc.	Black scurf, late blight, viruses and common scab.
West Bengal and Gujarat	Seed treatment with boric acid (3%) two sprays each of mancozeb (0.2%) and Methyl-demeton	Late blight, early blight,

	(metasystox 25 EC) 0.03% conc. and optimum date of planting in Gujarat.	common scab and viruses.
Orissa and Assam	Disease free seed, seed treatment with boric acid, *B. subtilis*, crop rotation, 2 sprays of Methyl-demeton (metasystox 25 EC) 0.03% conc. and 1 spray of mancozeb (0.2%).	Black scurf, viruses and bacterial wilt
Rajasthan	Planting at optimum time, tuber treatment with 3% boric acid, 2 sprays of monocrotophos (0.05% a.i.)/ imidacloprid (0.004% a.i.).	Stem necrosis and black scurf.
Madhya Pradesh	Optimum planting time, tuber treatment with 3% boric acid, 2 sprays each of mancozeb (0.2%) and monocrotophos (0.05% a.i.)/ imidacloprid (0.004% a.i), crop rotation and seed treatment with *Bacillus subtilis.*	Early blight, brown rot, and viruses.

30. Seed treatment with Imidacloprid @ 0.004% a.i. (10 min. dip) + 2 sprays of imidacloprid @ 0.002% a.i. starting with germination and at 25 days after planting is recommended for the management of whiteflies and apical leaf curl in Haryana and Punjab region. (2005)
31. Following recommendation is made for IPM of potato pest complexes in different areas. (2005)

Center/Area	Pest complex	Recommendation
Kalyani (West Bangal)	Cutworm, mole cricket and epilachna beetle	Spraying with chlorpyriphos (Dursban 20 EC @ 0.05% conc. at earthing up followed by one spray each with Nimbicidine @ 0.4% conc. and Imidacloprid @ 0.002% conc.
Jalandhar (Punjab) Patna (Bihar) and Deesa (Gujrat)	Defoliating caterpillars and cutworm	Spraying with chlorpyriphos (Dursban 20 EC @ 0.05% conc. at earthing up followed by one spray each with Nimbicidine @ 0.4% conc.
Hisar (Haryana)	Leafhoppers and mites	Crop meant for table purposes may be protected with higher dose of Nitrogen i.e. 200 Kg/ha followed by one spray with Nimbicidine @ 0.4% conc.

32. Treatment of cut seed pieces with 0.2% mancozeb + 0.2% benzimidazole for 10 minutes is recommended for the effective control of seed piece decay at Dharwad. This treatment also resulted in significant increase in tuber yield. (2007)
33. Delayed planting of seed crop by 10 to 15 days, seed treatment (dipping of chitted tubers for 10 minutes) with 0.04% (imidacloprid 200 SL 4 ml/10 lts.) of imidacloprid plus spray of imidacloprid @ 60 g a.i./ha at emergence and another spray of thiamethoxam 25WG @ 100 g a.i./ha after 15 days of emergence is recommended for the effective control of whiteflies and potato apical leaf curl disease (PALCD) in potato seed growing areas. (2007)
34. Prophylactic spray [just at the time of canopy closure (when leaves of adjacent rows come close]) with Mancozeb @0.2% followed by Cymoxanil + Mancozeb @0.3% or Dimetnomorph 0.3% after one week and one more spray with Mancozeb @0.2% after

another week should be adopted for late blight management at Faizabad, Patna, Kalyani, Pantnagar, and Hassan.(2009)

35. Late blight management in Hassan area of Karnataka: Following fungicide spray schedule may be followed for managing late blight in Hassan area of Karnataka. (2010)
    (i) Spray the crop (first spray) thoroughly covering the lower as well as upper part of the plant with Mancozeb @ 0.2% just at the time of canopy closure (30-45 days after planting).
    (ii) Spray the crop (second spray) with Dimethomorph + Mancozeb OR Cymoxanil + Mancozeb @ 0.3% after one week of the first spray.
    (iii) Spray the crop (third spray) with Mancozeb @ 0.2% after one week of second spray.
36. Integrated management of bacterial wilt/brown rot management in Hassan area of Karnataka: Following integrated package is recommended for managing bacterial wilt/brown rot in Hassan area of Karnataka.(2010)
    (i) Soil solarization by covering the plot with linear low density polyethylene (LLDPE) sheet during summer for at least 15 days.
    (ii) Use healthy seed tubers obtained from bacterial wilt-free regions.
    (iii) Dip well chatted tubers in 0.25% (10^6 CFU/ml) suspension of *Bacillus subtilis* (B-5) and dry under shade before planting.
    (iv) Crop rotation with finger millet or *ragi*.
37. Management of white flies: Following package is recommended for managing white flies. (2010)
    (i) Place yellow sticky traps (15 x 30 cm^2) just above the canopy height @ 60 traps per hectare at equidistance from each other.
    (ii) Seed treatment with Imidacloprid (200 SL) @ 0.04% (4 ml/10 lit.) for 10 minutes before planting.
    (iii) First spray with Imidacloprid (200 SL) @ 0.03% (3 ml/10 lit.) at the time of emergence of crop.
    (iv) Second spray with Thiamethoxam (25 WG) @ 0.05% after 15 days of crop emergence.
38. Spray schedule for late blight management at Jorhat, Assam (2011)

    (i). First prophylactic spray with Mancozeb @ 0.2% (just at the time of canopy closure).
    (ii). Second spray with mixed formulation of (Dimethomorph 0.2% + Mancozeb @ 0.3%) after one week of first spray.
    (iii). Third spray with Mancozeb @ 0.2% after one week of second spray.
39. Seed treatment with imidacloprid 70 WS @ 0.1% for 10 minutes dip and one spray of imidacloprid 17.8 SL @ 0.06% at 21 days after planting is recommended for the management of stem necrosis disease in Kota areas of Rajasthan. (2012)
40. Nine cultures (CP-3001, CP-3021, CP-3036, CP-3116, CP-3152, CP-3149, CP-3181, CP-3186 and CP-3378-D) have been identified to be immune to stem necrosis disease, which may be used as parental line for breeding varieties resistant to stem necrosis disease. (2012)
41. An integrated schedule involving sowing of sorghum in *rabi* + deep ploughing in summer + FYM application @ 10 t/ha at planting + tuber treatment with carboxin (0.2%) followed by *T. harzianum* (1%) + soil application of *Neem* cake (2 q/ha) is recommended for the management of *sclerotium* wilt in Dharwad areas of Karnataka. (2012)

42. Foliar spray of spiromesifen 240 SC at emergence @ 96 g a.i./ha (400 ml/ha) + second spray with Thiamethoxam (25 WG) @ 100 g a.i./ha after 15 days of first spray is recommended for the management of whiteflies and aphids of potato in Haryana. (2012)
43. Model for predicting first appearance of late blight in Kalyani, West Bengal has been developed for both rainy and non-rainy years. The model specifies that if 7 day moving sum of ≥ 90% RH prevails for ≥105 hrs and 7day moving congenial temp (7.2 to 26.6^{o}C) for ≥150 hrs, blight would appear within 14 days. For rainy years, if 5 day moving sum of ≥ 90 RH% prevails for ≥65 hrs with 5 day moving congenial temp. (7.2 to 26.6^{o}C) for ≥105 hrs and sum of two consecutive rainfall events is ≥ 2.5 mm, blight would appear within 14 days. (2013)
44. Late blight forecasting model developed for Pantnagar specifies that if 7 day moving sum of ≥ 85% Relative Humidity prevails for ≥85 hrs and 7day moving average congenial temp. (7.2 to 26.6^{o}C) for ≥135 hrs, blight would appear within 14 days. (2013)
45. Use of yellow sticky traps (12 no./ha) and seed treatment with imidacloprid 200 SL @ 0.04% (4ml/10ltr) for 10 minutes dip followed by foliar spray with imidacloprid @ 60 gm a.i./ha at emergence and second spray with thiamethoxam (25 WG) @ 100 g a.i./ha after 15 days of first spray is recommended for the management of whiteflies and aphids in Kalyani, West Bengal. (2013)
46. Foliar spray of spiromesifen 240SC at emergence @ 96 gm a.i./ha (400ml/ha) followed by second spray with thiamethoxam (25 WG) @ 100 gm a.i./ha after 15 days of first spray and third spray of spiromesifen 240SC @ 96 gm a.i./ha (400ml/ha) after 15 days of second spray is recommended for the management of all sucking pests for Pune region of Maharashtra. (2013)
47. Prophylactic spray with mancozeb @ 0.2%, followed by second spray of (fenamidone + mancozeb) @ 0.3% after seven days and a third spray with mancozeb @ 0.2% after seven days of the second spray is recommended for the control of late blight in West Bengal and Eastern Uttar Pradesh under moderate disease pressure. (**2014)**
48. Biofumigation by incorporating one-month old Indian Mustard crop (seed rate 5 kg/ ha) just before the planting of potato crop is recommended for management of black scurf and common scab in Central and Eastern Uttar Pradesh. (**2014)**
49. Prophylactic spray with mancozeb @0.2% followed by second spray of (fenamidone + mancozeb) @0.3% after seven days and a third spray with mancozeb @0.2% after seven days of the second spray is recommended for the control of late blight in Hassan and Pantnagar(**2015)**
50. Prophylactic spray with mancozeb @0.2% followed by second spray of (cymoxanil + mancozeb) @0.3% after seven days and a third spray with mancozeb @0.2% after seven days of the second spray is recommended for the control of late blight in Patna. (**2015)**
51. Prophylactic spray with mancozeb @0.2% followed by second spray of (dimethomorph + mancozeb) @0.3% after seven days and a third spray with mancozeb @0.2% after seven days of the second spray is recommended for the management of late blight in Srinagar and Shillong. (**2015)**
52. Spray with mancozeb (0.25%) followed by second spray of hexaconazole @0.05% after 10 days and a third spray with mancozeb @0.25% after 10 days of second spray is recommended for the management of early blight in Bhubaneswar. (**2015)**
53. Spray with chlorothalonil (0.25%) followed by second spray of hexaconazole @0.05% after 10 days and a third spray with chlorothalonil @0.25% after 10 days of second spray is recommended for the management of early blight in Deesa and Pune. (**2015)**

54. 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). (**2016)**
55. 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). (**2016)**
56. Forecasting model has been developed for prediction of early blight and may be used for issue of agro-advisories. (**2016)**
57. 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. (**2016)**

SEED PRODUCTION

1. The time of appearance of *Myzus persicae* and its build up has been determined at 15 locations. In Bihar, the critical population builds up about three weeks later than in western Indo-Gangetic plains. In such area, the actual date of removal of haulms could be delayed up to 3rd week of January. The available data may be used to demarcate the areas suitable for seed production. (1974)
2. The farmers in the plains should be encouraged to grow their own seed during aphid free period instead of importing seed from hills because their own seed would be in a better germinable stage in comparison with the hill seed and would also be cheaper. This will reduce the chances of spread of soil borne diseases from the hills to the plains. (1977)
3. Haulm cutting in seed crop can be delayed by 10 days with the use of systemic insecticides like Metasystox. (1983)
4. Based on aphid population data of last several years, Hisar, Faizabad, Kanpur and Deesa centres have been identified as suitable places for seed production. (1991)

POTATO STORAGE

1. The potato heap for storage under ambient conditions should be made immediately after the harvest and heap should be covered with at least one feet thick straw layer and properly protected from the rains. Potatoes of the heap should be disposed off as soon as the temperature inside the heap reaches 28-30 ^{0}C and monsoon rains set in. (2003)