



## Package of practices for ware and seed potato production in Western Indo-Gangetic plains



**Central Potato Research Institute**  
(Indian Council of Agricultural Research)  
Shimla-171 001

## Package of Practices for Ware and Seed Potato Production in Western Indo-Gangetic Plains

### Ware potato production

1. **Hot weather cultivation:** Plough the fields during May-June to reduce the incidence of soil borne diseases and pests as well as to control the perennial weeds.
2. **Green manuring:** Sow green manure crop like dhaincha or sunhemp during *kharif* by the end of June. Bury full grown crop after 7-8 weeks and allow for its proper decomposition before potato planting.
3. **Variety:** Following high yielding cultivars are recommended for the region:

Maturity class	Variety	Maturity period
1. Early	Kufri Chandramukhi (white tuber)	89-90 days
	Kufri Ashoka (white tuber)	75-80 days
2. Medium	Kufri Jyoti (white tuber)	90-110 days
	Kufri Sutlej (white tuber)	
	Kufri Jawahar (white tuber)	
	Kufri Bahar (white tuber)	
3. Late	Kufri Badshah (white tuber)	110-120 days
	Kufri Sindhuri (red tuber)	

Recently released cultivars, Kufri Pukhraj and Kufri Anand are also suitable for the region.

4. **Seed source:** Obtain seed from a reliable source, preferably from a Government seed producing agency. It is advisable to

replace the seed every 5 years. The yield is reduced progressively if the same seed is used year after year.

5. **Field preparation:** Level the field and provide proper drainage. Plough the fields with a mould-board plough or disc harrow followed by one or two tillings with tiller. Plank the field after each round of tillage to break the clods and conserve moisture. Remove the uprooted weeds after successive ploughings.
6. **Seed size and seed rate:** Use well-sprouted tubers preferably weighing 40-50 g each. The seed rate may vary from 30-45 q/ha depending upon the seed size.
7. **Seed preparation:** Remove the seed potatoes from the cold store about 8-10 days before the date of planting. Keep the seed bags in precooling chamber of the cold store for at least 24 hours. Do not bring bags directly outside as immediate exposure to high temperature may lead to rotting of tubers. Spread the tubers under shade in diffused light for presprouting. Sort out unsprouted, cut and rotten tubers from the lot. Carry the sprouted tubers to the fields in seed trays or baskets for planting to avoid sprout damage.

For spring planting, use long stored seed or autumn harvested potatoes after breaking their dormancy. This may be done by dipping cut tubers in a mixture of 1% thiourea and 1 ppm (1mg/l) gibberellic acid for one hour followed by treatment with ethylene chlorhydrin (3%) in air tight chamber for 72 hours. Avoid direct contact with ethylene chlorhydrin. Air dry the treated seed for 48 hours in shade before planting.

8. **Planting time:** The ideal time to plant the autumn crop is 1-10 October. Farmers, if desirous of raising good crop of wheat or to catch the early market, may plant the crop by 15 September. Plant the spring crop between 15-25 January.
9. **Manuring:** (a) Apply 15-30 t/ha well-rotten FYM in furrows at the time of planting. Thirty (30) t/ha FYM can take care of P and K needs of potato crop. If FYM is applied at 15 t/ha, then half the dose of P and K is to be applied through fertilizers.

(b) Apply 75-90 kg nitrogen (3.5 - 4.5 q ammonium sulphate), 80 kg phosphate (5.0 q single superphosphate) and 120 kg potash (2.0 q muriate of potash) per hectare at planting and 75-90 kg nitrogen (3.5-4.5 q ammonium sulphate) per hectare at the time of earthing up, when the crop is 30-days old. Apply the fertilizer in furrows so that the tubers do not come in direct contact with it. However, in mechanised planting the fertiliser is applied in ridges.

(c) If soil is deficient in zinc, apply 25 kg/ha of zinc sulphate at the time of planting.

10. **Method of planting:** Place the seed in furrows already made for the application of fertilizers. In case of tractor planting, the spacing between the rows should be kept 60 cm and between the tubers 20 cm. In case of manual planting, the distance between the rows can be kept at 50 cm and between tubers 15 cm. Cover the tubers with soil using a ridger.

11. **Mulch:** Mulching of the field helps in conserving soil moisture and reducing temperature of the soil. Farm refuse, like, paddy or wheat straw can be used as mulch.

12. **Interculture:** (a) Weed the crop as soon as the weeds emerge, but preferably when potato plants are about 8-10 cm tall.

(b) Spray any of the following pre-emergence herbicides after dissolving in 800-1000 litres of water per hectare within 3-5 days of planting: metribuzine @ 750 g/ha; oxyflourfen @ 150 g/ha; alachlor @ 150 g/ha.

(c) If pre-emergence herbicides are not used, then spray paraquat @ 500 g/ha in 800-1000 litres of water at about 5-10% emergence of potato plant, to kill weeds.

13. **Irrigation:** First irrigation should be done immediately after planting. It should be light so as to minimise the damage to newly formed ridges. Second irrigation may be given after about a week. Subsequent irrigations are given as and when required. Avoid flooding over the ridges while irrigating and irrigate as far as possible in the morning and evening hours. Stop irrigating about 10-15 days before harvest.

14. **Plant protection:** Periodic sprays of mancozeb @ 0.2% (2 kg/ha in 1000 litres of water) at 10 days interval should be given beginning around 20 November to control late blight, early blight and phoma spots. If late blight appears, a spray of Ridomil MZ 0.2% @ 2kg/ha in 1000 litres of water) may be given. This may be followed by mancozeb 0.2% after 15 days, if cloudy weather and rain continues. If any damage is noticed at any stage due to leaf eating caterpillars, spray the crop with endosulfan 35 EC @ 1.5 l/ha or carbaryl 50% WP @ 2.5 kg/ha in 1000-1200 litres of water.
15. **Harvesting and marketing:** The crop should be harvested as soon as it matures. The time of harvest can be adjusted to suit the market price. Early autumn crop of Kufri Chandramukhi can be harvested even after 70 days.

Harvest the spring crop after mid-April or as soon as the maximum temperature rises beyond 35°C to avoid tuber rot.

After harvest of autumn crop, air dry the surface of potatoes and store them in heaps for 10-15 days in shade. Sort out all damaged, rotten and diseased tubers. Grade the potatoes in appropriate grades/sizes and pack in gunny bags. Take care to avoid greening of potatoes, which is caused by exposure to direct sunlight, store the bags in shade before sending to the market/cold store.

### See potato production

If the seed is meant for sale as certified seed, the State Seed Certification Authority should be consulted about their prescribed standards of seed production.

1. **Hot weather cultivation:** Plough the fields during the months of May-June. Do this practice once or twice to reduce the incidence of soil borne diseases and pests as well as to control the perennial weeds.
2. **Green manuring:** Sow green manure crop like dhaincha or sunhemp during *kharif* by the end of June. Bury full grown crop after 7-8 weeks and allow for its proper decomposition before potato planting. This will reduce N, P, K need by 20-30 per cent and will improve the potato yield by 3 t/ha.

3. **Variety:** The following high yielding cultivars are recommended for this region:

Maturity class	Variety	Maturity period
1. Early	Kufri Chandramukhi (white tuber)	80-90 days
	Kufri Ashoka	75-80 days
2. Medium	Kufri Jyoti (white tubers)	90-110 days
	Kufri Sutlej (white tubers)	
	Kufri Jawahar (white tubers)	
	Kufri Bahar (white tubers)	
3. Late	Kufri Badshah (white tubers)	110-120 days
	Kufri Sindhuri (red tubers)	

Kufri Pukhraj and Kufri Anand varieties released recently are also recommended for this region.

- Seed source:** Obtain seed from a reliable source, preferably from a government seed producing agency. Use only foundation or certified seed. It is better to replace seed stock every 5 years.
- Field preparation:** Level the field and provide proper drainage. Plough the fields with a mould board plough or disc-harrow followed by one or two tillings with tiller or *desi* plough to a depth of 30 cm. Plank the field after each round of tillage to break the clods and conserve the moisture. Remove the uprooted weeds after successive ploughing.
- Seed size and seed rate:** Use seed tubers each of 35-50 g having multiple sprouts. The seed rate may vary from 35-50 q/ha depending upon the size of tubers. Tubers having multiple sprouts produce large number of seed size tubers.
- Seed preparation:** Remove the seed potatoes from cold store at least 8-10 days before planting. Keep the seed bags in precooling chamber of the cold store for at least 24 hours. Bringing tubers from the cold store directly outside will result in condensation and promote rotting. Spread the tubers under shade in diffused light for presprouting. Remove the unsprouted, cut and rotten

tubers from the lot. Carry the sprouted tubers to the fields in seed trays or baskets, for planting, to avoid sprout damage.

8. **Planting time:** Plant the crop between 1-10 October.
9. **Manuring:** (a) Apply 15-30 t/ha well rotten FYM in furrows at the time of planting. Thirty (30) t/ha FYM can take care of P and K needs of potato crop. If FYM is applied at 15 t/ha, then half the dose of P and K is to be applied through fertilizers.  
  
(b) Apply 75 kg nitrogen (3.5 q ammonium sulphate), 80 kg phosphate (5.0 q single superphosphate) and 120 kg potash (2.0 q muriate of potash) per hectare at planting and 75 kg nitrogen (3.5 q ammonium sulphate) per hectare at the time of earthing up when the crop is 25-30 days old. High dose of nitrogen should be avoided as this produces dark green foliage and masks the symptoms of viral and mycoplasma diseases causing difficulty in detection of infected plant.
10. **Planting method:** Place the seed in furrows already drawn for application of fertilizers. The spacing between the rows should be kept 60 cm and between the tubers 20 cm in case of tractor planting. In case of manual, distance between rows can be kept at 50 cm and between the tubers at 15 cm. Cover the tubers with soil using a ridger.
11. **Interculture:** (a) Weed the crop as soon as the weeds emerge, but preferably when the potato plants are about 8-10 cm tall.  
  
(b) Spray any of the following pre-emergence herbicides after dissolving in 800-1000 litres of water per hectare within 3-5 days of planting: metribuzine @ 750 g/ha; oxyflourfen @ 150 g/ha; alacholar @ 150 g/ha.  
  
(c) If pre-emergence herbicides are not used, then spray paraquat @ 500 g/ha in 800-1000 litres of water at about 5-10% emergence of potato plants to kill emerged weeds.
12. **Irrigation:** Presowing irrigation is advantageous for uniform germination. First irrigation should be given immediately after planting. Subsequent irrigations are given as and when required. Stop irrigation about 10 days before haulm killing.

13. **Roguing:** During the crop season, examine the seed plot thrice to remove off-type and diseased plants showing mottling, veinal necrosis, mosaics, crinkling, rolling of leaves, marginal flavescence and purple top roll symptoms. Do first roguing at 25-30 days after planting and immediately before earthing up. Do the last roguing 3-4 days before haulm killing. Ensure that all the tubers of the diseased and off-type plants are removed.

14. **Plant protection:** (a) Apply granular systemic insecticide, such as phorate 10G @ 10 kg/ha at earthing up against aphids and leaf hoppers.

(b) To control late blight and other leaf spot diseases, give periodic sprays of 0.2% mancozeb (@ 2 kg/ha in 1000 litres of water) at 10 days interval starting from the third week of November. If late blight appears, a spray of metalaxyl + mancozeb, such as Ridomil MZ @ 2 kg/ha may be given. This may be followed by mancozeb @ 2 kg/ha after 15 days, if cloudy weather and rain continues.

In early planted crop, against leafhoppers' mites, foliar spray 40 EC @ 1.2 l/ha and dicofol 18 EC @ 2l/ha respectively at 30-35 days after planting should be applied.

To control leaf eating caterpillars, spray endosulphate 15-20 EC @ 1.5 l/ha or carbaryl 50% WP @ 2.5 kg/ha.

(c) Spray dimethoate-35 EC or methyl demeton 25EC @ 1.0 l/ha around 10 December to keep aphid build up under check.

In spring planted crop, foliar sprays with chlorpyrifos 20 EC @ 2.5 l/ha should be given at 30-35 days after planting.

15. **Haulm killing:** Kill the haulms of seed crop by 31 December either by cutting or by spray of paraquat dichloride @ 2.5 l/ha. Ensure that regrowths do not appear on the stumps as tender leaves attract aphid vectors.

16. **Harvesting and grading:** Begin harvesting 15-20 days after haulm killing when the skin of tubers has become firm. Keep the freshly harvested tubers in heaps in a cool place for about 10-15 days. The size of the heap should be about 1.5 meter high and 3.5 meter broad. Cover the heaps with paddy or wheat straw



to protect them from direct sunlight. If it rains, cover the heaps with tarpaulin/plastic covers. Potato seed may be graded into three grades, i.e., under size (less than 25 mm), seed size (25-65 mm) and over size (more than 65 mm). Sort out the cut and cracked tubers.

17. **Seed treatment:** Spray 3% boric acid solution @ 1.5 on the surface of seeds before or after cold storage. Best way of seed treatment is to wash the tubers first by water, dip washed tubers in 1% Chlorocin solution and then dip seed tubers in 3% solution of boric acid for 30 minutes, ensure proper drying and then pack in gunny bags. Organo-mercurial compounds like Emisan - 6(0.25% solution), 20 min dip can also be used.
18. **Seed storage:** Pack the seed potatoes in clean hessian bags and label them. Store them immediately in cold store. If the ambient temperature is high, the seed bags should be kept in precooling chamber or in a cool place and then stored in cold store at temperature at 2-3°C and relative humidity (RH) 75-80 per cent. The stored bags should be inspected periodically. Seed treated with chemicals should not be used for table purposes.

For further information, please contact

The Head,  
Central Potato Research Station,  
Post Bag No.1, Model Town, PO  
Jalandhar - 144 003 (Punjab)  
Grams: POTATOSEARCH, Jalandhar  
Tel: 741474

The Director,  
Central Potato Research Institute, Shimla-171001 HP.  
Grams: POTATOSEARCH Shimla - 171001  
Tel: 225073 (0177)  
Fax: 0177-224460  
E-mail-director@cpri.hp.nic.in.