

POTASH FERTILIZERS

**TOWARDS HIGHER YIELDS
OF VEGETABLES AND
BETTER QUALITY**



INTERNATIONAL POTASH INSTITUTE

SWITZERLAND



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Importance of potassium for vegetables

Potassium is an extremely important nutrient for vegetables, its application :

- Increases crop yield
- Improves appearance and marketability (size, shape, colour, hygienic properties)
- Enhances nutritional value (content of vitamin C and antioxidants, starch content in potato)
- Reduces incidence and severity of pest and diseases
- Improves plant resistance to drought
- Decreases storage losses, enhances shipping quality and extends shelf life of production
- Improves processing quality of production

Nutrient uptake by vegetables

Vegetable crops uptake more K than N or P. Adequate potash fertilization is a precondition of high yield of vegetables and better yield quality.

Crop	Yield t/ha	Nutrient uptake, kg/ha		
		N	P ₂ O ₅	K ₂ O
Cabbage	70	370	85	480
Cauliflower	50	250	100	350
Eggplant	40	207	46	340
Potato	40	175	80	310
Spinach	21	131	34	226
Carrot	30	125	55	200
Tomato	50	140	65	190
Beans	15	130	40	160
Onion	35	120	50	160
Lettuce	18	68	21	130
Cucumber	40	70	50	120
Radish	20	120	60	120
Capsicum	21	70	16	92
Okra	20	60	25	90
Pumpkin	50	75	80	80

Potassium deficiency symptoms

Leaf marginal scorch is a typical K-deficiency symptom, first appearing in the older leaves. At more advanced deficiency older leaves turn brown (necrotic) and die early. Leaf margins may curl down. Severe K-deficiency results in short plants with shortened internodes and petioles and poor root growth. Vegetable production is small-sized and disease-susceptible; it has deteriorated appearance and marketability and short shelf life.

Potato: The canopy turns bronze. Tubers are predisposed to internal blackening, bruising and hollow heart. Weight loss from the tubers after harvest increases.

Tomato: Such physiological disorders of fruits as gold specks, puffiness, blotchy ripening complex, grey wall, greenback or yellow shoulder and internal white tissue are widespread.

Cucumber: Fruits enlarge at the blossom end but remain underdeveloped at the stalk end, producing distinct tapering in the stem end of the fruit.

Cabbage: Heads are loose.

Onion: Older leaves show brown tips, bulb formation is poor.



Potato K -deficiency



Onion K-deficiency

Efficiency of potash fertilizer use to major vegetable crops

Vegetables showed high response to potash use in field experiments conducted at farmers' fields on most widespread soils of Chhattisgarh.

Potato: Marketable yield of tubers increased to 33-37% due to 100 kg K₂O/ha application. Tubers harvested from zero potash plots were disease-susceptible. With potash, the weight of rotten tubers decreased to 30-57% after 60-days storage.



N₁₅₀ P₁₀₀ K₀



N₁₅₀ P₁₀₀ K₁₅₀

Healthy potato due to potash use (yield of 3 plants)

Onion: Yield of bulbs increased to 23-38% in a result of 90 kg K₂O/ha application. With potash, the weight of bulbs was 1.5 times higher and the weight of rotten bulbs after 60-days storage decreased to 35% (one season observation).

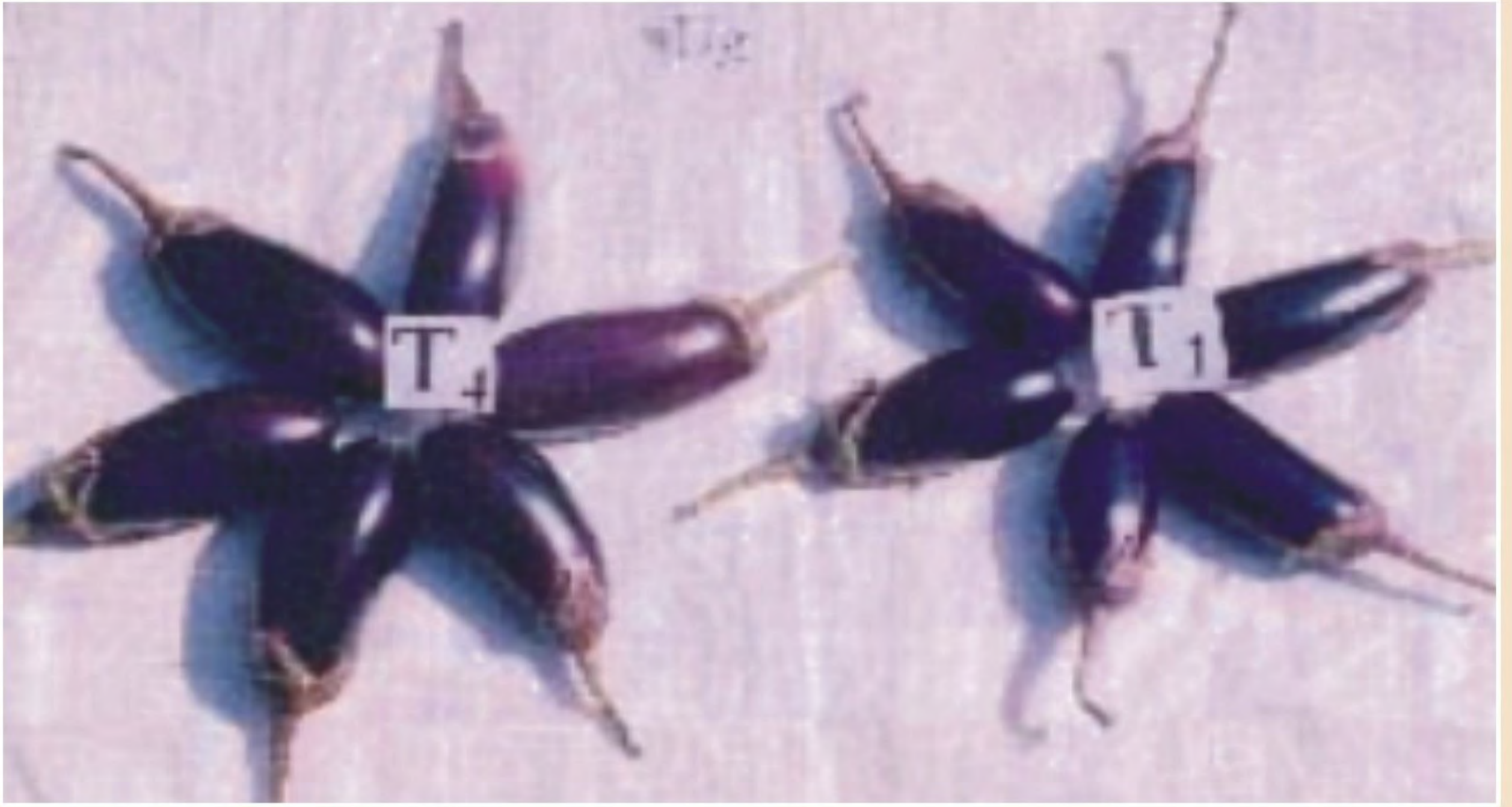


N₁₀₀ P₈₀ K₀

N₁₀₀ P₈₀ K₉₀

Enlarged onion bulbs in a result of potash application

Eggplant: Yield of fruits grew to 61% when the rate of 75 kg K₂O/ha was applied (one season observation). With potash, the weight of fruits was 1.5 times higher.



N₁₅₀ P₁₀₀ K₁₀₀

N₁₅₀ P₁₀₀ K₀

Good size eggplant due to potash use

Cabbage: Yield of cabbage heads increased to 23% due to 90 kg K₂O/ha application (one season observation).



N₁₅₀ P₁₀₀ K₀

N₁₅₀ P₁₀₀ K₅₀

Better quality of cabbage with potash

Economics of potash fertilizer application to vegetables

Farmer's profit due to potash fertilizer use to vegetable crops is high as vegetables highly respond to K in terms of both yield and quality. Better quality means higher competitiveness of farmers in the market.

K ₂ O	MOP	Cost of MOP	Marketable yield of Potato	Yield increase over control	Value of extra production	Profit due to K
kg/ha		Rs/ha	q/ha	q/ha	Rs/ha	Rs/ha
0	0	-	110	-	-	-
50	83	383	132	22	11,000	10,617
100	166	766	151	41	20,500	19,734
150	249	1149	154	44	22,000	20,851

Methods of potash fertilizer application

Requirements of vegetables in K are met mainly by basal application of potash fertilizers before planting. Muriate of potash, MOP, is a major form of potash fertilizer for vegetables. To avoid excessive leaching, split application of potash is a good practice on light-textured soils, e.g. with potato, K application may be done in two splits (1/2 at planting and 1/2 at earthing up).

Potash fertilizer recommendations

The indicated below are the average NPK fertilizer recommendations for major vegetable crops in Chhattisgarh (kg/ha):

Crop	N	P ₂ O ₅	K ₂ O
Potato	150	100	100
Onion	100	80	60
Cabbage	150	100	60
Eggplant (O P)	150	100	100
Eggplant (Hybrids)	250	175	150
Tomato (O P)	150	100	75
Tomato (Hybrids)	250	175	150
Okra	100	60	60

100 kg K₂O/ha = 40 kg K₂O/acre = 167 kg MOP/ha = 67 kg MOP/acre

Modern high yielding varieties/hybrids have higher demand in nutrients, including K, as compared with the traditional varieties. Thus, the yield potential of modern varieties is utilized only with high rates of mineral fertilizers, and especially potash.



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