



# SYMPTOMS OF POTASSIUM DEFICIENCY IN VEGETABLE CROPS

POTASH & PHOSPHATE INSTITUTE OF CANADA – INDIA PROGRAMME, GURGAON-122016

India is endowed with favorable tropical, sub-tropical and temperate climates, making it conducive for producing high quality, high value vegetables year round in various parts of the country. At present, 90 million tonnes of vegetables are produced from about 6 million hectares which account for less than two percent of the cropped land.

There is an appalling gap between potential yields and actual yields harvested by farmers. For most vegetable crops, yields realized are less than 50% of the potential (Table 1). By the year 2010, India will need to produce 160 million tones of vegetables from about 8 million hectares by increasing productivity from to 15 or 20 t /ha. This task calls for better crop husbandry including the use of optimum rates of nitrogen (N), phosphorus (P) and potassium (K). On average, a 38t/ha crop of vegetables removes 148, 57 and 209 kg N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O, respectively (Table 2)

**Table 1 : Area, production productivity and potential of vegetable crop (1999-00).**

Crop	Area, 000 ha	Production 000 tonnes	Productivity, t/ha		
			Actual	Potential	Percent
Potato	1341	25000	19	40	48
Brinjal	500	8117	16	60	27
Onion	493	4900	10	35	29
Tomato	457	7427	16	50	32
Okra	349	3419	10	20	50
Peas	273	2712	10	20	50
Cabbage	258	5909	23	70	33
Cauliflower	248	4718	19	50	38
Others	2074	28629	14	40	35
<b>Total</b>	<b>5993</b>	<b>90831</b>	<b>15</b>	<b>43</b>	<b>35</b>

Potassium content of Indian soils has traditionally been considered as adequate. In recent years, however, there has been a growing awareness of the importance of K in crop production. It is importance to remember that long before symptoms of K deficiency become visible, severe losses in both crop yield and crop quality occur.

As K is highly mobile within the plant, the first symptoms show on older leaves since their K supplies are drained to supply young leaves. The sequences in the development of deficiency symptoms is almost the same with all plants, although particular species, cultivars or clones may exhibit characteristic symptoms.

The first sign of a deficiency is a reduction in growth rates. Plants become stunned and usually leaf color becomes darker green. At a more advanced stage specific deficiency symptoms begin to appear. These include :

**Table 2 : Nutrient removal by some vegetable crops**

Crop	Yield, t/ha	Nutrient removal, kg/ha		
		N	P2O5	K2O
Potato	40	175	80	310
Brinjal	60	175	40	300
Onion	35	120	50	160
Tomato	50	140	65	190
Okra	20	60	25	90
Peas	20	125	35	80
Cabbage	70	370	85	480
Cauliflower	50	250	100	350
Carrot	30	125	55	200
Cucumber	40	70	50	120
Beans	15	130	40	160
Radish	20	120	60	120
Pumpkin	50	90	70	160
Spinach	25	120	45	200
<b>Mean</b>	<b>38</b>	<b>148</b>	<b>57</b>	<b>209</b>
<b>Nutrient Ratio</b>		<b>2.60</b>	<b>1.00</b>	<b>3.67</b>

- Decreased drought resistance
- Appearance of white, yellow or orange chlorotic spots or stripes on older leaves, usually starting from the leaf tips and margins. In some species irregularly distributed chlorotic spots appear, but in all cases symptoms start from the leaf tip. The base of the leaf usually remains dark green.
- The chlorotic areas become necrotic. The tissue dies and leaves dry up.
- The symptoms spread to younger leaves and finally the entire plant may die.
- Roots of K deficient plants are poorly developed and often affected by rot.
- Disease incidence is increased and crop quality is severely reduced, especially in the case of vegetables, fruit, tobacco and fibre crops.

Apart from the above "typical" symptoms, other symptoms may occur as a result of imbalance of K with other nutrients, N and Ca in particular.

Symptoms similar to K deficiency can occur due to salt injury, fungus attack, spray damage etc. When diagnosing K deficiency in the field, these conditions should be checked and eliminated as possible causes of the apparent deficiency symptom.



**Potato:** *Interveinal chlorosis of the older leaves, afterward leaf tips and margins become necrotic.*



**Tomato:** *Yellowing and premature shedding of old leaves; downward cupping of old leaves showing marginal necrosis.*



**Onion:** *Chlorosis and necrosis of tips and withering of older leaves in acute K deficiency*



**Brinjal:** *Old leaves show brown necrotic lesions in the interveinal areas almost covering the entire lamina. Loss of chlorophyll from middle leaves.*



**Cabbage:** *Acute potassium deficiency; showing puckering and marginal scorching of old leaves. Withering of lowest whorl of leaves is visible in one plant.*



**Amaranthus:** *Chlorosis and necrosis of tips and withering of older leaves in acute K deficiency*



**Chilli:** Chlorosis and necrosis of tips and withering of older leaves in acute K deficiency



**Arum:** Old leaves show chlorosis and yellowing of interveinal areas and necrosis of the margins



**Cucurbites:** Interveinal chlorosis of the older leaves, after-ward leaf tips and margins become necrotic.



**Okra:** Chlorosis and necrosis of tips and withering of older leaves in acute K deficiency



**Garlic:** Chlorosis and necrosis of tips and withering of older leaves in acute K deficiency



**Lettuce:** Chlorosis and necrosis of margins and tips and withering of older leaves in acute K deficiency

