

Nutrition deficiency and their management in potato

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Introduction

Nutrient deficiency occurs when a plant lacks sufficient quantity of an essential nutrient required for growth. Without sufficient essential nutrients, plants will not grow well and show various symptoms to express the deficiency.

Plants obtain carbon, hydrogen and oxygen from water, air and sunlight, to make food for growth.

They also require the following for healthy growth:

Macronutrients

Namely: Nitrogen, phosphorus, potassium, sulphur, calcium and magnesium. These are required by plants in relatively large amounts.

Micronutrients also known as trace or minor elements

Namely: Copper, manganese, zinc, iron, boron and molybdenum. These are required by plants in smaller quantities.

Nutrients their deficiency and management in potato

Nitrogen:

- Yellowing is caused because of nitrogen deficiency.
- It is uniform over the entire leaves including the veins.
- Younger leaves turn more darker greener while the older leaves turn yellowish coloured.

Correction measure: Foliar application of 2% urea thrice at every 15 days interval or soil application of nitrogen after the soil test recommendation.

Phosphorus:

First symptoms are seen on the older leaves.

- Necrotic spots are seen and the plants are stunted.
- Purpling of the stem and petiole is seen.
- Plant shows darker colour than normal.
- Lower surface of leaf turns grey greenish.

- In case of severe deficiency, rolling of leaflets to upwards is seen.

Correction measure: soil application of recommended dose of phosphorus during land preparation or even during sowing.

Potassium:

- Symptoms develop generally on younger plant parts as the potassium is mobile element.
- Leaves become crinkled and show tip burn and sometimes, interveinal necrosis.
- Leaves take a scorched appearance with black pigmentation and necrotic edges.

Correction measure: Foliar application of potassium sulphate @ 1%.

Sulphur:

- Overall chlorosis on the leaves is seen.
- Veins and petioles show a distinct red colour.
- Reddish colour is often seen on the underside of the leaves.
- At severe deficiency, the leaves become more and more erect and often become twisted and brittle.
- Leaflet yellowing is uniform and general.

Correction measure: Application of gypsum@100kg /acre in the soil. Use of sulphur containing fertilizers like SSP, MSP etc. foliar application of calcium sulphate or potassium sulphate @ 1% twice at every 15 days interval.

Magnesium:

- Leaves show severe and advanced inter veinal chlorosis.
- Scorched look of the leaves is also seen because of necrosis.
- Symptoms generally start with mottled chlorotic areas developing in the inter veinal tissue.
- Symptoms first appear on the young mature leaves.

Correction measure: Foliar application of 0.2% magnesium sulphate

Manganese:

The foliar parts show slight interveinal chlorosis.

- The early stages of chlorosis because of manganese deficiency are similar to that of iron deficiency.
- As the deficiency prevails further on, we can see necrosis along the veins.
- Browning and spotting occurs on leaflets (especially on midribs and larger veins).

Correction measure: Spray 0.2% manganese sulphate at every 15-day interval.

Zinc:

- Leaves do show interveinal chlorosis.
- In the early stages, the leaves turn yellowish in colour and pitting develops on the upper surface of mature leaves.
- As the deficiency symptoms progresses, we can see an intense interveinal necrosis. However, the main veins remain green in colour.

Correction measure: Foliar spray of zinc sulphate @0.5%

Boron:

The boron deficient leaves show a slight generally occurring necrosis.

- Necrosis occurs in the meristematic regions of the growing tissues; leading to the disruption in apical dominance and there by the plants get a rosette shape.
- The deficiency symptoms are similar to those of calcium deficiency.
- Leaves become brittle and break very easily.
- Wilting of the younger leaves is seen even though there is an adequate amount of water supply, indicating the disruption of water transport caused by boron deficiency.

Correction measure: Foliar spray of Borax @0.2%

Calcium:

Necrosis is seen around the base of the leaves.

- The very low mobility of calcium is a major factor determining the expression of calcium deficiency symptoms in the plants.
- We can see soft dead necrotic tissues across rapidly growing areas, which is generally related to poor translocation of calcium.
- The margins of the leaf grow very slowly compared to the rest of the leaf, causing the leaf to cup downwards.
- Plants under severe calcium tendency are greatly prone to wilt disease.

Correction measure: Foliar spray of 0.2% calcium sulphate twice at every 8 days interval.

Copper:

- The copper deficient leaves are curled, and their petioles are bent downwards.
- Light overall chlorosis along with complete loss of turgor in the young leaves are the major



symptoms.

- Recently matured leaves show netted, green veining with areas bleaching to a whitish gray.
- Some leaves develop sunken necrotic spots and have a tendency to bend downward.

Correction measure: Foliar spray of 0.5% copper sulphate thrice at every 15 days interval.

Iron:

- Strong chlorosis at the base of the leaves with some green netting.
- Interveinal chlorosis initially begins at the youngest leaves, then evolves into an overall chlorosis and finally ends as a completely bleached leaf.
- Iron has a very low mobility and hence symptoms are seen initially on the younger leaves.
- Iron deficiency is strongly associated with calcareous soils, anaerobic conditions, and is often induced by an excess of heavy metals.
- Growing point and young leaves become yellow or in extreme cases, white colour.
- Necrosis is usually not seen.
- Veins and leaflet ends remain green.

Correction measure: Soil application of 10kg/acre ferrous sulphate or spraying of 0.5% ferrous sulphate solution 3-4 times at every 8-day interval.

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