# Timely management of Nutrient Deficiencies for reaping higher yield

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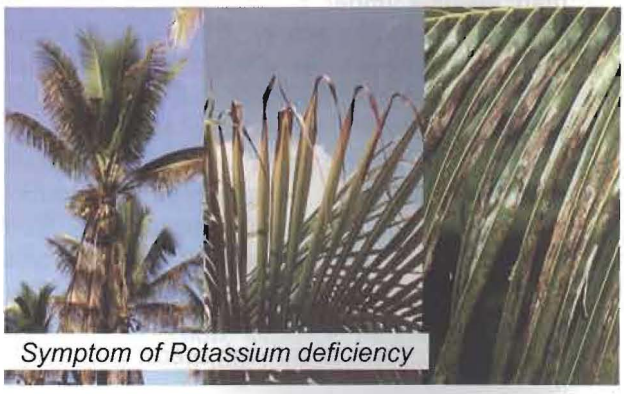
Coconut is a perennial crop that absorbs large quantity of nutrients from the limited volume of soil in the basin throughout its existence. In general, a palm yielding up to 100 nuts per year abrsorbs the three major nutrients viz; Nitrogen, Phosphorous and Potash from the soil. Coconut also requires other minor nutrients viz; Boron, Magnesium, Sulphur, Chlorine, Manganese, Iron, Zinc, Copper and Molybdenum in small quantities for successful crop production. Regular supplementing of these nutrients in the soil by adopting proper application of fertilizers and manures is essential to sustain crop yield. Due to continuous cultivation, coconut without regular application of optimum doze of manures and fertilizers lead to nutrient deficiency disorders in traditional coconut belts. Deficiency of major and minor nutrients is reported from most of the traditional coconut growing areas in India. Phosphorous deficiency is not generally noticed in coconut gardens. Its application can be skipped for a period of few years if the phosphorous available in the soil is more than 20 ppm. Powdered rock phosphate is the best and cheapest source of phosphate fertilizer for acidic soils. Potassium (K) Boron (B) Magnesium (Mg) and Nitrogen (N) are four major plant nutrients commonly found deficient in coconut plantations. Its deficiency adversely affects the growth of production in coconut palms. The wide spread deficiency of these nutrients is the limiting factor for increased productivity. The palm growth, nut and copra production get decreased due to deficiency of these nutrients. Generally severe deficiency of these nutrients produce characteristic visual symptoms on the leaves. Thus the condition can be easily identified by the farmers in the field by observing the symptoms. Visual Symptoms of deficiency of these nutrients and corrective measures recommended are briefly explained in this article.

## Potassium ($K_2O$)

It is one of the major nutrients required for coconut in large quantities compared to other crops. Coconut requires 1200 gm of potassium per palm per year where as other plantation corps like cashew and areca nut need 750 gm and 140 gm respectively per plant per year only. Since coconut palms remove large quantity of potassium, its deficiency disorders are commonly reported by farmers due to lack of regular application of manures to supplement its removal.

Symptoms of potassium deficiency is first observed in mature leaves where scattered rust coloured spots appear on either side of the midrib of the entire leaflet. The leaflets appear slightly yellowish in colour. Yellowing is seen more pronounced towards the tips. Gradually the spots enlarge and form large brown patches with leaflet tips showing distinct scorches. The crown appear yellowish with the lower half showing slight orange in colour. Ultimately the whole crown becomes smaller and yellowish orange.



*Symptom of Potassium deficiency*

*Symptom of Boron deficiency*

Its deficiency affects all production factors especially the nut set, leading to production of less number of bunches and female flowers.

To correct the potassium deficiency, application of potassium manures and fertilizers is advocated. The general recommendation for fertilizing adult bearing palm is to apply 1200 gm of $K_2O$ per palm per year in two split dozes ie; 1/3 during May-June and 2/3 during September- October. To supplement this quantity potassium, regular application of two kg muriate of potash (MoP) fertilizer per tree is required after neutralizing the acidity of soil. In the case of acidic soil, application of one kg dolomite per palm per year is required. Generally potassium deficiency occurs due to suspension of potassium fertilizer application by farmers. If the symptoms are not disappearing in spite of regular application of fertilizers and manures, apply additional 500 gm muriate of potash to adult palm to correct its deficiency.

## Boron (B)

Deficiency of boron is a limiting factor for increasing coconut production observed in traditional coconut growing belts. Boron deficiency is generally noticed in the coconut growing soils of Kerala, Assam and Lakshadweep Islands. Emergence of shorter leaves with deformed and crinkled leaflets is the first symptom of boron deficiency. Boron causes characteristic malformation of leaves like hook leaves, nut cracking, drying of female flowers etc. The leaflets are wedded together and the tip of the affected leaf appear like a hook. The lower basal region of the frond normally will not produce any leaflet. Crown rot disease or crown choke disease appear due to Boron deficiency. Inflorescence shows necrosis. In the advanced stage, the palm has only a central bulbous bud that does not develop any more, surrounded by some petioles without leaflets and finally, the palm dies. The death of the affected palm is not sudden, but it slowly loses vitality and finally succumbs within 3-4 years. The critical stage at which the palms will not respond to treatment is when the leaves are withered and have a severely stunted apical leaves, crinkled leaves, and when some leaves lack leaflets. Button shedding and production of barren nuts are the common symptoms associated with boron deficiency. Other associated symptoms include 'Hen and Chicken' symptom (few under developed nuts / small sized nuts along with full developed nuts), partial filling of endosperm, nut cracking etc

Soil application of Boron containing fertilizer borax 50 gm to 100 gm per tree based on the intensity of crown chocking symptoms twice at monthly intervals after appearance of the first symptom is recommended to correct the deficiency. In the root (wilt) disease affected areas, it is recommended to apply Borax @ 300 gm/seedling and @ 500 gm/ adult tree to correct its deficiency. Application of 10% solutions of sodium borate as foliar spray is recommended in Srilanka. The spraying has to be done at every 10 days intervals up to one month. Timely application of Borax is very important to correct its deficiency and to sustain growth for better yield of coconut. Coconut palm will not respond in the advanced stages of its deficiency. Hence application of Boron at initial or middle stage of symptoms is essential to correct its deficiency.

## Magnesium

Deficiency of magnesium can be identified by farmers by observing the yellowing of leaflets of mature leaves fronds. The leaflets would be pale yellow with a green band on either side of the midrib. The basal areas of leaflets remain green thereby showing a green band on either sides of rachis of whole frond. Gradually the leaflet tip dry giving the appearance of scorching. The crown leaves also remain pale yellow. In advanced stages, yellowing would be more conspicuous in the lower half of the crown.

To correct the magnesium deficiency, application of Magnesium sulphate 500 gm per tree or dolomite one kg per tree year is recommended. This application should be continued until the full recovery of visual symptoms. As a long term preventive measure against magnesium deficiency, ground dolomite lime stone (dolomite) should be applied to yielding palms along with other fertilizer application. For young palms 500 gm dolomite should be applied along with the application of recommended dose of fertilizers.

*Symptom of Magnesium deficiency*

*Yellowing of palm due to Nitrogen deficiency*

## Nitrogen

In nitrogen deficient coconut palms general yellowing of all leaves is noticed. In the initial stage of deficiency the crown as a whole appears pale green. As the deficiency advances, the crown appears clearly yellowish before turning reddish gray. In the advanced stage the crown become progressively smaller with tapering of stem. Many inflorescences are seen aborted and the number of female flowers is less.

Regular application of nitrogenous fertilizers and manures will help to correct Nitrogen deficiency. In general, application of one kg urea per palm per year in two split dozes is recommended for sustained supply of nitrogen to coconut palms. If deficiency symptoms appears even after regular application of manures and fertilizers apply additional 100 gm urea per palm for young palms and 200 gm of urea to yielding palms to correct the deficiency. Growing of leguminous green manure crops *in situ* and incorporation of the same in to the soil also help to correct nitrogen deficiency. Moreover recycling of palm waste is much beneficial especially for maintaining the status of major and micro nutrients. Palm wastes like coconut leaves, crown wastes, dried spathes, husk etc. are used for recycling to replenish the nutrient status of soil.

In order to ensure proper growth, flowering and fruiting and higher yield optimum concentration of nutrient should be maintained in the soil through regular application of manures and fertilizers in time. Deficiency of the four nutrients described above is commonly noticed in traditional coconut growing areas due to continuous cultivation without proper fertilizer management. Regular and timely application of fertilizers or manures is essential to those palms showing the visible symptoms in time to correct its deficiency. If farmers are not able to diagnose the cause of symptoms by visual observation they are advised to contact the nearby Agriculture or Horticulture Officers of the state government or Technical Officers of Coconut Development Board for proper remedial measures in time.

Farmers are advised to keep an eye on coconut palms to identify nutrient deficiency symptoms at an early stage and correct it through the proper fertilizer and manure management to restore health of the palm and to reap higher yield. ■