Nutrient Management in Coconut

P. G. Kamalakshi Amma, D. Prema[1] and M. Shanavas

Central Plantation Crops Research Institute, Regional Station, Krishnapuram (P.O.), Kayangulam - 670 533

Productivity of coconut in India is affected by several factors including diseases. Root (wilt) disease prevalent in southern districts contagiously and in isolated pockets of other districts in Kerala affects coconut production adversely. The disease has also been recorded from adjacent districts in Tamil Nadu. Root (wilt) disease is only a debilitating disease and not lethal. Management of nutrition and cultural practices help in sustaining the productivity of palms. Among the various management practices, integrated nutrient management gives foremost response in improving the productivity of root (wilt) affected palms.

The work done at CPCRI (RS), Kayangulam, in sandy soils of Kerala, showed that coconut palms yielding 25 nuts annually removes nutrients from one hectare at the rate of 55 kg N, 27 kg P, 84 kg K. The nutrient removal by palms varies according to the age and production potential of the palm, climate and soil type. A major portion of the nutrients taken up is utilised for the production of leaf and nuts.

For the best growth and productivity of coconut palms integrated and balanced nutrient management is essential. Malnutrition and excess nutrition are equally harmful. The ratio of different nutrient elements supplied is also important. For example, excess potassium is antagonistic to magnesium uptake and may lead to yellowing of leaves. Excess liming also causes yellowing of leaves due to iron and manganese deficiency. The nutrient requirement may be found out by scientific methods. Leaf tissue analysis is the best method for coconut. The leaf testing makes it possible to assess the deficiency and sufficiency of a particular nutrient and thereby forecasts the supplementation of the nutrient.

Potassium is needed by coconut in higher quantities. It increases the size of the nuts, copra weight per nut and quality of copra. Experiments showed that bearing started in five years when potash was applied to West Coast Tall variety from seedling stage onwards, whereas it took 8 years for those, which were not provided with potassium. The palms that received potassium at the rate of 1 kg per palm per year yielded 24 kg copra per palm per year while only 10 kg was obtained from those palms which were not supplied with K.

Potassium also imparts disease resistance. Chlorotic leaves having tips with a burnt appearance and ash colour exhibit the deficiency of potassium. Potassium improves the softness of the kernel and increases sweetness of coconut water.

Nitrogen is essential for the growth and metabolism of coconut palms. It increases button setting and improves production of nuts per year. Experiments at CPCRI (RS), Kayangulam showed that palms which received 500g N/Palm / year, had an increased nut production by about 15-20 per cent compared to that received no nitrogen. Excess nitrogen or shortage of phosphorous causes reduction in nut size, thinner kernel and susceptibility to *Myllocerous* attack. The optimum content of nitrogen in leaves is 1.8-20 per cent, below which the growth of the palm is adversely affected.

Phosphorous is required for the growth of roots, trunk, leaves and flowers. It is needed for the catabolism of starch, sugars, fats and protein. It affects the size of nuts, thickness of kernel and the time lag from bearing to maturity. Deficiency of phosphorous interrupts flowering and root growth.

Calcium and magnesium are mainly utilised in the production of leaves. Liming which improves soil reaction is also helpful in increasing the calcium content of soil. Liming is done either by basin application of calcite (calcium carbonate) or dolomite (calcium magnesium carbonate). Liming can be done two weeks before or after fertiliser application. In Kerala, in root (wilt) affected areas calcium and magnesium are found to be deficient. These palms express yellowing of leaves except for leaf veins that are green. Magnesium deficiency increases the time lag for bearing and delays trunk formation. Magnesium increases female flower production per flower stalk, the number of inflorescence and setting percentage.

There is no need for applying any fertiliser during the first three months of planting. From third month onwards, if magnesium is given regularly, the pre-bearing period may be reduced nine months and the nut production may be increased by 40 percent. In palms showing yellowing due to magnesium deficiency, green colour of leaves is restored by application of two percent magnesium sulphate on leaves, in every quarter of a year.

In addition, coconut palm requires other nutrients like sulphur, iron, manganese, sodium, copper, zinc, molybdenum and boron. Boron deficiency causes 'crown choking' disorder in coconut. Boron helps in division and multiplication of meristamatic tissues. Boron deficiency causes malformations of leaves resulting in fasciations and crowding of leaves. This gives a chocking appearance to the crown. In bearing palms, boron deficiency leads to button shedding and production of barren nuts. Often, such palms are of low bearing capacity, having cracks in the nuts. Dried flowers are seen attached to the scorched flower stalks. Boron deficiency is controlled by application of 300g borax per seedling per year up to the age of five years and 500g boron

[1]Scientist, CMFRI, Cochin

per palm per year for older palms in two split doses at an interval of three months. Borax can be given along with other fertilisers. Borax application may be discontinued once the symptoms disappear. The coconut palm needs all the essential elements in the required quantity for proper growth and production.

It is found that root (wilt) is not caused by the deficiency of an element, but integrated nutrient management is capable of improving the productivity of slightly or moderately affected palm. The palms above three years old need 500g N, 300g P_2O_5, 1000g K_2O and 500g Mg O per palm per year. The growth of coconut palms in the initial four years is critical. Special care must be taken during this period. For the first year, $1/10^{th}$ of the full dose of the recommended nutrients is given from the third month after planting. For the second year, $1/3^{rd}$ of the full dose is applied and $2/3^{rd}$ of the full dose is provided in the third year. Fourth year onwards full dose is supplied.

A coconut palm produces one leaf per month, if grown in well managed conditions. Accordingly, there will be flowering every month. Therefore it is better to distribute the supply of nutrients in many split doses. But this is not practical where there is no irrigation facility. In rainfed areas, fertiliser may be applied in two split doses during monsoons ($1/3^{rd}$ at the onset of south west monsoon and $2/3^{rd}$ at the onset of north east monsoon). If there is irrigation facility, the full dose may be provided in four equal split doses. At the time of fertiliser application, there should always be moisture in the soil. During drought, the absorbing tissues of root tips get dried up. The onset of monsoon or irrigation enhances development of new rootlets and the fertiliser applied will be utilised most efficiently.

Among the different methods of fertiliser application, basin application is found to be the best. The basin should be opened around the trunk to a distance of 2 meter from the trunk at 25-30 cm depth.

Application of organic manure in soil is essential for maintaining soil fertility. Each palm needs 25-50 kg organic manure every year in addition to inorganic fertilisers. Cow dung, green leaves, dry leaves, compost, husk etc. may be used as organic manures. The organics improve the structure of soil and help increase the water holding capacity as well as the nutrient holding capacity of the soil. The organic manures are also good sources of micronutrients. Green manuring may also be practised. Sunhemp, pueraria, calopogonium and mimosa are suitable green manure crops for raising in coconut gardens. The seeds of green manure may be broadcasted at the rate of 10g per palm basin, with the onset of South west monsoon, after the first dose of fertiliser application. It will yield around 15-20 kg green manure per basin, within four months. This may be incorporated into the basin soil with the onset of North East monsoon.