

Leaf and Soil Analysis—A Useful Tool in the Determination of Nutrient Requirements of Coconut

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Coconut production in Sri Lanka is often affected by deficiencies of minerals such as nitrogen, phosphorus, potassium and magnesium. Application of the correct fertilizer mixture at the proper time is important for optimum production. The nutrient requirements of the palm are determined by a number of factors such as the nutrient status in the soil and in the plant, level of production etc.

The soil and leaf can be chemically analysed to determine the content of nitrogen, phosphorus, potassium, magnesium and other nutrients. Depending on the levels of these nutrients, appropriate amounts of fertilizer can be applied. These analytical methods can therefore be used to avoid excessive application of fertilizer, thereby reducing costs. Also, when the production is above-average, the appropriate amount of fertilizer can be determined using data from soil and leaf analysis. Thus, this technique is an important and an efficient tool in determining the nutrient requirements of coconut in a given location. However, in order to use this method effectively, it is necessary to adopt correct techniques to obtain soil and leaf samples. Improperly collected samples will not reflect the correct nutrient status of the palm, thereby misleading the researcher in his recommendations.

Data from soil and leaf analysis could be used to rectify mineral deficiencies. Since these analyses are expensive, it is necessary to first determine the need for it. For example, if palms show clear visual symptoms of mineral defi-

ciency, then soil and leaf analysis may not be required to determine corrective action. In most instances, the general fertilizer recommendations of the Coconut Research Institute are adequate to achieve a high production. It is pertinent to mention here that by adopting the CRI general fertilizer recommendations with a modest level of management, yields in the region of 5000 to 9000 nuts/ac/year have been obtained. Thus, in many instances, it may not be necessary to carry out an expensive soil and leaf analysis programme to achieve a high yield.

Nevertheless, there are instances where data from soil and leaf analysis can be used to increase profitability by economising on fertilizer usage. The leaf number 14 (i.e. first fully opened leaf being number one) has been found to be the best for determination of nitrogen, phosphorus and potassium levels, whereas samples from both 6th and 14th leaf are necessary to determine magnesium levels. About five leaflets each from either side of the selected frond are collected. The 10 leaflets thus collected are bundled together and labelled giving details such as the date of collection, identification, locality, frond number etc. Leaf samples should reach the laboratory quickly, at least within two days after sampling, where they will be cleaned and a smaller sample taken for drying in the oven. The dried sample is then mechanically ground to a powder for use in analysis. The sample size depends on a number of factors such as the extent of the holding, age of palms, soil type, management practices, deficiency symptoms etc. It is very important to select representative palms in a plantation and

it may be necessary to sample about 2-3 palms per each one acre block to eliminate variability.

Soil samples are normally collected from the manure circle area or from the centre of the coconut square. Samples from manure circle area would give information on the status of nutrients and their availability to the palms whereas samples from the centre of the square will give a general idea on the nutrient status and availability of that particular soil. Generally, soil is sampled at two depths, 0-25 cm ("surface soil") and 25-50 cm ("sub soil"). Because of the high variability of nutrient content observed in soil samples, it is necessary to collect about 0.5 kg of soil from each of the 3-5 sites per 10 - acre block of uniform soil type. Then these samples are mixed to make a composite sample and about 1 kg of soil is taken into a clean plastic bag and labelled with details such as the date of collection, identification, locality, site and depth of sampling etc. During soil sampling, it is necessary to avoid roads, drains, pits, termite mounds etc. Soil samples should reach the laboratory quickly, but in any case within two days after sampling, for drying and grinding.

Sampling is normally carried out at the end of the dry season, as otherwise interpretation of results could be difficult. However, with certain safeguards, sampling could be done at other times also.

During sampling, it is necessary to avoid contamination of samples with extraneous matter. Also, it is necessary to clearly know the objective of sampling, i.e. for fertilizer requirement, check possible nutrient deficiency, to check the nutrient status of palms and/or soil etc. before attempting sampling.

From the foregoing, it would be obvious that sampling of leaf and soil has to be carried out very carefully with due consideration to all aspects and requires expertise and experience. We have observed that estate staff often collect samples, mostly soil, on their own. It is unlikely that these samples are collected on the basis indicated above, and the usefulness of such samples to evaluate the nutrient status of the holding is doubtful. It is therefore best to obtain the services of the staff of the Coconut Research Institute in this endeavour.



Soil and leaf analytical laboratory