GUIDE LINES TO COLLECT SOIL SAMPLES FOR SOIL TESTING

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SOIL TESTING

- Soil testing is a proven diagnostic tool to evaluate the available nutrient status of a soil and evolve a balanced fertiliser recommendation for crops.

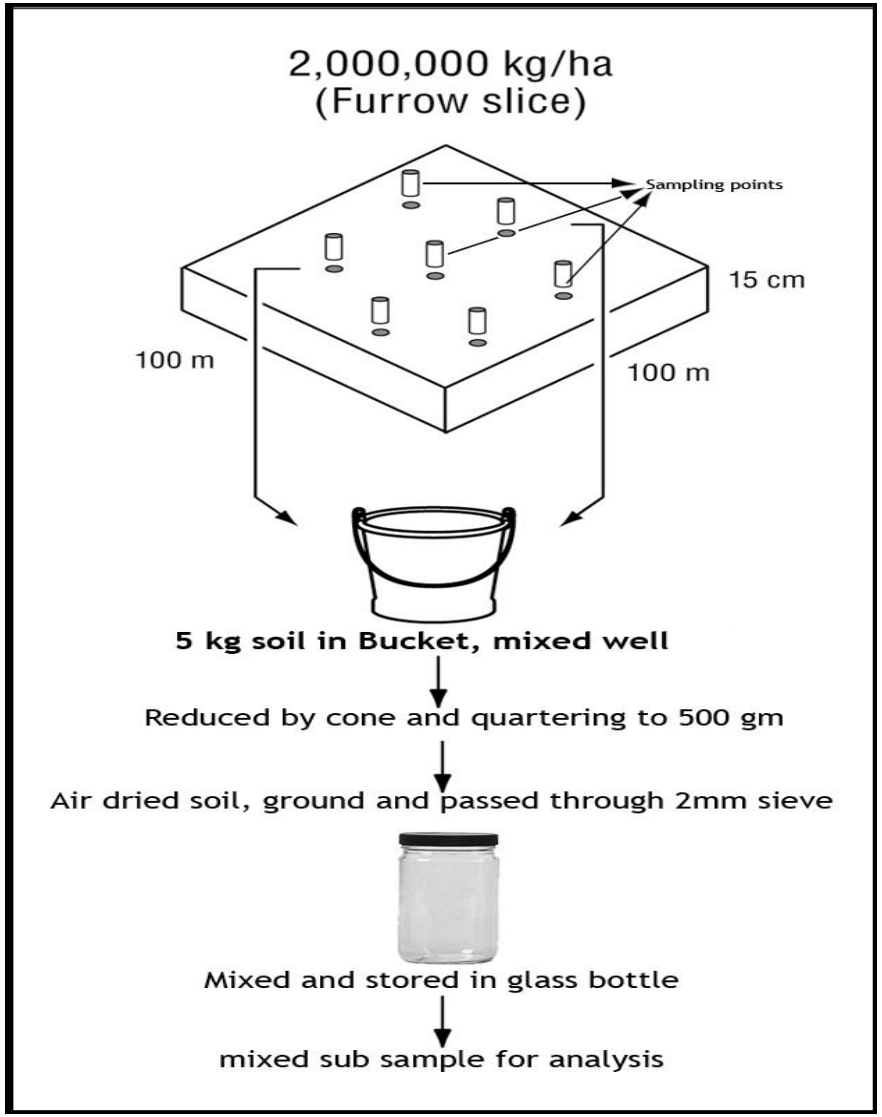
- Soil testing programme initiated in 1957 in Kerala was mainly intended to create an awareness on the use of fertilisers to maximise yield with thrust on major nutrients.

- Intensive agriculture and the use of high analysis fertilisers with greater purity resulted in depletion of secondary and micronutrients. Deficiency was further compounded by nutrient imbalances which upset the uptake of various nutrients.

Importance of representative sample

- Acre/ Hectare Furrow Slice - The area that spreads over one Acre/ Hectare of land to a depth of 15-20 cm (plough depth)
- The weight of soil from an acre/ hectare furrow slice corresponds to 2 million pounds or 2.24 million kg ha^{-1}.
- Soil samples to be taken from the field for analysis is only 500-750 g.
- Sample that is needed for analysis of each parameter in only a few grams
- Fertilizer recommendation is made on the basis of this analysis
- This highlights the need for utmost care in soil sampling to get a sample representative of the area

Acre/Hectare Furrow Slice calculation



- **Hectare furrow slice (HFS) is the volume or weight of the surface 15 cm (approximate plough depth) of soil in one hectare of land**
- **One hectare = 100 m x 100 m = 10,000 cm x 10,000 cm = 10,00,00,000 cm^2**
- **Volume of soil up to a depth of 15 cm = 10,00,00,000 x 15 cm^3**
- **Bulk density of soil = 1.33 g/cm^3 (approximately)**
- **Weight of HFS= 10,00,00,000 x 15 x 1.33 g = 20,00,000 kg (rounded) = 2 $x10^6$ kg**

- **A representative soil sample permits correct interpretation and accurate fertilizer prescription. Small amounts of soil samples used for the various tests represent a large area of the field. The steps involved in taking a soil sample for chemical analysis are given in the figure**

Collection of soil sample

- Four basic methods of soil sample collection for fertility assessment are practiced Viz:Benchmark sampling, Grid sampling, Topographic sampling, Random sampling.
- Random sampling with thrust on cropping systems is the most appropriate method for sample collection under homestead situation in Kerala with small holding size and undulating terrain,
- GPS enabled sampling will further be helpful for monitoring the fertility status in subsequent years for which GPS reading should be recorded field wise.
- Soil samples should be taken just prior to land preparation.
- Samples are collected from 0-15 cm for annual crops and 0-15 & 15-30 cm for perennial/horticultural crops

Collecting a field sample

- Collect sample from each cropping system separately
- It is enough if sampling is done from the crop having largest area
- Collect samples from uplands and rice fields separately
- For a representative sample, collect soil from four corners of the field and the centre
- Samples are collected from a “V” cut to a depth of 20 cm from the slanting side
- Cone and quartering of samples from different points is done to reduce volume.
- Avoid sampling near boundaries, bunds, unusual spots, near plants etc
- Final sample obtained should be 500-750 g and sieved through 2mm sieve to remove gravel

The following field situations occur in Kerala.

- Paddy field/garden lands: Composite samples to be collected at random using a soil auger
- Reclaimed paddy land/vegetables/banana/tapioca, often low lands reconfigured to raise crops requiring well drained soil condition.
- Such fields are made into raised bunds/ridges/mounds and beds.
- soil sampling should be carried out from the raised bunds, ridges and beds.
- In the case of mounds sampling is done between four mounds.
- Tree/plantation/ row crops: Composite samples should be collected from between the rows from the midpoint of four plants.

- Black pepper -Sampling at 30-60 cm distance from the base of the standard at a depth of 0-20 cm.
- Sampling is usually done at 2 to 3 points from the same plant and that will be mixed for getting the representative sample
- Ginger & Turmeric (on raised beds) It is better to take samples at 0-20 cm depth at the time of field preparation from different spots and then made into a composite sample.
- During cropping season, sample is collected from the inter space between plants 3 to 4 months after fertiliser application
- Tree spices -Sampling may be done between rows at the edge of the canopy at 0-20 cm depth

Rubber

- Soil samples collected before planting for fertilizer recommendation for the first 4 years
- Sample collection after planting- situations st in he field
- Planting in level areas Sampling from the middle of 4 trees
- Planting in gentle slope areas between 2 rows of plants
- Contour planting between 2 rubber plants on the contour terrace

❖**Soil Information sheets -The information sheets should be filled up carefully.**

❖**The GPS readings are to be noted at the site from where the readings are taken.**

Sample numbering and transport

❖**The number assigned to a sample should have the following components, a combination of alphabet and numerals indicating both panchayat and district.**

❖**For example when the first sample is taken from Kalliyur Panchayat of Trivandrum district, it will be indicated as Kyr- 1/ TVM and the second sample as Kyr-2/ TVM and similarly for the entire panchayat**

- The composite samples prepared after coning and quartering from each field are then transferred to thick polythene covers
- The sample numbers are to be written on an aluminium foil label which has to be placed inside the polythene cover
- Another paper label card with same number written using pencil or ball point pen has to be secured in a fold of the polythene cover and has to be sealed properly with a stapler
- Serial number of the sample also has to be written in bold on the polythene cover using marker pen

- Samples have to be transported in plastic/jute sacks.
- List of samples with the details shown in the data sheet has to be kept in each sack.
- This list has to be enclosed in a paper cover and keep securely in a polythene cover which has to be stapled properly.
- The sample information sheets are also to be enclosed with the sample list.

Materials to be procured before sampling

- Mammatty
- Plastic buckets
- Thick plastic/PVC sheets for cone & quartering
- Plastic covers (thick for soil sample)
- Aluminium foil labels
- Paper card labels
- Stapler and pins
- Plastic/Jute sacks for transporting samples
- Paper envelopes
- Plastic covers for securing envelopes with sample details /information sheet to accompany each sack
- Field books
- Marker pens

Frequency of Sampling for Soil Fertility Assessment

- For most field cropping systems, once in three years is adequate
- Soil fertility levels often change due to factors like cropping intensity, soil type, tillage practices, weather conditions, farm location, awareness of farmers to fertilizers etc which decide the frequency of sampling
- In coarse textured soils fertility levels especially in the case of K, Ca, Mg change due to crop uptake, leaching , surface runoff and in such cases annual sampling has to be done
- In intensive cropping systems where large amounts of fertilizers are applied or high crop removal as in the case of banana, tuber crops, coconut etc annual sampling is advisable
- For micronutrients, soil testing is insisted to avoid toxic levels in soil and is true for banana, tuber crops, coconut etc
- In the case of foliar application of micronutrients for vegetable crops this is not applicable.
- In organic farming application of micronutrients has to be done only in deficient situation which has to be confirmed by soil tests
- **Reference**

DOA, 2018, Soil Fertility Handbook, (eds.) V.K.Venugopal, K.M.Nair, P.Rajasekharan, A.N.Sasidharan Nair., **Department of Agriculture &Farmer's Welfare, Thiruvanathapuram, pp1-256**


Thank You