

SOIL SAMPLING PROCEDURES

Soil Sampling

The method and procedure for obtaining soil samples vary according to the purpose of sampling. Analysis of soil samples may be needed for engineering and agricultural purposes. In this publication, soil sampling for agricultural purpose is described which is done for soil fertility evaluation and fertilizer recommendations for crops.

The results of even very carefully conducted soil analysis are as good as the soil sample itself. Thus, the efficiency of soil testing service depends upon the care and skill with which soil samples are collected. Non-representative samples constitute the largest single source of error in a soil fertility programme. It is to be noted that the most important phase of soil analysis is accomplished not in a laboratory but in the field where soils are sampled.

Soils vary from place to place. In view of this, efforts should be made to take the samples in such a way that it is fully representative of the field. Normally one to ten gram of soil is used for each chemical determination and represents as accurately as possible the entire surface 0-22 cm of soil, weighing about 2 million kg/ha.

Sampling tools and accessories

Depending upon the purpose and precision required, following tools may be needed for taking soil samples.

- Soil auger- it may be a tube auger, post hole or screw type auger or even a spade for taking samples.
- A clean bucket or a tray or a clean cloth for mixing the soil and sub sampling.
- Cloth bags of specific size.
- Copying pencil for markings and tags for tying cloth bags.
- Soil sample information sheet.

Selection of a sampling unit

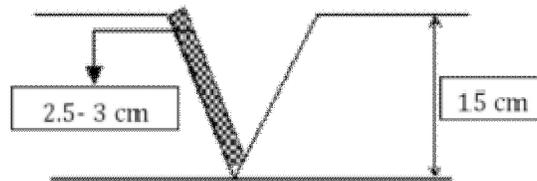
A visual survey of the field should precede the actual sampling. Note the variation in slope, colour, texture, management and cropping pattern by traversing the field. Demarcate the field into uniform portions, each of which must be sampled separately. If all these conditions are similar, one field can be treated as a single sampling unit. Such unit should not exceed 1 to 2 hectares, and it must be an area to which a farmer is willing to give separate attention. The unit of sampling is a compromise between the expenditure, labour and time on one hand and precision on the other. In view of limited soil testing facilities, it has been suggested to adopt an alternate approach where a sample may be collected from an area of 20-50 ha to be

called as composite area soil sample and analyse the same for making a common recommendation for the whole area.

Sampling procedure

Prepare a map of the area to be covered in a survey showing different sampling unit boundaries. A plan of the number of samples and manner of composite sampling is entered on the map, different fields being designated by letters A, B, C etc. Each area is traverse separately. A slice of the plough-layer is cut at intervals of 15 to 20 steps or according to the area to be covered. Collect at least 10 to 15 samples from each sampling unit and place in a bucket or tray. Generally 10 to 20 spots must be taken for one composite sample depending on the size of the field.

Scrap away surface liter; obtain a uniform thick slice of soil from the surface to the plough depth from each place. A "V" shaped cut to a depth of 15 cm in the sampling spot using spade to remove 1 to 2 cm slice of soil. The sample may be collected on the blade of the spade and put in a clean bucket. In this way collect samples from all the spots marked for one sampling unit. In case of hard soil, samples are taken with the help of augur from the plough depth and collected in the bucket.

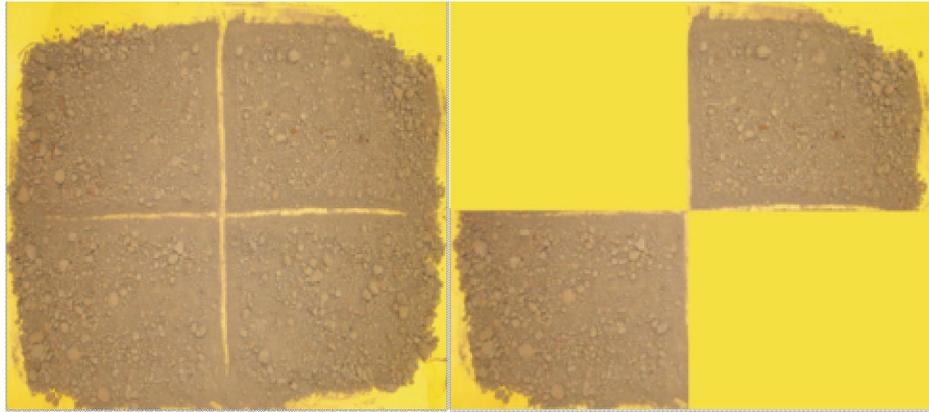


V shaped method of soil sampling

Guidelines for sampling depth

S.No.	Crop	Soil sampling depth	
		Inches	cm
1	Grasses and grasslands	2	5
2	Rice, finger millet, groundnut, pearl millet, small millets <i>etc.</i> (shallow rooted crops)	6	15
3	Cotton, Redgram, sugarcane, banana, tapioca, vegetables <i>etc.</i> (deep rooted crops)	9	22
4	Perennial crops, plantations and orchard crops	Three soil samples at 12, 24 and 36 inches	Three soil samples at 30, 60 and 90 cm

Pour the soil from the bucket on a piece of clean paper or cloth and mix thoroughly. Spread the soil evenly and divide it into 4 quarters. Reject two opposite quarters and mix the rest of the soil again. Repeat the process till left with about half kg of soil, collect it and put in a clean cloth bag. Each bag should be properly marked to identify the sample.



Quarter method of soil sampling



Collect the sample in a clean cloth or polythene bag



Label with required information

The bag used for sampling must always be clean and free from any contamination. If the same bag is to be used for second time, turn it inside out and remove the soil particles. Write the details of the sample in the information sheet like name of the farmer, location of the farm, survey number, previous crop grown, present crop, crop to be grown in the next season, date of collection, name of the sampler etc.,. Put a copy of this information sheet in the bag. Tie the mouth of the bag carefully.

Precautions

- Do not sample unusual area like unevenly fertilized, marshy, old path, old channel, old bunds, area near the tree, site of previous compost piles and other unrepresentative sites.
- For a soft and moist soil, the tube auger or spade is considered satisfactory. For harder soil, a screw auger may be more convenient.
- Where crops have been planted in rows, collect samples from the middle of the rows so as to avoid the area where fertilizer has been band placed.
- Avoid any type of contamination at all stages. Soil samples should never be kept in the store along with fertilizer materials and detergents. Contamination is likely when the soil samples are spread out to dry in the vicinity of stored fertilizers or on floor where fertilizers were stored previously.
- Before putting soil samples in bags, they should be examined for cleanliness as well as for strength.
- Information sheet should be clearly written with copying pencil.

Sampling of salt affected soils

Salt affected soils may be sampled in two ways. Surface samples should be taken in the same way as for soil fertility analysis. These samples are used to determine gypsum requirement of the soil. For reclamation purpose, it is necessary to know the characteristics of lower soil depth also. Such soils are, therefore, sampled depth wise up to one meter. The samples may be removed from one to two spots per 0.4 hectare if the soil is uniformly salt affected. If patches are conspicuous then all big patches should be sampled separately. Soil is sampled depth wise separately (about ½ kg from each depth) for 0-15 cm, 15-30 cm, 30-60 cm and 60-100 cm soil depths. If a stony layer is encountered during sampling, such a layer should be sampled separately and its depth noted. This is very important and must not be ignored.

Soil samples can be removed by a spade or if the auger is used then care should be taken to note the depth of 'concretion' (stones) or other impermeable layer (hard pan). If the soil shows evidence of profile development or distinct stratification, samples should be taken horizon wise. If a pit is dug and horizons are absent then mark the vertical side of the pit at 15, 30, 60 and 100 cm depth from the surface and collect about ½ kg. Soil from every layer, cutting uniform slices of soil separately. In addition to the

above sampling, one surface soil sample should be taken as in the case of normal soil sampling for fertilizer recommendation.

Pack the samples and label the bags in the same way as is done for normal soil sampling, giving additional information about the depth of the sample. The sheet accompanying the sample must include the information on nature of soil, hardness and permeability of soil, salinity cause and source, if known, relief, seasonal rainfall, irrigation and frequency of water logging, water table, soil management history, crop species and conditions of plant cover and depth of the hard pan or concretion. As the salt concentration may vary greatly with vertical or horizontal distance and with moisture and time, account must be kept about time of irrigation, amount of irrigation or rain received prior to sampling.

Despatch of Soil Samples to the Laboratory

Before sending soil samples to the testing laboratory by a farmer, it should be ensured that proper identification marks are present on the sample bags as well as labels placed in the bags. It is essential that it should be written by copying pencil and not with ink because the ink will smudge and become illegible. The best way is to get the soil sampling bags from soil testing laboratory with most of the information printed or stencilled on them with indelible ink.

Compare the number and details on the bag with the dispatch list. The serial numbers of different places should be distinguished by putting the identification mark specific for each center. This may be in alphabets, say one for district and another for block/county and third for the village.

Pack the samples properly. Wooden boxes are most suitable for long transport. Sample bags may be packed only in clean bags never used for fertilizer or detergent packing.

Farmers may bring soil samples directly to the laboratory.