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Collection of Soil Sampling and their Analysis

Gajveer Meena and Pravin Dalavi
Ph.D. (Scholar), Sher-e-kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar Campus, Srinagar-190025, J&K, India

SUMMARY

Soil sampling is a very important for soil health Mager, manage and monitor like soil physical, chemical as well as biological properties right time soil sampling support soil sustainability and precision agriculture, proper soil sampling helps in understanding the actual fertility status and health of the soil correct soil sampling increases crop yield, reduces unnecessary fertilizer dose, improves soil health, and protects the environment.

INTRODUCTION

Soil sampling is the process of collecting a small, representative portion of soil from a field for laboratory analysis to assess its nutrient status and overall condition. It helps determine the availability of essential nutrients such as nitrogen, phosphorus, potassium, as well as secondary and micronutrients, enabling farmers to identify deficiencies or toxicities. Since soil fertility varies across and within fields, soil sampling provides accurate information for proper fertilizer and amendment use. It is a fundamental practice in soil health, agronomy, and crop production, as it reveals the physical, chemical, and biological properties of soil. Proper soil sampling improves crop yield, maintains soil fertility, and reduces unnecessary fertilizer use, thereby lowering costs. It also supports sustainable agriculture by promoting balanced nutrient management and conserving soil resources for future generations.

Objectives:

- It helps farmers know which nutrients are present in their soil.
- It shows which nutrients are lacking and need to be added.
- It helps in selecting the right type and amount of fertilizer.
- It prevents overuse of fertilizers, saving money.
- It improves crop yield and quality.
- It helps maintain soil health for future crops.
- It reduces soil damage caused by excess chemicals.
- It supports better water use and irrigation planning.
- It helps in choosing suitable crops for that soil.
- It reduces farming risks and increases profit

Procedure for soil sample collection:

1 Selection of area:

First Selection of field and divided into uniform area and before sampling knowing about the field previous cropping system and pattern and avoid waterlogging, erosion, manure heaps, fertilizer bands, field boundaries, or near trees

2 Time of Sampling

Soil samples should preferably be collected before sowing of crops or after harvest At least 2-3 weeks after fertilizer or manure application but generally sampling doing after harvesting but some days after of crop during dry conditions for ease of handling and consistency (Carter *et al*., 2007).

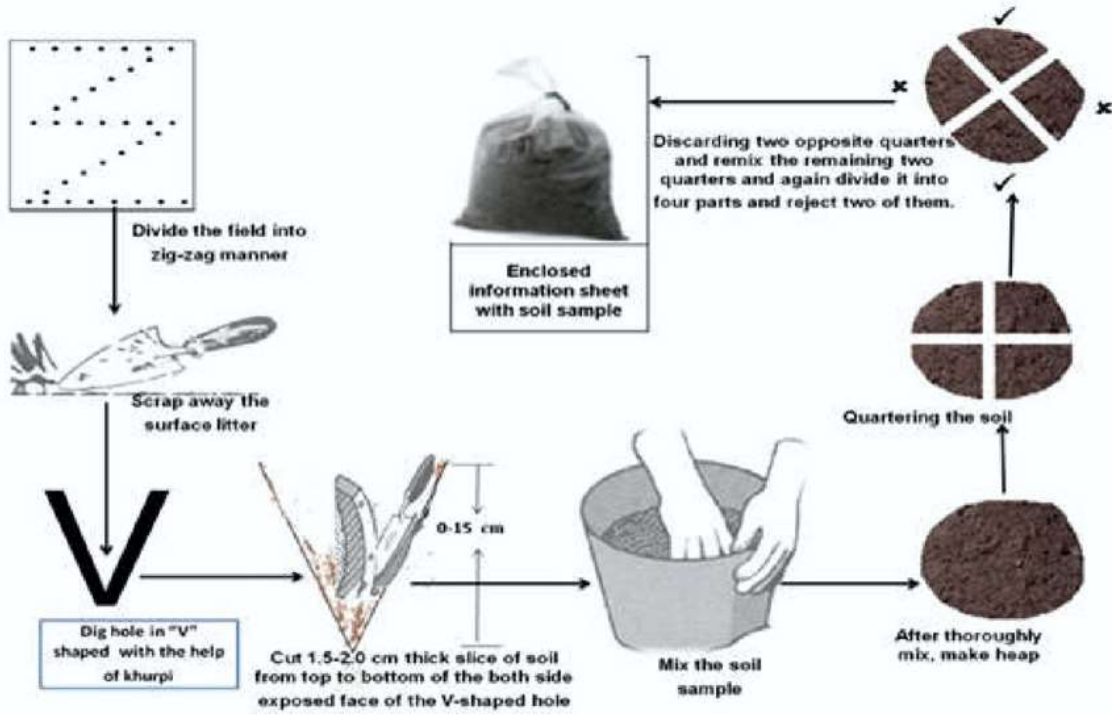
3 Sampling Depth:

Sampling depth depends on the purpose of analysis:
0–15 cm: For most agricultural field crops (plough layer)
15–30 cm: For subsoil nutrient assessment
0–30 or 0–60 cm: For perennial crops (orchards, plantations and medicinal crop)

4 Method and Equipment's:
Plastic bag, hammer, Bucket, air tite box, hand gloves
Spad/Khurpi: - generally use
Soil auger – use for disturbed soil
Screw- Use for hard soil
Tube sampler: - use for wet/rice field
If uniform area and same cropping pattern then one hectare area divided into 10-15 spots and use v notch method up to 15 cm soil depth and collect the all-soil samples in polyethene bag. Spared the soil sample on a plane surface area quartering soil sampling should be done then two opposite side samples removed and two opposite side sample collected. Same procedure followed up to sample size was 500 g (0.5kg). For one acre area divide into 4-5 spots and use v notch method up to 15 cm depth finally take 500g soil by every 2–3-year, normal soil 2-3 year, for orchard soil 2-year, problematic soil-1-year, heavy fertilizers used soil-1 year (Pennock *et al*., 2007).
5 Sampling Process: - Mix the composite sample thoroughly air-dry the soil in shade at room temperature crush gently and pass through a 2 mm sieve (0.5 mm sieve use for organic carbon) store the processed soil in clean, labelled plastic or cloth bags.
6 Labelling and Documentation: -
Each soil sample bag should have the following details:

- Farmer's Name
- Village / Location
- Field Number or Plot Name
- Area (Hectare, acer or Kanal)
- Sampling Depth
- Example: 0–15 cm or 0–30 cm
- Crop Grown / Proposed Crop
- Date of Sampling
- Sample Number

Diagrammatic representation of soil sample collection



7 Precautions During Soil Sampling: - following precaution use of clean equipment's, avoid the fertilizers spot, tree area, field boundary, maintain uniform depth and remove up to 2 cm upper area of soil because upper soil area containing high fertilizer and nutrients content, sampling doing proper time, sampling don't collect after rainfall, correct labelling, proper depth, sample dry under shade and room temperature, Collect soil before sowing or fertilizer application
Best time is before crop sowing or after harvest. Forster, (1995).

Soil analysis: generally, 2 mm sieve passed soil are used fore analysis, different different quantity of soil are used for different nutrient analysis like pH, EC 10 g soil is sufficient, organic carbon 0.5 g, nitrogen 20 gm, Phosphorus 5 g, Potassium 5- 10 g, Micronutrients 10 g for biological parameter like bacteria, fungi, actinomycetes use 1 g soil sample are use Tan, (2005).

Physical parameters	
Soil texture	proportion of sand, silt, and clay
Soil structure	arrangement of soil particles
Bulk density	soil compaction level
Porosity	space for air and water
Water holding capacity	ability to retain moisture
Chemical parameters	
Soil pH	acidic, neutral, or alkaline nature
Electrical conductivity (EC)	salinity level
Organic carbon (OC)	soil fertility and biological activity
Available nitrogen (N)	
Available phosphorus (P)	
Available potassium (K)	
Available sulfur (S)	
Calcium (Ca) and Magnesium (Mg)	
Cation exchange capacity (CEC)	
Micronutrients:	
Zinc (Zn)	
Copper (Cu)	
Iron (Fe)	
Molybdenum (Mo)	
Borone (B)	
Biological parameters	
Microbial population	
Soil respiration	
Enzyme activty	
Earthworm presence	
Special / problem soil parameters	
Exchangeable sodium percentage (ESP)	
Sodium adsorption ratio (SAR)	
Lime requirement (acidic soils)	
Gypsum requirement (alkaline/sodic soils)	
Heavy metals (Cd, Pb, Ni, Cr)	

Soil Health Card (SHC)

The Soil Health Card is a government-issued report that gives farmers clear information about the nutrient status and health of their soil, along with fertilizer recommendations for different crops (Kaur *et al*., 2020).

A. What information is given in a Soil Health Card

a. Soil properties

pH – acidity or alkalinity of soil

Electrical Conductivity (EC) – salinity status

Organic Carbon (OC) – soil fertility indicator

b. Macronutrients

Nitrogen (N)

Phosphorus (P)

Potassium (K)

c. Secondary nutrients

Sulphur (S)

d. Micronutrients

Zinc (Zn)

Iron (Fe)
Copper (Cu)
Manganese (Mn
Boron (B)

B. Purpose of Soil Health Card

To guide farmers on balanced fertilizer use
To reduce input cost
To improve crop yield and quality
To maintain long-term soil fertility
To avoid excess use of chemicals

C. How Soil Health Card helps farmers

Shows low, medium, or high nutrient levels
Gives crop-wise fertilizer recommendations
Suggests organic manure and soil amendments
Helps select suitable crops (Reddy *et al*., 2018).

D. How often is Soil Health Card issued

Once in 2-3 years for each farmer's field

E. Who provides Soil Health Card

Government of India
Implemented by State Agriculture Departments
Supported by ICAR, SAUs, and soil testing laboratories

F. Simple benefits for farmers

Better understanding of soil
Correct fertilizer dose
Higher profit
Healthy soil for future generation

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