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Popular Article

Collection of Soil and Root Sample for Nematodes Extraction

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Nematode are typically small roundworms that can be found in almost all habitat. They reproduce sexually and they are having bilaterally symmetrical body. Many species are known parasites of humans.

- Nematodes, also called roundworms, thread worms, are a large group of organisms belonging to the phylum Nematode.
- Nematodes are the most abundant multicellular animals on earth and a diversified group in the animal kingdom that occurs worldwide in virtually every environment.
- Nematodes are second only to insects in the number of species in the animal kingdom. However, only 3 percent of all nematode species have been studied and identified so far. One cubic meter of soil may contain millions of individual nematodes belonging to several different taxonomic groups.
- Many nematode species are beneficial to agriculture and the environment. For example, some have proven to be important allies in the biological control of insects and other pests, and some contribute to soil fertility by helping cycle nutrients through the soil.

Sample Collection:

- Most of plant parasitic nematode live in soil aggregate around the root zone, even the root endo parasites spend some part of their lifecycle in the soil.
- For nematode examination when we go for collecting plant and soil sample then it should kept in mind that many nematode feed on plant part so they are available in more amount where food is abundant. Therefore, a good way to collect soil sample around the roots of growing plants.



- Samples are always taken when the soil is having moist condition near in the plant roots; very wet or very dry surface soil should not be recommended for sampling.
- Collected soil and root samples are placed in polythene bags to avoid drying.

Various field characteristics influence the sampling method and should be taken into account at this stage:

- The nematodes' aggregated distribution, influenced by the host root system and seasonal behaviour.
- The type and historical cropping patterns of the crop.
- Different varieties planted in various areas.
- Soil moisture levels, Soil compaction status and Soil type variations.
- Temperature fluctuations and seasonal changes.

A. Sampling tools:

- | | |
|--------------------|---|
| 1. Spade/Khurpi | 2. Soil tube |
| 3. Knife | 4. Scissor |
| 5. Rubber bands | 6. Plastic sheet |
| 7. Shovel | 8. Trowel |
| 9. Fork | 10. Hand hoe |
| 11. Carry bag | 12. Plastic bag |
| 13. Marker/ pencil | 14. Area Select (1 hectare) for sample collection |
| 15. Infected root | 16. GPS system |
| 17. Auger | 18. Whatever |

B. Sample collection from Soil:

- Begin by leaving approximately a 1-meter peripheral area of the field untouched.
- Remove 3-5 cm top soil.
- Utilize a hand hoe (khurpi/spade) to carefully remove the upper layer of soil, around 2-3 cm deep.
- Collect soil samples, each weighing about 250-500 grams (equivalent to a handful), along with feeder roots, reaching a depth of 15-20 cm, constituting individual subsamples.
- Employ a zig-zag pattern to draw 10-20 such subsamples from a one-hectare area, ensuring comprehensive coverage of the entire field.
- Consolidate all subsamples into a single polythene bag to create a composite sample, ensuring a total weight not less than 500 grams, and securely fasten it with a rubber band. Place this sample into another polythene bag.



- Document the sample details as per labelling instructions (refer to subsequent section), and insert this information between the inner and outer polythene bags.
- Seal the outer bag tightly, rendering the sample ready for dispatch.
- Other method for collecting the soil sample like collect at one place mix thoroughly with hands and spread on a make four quarter.
- Remove the two opposite quarters and retain the other two. Repeat the same process until the soil is remaining 500 grams.

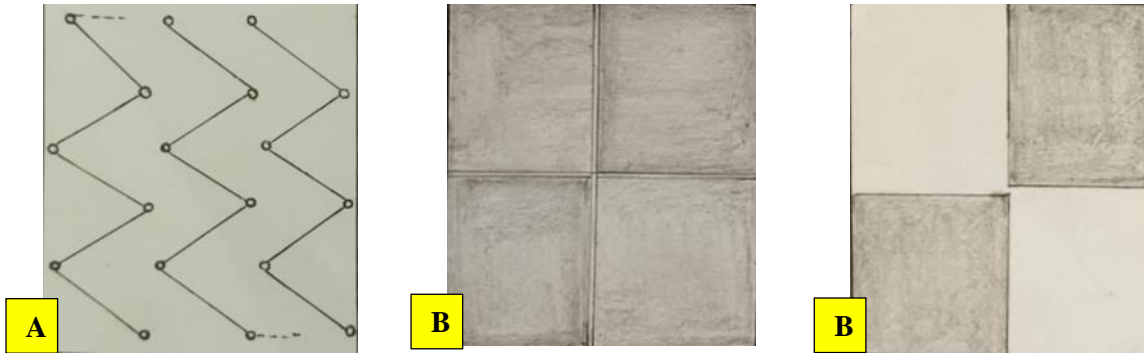


Fig. 1. A). Zig zag method for soil sample and B). Quarter method

Depth of soil sampling:

- Nematodes are mostly present within the root zone and, for shallow-rooted crops samples should be taken to a depth of about 20 cm.
- Some nematodes are more abundant at greater depth during summer, and it should be taken second sample pre-planting from depth 20 to 40 cm or more, especially where deep-rooted crops like e.g. trees, vines were previously growing.
- In grapevines, a sampling depth of 0 to 30 cm is often used but some species abundant having highest populations at 30 to 60 cm in deep soils.

C. Sample collection from Root:

- Roots can be collected at the same time and from the same locations as for soil mainly near wet condition.
- Sample taken depend on the crop, 25–100 g of roots per total sample is sufficient, for lower weight may be collected for finer roots such as from rice.
- For higher weight for thick, heavy roots such as from banana or trees.
- Where both fine and heavy roots are there like such as banana, then it is suggested to sample these separately.



- Avoid sampling dead plants or maturity stage, as nematodes will often have migrated from these to other food sources.
- For small crop plants, the whole root system of a plant can be used for each sub-sample.
- Taken out the plants and their roots from the soil using a spade, so that a sizeable proportion of the root system is unearthed intact, and taking care not to break off the roots and leave them in the ground.
- After tapping soil free randomly remove roots by using a knife or scissors.

Sample Labelling:

Labelling purposes, include the following details on the provided paper accompanying the sample:

1. Specify the sampling site, preferably with GPS coordinates, detailing the village, Tehsil/Block, and District.
2. Mention previous crop and current crop in the target field.
3. Indicate whether the sample is from a standing crop or a fallow field.
4. Provide information on the cropping pattern.
5. Describe any observed symptoms on the crop, if applicable.
6. Record the date of sampling.
7. Include the farmer's name and complete address for the report's recipient.
8. Provide contact details such as phone number and/or email address for correspondence.

Storage of collected samples:

1. Collect samples in strong plastic bags, label them clearly, record crop and cultivar, date, location.
2. Nematodes are very sensitive, so keep in dark place or in a closed vehicle.
3. Sub-samples of Soil mixed before placing at least 500 g in a plastic bag, avoid to use cloth or paper bags.
4. After filling the bag, seal bags to prevent drying and protect samples from heat.
5. Perishable plant samples need to be sent promptly or be refrigerated.
6. Label the bag as appropriate rule and complete a specimen form with the test required, block/sample numbers, depth, crop type, name, address, phone number etc.
7. Do not put paper labels inside the bags with the soil.
8. Send the samples promptly to the laboratory.

