

General Recommendations for Nematode Sampling

The following recommendations are presented as general guidelines. They may require modification for specific crops, soil types, nematode pest, or field situations.

Background Information _____

Name, location, soil type and texture, notable symptoms (yellowing, necrosis, root rotting, galling, wilting), cropping history (crops for last several years, current crop, anticipated crop), and last nematicide treatment and type should all be included. This information is invaluable for diagnosing nematode problems.

Time of Sampling _____

Samples should be taken before any treatment decision is required, while nematodes are expected to be active, and when soil is moist (<60cb). Samples should include roots when possible.

Stratifying the Field _____

The field should be subdivided according to any observable variation in previous growth, soil texture, moisture and drainage patterns, and cropping history to create areas with a uniform history and uniform soil conditions. Each subdivided area of the field is called a stratum. The rules for sample size apply to each stratum of the field.

Number of Samples _____

Each stratum should be represented by a separate sample, which will allow mapping of the nematode population and differential management as appropriate.

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Taking more than one sample from a stratum will improve the precision of the estimate and of the information on nematode distribution in the field. However, the processing of samples is costly. A useful rule of thumb is that 1 percent of crop production costs can be used in nematode sampling to protect the investment. Production cost may be approximated at about 90 percent of anticipated crop value in annual crops, and at actual establishment costs in perennial crops. Thus, if production costs will be \$500 per acre, and the cost of processing samples consisting of 15 to 20 soil cores is \$20 per sample, one sample can be used to represent 4 acres of uniform stratum. If establishment costs for an orchard are \$5,000 per acre, about 2.5 samples per acre can be justified. In the latter case, a preliminary sample survey of the field may be considered to allow planning of a suitable sampling strategy.

Note: A nursery or quarantine situation requires somewhat different considerations. The objective there is to prevent the spread of a hazardous pest to other locations and more thorough sampling is necessary.

Size of Samples

The size of a sample depends on the area, the crop, the crop value, and supplementary information which can be gathered from the sample itself.

The size is measured in terms of the number of cores of soil in the sample. The minimum sample size for up to 5 acres with uniform field history and soil conditions is 15 to 20 soil cores. This basic sample size varies with the value of and investment in the anticipated crop, with the available management strategies, and with supplementary information (soil depth and hardpans, nutritional analyses, etc.) which can be gathered from the sample itself.

It costs less to improve the precision of an estimate by increasing the number of cores per sample than by increasing the number of samples. However, there is a limit to the sample size that can be conveniently handled and processed. A quart of soil is a convenient size.

A useful approach is to put all the soil cores in the sample into a clean bucket, mix the soil thoroughly, and take a one-quart subsample

Situation	Minimum number of cores per 5 acres of stratum	Core depth
Field or row crops	15-20	12-18"
Vineyard or orchard (before planting)	20-50	12-18" after row or field crop 36" after orchard or vineyard

for processing. **Caution:** This subsampling process can introduce extra error into the estimate, so thorough mixing of the soil is essential. The sample should be placed in a durable bag. Double bags increase the protection. The bag should be labelled with a tag attached to the outside. Labels fastened inside the bag rapidly become illegible.

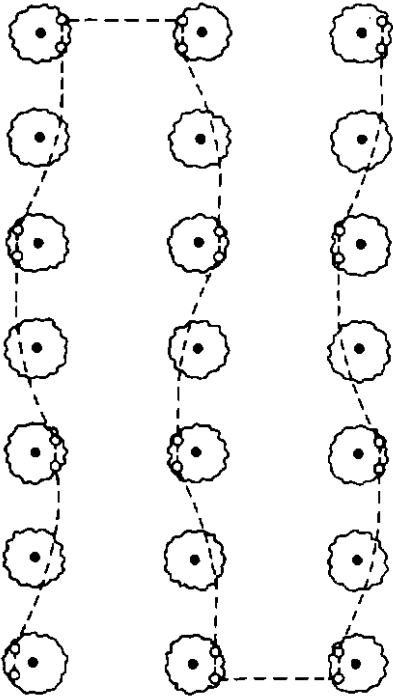
Depth of Samples

In general, cores from annual crops should be taken to a depth of 12 to 18 inches. After prolonged fallow, deeper cores should be taken (to 36 inches). Deep-rooted perennial crops should be sampled to a depth of 36 inches, or to the hardpan layer. Samples for cyst nematodes can be taken from the soil surface, which makes increases in the number of cores easy.

Collection of Samples

Established crops. Samples should be collected from areas which show symptoms (if present) and from areas with healthy plants. As appropriate, the field should be further stratified as described. Samples from different strata and conditions should be kept separate and should be distinctly labelled. Samples should be taken from the same area of the root zone of each plant and should include roots. Orchards should be sampled at the tree drip line, and samples should include some feeder roots (Figure 1). Vineyards should be sampled in the vine row where roots and nematodes are undisturbed by tillage and cultural operations (Figure 1). Established row or field crops should be sampled in a random zig-zag pattern across the stratum, ensuring adequate coverage of the area (Figure 2).

A.



B.

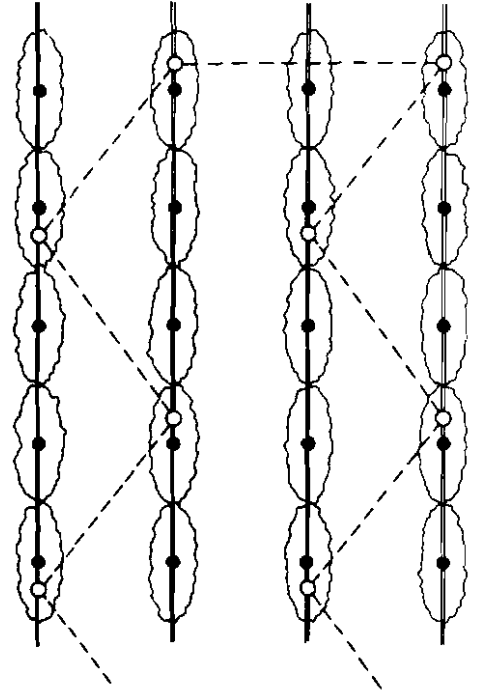


Figure 1. Recommended pattern for collecting soil cores in A, an established orchard and B, a vineyard.

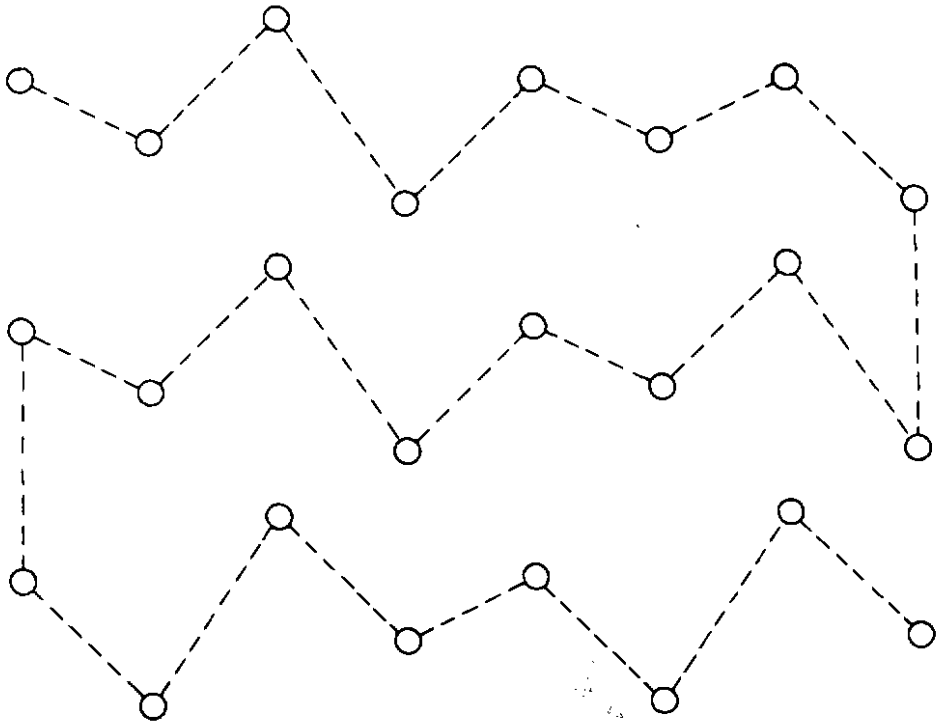


Figure 2. Recommended pattern for collecting soil cores in a fallow field or established row or field crop.

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Fallow fields. The field should be stratified as described, and at least one sample should be collected per stratum. Additional samples from the same stratum can be taken from subdivisions of the area to provide information on nematode distribution, or from the whole stratum to measure the variability among repeated estimates from the same area. Cores are collected in the same pattern as established row or field crops (Figure 2).

Storage and Delivery

Samples should be kept cool, ideally between 50° and 58°F. They should not be left in direct sunlight or in a car trunk. An insulated cooler

is convenient for protecting the samples. They should be mailed immediately (USPS-1st Class, UPS, or Greyhound) in a well-packed, sturdy cardboard box or a coffee can to the processing laboratory. **Remember**, samples must be clearly labelled, and should include any information that may aid in diagnosis.

A free publication, **Commercial Analytical Laboratories in California Available for Agricultural Testing**, Special Publication 3024, is available from James Quick, Land, Air, and Water Resources, Hoagland Hall, University of California, Davis, CA 95616. It may also be available from county Cooperative Extension offices.

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