

Portable Cyst Extractor: Detecting Cyst Nematodes in the Field¹

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Abstract: For on-site detection of cysts, a portable cyst extraction kit was constructed from nine readily available items. The portable cyst extractor detected cysts in a range of 1–117 cysts/100 g soil from 42 fields. Samples processed by this kit in fields were clean and easy to examine, possibly because the kit is a compact version of the standard wet-sieving technique used in the laboratory. The portable cyst extractor has several advantages over traditional survey methods: i) diagnosis of cyst infestations in the field accurately and rapidly most of the year and ii) reduction in the labor of samplings and transportation of soil samples.

Key words: apparatus, diagnosis, *Heterodera*, soybean cyst nematode technique.

Soil samples for cyst nematode assay are obtained by mixing at least 25 individual core samples, taken at a depth of 15–20 cm and distributed systematically over the area to be sampled. Samples are then sealed in a plastic bag, labelled, and transported to a laboratory for extraction and counting. This procedure is laborious and time-consuming for collecting cyst populations in widely scattered areas for determination of races or isolation of biological control agents.

MATERIALS AND METHODS

For on-site detection of cysts, a portable cyst extraction kit (Fig. 1) was constructed from the following items: i) garden trowel; ii) 1-liter plastic beaker; iii) 850- and 250- μ m-aperture, 12.7-cm-d sieves; iv) 1.9-liter garden sprayer (Model 050P, Gilmour, Somerset, PA); v) 500-ml wash bottle; vi) plastic square counting dish (100 \times 15 mm with grid; Falcon, Oxnard, CA); vii) magnifier (Bausch and Lomb, Rochester, NY) or a stereomicroscope; viii) small, high-intensity flashlight; and ix) 20-liter water jug. The equipment weighs 2.5 kg (exclud-

ing water and microscope), and all equipment except the water jug can be packaged easily in a 20 \times 20 \times 35 cm box.

The procedures are as follows: put the soil sample (ca. 100 g) in the plastic beaker and add 500 ml of water; stir vigorously with trowel and pour immediately into the nested sieves, 840- μ m over 250- μ m aperture, while moderately shaking the sieves; wash the top sieve with a jet of water from the pressurized sprayer until all spherical particles have passed through the sieve; wash the bottom sieve thoroughly with a jet of water from the sprayer to remove colloidal clay particles (this is a critical step to obtain a clean sample); wash the contents of the sieve into the counting dish using a wash bottle and examine for the presence of cysts with the magnifying glass (or microscope if available). Use the flashlight to discern mature cysts, which are normally shinier than other cyst-like materials in the soil. Processing time per sample takes less than 10 minutes and uses ca. 1 liter of water for screening and cleaning.

RESULTS AND DISCUSSION

A total of 42 soybean fields in five states were diagnosed by this kit as "cyst-infested" fields. Samples (>5 kg) from each field were transported to the laboratory and mixed thoroughly; 1 kg of soil from each sample was then screened by the wet-sieving technique (1), and cysts were identified and counted with a \times 10

Received for publication 17 May 1994.

¹ Approved for publication by the Director of the Arkansas Agricultural Experiment Station. This research was supported in part by a grant from the Alternative Pest Control, USDA/CSRS special grant.

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FIG. 1. Components of portable cyst extractor. 1) 1-liter plastic beaker; 2) 500-ml wash bottle; 3) stereomicroscope; 4) 1.9-liter garden sprayer (Model 050P, Gilmour, Somerset, PA); 5) magnifier; 6) 850- and 250- μm -aperture, 12.7-cm-d sieves; 7) garden trowel; 8) plastic square counting dish (100 \times 15 mm with grid; Falcon, Oxnard, CA); 9) small high-intensity flashlight. Bar = 10 cm.

stereomicroscope. All 42 fields had cysts in a range of 1–117 cysts/100 g soil and an average of 28 cysts/100 g soil. Approximately 70% of the fields had over 10 cysts/100 g soil. This result demonstrated that the portable cyst extractor is capable of detecting cysts in the field and could be a useful apparatus when a rapid assay is desired. Samples processed by this kit in soybean fields were as clean and easy to examine as were samples processed by the wet-sieving technique in the laboratory, possibly because the kit is a compact version of the standard wet-sieving technique. The kit uses a small amount of soil (100 g) with a jet of water from the pressurized sprayer, whereas the traditional wet-sieving technique uses large amounts of soil (500 g–1 kg) and water from a water line.

When this kit is used properly, extension personnel or researchers can diagnose cyst infestation rapidly in farm fields. Only samples that contain cysts and need to be identified to race would be sent to the laboratory. The portable cyst extractor has several advantages over traditional survey methods: i) diagnosis of cyst infestations in the field accurately and rapidly during most of the year and ii) reduction in the labor of sampling and transportation of soil samples.

LITERATURE CITED

1. Shepherd, A. M. 1986. Extraction and estimation of cyst nematodes. Pp. 31–49 *in* J. F. Southey, ed. Laboratory methods for work with plant and soil nematodes. London: Her Majesty's Stationery Office.