Identification of species of *Meloidogyne* Goeldi, 1887 is frequently accomplished by using perineal patterns and morphometrics, but intraspecific populations are not easily distinguished. Chromosome numbers have been determined for 10 (6) of the 36 species of *Meloidogyne* which are currently recognized (1, 5). Four of these species have a range of chromosome numbers. This chromosome range permits the identification of 19 chromosomal populations among *M. arenaria* (Neal, 1889) Chitwood, 1949; *M. hapla* Chitwood, 1949; *M. incognita* (Kofoid and White, 1919) Chitwood, 1949; and *M. javanica* (Treub, 1885) Chitwood, 1949.

The purpose of this study was to identify *Meloidogyne* spp. present in 0.2 ha of a 37-year-old vineyard of own-rooted grape vines (*Vitis vinifera* L., 'Thompson Seedless') on McCall Avenue, Selma, California. The use of perineal patterns alone to identify species of *Meloidogyne* was unsatisfactory for an analysis of nematode community structure (3, 4).

Soil samples were taken from the root zones of six vines chosen at random from 200 vines. Forty samples were taken from each vine site with a 7.5-cm diam auger (3). These 240 soil samples (Hanford sandy loam: 54.6% sand, 27.5% silt, 17.9% clay) were pooled. Eight tomato plants (*Lycopersicon esculentum* L., 'Pearson') were grown in subsamples of this vineyard soil. Sixty single egg-mass cultures were established on 'Pearson' tomato in the greenhouse. The females which produced these egg masses were dissected from root-gall tissue. Chromosome analyses were performed on these females according to the method of Triantaphyllou (7), and perineal patterns were cut from the empty cuticles. After 6 weeks, each culture was examined for chromosome number and perineal patterns.

Six chromosomal populations representing four species of *Meloidogyne* were detected. Chromosome numbers of 43, 47, 42, 37, 52, and 17 indicated, respectively, *M. javanica*, *M. javanica*, *M. incognita*, *M. arenaria* (2n form), *M. arenaria* (3n form), and *M. hapla* race A. Forty-three chromosomal populations indicated either *M. javanica* or *M. incognita*, but the perineal patterns of *M. javanica* were always typical.

These six populations of *Meloidogyne* represent a more complex mixture of populations than is usually recognized in an area of cultivated soil as small as 0.2 ha. In situations of this nature, the use of perineal patterns alone may result in identification of the species present. However, intraspecific variation may not be detected (2).

Cultural practices (such as crop rotation) or resistant cultivars are frequently designed to provide nonhosts or poor hosts for a rather narrow genetic base for virulence. It would be valuable, in future research, to determine whether different chromosome numbers within a species are correlated with different host ranges and pathogenicity. This information could be used in designing crop rotation systems or in evaluating plant resistance in breeding programs.

**LITERATURE CITED**

5. Mulvey, R. H., J. L. Townshend, and
A Technique for the Collection of Larvae of Meloidogyne spp. and a Comparison of Eggs and Larvae as Inocula

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The infectivity of second-stage larvae of Meloidogyne spp. is a function of soil temperature, aeration, moisture, texture, and density, as well as a function of the distance the second-stage larvae have to travel prior to root penetration (3, 4). Because eggs may require up to 2 weeks to hatch under greenhouse conditions, infection periods with larvae are normally shorter than those with eggs. Larvae inoculum is easily obtained by placing galled roots with egg masses in a container over a funnel in a mist chamber. However, a large percentage of larvae become noninfective or they die within 12 to 24 h when numbers accumulating in the funnel stem exceed a few thousand.

The object of this investigation was to compare the yield of larvae of Meloidogyne incognita (Kofoid and White) Chitwood obtained from egg masses in a mist chamber, and that obtained with a new technique that allows for longer periods of accumulation of larvae without loss of infectivity. The infectivity of the larvae hatched on the sieve was compared to that of larvae hatched from intact egg masses and from eggs released from egg masses by a sodium hypochlorite (NaOCl) solution (2).

Method for collection of infective larvae: Heavily galled roots from three tomato plants (Lycopersicon esculentum) 'Manapal' infected with M. incognita were washed clean of soil, cut in 2- to 5-cm segments, mixed, and weighed. Half of the root segments were divided into fifths and placed on top of five funnels in a mist chamber at 23 C. The remaining roots were treated to release the eggs from the egg masses by means of a procedure modified from Hussey and Barker (2). The root pieces were stirred for 3 min in 4 liters of a 0.53% NaOCl solution at 23 C. The egg suspension was poured through four nested metallic sieves (20-cm diam) with decreasing pore size from top to bottom: 420 μm (40 mesh), 149 μm (100 mesh), 53 μm (270 mesh), and 26 μm (500 mesh). The eggs were quickly rinsed with tap water and washed down onto the bottom sieve. The number of eggs collected was determined before they were placed on top of a 28-μm plastic sieve in a closed chamber with sufficient water to cover the eggs. The numbers of larvae obtained with both techniques were determined every 24 h and transformed to percentage of the number of eggs placed on the sieve.

Comparison of infectivity of various inocula: Three types of inocula were evaluated: (i) intact egg masses, (ii) eggs released from egg masses with NaOCl, and (iii) larvae hatched from NaOCl-treated eggs on the sieve. Ten egg masses containing 100 to 400 eggs each, or 1,000 eggs released from egg masses by dissolution of the matrix in 0.53% NaOCl solution, or 2,000 second-stage larvae hatched on the sieve in 24 h were mixed with 100 cm³ of a sterilized loamy sand (texture: 82% sand, 14% silt, 4% clay) in plastic cups. A 2-week-old tomato seedling was transplanted into each cup. A complete range of treatments was placed in an air-conditioned greenhouse at 24 ± 2 C. In addition, tomato seedlings in cups inoculated in the same manner with parasitic nematodes. Academic Press, New York and London.

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