REHABILITATING TEA SOILS:

I. SUSCEPTIBILITY OF PLANTS NOW IN USE TO THE ROOT-LESION NEMATODE, *PRATYLENCHUS LOOSI*

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Review of the Literature

Guatemala grass (*Tripsacum laxum* Nash) is in widespread use in Ceylon for planting after old tea is uprooted, prior to new tea being planted. Mana grass (*Cymbopogon confertiflorus* C. Steud. Stapf.) is similarly used, but to a much lesser extent. The object is to improve the soil structure, add organic matter, produce material for thatching the soil, and to eliminate pests of tea such as the *Poria* root disease and the "meadow" or "root-lesion nematode", *Pratylenchus loosi* Loof. Tolhurst (1958) regards the elimination of pests as the overriding consideration.

However, although Guatemala grass has been in use for 15 years, the question of its susceptibility to the root-lesion nematode has never been settled conclusively. Webster and Portsmouth (1957) reported that when introduced into pots containing Guatemala grass, ro '-lesion nematodes died out completely within as short a period as 6 months. ..sc.. gives results of two additional observations. In one (Visser and Vythilingam, 1959) he notes that root-lesion nematodes were found in small numbers inside the roots of Guatemala grass plants growing under field conditions. In the other paper (Visser, 1959) he reports that in field plots containing Guatemala grass, the nematode population was reduced to very low levels after 8 months, in contrast to the 13 months required in plots kept free of vegetation.

Webster and Portsmouth (1957) noted that small numbers of root-lesion nematodes have been found in fields in which Guatemala grass had been growing for 2 to 3 years, and the present writer has noted two instances where root-lesion nematodes were recovered after 4 years.

Previous observations would, therefore, appear to leave unsettled the question of whether or not Guatemala grass can be a host of *Pratylenchus loosi*. Mana grass has never been tested in this respect. However, root-lesion nematodes have been found in at least one stand of this plant (Gadd, 1942).

Materials and Methods

A trial was initiated in December 1961, wherein Guatemala grass, mana grass, marigold (*Tagetes erecta* L.) and tea (*Camellia sinensis* L., T.R.I. Clone 2024) were exposed to repeated inoculations with *Pratylenchus loosi* obtained from 25 estates. The plants were grown in cement pots, measuring 11 inches square (inside measurements). The bottom third of the pots was filled with coarse rubble to facilitate drainage. The experiment was replicated nine times, using single plants in each pot. The experiment was continued for 6 months, during which time each plant was inoculated with several thousand nematodes on each of 20 occasions.

Examinations were made of the entire root system of each plant during June, 1962. The roots were carefully washed, dried, weighed, and cut up prior to maceration in a mechanical blender. The resulting macerate was poured into a 60-mesh

sieve covered by a special nylon-cottonwool filter (Oostenbrink, 1960), which was then placed in a shallow enamel pan containing sufficient water to flood the surface of the filter. The nematodes migrated through the filter and were recovered and counted on the following day. The water in the pan was poured off and diluted to 100 c.c. Three 1 c.c. aliquots were counted and the counts were averaged. The average counts were then multiplied by 100 to yield the number of nematodes originally present in the root system. This method recovers nematodes in all stages of post-embryonic development. Where the root mass of a single plant was very large, it was divided into as many as 20 separate portions for processing.

Results

As shown in Table 1, no root-lesion nematodes were found in the roots of Guatemala grass, mana grass, or marigold, whereas they were found in large numbers in the roots of tea.

TABLE 1.—*Susceptibility of plants used for rehabilitating tea soils to the root-lesion nematode, Pratylenchus loosi*

Plant	Wt. of roots, grams	Nematodes per plant
Guatemala grass ...	1275	0
	880	0
	1150	0
	862	0
	965	0
	1176	0
	1080	0
	896	0
	840	0
Mana grass ...	414	0
	410	0
	240	0
	335	0
	244	0
	403	0
	465	0
	306	0
	416	0
Marigold ...	17.9 (1)	0
	92.1	0
	35.6	0
	7.3 (1)	0
	38.8	0
	24.0	0
	66.7	0
	42.1	0
	50.0	0
Tea ...	19.7	17450
	63.5	22800
	94.4	6840
	65.1	15000
	62.0	23000
	90.5	9560
	85.7	29350
	64.5	23830
	71.6	44500

(1) *dying*

Discussion

The experiment was sufficiently thorough and the results sufficiently conclusive to show that Guatemala grass, mana grass, and marigold are unlikely to be hosts of *Pratylenchus loosi* under any conditions whatever. Therefore, their use may be safely continued for rehabilitating tea soils. Marigold is not primarily a rehabilitation crop, since it cannot easily be kept vegetative for longer than 6 months, and because of the relatively small root system produced. In this regard, Table 1 provides an instructive comparison of the root bulk to be expected from these three crops. Although they were approximately the same size when originally planted, the resultant root weights are 3 times greater for Guatemala grass than mana grass, and 20 times greater than for marigold. Marigold can, however, be useful in combination with Guatemala grass, since it produces top growth much more quickly, and thus minimizes soil erosion.

Previous records of *Pratylenchus loosi* in stands of Guatemala grass are probably explained by one of the following factors: living roots remaining from uprooted tea and still capable of supporting the nematodes within root lesions, weeds that can support the nematodes and introduction of the nematodes with drainage water from infested tea.

The following practices are therefore indicated, particularly in up-country areas known to be infected with the nematodes:

1. Careful removal of the larger roots when uprooting old tea.
2. Careful and continued weeding of established stands of the rehabilitation crops.
3. Establishment of new clearings at the highest points in a field, so that water cannot drain down into the rehabilitation crop from infested tea. An alternative policy would be to establish new clearings that extend from the top to the bottom of a slope.

The above precautions are not expected to eradicate root-lesion nematodes in new clearings, so much as to postpone their ability to damage the new tea. Some few nematodes are almost certain to survive the planting of the rehabilitation crop. However, the time required for the survivors to build substantial populations is expected to be sufficiently great to insure a satisfactory establishment of the young plants.

Since the nematodes are ultimately expected to occur in new clearings on infested estates—either because of survival on the site, or because of reintroduction from other parts of the estate—it is advisable to plant new clearings with clones having resistance to the nematodes and/or tolerance of their attack.

References

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