RESEARCH NOTE

Observations on Nematode Populations of Undisturbed Fynbos Compared with Those in an Adjacent Vineyard and a Pine Plantation

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The nematode species present in natural fynbos, represented by *Protea repens* were examined qualitatively and quantitatively and compared with those occurring in an adjacent vineyard and pine plantation. The latter maintained very low numbers of few species of free-living and plant parasitic nematodes when compared with the fynbos community. In contrast, the vineyard maintained the highest numbers of plant parasites, but fewer species of predatory and free-living nematodes. The fynbos, which can be regarded as the original habitat, had the greatest bio-diversity, but the plant parasitic species never reached the high numbers they attained in the rhizosphere of

There are two possible origins for the rich diversity of plant parasitic nematodes in the vine rhizosphere. Firstly, they could have been introduced into vineyards through infested plant material or, alternatively they could have been present in the soil at the time the vineyard was established. In the latter case the parasites present and their numbers would be largely determined by the host plant community of the preceding crop(s). When establishing a vineyard on virgin soil in the Western Cape Province one can assume that the fynbos, dominated by species of *Proteaceae, Ericaceae* and *Restionaceae*, previously made up the soil cover. These plants are also hosts to various plant parasitic nematodes. (Meyer, unpublished data)

Most of the known and economically important plant parasitic nematodes were shown to be present in vineyards of the Western Cape Province, South Africa (Smith, 1977). Species in the genera *Meloidogyne* and *Xiphinema* were considered the most noxious by De Klerk & Loubser (1988). Uncertainty still exists about the pest status in vineyards of other genera like *Pratylenchus* (lesion nematodes), *Trichodorus* and *Paratrichodorus* (stubby root nematodes) and *Scutellonema, Helicotylenchus* and *Rotylenchus* (sprial neamtodes). These groups include root endoparasites (lesion nematodes), semi-endoparasites (*Criconemella* or ring nematodes) as well as ectoparasites and virus vectors.

This study compares the nematode populations of fynbos with those of grapevines and pine trees growing in the same immediate vicinity.

MATERIALS AND METHODS

The experimental site, on the farm Nietvoorbij of the Viticultural Research Institute near Stellenbosch, was selected because it consisted partly of original fynbos vegetation with an adjoining 10-year old vineyard and a pine plantation more than 16 years old.

Soil and root samples were collected in January 1998 from rhizophere of *Protea repens* in the fynbos, from a vineyard rootstock trial and from *Pinus radiata* in the plantation. Samples were taken from at least 5 sites in each vegetation type. Samples were transported in a cool bag to the laboratory and were stored at 5°C until processed.

Nematodes from the soil were extracted by two methods. The larger nematodes were collected using the procedure described by Flegg (1968), followed by a second extraction by decanting and sieving combined with sugar centrifugation as described by Jenkins (1964). Root samples of 5g each were incubated on modified Baermann funnels for 24 hours.

The catches of all three methods of extraction were combined for eventual population estimates.

Nematodes were counted and rated as follows:

*	=	1 – 50	individuals / 250cc soil
**	=	51 – 200	individuals / 250cc soil
***	=	201+	individuals / 250cc soil

From each sample 200 individuals were selected at random, fixed in hot 4% formalin and processed to anhydrous glycerin using the rapid method of Seinhorst (1959). Mounting was done on slides with wax rings sealed by glyceel (De Grisse, 1969).

Representative individuals from the most important genera were indentified to species. The sign test was applied to the data (Siegel, 1956).

RESULTS AND DISCUSSION

The genera and species of nematodes identified in the

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TABLE 1
Nematode taxa identified from three vegetation types at Nietvoorbij.

	Protea repens	*Grapevine rootsocks*	*Pinus radiata*
Meloidogyne javanica	***	**	–
Criconemella xenophax	*	***	–
Pratylenchus neglectus	*	***	–
Xiphinema brevicolle	–	*	–
Xiphinema elongatum	–	*	–
Scutellonema brachyurus	**	**	–
Aphelenchus	–	–	*
Boleodorus	–	–	**
Mononchida	–	–	*
Rhabditida	**	**	**
Freeliving Dorylaimida	**	**	**

samples from the three vegetation types are given in Table 1. There was no significant difference in the plant parasitic nematode populations between the grapevines and fynbos (P = 0.19) but significant differences between those of the pine plantation and the other two vegetation types.

The most important nematode parasites of vineyards locally and world-wide are *Meloidogyne* species or root-knot nematodes (De Klerk & Loubser, 1988) and *Xiphinema index* because it transmits the fanleaf virus (Malan & Meyer, 1993). Hardly any information exists on the actual damage to vines caused by other *Xiphinema* species as direct ectoparasites, or species of *Pratylenchus* (lesion nematodes) as endoparasites of vine roots. Both groups have been shown to be capable of considerable damage to numerous other agricultural crops. (Hoestra & Oostenbrink 1962; Olthof & Potter 1972, Pinochet, *et al.*, 1976).

From the present study it is obvious that *Protea repens* is a good host for *Meloidogyne* and that the original hosts of these parasites were probably *Protea* species. It also shows that fynbos can be an important source of initial infestation with species like *Criconemella xenoplax, Pratylenchus* spp. (lesion nematodes) and *Scutellonema brachyurus* (spiral nematodes). These nematodes subsequently thrive and reach higher populations under the influence of a more favourable host like grapevines. It must therefore be concluded that the only truly virgin soil in which to establish a vineyard, is soil devoid of any indigenous flora.

From these observations (Table 1) one may believe that *Protea repens* maintained the original popultions of these nematodes. The grapevine rootstocks that followed, increased some of the parasitic species but the *P.radiata* was on the long run not a favorable host. This does not mean that certain plant parasitic nematodes cannot reach high numbers on *Pinus* species under different circumstances. (Swart, 1998)

CONCLUSIONS

Establishment of vines on land previously covered by fynbos vegetation affects nematode populations and diversity. Certain groups tend to decline somewhat (*M. javanica*) and some tend to increase like *C. xenoplax* and *P. neglectus*. *Pinus radiata* failed to maintain any of these parasitic species.

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