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# EFFECT OF INTERCROPS ON OCCURRENCE OF *RADOPHOLUS SIMILIS* IN ARECANUT PALMS*

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ABSTRACT

**Survey conducted in the major arecanut growing tracts of Kerala, Karnataka and Tamil Nadu revealed the widespread occurrence of the burrowing nematode, *Radopholus similis* in South India. Maximum percentage occurrence of *R. similis* was recorded from arecanut palms (55.1%) intercropped with banana, followed by 45.2, 43.9, 29.8 and 11.1 per cent when inter/mixed cropped with black pepper, cardamom, coconut and cacao, respectively, whereas in pure areca plantations, the percentage occurrence was only 25.4. Maximum percentage occurrence of *R. similis* was also noticed in banana (64.5%) compared to black pepper (26.0%), cardamom (19.5%), coconut (16.6%) and cacao (Nil). Banana as an intercrop was found to favour multiplication of *R. similis* in arecanut gardens, whereas when cacao was used as mixed crop nematode population was lowest and cacao was found to be free of infestation.**

## INTRODUCTION

The arecanut palm, *Areca catechu* L. is extensively cultivated in South India. The burrowing nematode, *Radopholus similis* was first reported from the root zone of arecanut by Kumar, Viswanathan and D'Souza (1971). Later, Koshy, Sundararaju and Sosamma (1978) recorded the widespread distribution of *R. similis* in South India associated with coconut, arecanut, banana and black pepper. In general, arecanut is inter/mix cropped with either one or more crops like banana, black pepper, cardamom, coconut, cacao etc. Hence, a survey was undertaken to study the effect of inter/mixed crops on *R. similis* population in arecanut plantations.

## MATERIALS AND METHODS

Survey was carried out in pure arecanut garden and gardens intercropped/mix-cropped with other crops such as coconut, banana, cardamom, black pepper and cacao. A total of 882 each of soil and root samples was collected from the rhizosphere of arecanut in Kerala, Karnataka and Tamil Nadu. Root samples were also collected from coconut (271), banana (274), black pepper (73), cardamom (41) and cacao (18) which are grown in arecanut gardens. For arecanut, soil and root samples were collected 75 cm away from the bole of the palm at a depth of 10 to 50 cm with a 75 mm diameter soil auger. Three such samples were taken within the basin at 120° to each other, mixed well and an aliquot of 250 cc samples drawn. In addition to the root bits collected through auger, 50–60 g tender main feeder roots were also collected wherever possible from the base of the palm. In the case of coconut, samples were collected one metre away from the bole of the palm to a depth of 10–50 cm as in the case of arecanut.

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Root samples of black pepper, cardamom and cacao, were collected mostly from arecanut gardens wherever it was convenient. Soil samples were processed by Cobb's sieving and sifting method and root populations were extracted by the method reported by Koshy, Sosamma and Nair (1975) and counts made under a stereoscopic microscope.

## RESULTS AND DISCUSSION

The percentage occurrence of *R. similis* in arecanut palms grown with inter/mixed crops are given in Table I. It is interesting to note that *R. similis* was observed in 55.1 per cent of samples from arecanut palms intercropped with banana, followed by 45.2, 43.9, 29.8 and 11.1 per cent when inter/mixed cropped with black pepper, cardamom, coconut and cacao, respectively. In pure areca plantations, the percentage occurrence of *R. similis* was only 25.4. The crop combinations of arecanut, banana and cardamom were practised only in Karnataka, whereas inter cropping of arecanut with banana is practised in all plantations in Kerala, Karnataka and in some parts of Tamil Nadu. Another factor was the influence of irrigation in areca gardens in Karnataka area and the resultant increased occurrence of *R. similis* irrespective of the crop combinations involved. It was also seen from Table II that high percentage occurrence of *R. similis* was recorded from

Table I. *Effect of intercrops on occurrence of* Radopholus similis *in arecanut palms*

| Crop combinations | No. of samples collected from arecanut | No. of samples yielded *R. similis* | Percentage |
|---|---|---|---|
| Arecanut + Banana | 274 | 151 | 55.1 |
| Arecanut + Pepper | 73 | 33 | 45.2 |
| Arecanut + Cardamom | 41 | 18 | 43.9 |
| Arecanut + Coconut | 271 | 81 | 29.8 |
| Arecanut + Cacao | 18 | 2 | 11.1 |
| Arecanut alone | 205 | 52 | 25.4 |

Table II. *Occurrence of* Radopholus similis *in different intercrops grown in arecanut gardens*

| Crops | No. of samples collected | No. of samples yielded *R. similis* | Percentage |
|---|---|---|---|
| Arecanut | 882 | 338 | 38.3 |
| Coconut | 271 | 45 | 16.6 |
| Banana | 274 | 177 | 64.5 |
| Black pepper | 73 | 19 | 26.0 |
| Cardamom | 41 | 8 | 19.5 |
| Cacao | 18 | 0 | 0.0 |

the roots of banana (64.5%), followed by black pepper (26%), cardamom (19.5%) coconut (16.6%) and cacao (nil) which are commonly grown in arecanut gardens.

Banana and black pepper are favoured hosts of the burrowing nematode which has been reported as the agent of the root rot disease of banana (Blake, 1961) and yellows black pepper (Van der Vecht, 1950).

Studies conducted at CPCRI Regional Station, Vittal and Research Centres at Kahikuchi and Hirehalli showed that yield of arecanut decreased by growing banana as an intercrop (Sannamarappa and Muralidharan, 1982) Bhandary (1974) reported 54.4 per cent decrease in the yield of arecanut due to mixed cropping with black pepper, though it is not known whether pepper was manured adequately in this trial, nematode populations were not monitored in any of these investigations. Arecanut, banana and black pepper being highly susceptible to burrowing nematode, it is likely that root rotting on these crops would have increased consequent to increase in nematode populations, particularly, under irrigated conditions. This certainly could be the possible reason for reduction in yield even with adequate manuring of all the crops involved. On the contrary, yield of arecanut was found to increase when cacao a non-host of the burrowing nematode was grown as a mixed crop in the arecanut gardens. Thus, the present investigations have clearly brought out that banana and black pepper as intercrops in arecanut based farming system favoured the multiplication of *R. similis* in arecanut palms, whereas cacao could be used as an ideal intercrop for mixed cropping with arecanut, since cacao is free from nematode infestation. There is a need for introducing only nematode free planting materials as well as regular application of nematicides in such farming systems.

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