

## EFFECT OF SOIL AMENDMENTS ON THE VIABILITY OF SCLEROTIA OF *Rhizoctonia Solani* IN SOIL

P. LAKSHMANAN<sup>1</sup> AND M. CHANDRASEKARAN NAIR<sup>2</sup>

Neem cake and groundnut cake under dry condition, Ellupa cake, Gingelly cake and Neem cake under flooded condition were found to be very effective in reducing the viability of sclerotia. The sclerotial viability was also lost significantly when soil was treated with Neem leaf and gliricidia leaf.

Sheath blight disease of rice incited by *Rhizoctonia solani* Kuhn (perfect stage: *Thanatephorus cucumeris* (Frank) Donk) is considered as one of the major diseases of rice in Kerala. With introduction of high yielding varieties the incidence of this disease has been found to be severe. The main mode of survival of the fungus is by the formation of sclerotia which remain viable for long period (Mahendra Prabhath *et al.*, 1974). The sclerotia germinate under favourable conditions and infect the host.

Addition of oil cakes and green leaf manures are known to influence plant growth in various ways besides the supply of nutrients. Though there are reports on the effects of soil amendments on certain soil fungi (Bingham *et al.*, 1958) attempts have not been made to study their effects on the dormant structure (Sclerotia) of this fungus. A study was, therefore, undertaken to assess the effects of different oil cakes and green leaf manures on the viability of sclerotia of *R. solani*.

### MATERIALS AND METHODS

#### a) Viability of sclerotia in soil amended with different oil cakes

Neem cake, Ellupa cake, Gingelly cake, Groundnut cake and Coconut cake were well powdered and mixed at the rate of 300 mg with 300 g soil (Equivalent to a field rate of 25 quintals/ha), taken separately in 250 ml beaker and allowed 15 days for decomposition. Twenty uniform sized sclerotia from 15 days old PDA culture was added in each beaker and mixed thoroughly. All treatments were maintained in duplicate. In one set of experiment, soil was flooded and in another set soil was kept dry. The beakers were kept under laboratory conditions. Ten sclerotia were picked out at twenty days interval from each treatment, washed off the soil and their viability assessed after surface sterilization with 0.1 per cent Mercuric Chloride

#### b) Viability of sclerotia in soil amended with various green leaf manures :

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1. Assistant Professor, T. N. A. U., Vellore - 632 001.

2. Professor and Head, K. A. U., Vellayani.

Leaves from various plants like Neem (*Azadirachta indica* B. JUZZ), calotropis (*Calotropis gigantea* R. Br.), Pongamia (*Pongamia Pinnata* Pier.) and gliricidia (*Gliricidia sepium* stend.) were cut into small bits and mixed with soil at the rate of 1300 mg with 300 g soil (field rate of 10 tonnes/ha) separately in 250 ml beakers. Flood conditions were maintained for 15 days for full decomposition of green leaf manures. Then, twenty uniform sized sclerotia from 15 days old, PDA culture were mixed thoroughly in each beaker and maintained under flooded condition. For each treatment two replications were maintained. The viability of sclerotia was noted at twenty days interval as under the previous experiment.

## RESULTS AND DISCUSSION

The data presented in Table 1 and 2 indicate that both under dry as well as under flooded conditions all the five different oil cakes tested, have significantly reduced the viability of sclerotia even on 20th day. Under dry condition soil amended with neem cake and groundnut cake were found to be very effective among the treatments and more than 50 per cent lose in viability was recorded on 20th day itself (Table 1). Under flooded condition among the treatments, Ellupa cake, Gingelly cake and Neem cake were found to be very effective. The viability of sclerotia was lost completely on 40th day in soil amended with, Ellupa cake and on 60th day in soil amended with Gingelly and Neem cake (Table 2) The sudden loss in viability of sclerotia under flooded condition may be due to the presence of antagonistic organisms as

well as poor aeration. According to Papavizas and Davey (1961) high soil moisture content would stimulate bacterial activity which in turn will affect the *R. solani*. At high soil moisture a stimulation in the activity of antagonistic micro organism was also detected by Radha and Menon (1957). The longer viability under dry condition when compared to flooded condition may be due to the formation of thick and hard wall which resist the adverse effect of environment as pointed out by Bulter (1966). Singh (1968) obtained good control of black scurf of Potatoes by amending the soil with mustard cake followed by groundnut cake, margosa and castor cakes.

The results on loss of viability of sclerotia in soil amended with different green leaves are presented in Table 3. All treatments except calotropis showed significant reduction in the viability of sclerotia. Of these treatments, Neem leaf followed by Gliricidia and Pongamia leaf were found to be very effective. In Neem leaf treated soil the viability of sclerotia was completely lost on 60th day. But in Calotropis treated soil the longivity of sclerotia was prolonged when compared to the control.

The inhibitory effect of green leaf may be due to their ability to increase the number of antagonistic micro organism soil or may be due to the rapid assimilation of Nitrogen and excessive evolution of Carbondioxide which inhibited the germination of sclerotia. Papavizas and Davey (1960) reported that amendments with a number of green manure crops

substantially increased the total number of actinomycetes as well as total number of soil bacteria which suppressed the incidence of *R. solani*.

Boosalis (1956) found that in green manure amended soil *R. solani* is parasitised by *Penicillium Vermiculatum* and *Trichoderma viridae*.

Table-1 Viability of sclerotia in soil amended with different oil cakes under dry condition. (Mean value after angular transformation)

Oil cakes	20th day	40th day	60th day	80th day
Neem cake	47.88	42.11	36.22	22.50
Groundnut cake	47.88	42.11	42.11	29.88
Gingelly cake	50.76	45.00	39.23	39.23
Coconut cake	67.49	80.11	56.78	47.88
Ellupa cake	67.49	60.11	60.11	53.77
Control	90.00	90.00	80.78	63.43
C. D. (P=0.05)	17.22	9.97	9.49	8.81

Table-2 Viability of sclerotia in soil amended with different oil cakes under flooded condition. (Mean value after angular transformation).

Oil cakes	20th day	40th day	60th day	80th day
Neem cake	36.22	22.50	0	0
Groundnut cake	39.23	26.56	22.50	0
Gingelly cake	29.88	22.50	0	0
Coconut cake	50.76	42.11	39.23	0
Ellupa cake	29.88	0	0	0
Control	90.00	80.78	39.23	9.21
C. D. (P=0.05)	15.90	7.90	5.75	—

Table-3 Viability of sclerotia in soil amended with various green leaf manures under flooded condition. (Mean value after angular transformation)

Green leaf manures	20th day	40th day	60th day	80th day
Gliricidia	60.11	42.11	33.21	0
Pongamia	56.78	47.88	39.23	0
Neem	29.88	25.50	0	0
Calotropis	90	90	67.49	39.10
Control	90	80.78	39.23	9.21
C. D. (P=0.05)	16.96	16.84	7.28	6.30

It is likely that one or more of these possibilities discussed above were in operation in the present case also. Whatever be the actual mechanism it is clearly evident that application of groundnut cake or Neem cake after the harvest of crop under dry condition and application of Elluppa cake or gingelly cake or neem cake under Puddled condition, the sclerotia of this fungus in soil can be reduced considerably, thus bringing about almost a reduction in the source of primary inoculum. Addition of green leaves to the paddy field also has got beneficial influence in reducing the viability of sclerotia. Among the various leaves tried neem leaf ranks first, followed by gliricidia and Pongamia. But it may not be practicable to use neem leaf but addition of gliricidia as green manure will drastically reduce the inoculum potential.

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