https://doi.org/10.29321/MAJ.10.A02277

Madras Agric. J. 73 (6) : 325-328 June 1986

SURVIVAL OF *Rhizoctania solani* CAUSING SHEETH BLIGHT OF RICE UNDER VARIOUS CONDITIONS

P. LAKSHMANAN[1] and M. CHANDRASEKARAN NAIR[2]

The viability of sheath blight organism was studied under various conditions. The organism lost its viability after two weeks when the infected plant debris were buried in garden land soil and wet land soil under flooded condition and also in cattle manure But under dry condition the viability was lost only after four weeks. When infected straw was heaped under laboratory condition, the patnogen lost viability only after 180 days. The viability of Sclerotia was completely lost within 60-90 days when stored in flooded soils as well as in paddy field water. Under dry conditior ·zed percentage of sclerotia retained their viability even after 150 days.

Sheath blight of rice caused by *Rhizoctonia solani* Kuhn imperfect state of *Thanatephorus cucmeris* (Frank) Donk is considered as one of the major diseases of rice in Kerala. This disease occurs severely throughout the state in an endemic form causing considerable damage (Mahendra Prabhath, 1971) Foliar application of various fungicides is often reported to be ineffective in controlling the diseases The exact mode of survival of the organism and the primary source of inoculam are not exactly known under the conditions prevailing in Kerala for devising more efficient means of control. Taking into consideration of these facts, the present study was initiated to study the survival of this pathogen under various conditions

MATERIALS AND METHODS

a. *Survival of the Pathogen in infected debris buried in garden land soil, wet land soil and cattle manure.*

Earthen pots were filled separately with nearly two kg each of garden land soil, wet land soil and cattle manure. In each pot 10 bits of about 5 cm length from severely infected plant were buried at 5 cm depth The pots containing garden land and wet land soils were kept under both dry and floodcd conditions. But in cattle manure filled pots, water was added periodically just to moist the dung. The pots were kept in the open fields and at weekly intervals the infected bits were picked out from each treatment, and washed under tap water to remove the soil particles. They were then surface sterilized with 0.1 per cent mercuric chloride solution and planted on PDA and observed for the growth of the organism.

b. *Survival of the pathogen in severly infected paddy straw heaped under laboratory conditions.*

Paddy straw was collected from severely infected fields and stored in heap under laboratory conditions. Samples were taken at 20 day intervals and viability of the pathogen in the debris was tested as in the previous case.

1. Assistant Professor (Pathology), TNAU, Coimbatore-641 003.
2. Professor of Plant Pathology, KAU, Vellayani, Kerala State.

c. *Viability of sclerotia in garden land soil, wet land soil and cattle manure.*

Sclerotia of uniform size were collected from 15 days old culture of the pathogen grown on PDA. About 300g of garden land soil and wet land soil and 200 g cattle manure were taken separately in 250 ml beakers and ten sclerotia were buried at 5cm depth in each beaker. Wet land and garden land soils were kept under both dry and flooded conditions. But cattle manure was maintained in moist condition. The beakers were kept under laborarory conditions and at monthly intervals sclerotia were picked out and its viability was tested by planting them on PDA in petridishes after surface sterilization.

d. *Viability of sclerotia under laboratory conditions*

Fifteen day old sclerotia of uniform size were harvested from PDA cultures and kept in dry sterilized petridish under laborato y conditions. In another series sclerotia were collected from field and incubated under identical conditions. The viability of sclerotia was recorded at thirty day intervals for a period of six months following the same procedure as under the previous experiment.

e. *Viability of sclerotia in wet land water* (Paddy field)

Two hundred sclerotia from fifteen day old culture were added to 400 ml water from wet land paddy fields and incubated in 500 ml beaker. At thirty day intervals ten sclerotia were picked out at random and its viability tested.

RESULTS AND DISCUSSION

In general the organism remained viable for a longer period under dry conditions This is true with sclerotia as well as the mycelium in infected rice debris Infected rice debris when collected and stored in flooded garden land and wet land soil, as well as in cattle manure it lost viability by the 3rd week while those under dry condition lost viability only after 4 weeks (Table 1). But when sheath blight infected straw was heaped under laboratory condition, the Pathogen was viable upto 180 days. Similarly when sclerotia was stored in different types of soils under flooded and dry condition and in cattle manure even on the 150th day a good percentage of sclerotia retained their viability under dry condition (Table 2). But by the 90th day complete loss of viability was detected under flooded conditions. Sclerotia obtained from PDA culture and from the sheath blight infected field, stored under dry petridishes retained cent per cent viability even after 150 days, whereas those kept in water collected from wet land paddy fields, lost complete viability by the 90th day. These results clearly indicate that under high soil moisture levels either as mycelium or as sclerotia the rice sheath blight pathogen can survive only for a short period compared to that under dry conditions. It has already been reported that the sclerotia of this organism can survive for a longer period under dry conditions Park and Bertus (1932) noted that the sclerotia remained viable for 130 days in air dried soil kept at room temperature. Mahendra Prabhath (1971) found that the sclerotia buried in soil and also those stored in the laboratory under dry

Table 1 : Vaiability of the pathogen from infected rice plant debri: buried in garden land soil, wet land soil and cattle manure.

Observation at weekly intervel	Wet land soil		Garden land soil		Cattle manure
	Flooded condition	Dry condition	Flooded condition	Dry condition	
1st week	+	+	+	+	+
2nd week	+	+	+	+	+
3rd week	—	+	—	+	—
4th week		+		+	
5th week				—	

\+ Viable — Not viable

Table 2 : Percentage of viable sclerotia in wet land soil, garden land soil and cattle manure.

Observation at 30 days intervel	Wet land soil		Garden land soil		Cattle manure
	Flooded condition	Dry condition	Flooded condition	Dry condition	
2nd day	100	100	100	100	100
30th day	80	100	100	100	100
60th day	10	80	30	80	80
90th day	—	70	—	80	50
120th day	—	50	—	60	30
150th day	—	30	—	50	20

conditions remained viable for a very long Period but he reported the loss in viability of the sclerotia stored under flooded condition with in 60-80 days The present observation also agrees with the earlier reports on the survival of the pathogen. The sudden loss in viability of the pathagen under flood ed 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 antogonistic micro organisms was also detected by Radha and Menon (1957). The longer viability of the sclerotia under dry conditions may be due to the formation of thick and hard wall which resist the adverse effect of environment as pointed out by Butler (1966) The pathogen lost its viability completely after two weeks when infected plant debris was collected and stored in wet land and garden land soil under flooded condition as well as in manure. But on infected debris the pathogen retained its viability for a longer period of four weeks under dry conditions. According to Onesirosan and Sagay (1975) the infectivity of *R. solani* was lost

when infected leaves were buried in soil with the disintegration of leaves The sudden loss of viability of the pathogen observed in the present study in manure heap may also be due to the presence of antagonistic organism and or due to the high temperature developed in such heaps.

REFERENCES

BUTLER, M. 1956. Vegetative structure. In G.C. Ainsworth and S. Sussman (ed.). *The fungi* II : *The fungal organism*. Academic press, New York and London, pp. 83-112.

MAHENDRA PRABHATH, C. A. 1971. Studies on sheath blight of rice caused by *Corticium sasakii* (Shirai) Matsumoto. M.Sc.(Ag) Thesis, Udiversity of Kerala, pp. 80.

ONESIROSAN, P. T. and S. J. SAGAY. 1975. Survival of two pathogens of cowpea over the dry season. *Pl. Dis. Reptr.* 59 : 118-120.

PAPAVIZAS, G. C. and C. B. DAVEY. 1961. Saprophytic behaviour of *Rhizoctonia* in soil. *Phytopathology*. 51 : 693-699.

PARK, M. and L. S. BERTUS. 1932. Sclerotial disease of rice in Ceylon I. *Rhizoctonia solani* Kuhn *Ceylon J. Sci. Sect.*, 11 : 319-331.

RADHA, K. and K. P. V. MENON. 1957. The genus *Rhizoctonia* in relation to soil moisture. I. Studies on *Rhizoctonia* solani and *R. bataticula*. *Indian Coconut J.* 10 : 29-36.

Madras Agric. J. 73(6) : 328-333 June, 1986

HETEROSIS AND GENETIC ARCHITECTURE OF OIL CONTENT IN CASTOR (*Ricinus communis* L.)

H. C. PATHAK,[1] C. J. DANGARIA[2] and K. S. PARMAR[3]

Heterosis and genetic architecture of oil-content in castor (*Ricinus communis* L.) was studied in a complete diallel set of 11 parents excluding reciprocals. Twenty-five and thirteen crosses, respectively, exhibited significant heterosis over mid parent and better parents. The analysis of variance for combining ability indicated the importance of both additive and non-additive gene-action, however, non-additive gene action was predominant, for the inheritance of this trait. The varieties *viz*, 2-73-11, T-4, 1-21 and Masalio were the better general combiners. The crosses *viz*, "Aruna x HC-8", "Aruna x VI-9", "Aruna x Masalio", "279 x 2-73-11", "279 x Masalio", "Ho x HC-8", "Ho x 2-73-11", "Ho x T-4", "413A x VI-9", "413A x Masalio", "1-21 x 2-73-11", "1-21 x T-4", "2-73-11 x VI-9" and "VI-9 x Masalio" possessed higher mean values, significant heterosis, and higher and significant positive SCA effects which can best be exploited for developing higher oil-varieties in castor through further breeding.

The castor (*Ricinus communis* L.) is an important cash crop of India in general and North Gujarat in particular. The major produce of castor is utilised

1 Associate Research Scientist (Plant Breeding), N.A.R.P. Sub-Station, Gujarat Agricultural University, Derol-389 320.

2 Assistant Research Scientist (Plant Breeding), Gujarat Agril. University, Junagadh.

3 Assistant Research Scientist, (Chemistry) G. A. U., Bechau.