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EFFECT OF PLANT EXTRACTS AND OILS ON RICE YELLOW DWARF INFECTION

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ABSTRACT

The efficacy of plant products and oils in reducing the infection of rice by yellow dwarf MLO was tested. Leaf extracts of young and matured leaves of Neem, *Mirabilis jalapa*, *Catharanthus roseus*, Maize and *Nerium* sp were applied on TN 1 rice plants. The infective leafhoppers were caged on treated and control plants at 1, 24, 48 and 72 hr after applications of leaf extracts. Neem leaf (both matured and young) recorded low infection (40%) as compared to other treatments and control (82.2%). The incubation period in the neem leaf extract treated plants increased to 40.3 days as against 28.5 days in control. The reduction in infection and increase in incubation period were observed more significantly in plants inoculated one hr after the treatment than in plants inoculated at 24, 48 and 72 hr after the treatment. Of the three oils tested namely, Neem, *pungam* and *illupai* oils, Neem oil recorded lower per cent infection (13.3%) as compared to *illupai* oil (26.7%), *pungam oil* (20.0%) and control (82.2%). The incubation period was also increased significantly in the plants treated with oils. As in the case of leaf extracts, the favourable effect on infection and incubation period was reduced as the interval between application of oils and inoculation increased.

KEY WORDS : Rice yellow dwarf, Leaf extracts, oils.

Yellow dwarf is one of the important diseases of rice crop in different states in India. The possibility of utilising plant products and oils to manage the crop diseases has attracted the attention of many researchers. But only few attempts have been made to test plant products and oils for their efficacy against plant diseases caused by mycoplasma-like organisms. This paper reports the results of the effect of different plant products and oils on rice yellow dwarf (RYD) infection.

MATERIALS AND METHODS

Preparation of plant tissue extracts:: Ten g of leaves of neem (*Azadirachta indica* A. Juss), Four O' clock (*Mirabilis jalapa*), Nerium (*Nerium deander*), periwinkle (*Catharanthus roseus*) and maize (*Zea mays*) were washed with water and shade dried. Then they were ground in mortar with 100 ml distilled water. The extracts were first filtered through two folds of muslin cloth and then through Whatman No. 1 filter paper.

Fifteen seedlings of seven day old TN 1 were used for each treatment. The plant extracts were sprayed on test plants at 0.5 ml per seedling before inoculation.

The three oils *viz*., neem, pungam and illuppai at 0.1% were sprayed on 7-day old TN 1 seedlings at 0.5 ml per seedling before inoculation using 15 seedlings for each treatment. The sticker Teepol was added at the rate of 0.1% to the oil before spraying.

Method of inoculation : First and second instar nymphs of rice green leafhopper (*Nephotettix virescens* Distant) were given an acquisition access to RYD plant for 48 yours. The nymphs were later maintained on a healthy plant for the completion of latent period. The inoculative vectors were used to inoculate the test

seedlings as per the method of Daquioag and Hibino (1985). The inoculative insects were confined on seven days old TN 1 seedling kept in a test tube at the rate of two insects per seedling for 24 hours. After the inoculation, the seedlings were planted in earthen pots and observed for symptom development. The per cent infection in each treatment was calculated.

RESULTS AND DISCUSSION

Effect of plant extracts

The RYD infection was reduced by plant products to different extent (Table 1). Of the extracts tested, the extract from both matured and young neem leaves was found to be effective in reducing the infection by 33.12 per cent over control when inoculated at 1 hour after application and the reduction was significantly greater than in the rest of treatments. The per cent reduction in infection decreased from 50 to 18 in neem leaf extracts as the interval between application of extracts and inoculation increased. This trend was discernible in the case of other treatments also.

This showed that the plant extracts in general were effective in reducing the RYD infection thereby indicating that these leaf extracts may contain substances inhibitory to the causative agents. Liao and Chen (1980) reported that plant tissue extracts from corn, periwinkle, celery and lettuce contained inhibitory substances for *Spiroplasma* growth in culture. Kaklamanis *et al.* (1969) reported the presence of an antimycoplasma (mycoplasacidal) factor, lysolecithin in various animal tissue homogenates which could cause lyses of mycoplasma cells *in vitro*. The nature of antispiroplasma factor found in plant extracts appears to be different from that in animal tissue homogenates. Annapurna *et al.* (1983) reported that maize leaf extracts possessed antispiroplasma activity.

The incubation period in all plants treated with leaf extracts increased significantly over the control. The increase in incubation period was maximum and longer in plants treated with neem leaf extract (both young and matured) than in plants treated with other leaf extracts and inoculated at 1 and 24 hr inoculations (Table 2). The difference in incubation periods between treated and control plants was progressively reduced as the interval between leaf extract application and inoculation increased. This may indicate that the process of MLO multiplication may be interfered by the leaf extracts resulting in longer incubation period.

Effect of oils

Neem oil was found to be significantly superior over the other oils tested *viz.*, pungam and illuppai at all intervals of inoculation (1, 24, 48 and 72 hr). The per cent reduction in infection is 83.3, 75 and 6.6 in neem, *pungam* and *illuppai* oils respectively at 1 hr after inoculation and the per cent reduction in infection slowly decreased to 45.4, 27.3 and 27.3 in neem, *pungam* and *illuppai* oils respectively at 72 hr after inoculation (Table 3). The neem oil application has been reported to alter the feeding behaviour of *Nephetottix virescens* and the period of feeding on the phloem tissue of the neem oil treated plants was drastically reduced (Saxena and Khan, 1984 and 1985). This may lead to the failure of or reduction in RYD infection in neem oil treated plants. It is possible that other oils may also act in

Table 1. Effect of plant extracts on RYD infection

S. No	Plant leaf extract	RYD infection at different intervals					Per cent reduction over control
		1 h	24 h	48 h	72 h	Mean	
1.	*Azadirachta indica* (matured leaf)	40.0	53.3	53.3	60.0	51.7	33.12
2.	*A. indica* (young leaf)	40.0	53.3	60.0	60.0	53.3	30.95
3.	*Mirabilis jalapa*	46.7	53.3	60.0	66.7	56.7	26.66
4.	*Catharanthus roseus*	46.7	53.3	53.3	60.0	53.3	30.95
5.	*Nerium oleander*	46.7	53.3	53.3	60.0	53.3	30.95
6.	*Zea mays*	46.7	53.3	60.0	66.7	56.7	26.66
7.	Control	82.2	77.8	75.6	73.3	77.2	
	Mean	49.8	56.8	59.4	63.8		

	CD (P=O.05)
Plant leaf extracts	1.865
Interval	1.410
Interaction	N.S

Table 2. Effect of plants extracts on RYD infection (incubation period)

S. No.	Plant leaf extract	Mean incubation period at different intervals*					Per cent increase Over control
		1 h	24 h	48 h	72 h	Mean	
1.	*Azadirachta indica* (matured leaf)	40.33	37.12	35.67	31.57	36.17	20.04
2.	*A. indica* (young leaf)	40.50	36.63	31.33	31.00	34.86	15.70
3.	*Mirabilis jalapa*	30.27	31.40	31.23	30.77	30.91	2.60
4.	*Catharanthus roseus*	31.57	31.50	31.60	31.00	31.41	4.26
5.	*Nerium oleander*	31.73	31.73	31.43	31.63	31.63	4.96
6.	*Zea mays*	31.57	31.50	31.57	31.60	31.56	4.73
7.	control	28.57	29.77	31.20	31.00	30.13	
	Mean	33.50	32.80	32.00	31.22		

* Mean of 15 plants

	CD (P=O.05)
Plant leaf extracts	0.334
Interval	0.252
Interaction	0.668

Table 3. Effect of oils on RYD infection (per cent infection)

S. No.	Oil	RYD infection at different intervals					Per cent reduction over control
		1 h	24 h	48 h	72 h	Mean	
1.	Neem	13.3	26.7	33.3	40.0	28.3	63.05
2.	Pungam	20.0	33.3	40.0	53.3	36.6	52.19
3.	Illuppai	26.7	33.3	46.7	53.3	40.0	47.81
4.	Control	80.0	80.0	73.3	73.3	76.6	
	Mean	35.0	43.3	48.3	54.9		

	CD (0.05%)
Oils	5.440
Intervals	5.440
Interaction (Oils X Interval)	NS

Table 4. Effect of oils on RYD infection (incubation period)

S. No.	Oil	Mean incubation period at different intervals*					Per cent increase over control
		1 h	24 h	48 h	72 h	Mean	
1.	Neem	45.0	43.7	41.3	40.0	42.5	40.85
2.	*Pungam*	42.7	41.3	39.0	37.7	40.1	33.14
3.	*Illuppai*	40.3	38.7	36.7	35.0	37.6	24.86
4.	Control	28.8	29.3	30.3	32.3	30.1	
	Mean	39.2	38.2	36.8	36.2		

	CD (0.05%)
Oils	0.489
Interval	0.489
Interaction	0.978

a similar manner and further studies are required to elucidate the mode of action of other oils.

As in the case of plant extracts, the mean incubation period in oil treated plants increased significantly over the control at all intervals of inoculation. Neem oil was the most effective in increasing the incubation period significantly over the other treatments but the per cent increase slowly reduced from 56.5 to 23.4 as the interval between oil application and inoculation increased from 1 to 72 hr. This increased incubation period may be possibly due to the interference of oils in the multiplication of MLOs in the plants.

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CHARACTER ASSOCIATION IN PIGEONPEA (*Cajanus cajan* (L.) Millsp.

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ABSTRACT

Studies on correlation for fifteen characters with forty early maturing genotypes of pigeonpea (*Cajanus cajan* (L) Millsp.) revealed that seed yield showed positive and significant correlation with DMP, number of pods, number of clusters, number of branches, plant height, LAI, seeds per pod, days to flowring, pods per cluster, days to maturity, 100-seed weight, harvest index and pod length.

KEY WORDS : Pigeonpea, correlation, seed yield.

Grain yield is a complex trait influenced by a large number of other component traits. A knowledge of the association among the components can help in improving the efficiency of selection. Information on th degree and direction of the association of yield with other traits and among the components themselves would help in planning the breeding programme. Accordingly the present study was undertaken to gather information on association between yield and related characters in pigeonpea.

MATERIALS AND METHODS

Forty early maturing genotypes of pigeonpea were grown in a randomized block design with four replications during 1985-86 at the School of Genetics, Tamil Nadu Agricultural University, Coimbatore. Each entry was assigned to a row of 4 m length with a distance of 45 cm and 20 cm between rows and plants respectively.