Potential of plant products for the management of whiteflies in nurseries

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Whiteflies are tiny sap-sucking insects belonging to the family Aleyrodidae. They injure plant in a variety of ways. Among them the spiralling whitefly *Aleurodicus dispersus* and the babul whitefly *Acaudaleyrodes rachipora* are highly polyphagous attacking important tree species both in nurseries and plantations. Experiments were conducted to study the efficacy of a dye obtained from the bark of *Persea macrantha* against *A. dispersus* on *Michelia champaca* seedlings. The results showed that the 1% concentration of dye dissolved in ethanol and teepol were very effective in containing the population of the nymphs of *A. dispersus* on *M. champaca*. Further foliar application of neem seed oil alone at 5% concentration and basal application of deoiled neem cake at 1 gm/ polybag gave effective control of the babul whitefly *A. rachipora* on important tree species of arid and semi-arid zone of India. The findings are discussed in this communication.

Keywords: Whiteflies, Aleyrodids, *Persea macrantha*

Introduction

Whiteflies are tiny sap-sucking insects belonging to the family Aleyrodidae. In recent years, whitefly pests have become a major problem, almost world wide. They injure plant in a variety of ways (David and Subramanium 1976). Among the whitefly pests the spiralling whitefly *Aleurodicus dispersus* Russell and the babul whitefly *Acaudaleyrodes rachipora* (Singh) are highly polyphagous attacking important tree species both in nurseries and plantations. High population of whiteflies feeding on nutrients of plants affect the plants physiological process, ultimately causing leaf shedding and reduced growth rate. Chlorotic spots appear at feeding sites on leaf surfaces. Vast amount of honey dew produced by nymphs leads to mould development on leaves and adversely affects photosynthesis (Sundararaj et al. 2000). All the life stages of whiteflies are hard to control with conventional insecticides because of rapid multiplication, their preferred habitat on the under surface of leaves, thereby not being easily targeted by direct hit of spraying insecticides (Sood et al. 2003). Further with the growing evidence of the adverse effects of conventional pesticides on health and environment, the need for safer methods of pest management has become inevitable. Use of plant products is now emerging as one of the prime means to protect any plant. This communication deals with the possibility of managing *A. dispersus* and *A. rachipora* on some forest tree species.

Material and methods

Experiments for the control of *A. dispersus*

A solid colouring matter obtained (yield 6 to 7%) from the bark of *Persea macrantha* (Nees.) Koster. by hot extraction with alcohol and repeated purification using ethanol and chloroform, was assessed for its pesticidal properties against *A. dispersus* on the seedlings of *Michelia champaca* L. The dye was dissolved separately in 50% ethanol and 0.1% teepol and two sets of experiments were conducted, one for ethanol and the other for teepol based solutions. Each treatment consisted of 10 seedlings. The spray solutions were applied by using a hand sprayer. The nymphal population was taken by counting the nymphs on a leaf from the middle canopy from three plants at random per treatment. The data collected were pooled and means were computed for statistical analysis.

Experiments for the control of *A. rachipora*

Series of experiments were conducted with neem based products along with other biofertilizers and conventional pesticides and fertilizers for the management of *A. rachipora*. The effect of basal application of freshly prepared neem cake alone and in combination *Rhizobium*, VAM, Single Superphosphate against the incidence of the *A. rachipora* was evaluated in one month old seedlings of forest tree species of Indian arid zone *viz.*, *Acacia nilotica* (L.) Willd., *A. senegal* (L.) Willd., *A. tortils* L., *Prospis cineraria* Ronjh, *P. juliflora* D.C. and *Albizia lebbeck* (L.) Benth. Foliar spray of neem seed oil alone or and in combination with conventional insecticides *viz.* Chlorpyriphos and Monocrotophos were evaluated on heavily infested three month old seedlings of *A. nilotica, A. senegal* and *A. tortilis* against *A. rachipora*. From the results of the experiments conclusions were drawn for the management of *A. rachipora* on important forest seedlings of Indian zone.

Results and discussion

The nymphal population of *A. dispersus* observed in different treatments with dye of *P. macrantha* dissolved in ethanol is shown in Table. 1. The pretreatment count varied from 88 to 123 nymphs per leaf in different treatments and the nymphal population invariably affected in all the treatments except control. The effect was maximum with minimum nymphal population being 0 to 7.3 nymphs per leaf at 1% concentration and it was significantly less than all other treatments at all the observation days after treatment.

Table 1. Nymphal population of *Aleurodicus dispersus* on *Michelia champaca* in different treatments with dye of *Persea macrantha* (Solvent: Ethanol 50%).

Concentration of dye (%)	Mean no. of nymphs/leaf at different DAT*						
	0	1	2	3	7	10	14
1.00	105.33	1.66	1.33	0.66	0.00	2.00	7.33
0.50	88.00	42.33	18.66	33.33	40.66	41.66	46.66
0.25	111.66	39.66	35.66	30.66	39.33	41.66	46.33
0.13	114.33	59.00	64.66	49.00	57.33	60.66	65.66
0.05	83.33	62.33	56.33	53.00	57.66	60.00	69.33
0.02	99.33	82.00	75.00	65.00	80.33	82.00	84.33
Control	123.00	97.00	89.33	84.66	90.33	93.33	97.00
CD (P=0.05)	NS	12.76	11.04	13.09	17.43	20.65	19.76

*DAT= Days after treatment

The pretreatment count of nymphal population per leaf ranges from 89.3 to 112.3 in different treatments with dye of *P. macrantha* dissolved in teepol (Table 2). In this experiment too the treatment with 1% dye recorded lowest number of nymphal population being 8 nymphs per leaf at one day after treatment to 20 nymphs per leaf at 14 days after treatment. In general treatment with 1% dye recorded significantly less number of nymphs than control in all the days of observations. The study showed that the solid colouring matter from the bark of *P. macrantha* contains insecticidal principles effective against *A. dispersus.* The present record of effectiveness of dye of natural origin on whitefly is in agreement with the findings and advocations of Reddy et al. (1985), Vir (1990) and Reddy and Venugopal (1993). To date 1079 plants are reported to have pest management properties. Of them 866 plants against insects, 150 plants against nematodes, 30 plants against mites, 20 plants against rodents and 13 plants against snails (Prakash and Rao 1996). The study indicated that the solid dye from the bark of *P. macrantha* contains insecticidal principles which can be used in the management of *A. dispersus*.

Table 2. Nymphal population of *Aleurodicus dispersus* on *Michelia champaca* in different treatments with dye of *Persea macrantha* (Solvent: Teepol 0.1%).

Concentration of dye (%)	Mean no. of nymphs/leaf at different DAT*						
	0	1	2	3	7	10	14
1.00	89.33	8.00	12.33	9.66	18.66	16.00	20.00
0.50	112.33	35.66	29.66	36.00	42.65	51.33	60.66
0.25	106.00	41.33	52.33	61.66	59.00	73.33	82.66
0.13	112.33	76.66	61.33	55.66	72.33	119.66	122.33
0.05	101.66	78.66	109.00	111.33	122.00	148.66	121.33
0.02	98.33	103.00	121.33	115.33	102.66	111.66	123.33
Control	107.00	112.66	117.66	128.00	115.33	109.66	132.33
CD (P=0.05%)	NS	23.45	18.67	23.54	18.76	22.94	21.90

*DAT= Days after treatment

In the other set of experiments conducted on seedlings of different tree species from the Indian arid zone, the seedlings treated with neem cake alone and in combination with other nutrients recorded lower number of eggs and nymphs of *A. rachipora.* This trend was observed for 3 months after application in the tested tree species. Experiments of foliar spray of neem seed oil alone or in combination with synthetic insecticides demonstrated that the neem seed oil at 0.5 % alone is significantly superior to monocrotophos 0.2 % and endosulfan 0.2 % in reducing egg and nymphal populations and its combination with either 0.1 % monocrotophos or endosulfan is on par with neem seed oil alone to control this whitefly. In general, neem seed oil at 0.5% and its combination with monocrotophos and endosulfan resulted in fewer eggs and nymphs while monocrotophos and endosulfan alone were less effective in reducing the incidence of egg and nymphal population of *A. rachipora*. Similar findings were reported by Coudrict et al. (1985) on Sweet Potato whitefly *Bemisa tabaci* and Sundararaj et al. (1996) on *A. rachipora.* The studies revealed that by basal application of neem cake and foliar spray of neem seed oil the incidence of *A. rachipora* on the seedlings of important tree species of Indian arid zone can be managed.

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