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SANTOLINA VOLATILE OIL, A POTENTIAL ANTIFEEDANT FOR THE CONTROL OF THE BROWN PLANT HOPPER, MILAPARVATHA LUGENS

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ABSTRACT: The essential oil of santolina chamaecyparissus reduced the survival of Nilaparvatha lugens after 72 hours. The oil is found to be a good pesticide.

Introduction:

Protection of crops from insect pests by application of deterrent chemicals has received increased attention in past three decades, In recent times, most of the researches is focused to develop non-residual insecticides to control pests and vectors, this has been in part due to pests becoming resistant to insecticides, unacceptable pesticide residue levels in the environment, the banning of certain pesticides, increased costs of insecticide application and finally their detrimental effect on the judicious management of beneficial arthropods (Bernays, 1983). There-fore researchers have sough methods, alternative to conventional ones, not much involving the use of insecticides to control or eliminate the pests, It is widely reported that 150 species of forest and roadside trees (including shrub) in India produce oil seeds which are popularly known as minor or nonedible oils most of the oils contains valuable active principles and chemical compounds useful as medicines and pesticides (schmutterer and Ascher, 1984). Santolina chamaecyparissus oil has been used mainly for medicinal purposes and antifungal activity especially to control condidiasis (Suresh, 1993). Saxena (1987), and Mariappan et al (1988) have recommended nonedible oils of neem, chinaberry, custard, karanj and mahua for use against rice leaf hoppers and plant hoppers in laboratory and field trials, it was of our interest, to study the effectiveness of santolina oil against the survival of spodoptera litura and survival and ovipositional behaviour of the rice brown plant hopper nilaparvatha lugens (B.P.H) in laboratory comditions.

Materials and Methods:

Santolina oil obtained by steam distillation of aerial parts of santolina chamaecyparissus during flowering period had the following characteristics: specific gravity 0.95.(a) 6.4 acid value 0.97; ester value 38.46; Iodine value 88.01; boiling point 154oC; optical rotation +5.55 (at 20oC); refractive index 1.474-1.476 at 20oC and soluble in 0.1 Volume of 95% alcohol. A preliminary phytochemical investigation showed the presence of terpenes and flavonoids in the oil.

Mass rearing of nilaparvatha lugens (B.P.H) was done in the Insectary section of Tamilnadu Agricultural University. From third in star onwards the larva was reared at the rate of 25/basket to avoid crowding. The whole set up was maintained at 25±2oC and 65% R.H. The baskets were cleaned using cotton and 10% ,05% 1%,2%,5% and 10% of santolina oil were prepared using teepol as emulsifier, The control castor leaves were dipped in the volatile oil solution for 10 seconds, the dried treated leaves were fed to the 3rd in star larvae for two days A positive control was maintained throughout the experiment (Elgengaihi et al , 1992) for testing the activity in N. lugens the santolina volatile oil was prepared in different concentration for 1%, 3%,5% and 10%, V/V as mentioned earlier and sprayed on respective batches of rice seeding (45 days oil) five males and fifteen females released in each batch were covered with a chimney and the upper protion closed with a piece of muslin cloth, four replications were made for each concentrations, A control batch was maintained throughout the experiment, after 72 hrs, the insects were observed for their mortality and ovipositional behaviour, The % mortality and ovipositional behaviour were transferred into corresponding angles (aresin) and square root transformation according to panes and sukhatme (1985) and statistically analysed by randomized block design.

Results and Discussion:

The Santolina oil reduced inset survival after 72 hrs, the mortality rate was maximum at 5% group, when compared with 1% and 3%. The mortality rate was increased from the lower concentrations to higher concentrations i.e. 5% But there was no marked variation between 5% and 10% concentrations (Table 1). These results are compared with other selective non ediable oils and presented in table 1. Mariappan et al (1988) used rice green leaf hopper Nephotettix virescens and found insect mortality was 86%, 93% 99% 71%, 90% and 22% after spraying 5% concentrations of Karanj, Mahua, pinnai, Neem, custard – apple oil and detergent control respectively (Table 1.) from the results it is observed that the mortality rte of N luguns after exposure to santolina oil and less effective when compared to other nonedible oil in the same concentration. The DMRT test also confirms that 5% is the effective concentration to control N.lugens.

Table 1: The % mortality of N. lugens after exposure to TNI rice seedings sprayed with emulsified santolina volatile oil in different concentrations.

Treatment	Mean% mortality after 72 hours	Mean ovipositional behaviour (No of eggs laid after 72hours)
Oil (V/V)		
S. Oil (V/V)		
1%	12.50 (18.28)c	33.00 (5.33)d
3%	43.75 (41.25)b	15.25(3.93)c
5%	68.75 (65.25)a	5.25 (2.36)b
10%	68.75 (56.25)a	0.01 (0.71)a
Teepol (Control)	00.00 (6.55)d	44.75 (6.67)a
Karanj Oil*	0.86b	--
Mahua Oil	93ab	--
Pinnai Oil	99a	--
Neem Oil	71c	--
Custard-apple oil	90b	--
Detergent	22d	--

In a column, means followed by similar bitters are statically not different by multiple range test (Duncan, 1951)
* Data from Mariappan et.al (1988)

Nevertheless, the pest control potential of non edible and volatile oils has not been completely explored, consequently, the active principles of these oils are not thoroughly studied. Therefore we planned to study the ovipositional behaviour of the pest AN. Lugens. It is found that at 10% concentration the egg laying behaviour of the pest was fully controlled (Table 1). Statistical analysis (DMRT) showed that santolina oil has significantly higher pesticide activity against the sucking type pest N. lugens From the results presented in Table 1, it is concluded that the present findings are of interest to persons studying pest control strategies especially in developing countries, for whom the cost of input such as synthetic pesticides and environmental degradation is prohibitive, In addition the evaluation of pesticide activity form readily available resources for crop protection derive high priority and is more indigenous with respect to developing countries.

References:

1. Bernays E.A, (1983), Antifeedents in crop pest management pp. 259-271. In D.L Whitehead & W.S Bowers (Eds) Natural products for Innovative pest Management, pergamon Oxford.

2. Schmutterer H, and K.R.S Ascher (Eds) 1984. Natural Pesticides from neem tree. (Azadirachta indica A Juss) and other tropical plants Proc 2nd Deutsche Gesselschaft fuer technische Zusammenarbeit Eschborn.

3. Saxena R.C (1987) Neem Seed derivatives for management of Rice Insect Pests – A review of recent studies pp. 81-93. In H Schmutterer and K.R.S Ascher (Eds) Natural pesticides from the neem tree (Azadirachta indica A Juss) and other tropical Plants Proc 3rd Ind Neem conf Nairobi 1986. Deutsche Gesellschaft fuer Technische Zusammenarbeit, Eschborn.

4. Mariappan V.S, Jayaraj and saxena RC 1988. Effect on Nonedible seed oils on survival of Nephotettix Virescene (Homophera : cicadellida) and on transmission of rice Tungo virus 81 (5): 1396-1372.

5. Elgengaihi S.E, Motawe E.A Omer and Elbazza ZE (1992) chemical and biological studies on vitrex agnus costus L Volatile oils Indian perfumer 36(9) : 293-296.
6. Panse V.G and sukhatma P.V (1985) Statistical methods for agricultural workers ICAR, New Delhi, pp 359-360.

7. Suresh B, 1993. Evaluation and development of drugs in the Treatment of candidiasis, Ph.D thesis, Bharathiar University.