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CONTROL OF ASH WEEVIL, *MYLLOCERUS SUBFASCIATUS* GUERIN. (CURCULIONIDAE : COLEOPTERA) IN BRINJAL USING FIPRONIL

G.P. MUTTHURAJU, N. SRINIVASA AND R. GIRISH
DEPARTMENT OF AGRICULTURAL. ENTOMOLOGY, UNIVERSITY OF AGRICULTURAL SCIENCES, GKVK, BANGALORE 560 065, INDIA
(e-mail : mutthuwithu@yahoo.co.in)

Incidentally significant mortality of adult ash weevil, *Myllocerus subfasciatus* Guerin. was noticed in brinjal crop when fipronil 5SC was attempted as foliar spray against serpentine leaf miner in our experimental field at Gandhi Krishi Vignana Kendra, Bangalore during summer 2012. Hence the present study was aimed at the effectiveness of fipronil against ash weevil adults. Data from a laboratory study revealed that compared to the conventional insecticide chlorpyrifos, fipronil can be a promising treatment for protecting brinjal crop from *Myllocerus subfasciatus* infestation.

Key words : Brinjal, Ash weevil, *Myllocerus subfasciatus*, fipronil.

INTRODUCTION

Brinjal (*Solanum melongena* Linn.) is an important poor man's vegetable crop of India and is widely grown throughout the year in all parts of the country and contributes to 17.8 per cent of the total production of vegetables in the country. It is a popular vegetable in the entire Asia and also in Southern Europe, known as eggplant. In India, brinjal is grown over an area of 6.80 lakh hectares, with an annual production of 118.96 lakh tonnes and the productivity stands at 17.50 tonnes per hectare (Anonymous, 2011). Also the crop is threatened by several insect and non-insect pests, of which grey or ash weevil, *Myllocerus subfasciatus* Guerin, is a major pest in the South Indian states since 1983 (Tewari & Krishna Kumar, 1983), causing 100% crop loss at times. The adult weevils feed on the leaves, while the grubs being subterranean exclusively feed on root portion leading to wilting and premature death of plants.

Application of conventional insecticides like chlorpyrifos, phorate, carbofuran, *etc.* including entomopathogenic nematodes and bacterial preparations against this weevil in the field has not been satisfactory. Significant mortality of these adult weevils was noticed when fipronil 5SC was foliar sprayed to control serpentine leaf miner in the experimental brinjal crop in the field. Fipronil, a member of phenylpyrazole group is a "new generation" insecticide with good selectivity between insects and mammals. Fipronil compound interferes with the GABA-gated chloride channels, disrupts normal nerve influx transmission and at sufficient doses, causes excitation, severe paralysis and death (Gant *et al.*, 1998).

MATERIALS AND METHODS

Adult weevils collected from brinjal crop in field at Gandhi Krishi Vignana Kendra, Bangalore were reared on brinjal leaves in the laboratory. The weevils were assayed using 10 cm diameter glass petri plates with a thin layer of soil. Fipronil 5SC (Regent®) @ 1.0, 1.5, 2.0 and 2.5 ml/lt. of water and chlorpyrifos 20EC (Lethal® TC) @ 2 ml and 4 ml/lt. of water were evaluated for their toxicity against adult weevils. Soil and brinjal leaves were treated separately with various combinations, so that each chemical or concentration was used to treat only soil, only leaf and both soil & leaf maintained in the Petri plate and adult weevils were released for bioassay studies. Ten adult weevils were

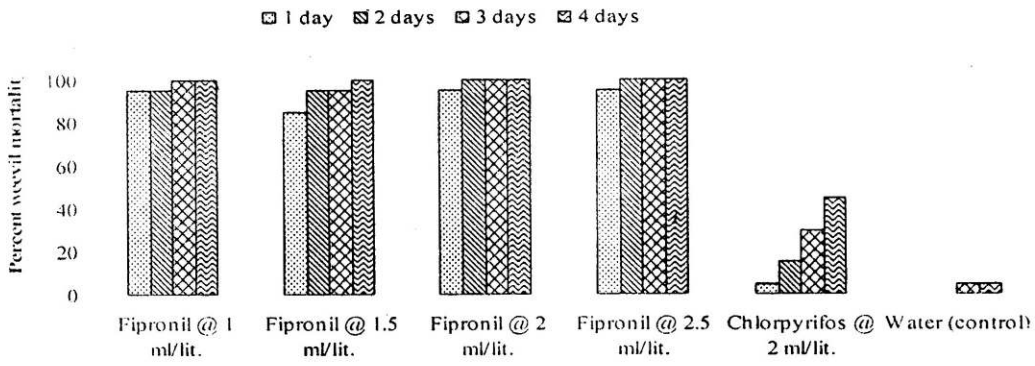

Fig 1. Leaf treatment

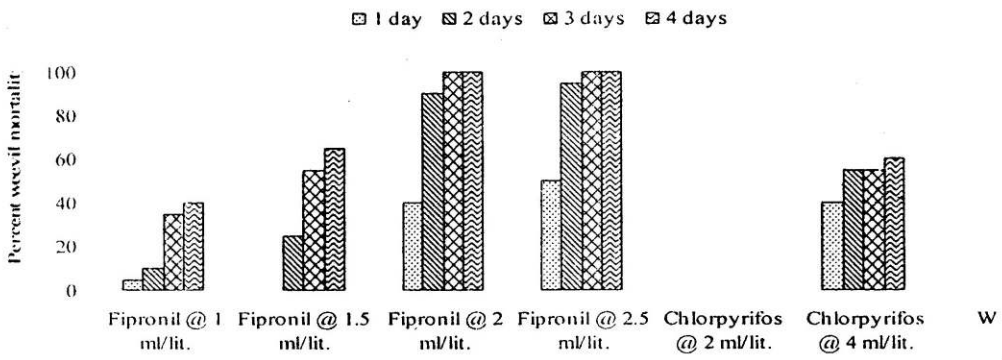

Fig 2. Soil treatment

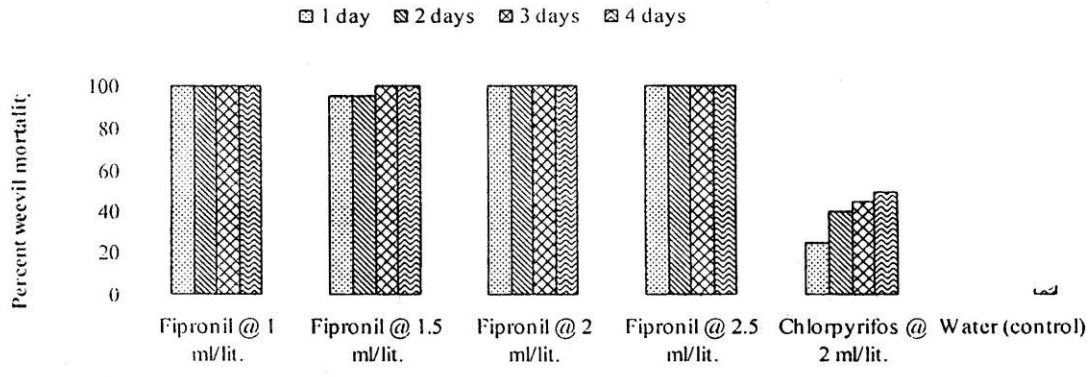

Fig 3. Leaf + Soil treatment

Figs. 1, 2 & 3 : Bioefficacy of fipronil 5SC and chlorpyrifos 20EC against ash weevil infestation in brinjal

Table 1 : Bioefficacy of fipronil 5SC and chlorpyrifos 20EC against ash weevil infestation in brinjal.

Treatments		Per cent mortality after			
		1 day	2 days	3 days	4 days
Leaf treated	Fipronil @ 1 ml/lit.	95 (80.50)^{a}	95 (80.50)^{a}	100 (89.43)^{a}	100 (89.43)^{a}
	Fipronil @ 1.5 ml/lit.	85 (67.50)^{ab}	95 (80.50)^{a}	95 (80.50)^{a}	100 (89.43)^{a}
	Fipronil @ 2 ml/lit.	95 (80.50)^{a}	100 (89.43)^{a}	100 (89.43)^{a}	100 (89.43)^{a}
	Fipronil @ 2.5 ml/lit.	95 (80.50)^{a}	100 (89.43)^{a}	100 (89.43)^{a}	100 (89.43)^{a}
	Chlorpyrifos @ 2 ml/lit.	5 (9.22)^{d}	15 (22.50)^{cd}	30 (32.89)^{bc}	45 (42.12)^{b}
	Water (control)	0 (0)^{d}	0 (0)^{e}	5 (9.22)^{cd}	5 (9.22)^{c}
Soil treated	Fipronil @ 1 ml/lit.	5 (9.22)^{d}	10 (13.28)^{de}	35 (34.60)^{bc}	40 (38.67)^{b}
	Fipronil @ 1.5 ml/lit.	0 (0)^{d}	25 (29.89)^{bcd}	55 (48.32)^{b}	65 (53.78)^{b}
	Fipronil @ 2 ml/lit.	40 (39.11)^{c}	90 (71.57)^{a}	100 (89.43)^{a}	100 (89.43)^{a}
	Fipronil @ 2.5 ml/lit.	50 (45.00)^{bc}	95 (80.50)^{a}	100 (89.43)^{a}	100 (89.43)^{a}
	Chlorpyrifos @ 2 ml/lit.	0 (0)^{d}	0 (0)^{e}	0 (0)^{d}	0 (0)^{c}
	Chlorpyrifos @ 4 ml/lit.	40 (39.11)^{c}	55 (48.32)^{b}	55 (48.32)^{b}	60 (51.33)^{b}
	Water (control)	0 (0)^{d}	0 (0)^{e}	0 (0)^{d}	0 (0)^{c}
Leaf and soil treated	Fipronil @ 1 ml/lit.	100 (89.43)^{a}	100 (89.43)^{a}	100 (89.43)^{a}	100 (89.43)^{a}
	Fipronil @ 1.5 ml/lit.	95 (80.50)^{a}	95 (80.50)^{a}	100 (89.43)^{a}	100 (89.43)^{a}
	Fipronil @ 2 ml/lit.	100 (89.43)^{a}	100 (89.43)^{a}	100 (89.43)^{a}	100 (89.43)^{a}
	Fipronil @ 2.5 ml/lit.	100 (89.43)^{a}	100 (89.43)^{a}	100 (89.43)^{a}	100 (89.43)^{a}
	Chlorpyrifos @ 2 ml/lit.	25 (22.50)^{cd}	40 (38.67)^{bc}	45 (41.99)^{b}	50 (45.00)^{b}
	Water (control)	0 (0)^{d}	0 (0)^{e}	0 (0)^{d}	5 (9.22)^{c}
'F' test		*	*	*	*
SEM±		(8.65)	(6.87)	(6.28)	(5.71)
CD at P=0.05		(24.69)	(19.63)	(17.93)	(16.23)

* : Significant at P=0.05; Values in the parentheses are angular transformed values;
Mean values with same alphabetical superscript within each column are statistically on par.

used for each treatment, with two replications. Altogether, there were 19 treatment combinations including three water used controls (for leaf, for soil and for both soil & leaf). Spray treated brinjal leaves and soil were air dried and treated leaves were offered to adult weevils in the petri plate, taking care to avoid the escape of weevils and maintained in the laboratory. After 3 days, the test insects were provided with fresh untreated brinjal leaves. Mortality of adult weevils was recorded treatment-wise at 24 hrs intervals up to 96 hrs (4 days). Per cent mortality data after angular transformations were subjected to statistical analysis following Analysis of Variance technique for Completely Randomized Design to draw inference at 5% level of significance.

RESULTS AND DISCUSSION

Data pertaining to mortality of adult weevils presented in the table and figures indicated significant effect of fipronil when treated on the leaves. As a result, weevil mortality (95%) was observed within 24 hrs (Table I; Figs. 1, 2 & 3). After 4 days, fipronil @ 1 and 1.5 ml/lt. of water when used on soil could result in highest mortality of 65% only, but with 2 ml and 2.5 ml treatment more than 90% mortality of adults was observed from second day onwards. Comparatively chlorpyrifos treatment @ 2 ml on the leaf resulted in maximum adult mortality of only 45% on the fourth day and the same treatment in soil had no effect absolutely. Also, treating the soil with chlorpyrifos @ 4 ml, though recorded 40% weevil mortality initially after 24 hrs (on the first day), did not result in further improvement in its efficacy up to the fourth day, as the maximum mortality observed was only 60%. Significant control of adult weevils was apparent when fipronil treated leaves were made available and thus the additional effect by treating the soil may not be necessary or appreciated. Also treating soil with chlorpyrifos 4 ml was not found superior over treating both leaf and soil @ 2 ml.It is inferred from the laboratory study that fipronil could be an effective treatment for protecting brinjal crop from *Myllocerus subfasciatus* weevil damage early in the season. Significant (90-95%) mortality of adults early in the season with fipronil application would certainly reduce pest density, which otherwise continue to damage this ong duration crop (140-150 days) of brinjal. More detailed studies on the persistence and dissipation of fipronil on foliage and soil would be necessary before recommending fipronil as a foliar / soil application, to target both adults and grubs of this weevil pest.

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