correlated with the coccinellid population at per cent level. The rate of increase was 0.05 in all the weeks. Increase in the humidity favours the aphids and thrips, which supported the higher coccinellid population.

References

Banarjee, B. (1972). Rainfall pest activity. *Tea and bud, newsletter*. Tea research association. Tokkai Experiment Station, Jorhat, **19**: 44-47.

Becker, P.C. (1974). Pest of ornamental plants. Ministry of Agriculture. Fisheries and Food, London.

Beshnoi, O., Mohan Singh, P., Rao, V.U.M., Ram Niwas and Sharama, P.D. (1996). Population dynamics of cotton pests in relation to weather parameters. *Indian J. Ent.* **58**: 103-107.

Fisher, R.A. and Yates, F. (1938). Statistical tables for biological, agricultural and medical research. Oliver and Boyd. London, W.C.

Parker, M.W. (1946). Environmental factors and their control in-plant experiments. *Soil Sci.* **62**: 109.

Rote, N.B. and Puri, N. (1991). Population dynamics of whitefly, *Bemisia tabaci* on cotton and its relationship with weather parameters. *J.Cotton Res. Dev.* **5**: 181-189.

Saminathan, V.R., Jayaraj, S. and Regupathy, A. (2001). Studies on the influence of major weather factors on the incidence of gram caterpillar *Helicoverpa armigera* (Hubner) and *Amrasca devastans* (Distant) on cotton. Proceedings of the national symposium on pest management strategies: Current trends and future prospects. Entomological research institute, Loyala College, Chennai-600 034.

Shyam Prasad, G. and Logiswaran, G. (1997). Influence of weather factors on population fluctuation on insect pests on brinjal at Madurai, Tamil Nadu. *Indian J. Ent.* **59**: 385-388.

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Research Notes

Bioefficacy of betacyfluthrin against *Spodoptera litura*

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Defoliators often pose a serious problem in groundnut and cause significant yield loss, if left unchecked. Among defoliators, the tobacco caterpillar *Spodoptera litura* (Fab.) has assumed the status of serious pest of irrigated groundnut. The polyphagous nature of the pest allows it to survive on numerous alternative hosts, thus poses a big problem in the management (Ramana *et al.* 1988). Chemical insecticides have been extensively used to control *S.litura*, but the pest has developed resistance to most of the available organochlorine, organophosphate and carbamate compounds (Jaglan *et al.* 1997). There is therefore challenging interest in the discovery of novel insecticide molecules with different biochemical targets. Betacyfluthrin is a novel insecticide of pyrethroid group developed by Bayer and has a broad spectrum activity against lepidopteran, coleopteran and sucking pests. The present study was undertaken to evaluate the bioefficacy of betacyfluthrin against *S.litura* on irrigated groundnut.

Two supervised field experiments were conducted to evaluate the bioefficacy of betacyfluthrin against *S.litura*. The first field experiment was conducted at a farmer's field at Arasakuli in Cuddalore district of Tamil Nadu during summer 1998 with TMV 7 cultivar as an irrigated crop. The experiment was laid

Table 1. Effect of betacyfluthrin as foliar application against *S. litura* on groundnut (Summer 1998)

(mean of four observations)

Sl. No.	Treatments	No. of larvae/10 plants					Pod yield** kg/ha
		Before treatment #	1 DAT**	3 DAT**	7 DAT**	14 DAT#	
1.	Betacyfluthrin 025 EC @ 12.5 g a.i./ha	8.50 (2.979)	3.75 (2.014)b	3.25 (1.907)b	2.25 (1.654)b	0.25 (0.837)	1764b
2.	Betacyfluthrin 025 EC @ 18.75 g a.i./ha	8.25 (2.957)	3.25 (1.917)b	2.25 (1.654)ab	1.00 (1.844)ab	0.00 (0.709)	1812b
3.	Betacyfluthrin 025 EC @ 25.0 g a.i./ha	9.75 (3.199)	1.75 (1.475)a	1.50 (1.319)a	0.00 (0.709)a	0.25 (0.837)	1906a
4.	Cypermethrin 10 EC @ 60 g a.i./ha	9.75 (3.195)	3.25 (1.917)b	3.25 (1.924)b	1.00 (1.184)ab	0.00 (0.709)	1760b
5.	Quinalphos 25 EC @ 500 g a.i./ha	9.25 (3.116)	3.75 (2.052)b	3.25 (1.934)b	1.00 (1.184)ab	0.00 (0.709)	1772b
6.	Untreated check	9.5 (3.153)	7.25 (2.783)c	7.0 (2.730)c	5.00 (2.325)c	0.25 (0.837)	1606c

In a column means followed by a common letter are not significantly different by DMRT ($p=0.05$)

Values in parentheses are transformed values $\sqrt{x+0.5}$

\# - Non significant

** - Significant at $p = 0.01$

DAT - Days after treatment

out in randomised block design, replicated four times with a plot size of 8x4m in 30 x 10 cm spacing. Betacyfluthrin 025 EC at 12.5, 18.75 and 25.0 g a.i./ha were applied at 45 days after sowing (DAS) using high volume sprayer with 500 l/ha spray fluid. Cypermethrin 10 EC at 60 g a.i./ha and quinalphos 25 EC at 500 g a.i./ha were used as standards. An untreated check was maintained.

Assessment of the larval population of *S. litura* was made before the treatment and 1,3,7 and 14 days after the treatment in each of 10 randomly selected plants per plot leaving border rows. Yield was recorded at harvest.

A second field experiment was conducted at Regional Research Station, Vridhachalam during *kharif* 1998. The experiment was conducted on VRI 2 cultivar in irrigated condition with a spacing of 30 x 10 cm in 5 x 4 m plots laid out in a randomised block design, replicated four times. The treatments were given on 45 and 60 DAS and the pest population was assessed as in the previous experiment.

In the first field experiment conducted during summer 1998, the pretreatment population of *S. litura* ranged from 8.25 to 9.75/10 plants (Table 1). All the treatments significantly reduced the population at one day after treatment (DAT). A minimum of 1.75/10 plants was observed in betacyfluthrin at 25.0 g a.i./ha and the maximum (7.25) was observed in the untreated check. At 3 and 7 DAT also, a similar trend was noticed. Betacyfluthrin at 18.75 and 25.0g a.i./ha were significantly superior to other treatments in reducing the larval population. At 14 DAT,

Table 2. Effect of betacyfluthrin as foliar application against *S. litura* on groundnut (*kharif* 1998) (mean of four observations)

Sl. No.	Treatments	No. of larvae / 10 plants									Pod yield** kg/ha
		Before treatment#	1 DAT**	3 DAT**	7 DAT**	14 DAT**	1 DAT**	3 DAT**	7 DAT**	14 DAT**	
1.	Betacyfluthrin 025 EC @ 12.5 g a.i./ha	10.25 (3.261)	11.00 (3.379)c	4.50 (2.201)bc	5.75 (2.489)b	7.00 (2.73)b	4.00 (2.103)c	2.50 (1.726)b	1.25 (1.274)b	1.25 (1.274)b	1872b
2	Betacyfluthrin 025 EC @ 18.75 g a.i./ha	10.00 (3.193)	4.00 (2.093)ab	2.75 (1.699)b	4.00 (2.103)ab	6.25 (2.581)ab	4.00 (2.115)c	1.75 (1.492)b	1.50 (1.403)b	1.25 (1.274)b	2070a
3.	Betacyfluthrin 025 EC @ 25.0 g a.i./ha	11.00 (3.383)	2.50 (1.726)a	0.75 (1.055)a	2.75 (1.772)a	4.25 (2.149)a	1.00 (1.216)a	0.00 (0.709)a	0.00 (0.709)a	0.00 (0.709)a	2125a
4.	Cypermethrin 10 EC @ 60 g a.i./ha	12.75 (3.635)	4.00 (2.087)ab	2.75 (1.772)bc	4.25 (2.171)ab	7.50 (2.817)b	2.75 (1.798)bc	2.00 (1.507)b	2.00 (1.565)b	1.00 (1.216)ab	1890b
5.	Quinalphos 25 EC @ 500 g a.i./ha	12.00 (3.5210	5.25 (2.376)b	4.75 (2.284)c	5.25 (2.391)ab	8.50 (2.994)b	2.50 (1.726)b	2.00 (1.565)b	2.00 (1.538)b	2.00 (1.565)b	1850b
6.	Untreated check	12.00 (3.507)	11.00 (3.369)c	16.50 (4.109)d	20.00 (4.499)c	20.50 (4.577)c	16.50 (4.109)d	10.00 (3.231)c	10.00 (3.235)c	5.50 (2.418)c	1735c

In a column means followed by a common letter are not significantly different by DMRT (p=005)
Values in parentheses are transformed values $\sqrt{x + 0.5}$
\# - Non significant **- Significant at p=0.01 DAT- Days after treatment

the larval population declined in all the treatments and the differences among the treatments were not significant.

The result on pod yield indicated that all the treatments recorded significantly higher yield over untreated check. Among the treatments betacyfluthrin at 25.0 g a.i./ha recorded 1906 kg/ha and was superior to the other treatments. Betacyfluthrin at 18.75 g a.i./ha recorded 1812 kg/ha.

In the second experiment conducted during *kharif* 1998, population of *S. litura* ranged from 10.00 to 12.75/10 plants before the treatment (Table 2). At one DAT, all the treatments except betacyfluthrin at 12.5 g a.i./ha significantly reduced the larval population. At 3 DAT, a minimum of 0.75 larvae/10 plants was observed in betacyfluthrin at 25.0 g a.i./ha, while the maximum (16.50) was observed in untreated check. A similar trend was noticed during 7 and 14 DAT also. Second round of spray was given at 14 days after first spray and betacyfluthrin at 18.75 and 25.0 g a.i./ha recorded a significant lower population in all the observations recorded after second spray.

Among the treatments betacyfluthrin at 18.75 and 25.0 g a.i./ha recorded a pod yield of

2070 and 2125 kg/ha respectively and were superior to other treatments.

Rathi *et al.* (1982) reported that fenvalerate 0.01 per cent spray was toxic to *S.litura* and was superior to other insecticides *viz.* phenthoate (0.05%), dimethoate (0.05%) and quinalphos (0.05%). The synthetic pyrethroids decamethrin (0.005%), cypermethrin (0.01%) and fenvalerate (0.01%) were found to be effective in checking *S.litura* on groundnut (Patel and Vyas, 1989). Mathirajan (1998) reported that 15 g ai./ha of lambdacyhalothrin was effective against *S.litura* on groundnut. In the present study also, betacyfluthrin 025 EC effectively checked the population of *S.litura* and a dose of 18.75 g a.i./ha is sufficient for control of the pest and to obtain an increased pod yield.

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References

Jaglan, R.S., Sircar, P. and Dhingra, S. (1997). Relative efficacy of solvents and emulsifiers in designing of the toxicity of decamethri emulsion to *Spodoptera litura*. *Indian Ent.* **58**: 226-230.

Mathirajan, V.G. (1998). Bioefficacy and dete mination of lambdacyhalothrin (Karathe EC) residues on brinjal, tomato and chillie *M.Sc.(Agri.) Thesis*, Tamil Nadu Agricultur University, Coimbatore-641 003.

Patel, R.L. and Vyas, H.N. (1989). Evaluation toxicity of some insecticides against tl eggs of *Spodoptera litura* infesting ground nut. *Agricultural Science Digest (Karnal)* **9**: 110-112.

Ramana, V.V., Reddy, G.P.V. and Krishnamurthy M.M. (1988). Synthetic pyrethroids and othe bait formulations in the control of *Spodopter litura* (Fab.) attacking *rabi* groundnut *Pesticides*, **1**: 13-16.

Rathi, R.K., Thakur, R.C., Kharthi, A.K. and Patitunda K.A. (1982). Relative efficacy of some moder insecticides against *Spodoptera litura* (Fab. on soybean. *Pestology*, **6**: 13.

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Acute toxicity of betacyfluthrin to *Helicoverpa armigera*

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Helicoverpa armigera (Hub.) is the most dreaded insect pest in agriculture, accounting for the consumption of over 30 per cent of the total insecticides used all over the world. An annual crop loss to *Helicoverpa* in India has been estimated to around Rs.2000 crores inspite of the use of insecticides worth about Rs.5000 crores (Pawar, 1998). The pest has assumed major status in crops like cotton, pigeonpea, chickpea, groundnut, sunflower, tomato and many other crops of economic importance. Synthetic pyrethroids are playing an important role in the control of *H.armigera* all over the world because of their quick action, high insecticidal efficacy and low mammalian toxicity (Sidhu *et al.* 1983). Betacyfluthrin 025 EC (Bulldock) is a new insecticide of the pyrethroid group developed by Bayer. In the present study the acute toxicity of betacyfluthrin was evaluated against *H.armigera*.