Biological Forum – An International Journal 15(1): 286-288(2023)

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Efficacy of different Botanicals against Blue Butterfly, *Lempides boeticus* in Pigeonpea

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(Received: 06 January, 2023; Revised: 08 January, 2023; Accepted: 09 January, 2023; Published: 16 January, 2023)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: A field experiment was conducted at Agricultural Research Station, Anand Agricultural University, Derol, Gujarat, India during *kharif*, 2018-19, 2019-20 and 2020-21, to study efficacy of different botanicals against Blue butterfly, *Lempides boeticus* in pigeonpea. Ten treatments including untreated control were evaluated for the management of *L. boeticus*. The botanicals neem seed kernel extract 5 per cent, neem leaf extract 10 per cent, neem oil 0.5 per cent, custard apple leaf extract 10 per cent, custard apple seed extract 5 per cent, garlic extract 5 per cent, tobacco decoction 2 per cent, eucalyptus leaf extract 10 per cent, azadirachtin 0.15 EC 0.0006 per cent were applied at initiation of pest and subsequent two sprays were applied at ten days interval. Among all the different botanicals, larval population of *L. boeticus* was found significantly lower in the plot treated with azadirachtin 0.15 EC @ 0.0006 per cent (0.34 larva/plant) followed by neem oil 0.5 per cent (0.45 larva/plant).

Keywords: Blue butterfly, Botanicals, Pigeonpea, Lempides boeticus, Azadirachtin.

INTRODUCTION

Pigeonpea [*Cajanus cajan* (L.) Millsp] a very important and widespread used legume crop. In India it is also called as arhar or tur (Dehury *et al.,* 2020). Pigeonpea is highly nutritious and a rich source of dietary protein (22.3%), carbohydrates (57.6%), fibre (1.5%) and minerals (3.5%) (Gupta *et al.,* 2006). It is an important pulse crop in the semi-arid tropics and sub-tropical farming systems, providing high quality vegetable protein, animal feed and firewood (Mittal and Ujagir 2005). In India, pigeonpea is cultivated in the area of 45.32 lakh hectares, while its production is 38.92 lakh tonnes and productivity is 859 kg/ hectare (Anonymous, 2020). The area under pigeonpea cultivation in Gujarat is 2.13 lakh hectares, whereas its production is 2.11 lakh tonnes with productivity of 991 kg/ hectare (Anonymous, 2020). Pigeonpea being a rich source of protein are prone to insect pests and diseases attack. A pigeonpea crop produces two to three flushes of flowers during a season, but only one of them contributes significantly to the overall grain harvest; the others are either destroyed by insects or suffer from other biotic and abiotic factors that cause poor flower and pod retention (Pandit and Dwivedi 2021). It is generally attacked by more than 300 species of insect- pests and this lead to an approximate economic loss in yield of 15 per cent worth $2285.29 million (Dhaliwal *et al*., 2015). More than 300 insect species belonging to 8 orders and 61 families have been found to infest pigeon pea starting from seedling stage and continues till harvesting and even during the storage condition (Kevel *et al*., 2010). However, about 60 per cent damage is solely caused by the pod borer complex (Wadaskar *et al.,* 2013). The pod borer complex comprising, gram pod borer, *Helicoverpa armigera*, spotted pod borer, *Maruca vitrata* and pod fly, *Melanagromyza obtusa* cause a yield loss up to 60 per cent (Sreekanth *et al.*, 2021). Pod borers, *Maruca vitrata* (Geyer), *Exelastis atomosa* (Wals.), *Lampides boeticus* (L.), *Helicoverpa armigera* (Hubner) and *Melanagromyza obtusa* (Malloch), on the pigeonpea are of major importance (Srilaxmi and Paul 2010; Sharma, 2016). Among this pests *L. boeticus* damage caused during the flowering and podding stage. Due to regular and indiscriminate use of chemical insecticides and the misuse of synthetic pesticides on the crop led to development of insecticide resistance in target pests, pest resurgence and secondary pest outbreaks, loss of bio-diversity, environmental pollution and residual toxicity and occurrence of human health hazards. Therefore, there is need to develop eco-friendly tools of pest management. Out of different tools use of botanicals in one of them. Hence, present experiment was conducted to evaluate some botanicals for the management of blue butterfly, *L. boeticus* in pigeonpea.

MATERIALS AND METHODS

A field experiment on efficacy of different botanicals against blue butterfly, *L. boeticus* in pigeonpea was carried out at Agricultural Research Station, Anand Agricultural University, Derol (Gujarat), India during *kharif*, 2018-19, 2019-20 and 2020-21. The experiment was laid out in randomized block design with ten treatments and three replications using pigeonpea variety AGT 2. Pigeonpea crop was sown in mid-July at the spacing of 120 × 30 cm. The gross plot size was 6.0 × 5.1 m, whereas net plot size was 3.6 × 5.0 m. All agronomic practices were followed to raise the crop. Neem seed kernel extract 5 per cent, neem leaf extract 10 per cent, neem oil 0.5 per cent, custard apple leaf extract 10 per cent, custard apple seed extract 5 per cent, garlic extract 5 per cent, tobacco decoction 2 per cent, eucalyptus leaf extract 10 per cent, azadirachtin 0.15 EC 0.0006 per cent were evaluated along with control. The first spray was applied at initiation of pest and subsequent two sprays were applied at 10 days interval. The spray was applied with manually operated knapsack sprayer fitted with hollow cone nozzle. For record the observations, 5 plants was selected randomly from each net plot area and number of larvae of *L. boeticus* were counted. The larval population was recorded before first spray, 5 and 10 days after each spray.

RESULTS AND DISCUSSION

The data on the efficacy of different botanicals against *L. boeticus* of pigeonpea are given in Table 1. Data showed that during the year 2018-19, significantly lower larval population of *L. boeticus* was recordedd in plot treated with azadirachtin 0.15 EC 0.0006 per cent (0.45 larva/plant) and it was at par with neem oil 0.5 per cent (0.56 larva/plant). Similarly, in the year 2019-20, all the tested botanical treatments were found to be significantly superior over control. Significantly lower larval population of *L. boeticus* was observed in plot treated with azadirachtin 0.15 EC (0.22 larva/plant) and it was at par with neem oil 0.5 per cent (0.36 larva/plant). Next best treatment was neem seed kernel extract 5 per cent (0.48 larva/plant).

Table 1: Efficacy of different botanicals against *L. boeticus* of pigeonpea.

Sr. No.	Treatment	No. of larva(e)/plant												
		2018-19				2019-20				2020-21				Pooled over spray over years
		1st spray	2nd spray	3rd spray	Pooled over sprays	1st spray	2nd spray	3rd spray	Pooled over sprays	1st spray	2nd spray	3rd spray	Pooled over sprays	
1.	Neem Seed Kernal Extract 5%	1.12^{ab} (0.74)	1.21^{bcd} (0.95)	1.18^{cd} (0.89)	1.17^{c} (0.86)	0.94^{abc} (0.38)	1.05^{bc} (0.60)	0.97^{a} (0.44)	0.99^{b} (0.48)	0.95^{ab} (0.41)	1.09^{abc} (0.68)	0.96^{ab} (0.42)	1.00^{a} (0.50)	1.05^{c} (0.60)
2.	Neem Leaf Extract 10%	1.24^{cd} (1.05)	1.38^{cd} (1.40)	1.30^{cd} (1.18)	1.31^{d} (1.20)	1.09^{bcd} (0.69)	1.21^{cd} (0.99)	1.19^{bc} (0.92)	1.16^{c} (0.85)	1.18^{c} (0.89)	1.27^{cd} (1.12)	1.26^{cd} (1.09)	1.24^{cd} (1.03)	1.24^{f} (1.03)
3.	Neem Oil 0.5%	1.15^{abc} (0.83)	0.97^{a} (0.45)	0.96^{ab} (0.42)	1.03^{ab} (0.56)	0.90^{ab} (0.31)	0.99^{ab} (0.48)	0.91^{a} (0.33)	0.93^{ab} (0.36)	0.94^{ab} (0.39)	1.04^{ab} (0.58)	0.90^{a} (0.32)	0.96^{a} (0.43)	0.97^{b} (0.45)
4.	Custard Apple Leaf Extract 10%	1.03^{a} (0.56)	1.15^{b} (0.82)	1.12^{bc} (0.74)	1.10^{bc} (0.71)	1.01^{abcd} (0.52)	1.10^{bc} (0.71)	1.13^{b} (0.78)	1.08^{c} (0.67)	1.07^{bc} (0.65)	1.16^{bcd} (0.85)	1.10^{bc} (0.71)	1.11^{b} (0.74)	1.10^{cd} (0.71)
5.	Custard Apple Seed Extract 5%	1.13^{abc} (0.79)	1.21^{bcd} (0.96)	1.19^{cd} (0.92)	1.18^{c} (0.89)	1.04^{bcd} (0.58)	1.16^{c} (0.85)	1.16^{bc} (0.87)	1.12^{c} (0.75)	1.11^{c} (0.72)	1.18^{bcd} (0.88)	1.16^{cd} (0.84)	1.15^{bc} (0.82)	1.15^{de} (0.82)
6.	Garlic extract 5%	1.64^{bc} (2.20)	1.20^{b} (0.93)	1.22^{cd} (0.99)	1.19^{c} (0.92)	1.08^{bcd} (0.67)	1.19^{c} (0.92)	1.17^{bc} (0.87)	1.15^{c} (0.82)	1.11^{c} (0.73)	1.26^{cd} (1.09)	1.21^{cd} (0.96)	1.19^{bcd} (0.92)	1.18^{ef} (0.89)
7.	Tobacco decoction 2%	1.17^{bc} (0.86)	1.18^{b} (0.89)	1.20^{cd} (0.93)	1.18^{c} (0.89)	1.05^{bcd} (0.60)	1.17^{c} (0.87)	1.14^{b} (0.80)	1.12^{c} (0.75)	1.10^{c} (0.72)	1.19^{bcd} (0.91)	1.14^{bcd} (0.79)	1.14^{bc} (0.80)	1.15^{de} (0.82)
8.	Eucalyptus leaf extract 10%	1.17^{bc} (0.86)	1.22^{bcd} (0.99)	1.21^{cd} (0.95)	1.20^{c} (0.93)	1.11^{cd} (0.73)	1.22^{cd} (0.99)	1.20^{bc} (0.94)	1.18^{c} (0.89)	1.15^{c} (0.83)	1.24^{bcd} (1.04)	1.26^{cd} (1.08)	1.22^{bcd} (0.98)	1.20^{ef} (0.94)
9.	Azadirachtin 0.15 EC (0.0006%)	1.09^{ab} (0.69)	0.93^{a} (0.36)	0.90^{a} (0.32)	0.97^{a} (0.45)	0.83^{a} (0.19)	0.88^{a} (0.27)	0.83^{a} (0.19)	0.85^{a} (0.22)	0.89^{a} (0.29)	0.96^{a} (0.41)	0.87^{a} (0.26)	0.90^{a} (0.32)	0.91^{a} (0.33)
10.	Control	1.33^{d} (1.26)	1.37^{cd} (1.38)	1.35^{d} (1.33)	1.35^{d} (1.32)	1.16^{d} (0.87)	1.38^{d} (1.40)	1.32^{c} (1.24)	1.29^{d} (1.16)	1.18^{c} (0.89)	1.30^{d} (1.19)	1.32^{d} (1.24)	1.29^{d} (1.16)	1.31^{g} (1.21)
S. Em. ±	T	0.04	0.05	0.07	0.03	0.06	0.05	0.05	0.03	0.05	0.06	0.06	0.03	0.02
	P	0.02	0.02	0.03	0.01	0.03	0.02	0.02	0.01	0.02	0.03	0.03	0.02	0.01
	S	--	--	--	0.02	--	--	--	0.02	--	--	--	0.02	0.02
	Y	--	--	--	--	--	--	--	--	--	--	--	--	0.01
	(T× P)	0.05	0.07	0.10	0.04	0.08	0.07	0.07	0.04	0.07	0.09	0.08	0.05	0.03
	(T × S)	--	--	--	0.05	--	--	--	0.05	--	--	--	0.06	0.03
	(T × Y)	--	--	--	--	--	--	--	--	--	--	--	--	0.03
	(S × P)	--	--	--	0.02	--	--	--	0.02	--	--	--	0.03	0.03
	(S × Y)													0.02
	(P × Y)	--	--	--	0.02	--	--	--	0.02	--	--	--	0.03	0.01
	(T × P × S)	--	--	--	0.08	--	--	--	0.07	--	--	--	0.08	0.05
	(T × P × Y)	--	--	--	--	--	--	--	--	--	--	--	--	0.05
	(T × S × Y)	--	--	--	--	--	--	--	--	--	--	--	--	0.06
	(P × S × Y)	--	--	--	--	--	--	--	--	--	--	--	--	0.02
	(T × P × S × Y)	--	--	--	--	--	--	--	--	--	--	--	--	0.08
C.D. at 5%		Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
C.V. %		7.95	10.61	14.1	11.09	13.45	11.18	10.53	11.69	10.69	13.16	12.87	12.92	11.91

Note: Figures outside parenthesis are $\sqrt{x + 0.5}$ transformed value and those inside parenthesis are retransformed values. Treatment means with the letter(s) in common are not significant by DNMRT at 5% level of significance. Significant parameters and its interactions: during 2018-19 (T and P), 2019-20 (T, P, S and P x S), 2020-21 (T, P, S and P × S) and pooled over years (T, P, Y, S × Y and P × S × Y.

In the year 2020-21, azadirachtin 0.15 EC 0.0006 per cent significant by lowest *L. boeticus* larvae (0.32 larva/plant) than rest of the treatments and it was at par with neem oil 0.5 per cent and neem seed kernel extract 5 per cent.

The pooled analysis of three years data indicated that the lowest larval population of *L. boeticus* (0.33 larva/plant) was registered in plots treated with azadirachtin 0.15 EC 0.0006 per cent. The order of different botanicals for their effectiveness against larval population of *L. boeticus* was azadirachtin 0.15 EC 0.0006 per cent (0.33 larva/plant) < neem oil 0.5 per cent (0.45 larva/plant) < neem seed kernel extract 5 per cent (0.60 larva/plant) < custard apple leaf extract 10 per cent (0.71 larva/plant) < custard apple seed extract 5 per cent (0.82 larva/plant) < tobacco decoction 2 per cent (0.82 larva/plant) < garlic extract 5 per cent (0.82 larva/plant) < eucalyptus leaf extract 10 per cent (0.94 larva/plant) < neem leaf extract 10 per cent (1.03 larvae/plant) < control (1.21 larvae/plant). Further with Singh *et al.* (2013) reported that significantly lowest larval population of *L. boeticus* was recorded in the plot treated with NSKE 5 per cent and it was at par with Nimbicidin 1 per cent and *Bacillus thuringiensis kurstaki* 1.5 per cent. The present findings might be substantiated by Das *et al.* (2022) findings, which revealed that among the bio-pesticides, *Bacillus thuringiensis* and azadirachtin found to be effective against pod borer complex in pigeon pea.

CONCLUSION

From the above result of the three years of field experiments, it can be concluded that azadirachtin 0.15 EC 0.0006 per cent most effective for the management blue butterfly, *L. boeticus* in pigeonpea.

Acknowledgement. The authors are thankful to Director of Research and Dean Post Graduate Studies, Anand Agricultural University, Anand for providing all the necessary facilities and encouragement during present investigation. The authors are also thankful to the Unit Head, Agricultural Research Station, Anand Agricultural University, Derol for providing all the necessary facilities during study.

Conflict of Interest. None.

REFERENCES

Anonymous (2020). Retrieved from: https://www.indiastatagri.com/table/agriculture/area-production-and-productivity-of-arhar-tur-in/17337.

Das, B. C., Patra, S., Samanta, A. and Dhar, P. P. (2022). Evaluation of bio-rational insecticides and bio-pesticides against pod borer complex in pigeonpea. *International Journal of Bio-resource and Stress Management*, *13*(3), 261-267.

Dehury, S. S., Keval, R., Sharma, R. and Chatterjee, S. (2020). Evaluation of eco-friendly approaches for the management of pod borer, *Helicoverpa armigera* (Hubner) (Lepidoptera: Noctuide) on pigeonpea [*Cajanus cajan* (L.) Millspaugh]. *International Journal of Current Microbiology and Applied Sciences, 9*(12), 3602-3610.

Dhaliwal, G. S., Jindal, V. and Mohindru, B. (2015). Crop losses due to insect pests: global and Indian scenario. *Indian Journal of Entomology*, *77*(2), 165-168.

Gupta, S., Bujarbaruah, K. M., Dhiman, K. R., Pathak, K. A., Das, S. P., Das, A. (2006). Pulse production technology for North East India. Research bulletin, No. *23*: 3.

Keval, R., Kerketta, D., Nath, P. and Singh, P. S. (2010). Population fluctuations of pod fly of some variety of pigeonpea. *Journal of Food Legume*, *23*(2), 164-165.

Mittal, V. and Ujagir, R. (2005). Evaluation of naturalyte spinosad against pod borer complex in early pigeonpea. *Indian Journal of Plant Protectio*n, *33*(2), 211-215.

Pandit, T. R. and Dwivedi, S. A. (2021). A study on biology and management of spotted pod borer, *Maruca vitrata* (Geyer) in legumes. *Biological Forum – An International Journal, 13*(2), 220-227.

Sharma, H.C. (2016). Host plant resistance to insect pests in pigeonpea: Potential and limitations. *Legume Perspectives*, *11*, 24-28.

Singh, R. S., Nath, P. and Kumar, A. (2013). Effect of biorational approaches for the management of blue butterfly, *Lampides boeticus* in pigeonpea. *Agricultural Science Digest, 33*(4), 299-303.

Sreekanth, M., Rao, G. M. V. P., Lakshmi, M. S. M. and Ramana, M. (2021). Impact of different insecticidal modules on pod borer complex in pigeonpea. *Biological Forum – An International Journal*, *13*(3a), 374-379.

Srilaxmi, K. and Paul, R. (2010). Diversity of insect pest of pigeonpea, *Cajanus cajan* (L.) Millspaugh and their succession in relation to crop phenology in Gulbarga, Karnataka. *The Ecoscan*, *4*, 273-276.

Wadaskar, R. M., Bhalkare, S. K. and Patil, A. N. (2013). Field efficacy of newer insecticides against pod borer complex of pigeonpea, *Journal of Food Legumes*, *26*(1&2), 62-66.

How to cite this article: G.D. Hadiya, C.B. Damor and R.G. Machhar (2023). Efficacy of different Botanicals against Blue Butterfly*, Lempides boeticus* in Pigeonpea. *Biological Forum – An International Journal, 15*(1): 286-288.