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Efficacy of different plant-based products against ocimum leaf folder, *Orphanostigma abruptalis* on sweet basil in Bihar

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Abstract
The present investigation entitled Efficacy of different botanical insecticides against ocimum leaf folder, *Orphanostigma abruptalis* on sweet basil, revealed that the untreated control was significantly inferior with maximum mean number of larvae population of 9.3 per five randomly selected plants. The highest per cent reduction in larval population after 14th day was observed in treatment T_4 – *Azadirachtin* 1.5% @ 15 ml/l (67.18) was significantly superior over other treatments followed by T_1- Neem oil 2% @ 20 ml/l (63.76), T_2- NSKE 5% @ 50 g/l (53.65), T_3- Karanj oil 2% @ 20 ml/l (48.67) followed by T_5- Castor oil 2% @ 20 ml/l (48.36) whereas, least per cent reduction in pest population after 14th day of spray was recorded in T_6- Tobacco decoction 5% @ 50 g/l (43.39).

Keywords: Sweet basil, leaf folder, antioxidant, NSKE, essential oil, botanical insecticides

Introduction
Sweet basil (*Ocimum basilicum* L.) is an important Lamiaceaeus medicinal and aromatic herb. The sweet basil also known as king of herbs and its locally called as babaui tulsi in Hindi and French basil in English. The origin of sweet basil advocated from tropical regions of South-Eastern Asia and it is cultivated in different countries. The essential oil of sweet basil used as aroma in food products, cologne and perfume making. The essential oil of French basil also used as psychotherapeutic antioxidant and antibacterial (Wierdak and Borowski, 2011) [28]. In India mainly grown in Himachal Pradesh, Madhya Pradesh, Rajasthan, Gujarat, Jharkhand and Haryana etc. grown over an area of, 25,000 ha and essential oil production around 250-300 tonnesper ha. The Samastipur, Muzaffarpur, East Champaran, West Champaran, Vaisali and Begusarai are sweet basil grown district of Bihar in 3.0 hac with an annual production of 1.2 metric tonnes (Directorate of Horticulture, Govt. of Bihar, 2018). The major insect pests reported at different growth stages include: lace bugs (*Monanthiaglobulifera;* Tingidae), ocimum leaf folder (*Orphanostigma abruptalis;* Crambidae), Thrips (*Bathripsmelanocornicus;* Thysanoptera), cotton aphid (*Aphis gossypii;* Aphididae), false-spider mite (*Brevipalpus californicus;* Tenuipalpidae), mealybug (*Pseudococcus* spp.; Pseudococcidae), tobacco whitefly (*Bemisia tabaci;* Aleyrodidae) and leaf miner (*Liriomyza* spp.; Agromyzidae). One of the main biotic factors that limit sweet basil yield and metabolism is insect infestations. Sathe *et al.,* (2014) [22] reported that *A. despursus* (Hemiptera: Aleurodidae), *Dialeurodes* sp. (Hemiptera: Aleurodidae), *C. bullita* (Hemiptera: Tingidae) and *Macrosiphum*sp. (Hemiptera: Aphididae) as the major pests on *Ocimumsanctum.* Theocimum leaf folder, *O. abruptalis*, is listed as a serious pest of sweet basil among all of the insect pests able to infect sweet basil (*O. basilicum*). The larvae seriously harm the plants by adhering to the underside of the leaf, folding them lengthwise from the midrib, and webbing them until they start falling off (Anonymous, 2019) [4].

Ocimum leaf folder is becoming the major insect- pests in growing district of Bihar. The damage intensity on sweet basil crop due to infestation by leaf folder, *Organophanostigma abruptalis* was evaluated by comparing the production of fresh herbage in treated (Prophenophos 50 EC @ 1 ml/lit at fortnightly interval) and untreated plots at 90 DAT. Two times during the crop season, the first spray was applied 15 days after transplanting, and the second was applied 45 days after transplanting, in order to evaluate the bio-efficacy of botanical insecticides. **(**Kumar *et al.* (2022) [17] reported that the effectiveness of bio-rational insecticides was evaluated after two sprays, and it was found that *Azadirachtin* 1500 ppm

was the most effective treatment against sap-sucking pests and defoliators at 3, 5 and 7 days after the initial spray; meanwhile, nicotine sulphate 40 S (0.02%) recorded the minimum percent mean population reduction against all insect pests on sweet basil all through *Kharif* season. Spinosad 45 SC (150 ml/ ha) was the most effective bio-rational insecticidal treatment against Lepidopteran insect pests at 3,5 and 7 days after second spray, while *Bacillus thuringiensis* (1.5 kg/ ha) was the least effective at these time points in both 2016 and 2017 (Kumar *et al.* 2021) [15].

Materials and Methods

The field experiment was carried out in a Randomized block design with 7 treatments and 3 replications at Herbal Garden, Hi- Tech Unit of Dr. Rajendra Prasad Central Agricultural University, Pusa (Samastipur), Bihar during *Kharif* 2021. The seedlings of French basil were transplanted in field after one month of seed sowing when plant attained a height of 10-15 cm with a spacing of 50 x 50 cm and plot size of 2.5 x 2.5 m area as per recommended package of practices excluding pesticide application. The larval observation was taken on five randomly selected plants in each plot. In order to evaluate the bio- efficacy of botanical insecticides against ocimum leaf folder, the botanical insecticides were sprayed two times during the crop season starting from 15 days after transplanting and the second spray at 45 days afer transplanting. Pre-treatments observations on population of ocimum leaf folder was recorded and post- treatment observation was recorded on 1st, 3rd, 7th and 14th days after spray. There were 7 treatments *viz.*, T_1 – Neem oil 2% @ 20 ml/l, T_2- NSKE 5% @ 50 g/l, T_3- Karanj oil 2% @ 20 ml/l, T_4- *Azadirachtin* 1.5% @15 ml/l,T_5- Castor oil 2% @ 20 ml/l, T_6- Tobacco decoction 5% @ 50 g/land T_7- untreated control.

Result and Discussion

Management of ocimum leaf folder on French basil *(Ocimum basilicum)* by botanical insecticides: A field experiment for management of ocimum leaf folder by botanical insecticides was conducted during *Kharif* 2021. Pre -treatment data was recorded one day before to spraying and the post- treatment data was recorded after 1st, 3rd, 7th and 14th days of spray. The initial larval population of ocimum leaf folder on different experimental plots including control or untreated one day before spray was found in the range of 6.4 – 8.4 per five randomly selected plants (Table 1) the untreated control was significantly inferior with maximum mean number of larvae population of 9.3 per five randomly selected plants. The highest per cent reduction in larval population after 14th day was observed in treatment T_4 – *Azadirachtin* 1.5% @ 15ml/l (67.18) was significantly superior over other treatments followed by T_1- Neem oil 2% @ 20 ml/l (63.76), T_2- NSKE 5% @ 50g/l (53.65), T_3- Karanj oil 2% @ 20 ml/l (48.67), followed by T_5- Castor oil 2% @ 20ml/l (48.36), whereas, least per cent reduction in pest population after 14th day of spray was recorded in T_6- Tobacco decoction 5% @ 50g/l (43.39). This result is comparably similar with the results of Kumar *et al.* 2022 [17] reported that the different treatments *viz.* Neem oil (3%) after that *Bt* (1.5 kg/ha), NSKE (5%) followed spinosad 45 SC (150 ml/ha), *Azadirechtin* 1500 ppm (1%) followed by Lamda Cyhalothrin 4.9 CS (1 L/ha), *Pongamia pinnata* oil (3%) Untreated followed by Cypermethrin 10 EC (0.005), Nichotin Sulfate 40 S (0.02 per cent), Deltamethrin 2.8 EC (0.015 per cent), and untreated control were listed in that order. The *Azadirachtin* 1500 ppm (1%) treatment was the most efficient against perilla leaf moths at 3, 5 and 7 days following the initial spray. Spinosad 45 SC (150 ml/ha) was the best treatment for perilla leaf moth at 3,5 and 7 days after the second spray, while *Azadirachta indica* oil (3 per cent) and *Bacillus thuringiensis* (1.5 kg/ha) were the least effective at these times in the following two years. Kumar *et al.* (2021) [15] was also observed that the effectiveness of bio-rational insecticides evaluated after two sprays showed that, among all the bio-rational insecticidal treatments, *Azadirachtin* 1500 ppm was reported to be effective at 3, 5 and 7 days after first spray against sap sucking insect pests as well as defoliators; in contrast, nicotine sulphate 40S (0.02 percent) on all the insect pests occurred on sweet basil during *kharif* season 2016-17 and the minimum percent mean population At 3, 5 and 7 days following the second spray, spinosad 45SC (150 ml/ha) was found to be the most effective bio-rational insecticidal treatment against defoliator insect pests, whereas *Bacillus thuringiensis* (1.5 kg/ha) was least effective throughout both the years 2016–17 and 2017–18.

Table 1: Efficacy of botanical insecticides against ocimum leaf folder on sweet basil

Treatments	Mean no. of larvae / 5 plants					Percent pest reduction over control after 14th day
	PTC	1 DAS	3 DAS	7 DAS	14 DAS	
T_1- Neem oil 2% @ 20 ml	7.2	6.90	5.70	4.90	3.87	63.76
T_2- NSKE 5% @ 50 g	8.4	7.13	6.07	5.53	5.07	53.65
T_3- Karanj oil 2% @ 20 ml	7.7	7.30	6.83	5.97	5.10	48.67
T_4- *Azadirachtin* 1.5% @ 15 ml	6.4	6.20	5.30	4.17	3.63	67.18
T_5- Castor oil 2% @ 20 ml	7.5	7.93	7.10	5.70	4.73	48.36
T_6- Tobacco decoction 5% @ 50 g	8.1	8.13	7.33	6.53	7.20	43.39
T_7-Control (Untreated)	9.3	9.50	9.80	9.53	10.57	-
S.Em (±)	0.37	0.34	0.32	0.29	0.28	-
CD at 5%	1.15	1.06	1.00	0.90	0.89	-
CV	8.20	10.45	8.08	8.33	8.66	-

Conclusion

The findings of this investigation revealed that the highest per cent reduction in the mean population was recorded in *Azadirachtin* 1.5% @ 0.75 litre/ha treated plot (67.18) followed by neem oil 2% @ 10 litre/ha was (63.76). The least per cent reduction was found in plot which was treated with tobacco decoction 5% @ kg/ha (43.39) was better than control or untreated plot after two successive sprays of botanical insecticides.

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References

1. Amal E, Hassan MI, Mansour AM. Survey of insect pests and spiders infesting medicinal and aromatic plants. Egypt. J Plant Prot. Res. Inst. 2019;2(2):368-377.
2. Anonymous. Cultivation of Ocimum. *Extension Bulletin*, ICAR-Directorate of Medicinal and Aromatic Plants Research, Boriavi, Anand (Gujarat); c2014. p. 17-26.
3. Anonymous. AICRP on MAPB Annual Report 2016-17, Dr. Rajendra Prasad Central Agricultural University, Pusa; c2017. p. 405.
4. Anonymous. Biology of leaf folder of Tulsi in laboratory under ambient condition. Annual report of All India Co-ordinated Research Project on Medicinal& Aromatic Plants and Betel vine, DMAPR, Anand (Gujarat); c2019 p. 87.
5. Arvind Kumar. The lace bug *Cochlochila bullita* (Stal), a destructive pest of *Ocimum sanctum in* Jharkhand, India. *Phytoparasitica*. 2014;42:295-302.
6. Biesiada A, Kus A. The effect of nitrogen fertilization and irrigation on yielding and nutritional status of sweet basil (*Ocimum basilicum* L.). Acta Scientiarum Polonorum Hortorum Cultus. 2010;9(2):3-12.
7. Butani DK. Insect pests of tulsi (*Ocimum sanctum* L.) and their control. Pesticides. 1982;16:11-12.
8. Calderon, Bravo, Vera Cespedes H, Zura-Bravo N, Munoz LA. Basil Seeds as a Novel Food, Source of Nutrients and Functional Ingredients with Beneficial Properties: A Review, Foods. 2021;10(7):1467.
9. Cassandra RM, Bidlack JE. Arthropod population, phenylalanine ammonia lyase activity and fresh weight of sweet basil (*Ocimum basilicum*) as affected by plant age and Bacillus thuringiensis treatment. Proceedings of the Oklahoma Academy of Science. 2005;85:9-17.
10. Charan C. Production of herbal and medicinal plant: An innovative effort towards sustainable development (A case study of Bihar). Global Journal Management and Business studies. 2013;3(2):145-152.
11. Das U, Pal S, Ponnusamy N. Biology and seasonality of lace bug *Cochlochila bullita* (Stal) (heteroptera: Tingidae) on tulsi *Ocimum sanctum* L. L. International Journal of Bio-resource and Stress Management. 2020;11(2):114-118.
12. Deshpande RS, Tipnis HP. Insecticidal activity of *Ocimum basilicum* Linn. Pesticides; c1977. p. 11-12.
13. Dhiman SC, Datta O. Seasonal occurrence of *Cochlochila bullita*: A serious pest of *Ocimum bacilicum*. Annals of Plant Protection Sciences. 2013;21(1):184-185.
14. Egata DF. Benefit and use of sweet basil (*Ocimum basilicum* L.) In Ethiopia:-A Review, Journal Nutrition and Food Processing, 2021;4(5):1-3. DOI: 10.31579/2637-8914/057.
15. Kumar A, Swaminathan R, Mahla MK, Ahir KC, Kachhawa D, Meena BM. Evaluation of bio-rational insecticides against major sap sucking insect pests of sweet basil (*Ocimum basilicum* L.). Medicinal Plants-International Journal of Phytomedicines and Related Industries. 2021;13(4):564-571.
16. Kumar A, Swaminathan R, Mahla MK, Ahir KC, Choudhary R, Kachhawa D, *et al*. Efficacy of Bio-rational insecticides against Perilla Leaf Moth on Sweet Basil (*O. basilicum*). Indian Journal of Agricultural Sciences, 2022, 92(5).
17. Kumar M, Rai D, Kanth N. Seasonal incidence, damage intensity and management of Ocimum leaf folder, *Orphanostigma abruptalis* on sweet basil (*Ocimum basilicum*). Journal of Entomological Research. 2022;46(1):145-148.
18. Kumar. Biological investigation and seasonal incidence of leaf folder, *Orphanostigma abruptalis* (Lepidoptera: Crambidae) on Tulsi, *Ocimum basilicum* L. Souvenir & abstract: International seminar on global partnership in agricultural education and research; c2016. p. 104-105.
19. Kumari S, Kumar N, Kumar A. Seasonal incidence and damage intensity of Lace bug, *Cochlochila bullita* (Stal) (Hemiptera: Tingidae) on Tulsi, *Ocimum basilicum* (L.). International Journal of Science, Environment and Technology. 2017;5(6):4312-4319.
20. Namvong U, Chongrattanameteekul U. Insect pest abundance on sweet basil, *Ocimum basilicum* L. (Labiatae) under different production systems. Kasetsart Journal (Natural Science). 2015;49:22-31.
21. Sajap AS, Peng TL. The lace bug *Cochlochila bullita* (Stål) (Heteroptera: Tingidae), a potential pest of *Orthosiphon stamineus* Bentham (Lamiales: Lamiaceae) in Malaysia; c2010.
22. Sathe TV, Sathe NT. Sucking insect pests and medicinal value of Tulsi, *Ocimum sanctum* (Lamiaceae). Indian Journal of Applied Research. 2014;4:31-33.
23. Saini RK, Mahla JC. Incidence and survival of *Helicoverpa armigera* (Hub.) larvae on some weeds in Haryana. Journal of Innsect Science (India); c1991.
24. Seni, A. *Nipaecoccus viridis* (Newstead) (Hemiptera: Pseudococcidae): An Emerging Threat of Tulsi; *Ocimum sanctum* L. National Academy Science Letters; c2021. p. 1-3.
25. Sharma PC, *et al.* Survey studies on insect-pests associated with important medicinal plants in Himachal Pradesh. Indian J Sci Res Technol. 2014;2(4):2-7.
26. Sood AK, Mehta PK, Pathania NK, Kashyap P. Efficacy of some insecticides against glasshouse whitefly, *Trialeurodes vaporariorum* Westwood on Saliva. Pestology. 2003;27:17-19.
27. Tigvattananont S. Studies on biology of the Ocimum leaf folder, *Syngamia abruptalis* Walker and its host plants. KhonKaen Agriculture Journal. 1990;18:316-324.
28. Wierdak RN, Borowski B. Dynamics of sweet basil (*Ocimum basilicum* L.) growth affected by cultivar and foliar feeding with nitrogen. Acta Scientiarum Polonorum Hortorum Cultus. 2011;10:307-317.
29. Zala MB, Patel BN, Vegad NM. Report on incidence of lace wing bug, *Monanthia globulifera* Walker on sweet basil (*Ocimum basilicum* L.) in middle Gujarat. Current Biotica. 2016;10(3):258-260.
30. Zhang Xiaoming, Yang Nianwan, Wan Fanghao. Population density of *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae) on different plants in the field. Acta Ecologica Sinica. 2014;34:4652-4661.