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EFFICACY OF OILCAKES AS BIOPESTICIDES AGAINST GUAVA FRUIT FLY (BACTROCERA DORSALIS HENDEL) IN BIHAR, INDIA

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ABSTRACT

Biopesticides are natural products or living organisms that control agricultural pests including insects. These are a crucial component of IPM (Integrated Pest Management) for pest control, which lead to more natural alternatives to chemical pesticides that are ecofriendly and safer. The study was carried out to evaluate the efficacy of some oil cakes as biopesticides against guava fruit fly (*Bactrocera dorsalis*). The efficacy of four oilcakes (Mustard cake, castor cake, Mahua cake and Neem cake) against the fruit fly was studied in guava orchards and observed that minimum infestation was found in treated trees by Neem cake followed by Mahua cake, castor cake and mustard cake. Manuring with neem cake was found highly significant (at 0.001%).

KEYWORDS: *Oilcakes, Biopesticides, Guava Fruit fly, Bactrocera dorsalis, Insect Pests, Bihar.*

INTRODUCTION

Guava being the fourth most important crop is grown extensively in India in an area of more than 0.15 million hectares, producing about 1.80 million tonnes of fruits annually. The guava, usually called the "Apple of tropic" is a good source of Vitamin C, pectin and minerals like calcium and phosphorus, besides, abundant dietary fibre and several health benefits. In India, Uttar Pradesh, Bihar, Madhya Pradesh, Andhra Pradesh and Maharashtra are leading states for producing highest quantity of guava fruits.

Fruit flies (Diptera: Tephritidae) are among the most economically important pests attacking fruits found everywhere in the world (Mun et al. 2003). According to white & Elson (1992) and Anonymous (2015), the most economically significant fruit fly genus *Bactrocera* Macquart, comprises 651 described species with atleast fifty species considered to be important pests, many of which are highly polyphagus. These constitute major threats to production, attacking a wide range of fruits and fleshy vegetables throughout tropical and subtropical areas causing qualitative and quantitative losses both. Out of various insect pets, fruit fly (*Bactrocera* spp) is major injurious pest, causing a heavy loss in guava yield (Butani 1979; verghese and sudhadevi, 1998; Singh etal; 2003; Atwal and Dhaliwal, 2009; Kumar and Kumar, 2023). Netwell and Haramoto (1968) reported that oriental fruit fly (*Dacus dorsalis*) attacks over 300 cultivated and wild fruits including avocado, banana, guava, mango, papaya, sugar apple, tomato etc. According to syed et al; (1970), the damage by the fruit flies *Bactrocera Zonata* ranged from 5 to 100% in Pakistan. Kumar and Kumar (2023) reported that fruit fly breeds in all fleshy fruits and it was estimated that 95% of the oriental fruit flies develop on guava.

The female fruit flies puncture the soft and tender fruits by their sharp ovipositor and lay eggs under the soft tissues of guava. After hatching, the maggots feed on the pulp of the fruits and finally they cause rotting of fruits. In North India, two crops of guava come in bearing i.e. February flowering (Ambe bahar) fruiting of which can be obtained from June to September (Rainy Season) and there after June flowering (Mrig bahar) having fruiting from November to March. The present investigation was carried out to control the pests by manuring with oil cakes (biopesticides) in Ambe bahar crop of guava.

Bipesticides can be applied as an alterantive to the use of chemical pesticides as they have been shown to be effective for pest management and the generation of sustainable agricultural products (Prabha et al; 2016). According to Mishra et al; (2015) biopesticides allow for a sustainable approach for improved crop production, which should increase their use and popularity in the coming years.

MATERIALS AND METHODS

Present investigation was carried out at farmer's guava orchard in Paroo of Muzaffarpur district, Bihar during rainy season of 2023. The variety of guava undertaken in investigation was Harijha, which attains a height of about 4 meters and sparsely branched. Fruits are round,

greenish yellow in colour with a sweet taste. The space between plant to plant was 7 meters and row to row was 8 meters.

To study the efficacy of manuring with oilcakes on the fruit infestation by the fruit fly a Manurial trial was conducted on the randomized block design in guava orchard. There were five treatments including the check. The treatments included were:

T1 Mustard cake (*Brassica nigra*)

T2 Castor cake (*Ricinus communis*)

T3 Mahua cake (*Madhuca longitolia*)

T4 Neem cake (*Azadirachta indica*)

T5 Check (Untreated)

Oil cakes were used @5 kgs/tree against the guava fruit flies. Before application of oil cakes, the soil around the root of trees was dug out upto a depth of one foot and now the soil that dug out was mixed with grinded oilcakes. The cavity thus created was filled up with the mixture of soil and oil cakes. An embankment was made around the tree and watered. This was carried out in the month of April, 2023. Each treatment was replicated four times. In the month of July, 2023, one hundred guava fruits were picked up from each replicate of all the treatments and brought to the laboratory. Number of healthy and infested fruits were isolated under each treatment and the percentage of infestation was estimated.

RESULTS AND DISCUSSION

The oil cakes were applied around the roots of the trees as described under "Materials and Methods". For estimating the fruits infestation, one hundred guava fruits from each replicate of different treatments were harvested and brought to the laboratory. Results obtained on the trial were statistically analysed and summarized in the Table -1A and 1B. Data of the table was also represented ideographically in Figure-1.

For determining the significance of the study, standard error of difference was calculated between T5 at one end and T1, T2, T3 and T4 at the other. 't' test was then applied. Analysis of variance and F-ratio were also calculated.

This is evident from the data of the table-1A and IB that the fruit investation of the treated trees was comparatively lower in respect of untreated ones. The minimum infestation (18.5%) was found under the treatment 4 (5 kgs Neem cake) followed by Treatment 3 (5 kgs Mahua

cake) and Treatment 2 (5kgs castor cake). Mustard cake was not found as effective as these cakes. T4 was found highly significant (at 0.001%).

Minimum percentage of fruit infestation under the neem cake treatment may be attributed to its antifeeding and deterrent properties. Jacobson et al; (1979) reported that the extract of the hexane extracted seed of the neem (*Azadirachta indica*) reduced egg deposition of Carpophilus beetles. According to Anonmous (1983), Neem reduces the growth, development and reproductive capacity of insects. Kumar et al (1990) evaluated the effect of some vegetable oil as grain protectants including neem, mustard and mahua against pulse beetle. Bowry et al. (1984) reported that neem and linseed cake powder was most effective in comparison to mustard, castor and mahua. Sachan (1987) studied mahua oil, neem kernel powder, neem oil, neem leaf powder against bruchus pest damaging in storage, and they observed that neem oil and mahua oil were very effective. Prabhakar et al. (1994) studied mahua for its toxic effect on *A. modicella*. Mishra and Prasad (1973) reported the toxic effect of oil seed cakes on the larvae of *meloidogyne incognita*, they found that mahua cakes were more toxic to mustard and karanj cakes. Umesh et al. (2022) reported that methyl eugenol traps + three sprays of 5% NSKE (Neem Seed Kernal Extract) were most effective against guava fruit fly *Bactrocera* spp.

CONCLUSION

On the basis of the findings, this may be concluded that manuring with 5 ks. Neem cake per tree of guava proved to be most effective in minimizing guava fruit infestation by fruit fly.

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Table 1(A): Effect of Manuring with oil cakes against the Guava fruit fly *Bactrocera dorsalis* Hendel in Bihar during 2023.

Replications	Treatments				
	T1 Mustard Cake (5kgs)	T2 Castor Cake (5kgs)	T3 Mahua Cake (5kgs)	T4 Neem Cake (5kgs	T5 Untreated (Check)
	Percentage of Infestation				
I	29	20	18	16	.37
II	28	22	21	20	39
III	32	26	24	18	42

IV	33	30	25	20	40
Average Fruit infestation	30.5	24.5	22.0	18.5	39.5
't' value at 6 d.f.	5.692	6.124	9.249*	14.85**	

*** Significant at 0.01% level**

**** Highly Significant at 0.001% level**

Table I (B): Analysis of variance.

Sources	Sum of squares	Degree of Freedom	Mean squires	F-Ratio
Between Treatments	1088	5-1=4	272	89.77**
Between Replications	93.6	4-1=3	31.2	10.30*
Error	36.4	4×3-12	3.03	
Total	1218	19		

F.05= 3.26 < F (Calculated Value) 89.77

F.05=3.49 < F (Calculated value) 10.30

*** Significant**

**** Highly Significant**

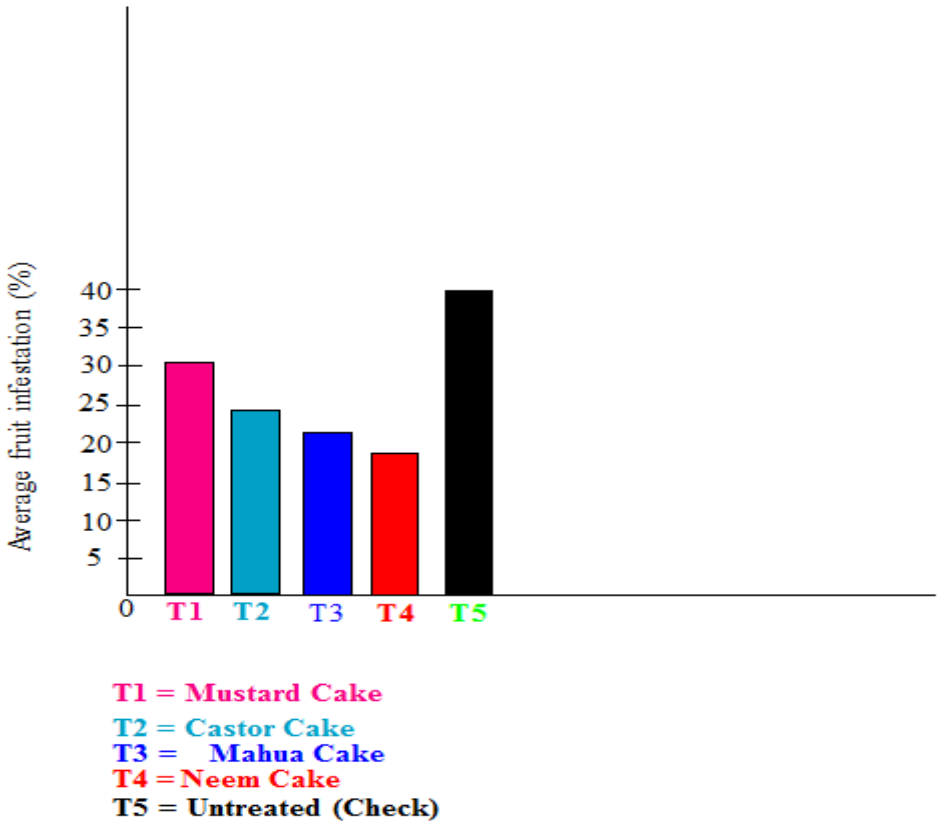

Figure I: Efficacy of Oilcakes manuring against the guava fruit fly *Bactrocera dorsalis.*

REFERENCES

1. Anonymous. Kitna karamati hai brilesh neem ka. *Kadambini*, 1983; 164-166.
2. Anonymous. Dacine Fruit flies of the Asia-Pacific. http://www. herbarium.hawaii.edu/fruitfly, 2015.
3. Atwal, A.S. and Dhaliwal, G.S. Agricultural pests of South Asia and their management. *Kalyani Publishers*, 2009; 380.
4. Bowry, S. Pandey, N. D. and Tripathi, R.A. Evaluation of Certain oil seed cake powder as grain protectant against *Sitophilus oryzae* (Linn.). *Indian J. Ent*, 1984; 46(2): 196-200.
5. Butani, D.K. Insects and Fruits. *Periodical Expert Book Agency*, New Delhi, 1979; 55.
6. Jacobson, M; Reed, D.K.; Crystal, M.M; Morano, D.B. and Soderodrom, E.C. Chemistry and biological activity of insect feeding deterrents from certain weed and crop plants *Rev. App. Ent*, 1979; 67(A): 9.
7. Kumar, K; Singh, M.M.; Meho, D.N. and Hammed, S.F. Effect of some vegetable oils as protectants against pulse beetle *callosobruchus chinensis* (Linn.) *Bull. Grain Tech,* 1990; 28(I): 58-60.
8. Kumar, Rahul and Kumar, Manendra, Life cycle of guava fruit fly *Bactrocera dorsalis* Hendel. *Advances in Bioresearch*, 2023; 14(5): 417-419.
9. Mihra, S.D. and Prasad, S.K. Effect of Water extract of oil seed cakes on the second stage larvae of *Meloidogyne incognita* at different concentration and exposure times. *Ind. J.Ent*, 1973; 35(2): 104-106.
10. Mishra, J; S. Tewari; S.Singh and N.K. Arora. Bipoesticides: where we stand. plant Microbes symbiosis, *Applied Facets*, 2015; 9: 37-75.
11. Mun, J.H., Bohonok, A.J. and Roderick, G.K. Poplation structure of the Pumpkin fruit fly *Bactrocera depressa* (Tephritidae) in Korea and Japan: Pliocane allopatry or recent invasion. *Mol. Ecol*, 2003; 12: 2941-51.
12. Netwell, I.M. and Horamoto, F.H. Biotic factors influencing Population of *Dacus dorsalis* in Hawaii. *Proceedings of Hawaiian Entomology society*, 1968; 20(1): 81-139.
13. Prabhakar, M; Kameswara Rao, P; Subramanyam Reddy, K. and Shrimanarayan, G. Effect of botanical pesticides on groundnut leaf miner *Aproarema modicella* (Dev.) *Ind. J. Ent*, 1994; 56(3): 306-307.
14. Prabha, S;. Yadav, Ashwani; A. Kumar and Yadav et al; Biopesticides - an alternative and eco-friendly source for the control of pests in agricultural crops. p*lants Archives*, 2016; 16: 902-906.
15. Sachen, J.N. All India coordinatated pulse Improvement Project Report, 1987; 96-97.

16. Singh, G. Misra, A. K.; Musarat, H; Tandan D. K. and Pathak, R.K. *The Guava central Institute of Subtropical Horticulture*, Lucknow, 2003; 38.
17. Syed, R.A.; Ghani, M.A. and Murtaza, M. Studies on the tephritids and their natural enemies in Pakistan. *Dacus zonatus* (Saunders). *Technical Bulletin*, commonwealth Institute of Biol. Control, 1970; III: 1-16.
18. Umesh, Rajeh Kumar; S.S. Yadav and Dilip Kumar, Eco-Friendly Management of Guava fruit fly *Bactrocera* spp. *Biological forum- An International Journal*, 2022; 14(2): 815-819.
19. Verghese, A. and Sudhadevi, K. Relation between trap catches of *Bactrocera dorsalis* (Hendel) and abiotic factors. *Proceedings of first National Symposium on Pest Management in Horticultural crops*, Bangalore, India, 1998; 15-18.
20. White, I.M. and Elson-Harris, M.M. Fruit flies of economic significance, their identification and Bionomics: *CABI International*: Wallingford, U. K., 1992.