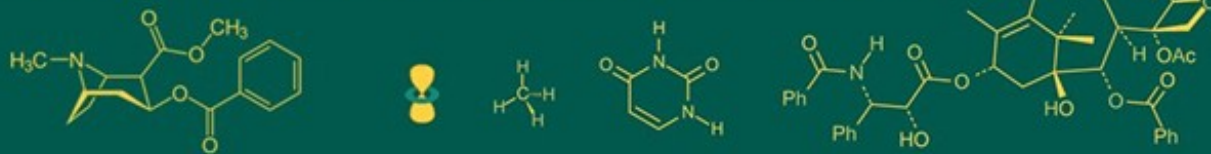


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Seasonal abundance, biology and evaluation of methyl eugenol and cue lure-based traps for management of guava fruit fly (*Bactrocera* spp.) during winter season

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ABSTRACT

Guava fruit fly, *Bactrocera* spp., is an important insect pest of guava and causes considerable damage by oviposition and subsequent larval feeding inside fruits. A field and laboratory investigation was conducted during winter 2023–24 at the MES Horticulture Farm, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, to study seasonal incidence, relationship with weather parameters, biology and efficacy of different lure-based traps. Maggot population increased from 2.10 maggots per infested fruit during the 45th SMW and reached 12.50 during the 52nd SMW, followed by decline to 0.90 during the 4th SMW. Correlation coefficients reported in the thesis were 0.526 with maximum temperature, 0.794** with minimum temperature, -0.786** with relative humidity, -0.173 with rainfall, -0.501 with wind speed and 0.714** with sunshine hours. Pre-oviposition, oviposition, incubation, larval and pupal periods averaged 12.4, 6.4, 1.5, 12.5 and 13.4 days, respectively; fecundity averaged 217.5 eggs female⁻¹. Male and female longevity averaged 21.0 and 26.4 days. Among treatments (T_2) methyl eugenol + malathion 50% EC at 2 + 2 ml recorded the highest overall mean catch (30.72 flies trap⁻¹ month⁻¹), whereas treatments (T_1) 1 + 2 ml methyl eugenol + malathion produced the highest marketable yield (69.00 q ha⁻¹) and benefit:cost ratio (17.03).

Keywords: Fruit fly, Methyl eugenol, Cue lure, Malathion, Biology, Weather parameters, Trapping

1. Introduction

Guava (*Psidium guajava* L.) is an important fruit crop of tropical and subtropical regions. Fruit flies are among the major insect pests of guava because females oviposit in physiologically mature fruits and the maggots feed within the fruit pulp. Eggs and maggots remain protected inside host tissues, making direct insecticidal management difficult. Fruit infestation also promotes rotting, premature fruit drop and loss of marketable produce.

Weather factors such as temperature, relative humidity, rainfall and sunshine influence fruit fly population dynamics. Understanding seasonal abundance and its association with weather parameters can improve timing of surveillance and management. Methyl eugenol is widely used as an attractant for male *Bactrocera* spp. and forms the basis of monitoring and male-annihilation approaches.

The present study integrated three components: seasonal incidence and weather association, biology under laboratory conditions, and evaluation of methyl eugenol- and cue-lure-based Rakshak traps. The objectives were to record fruit fly incidence, study its biology, and assess the effectiveness and economics of different lure treatments.

2. Materials and Methods

2.1 Experimental site

The study was conducted during 2023–24 at the MES Horticulture Farm, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh. The experimental crop was guava cv. Shweta planted at 8 × 8 m spacing. The lure experiment comprised seven treatments with four replications in randomized block design.

2.2 Seasonal incidence

Weekly observations were recorded during winter. Fruits were examined for infestation and infested fruits were dissected to count maggots. Seasonal observations extended from the 45th SMW through the 4th SMW in the detailed incidence series.

2.3 Weather association

Weekly maximum and minimum temperature, relative humidity, rainfall, wind speed and sunshine hours were obtained from the university meteorological observatory. Correlation analysis was used to quantify association between maggot population and weather variables.

2.4 Biology

Infested guava fruits were collected and maintained under laboratory conditions. The duration of pre-oviposition, oviposition, incubation, larval and pupal stages, fecundity and adult longevity were recorded.

2.5 Lure treatments

Cotton wicks were impregnated with the respective lure doses and 2 ml malathion 50% EC. Rakshak

Treatment	Lure + insecticide	Dose
T_1	Methyl eugenol + Malathion 50% EC	1.0 + 2.0 ml
T_2	Methyl eugenol + Malathion 50% EC	2.0 + 2.0 ml
T_3	Methyl eugenol + Malathion 50% EC	1.5 + 2.0 ml
T_4	Cue lure + Malathion 50% EC	1.0 + 2.0 ml
T_5	Cue lure + Malathion 50% EC	1.5 + 2.0 ml
T_6	Cue lure + Malathion 50% EC	2.0 + 2.0 ml
T_7	Untreated control	—

traps were installed on tree branches and observations were recorded monthly.

2.6 Yield and economics

Marketable yield was recorded in $q\ ha^{-1}$. Gross return was calculated using ₹3500 q^{-1} . The thesis used ₹6500 ha^{-1} as total treatment cost for the trap treatments. Benefit:cost ratio was calculated from the reported value of increased yield relative to management cost.

2.7 Statistical analysis

Lure-treatment data were analysed under randomized block design. Standard error and critical difference were used where appropriate. Correlation analysis was used for weather association.

3. Results and Discussion

3.1 Seasonal incidence

SMW	Maggots per infested fruit
45	2.10
46	3.45
47	3.90
48	4.61
49	5.35
50	10.35
51	9.25
52	12.50
1	5.24

SMW	Maggots per infested fruit
2	2.15
3	1.71
4	0.90

Maggot population increased progressively from 2.10 maggots per infested fruit in the 45th SMW to

12.50 in the 52nd SMW, after which it declined to 0.90 by the 4th SMW. The detailed thesis data therefore indicate the highest value in the 52nd SMW. The thesis abstract separately mentions a peak around the 50th SMW; this discrepancy should be checked against the original field sheet before journal submission.

3.2 Correlation with weather parameter

Minimum temperature and sunshine hours were positively associated with maggot population,

Weather parameter	<i>r</i>	Association
Maximum temperature	0.526	Positive
Minimum temperature	0.794	Positive, significant**
Relative humidity	-0.786	Negative, significant**
Rainfall	-0.173	Negative
Wind speed	-0.501	Negative
Sunshine hours	0.714	Positive, significant**

whereas relative humidity showed a negative association. These relationships suggest that the winter population was sensitive to the prevailing thermal and moisture conditions.

3.3 Biology of guava fruit fly

Parameter	Minimum	Maximum	Mean
Pre-oviposition period	11	14	12.4 ± 1.4
Oviposition period	3	8	6.4 ± 1.14
Fecundity (eggs/female/life)	200	235	217.5 ± 17.5
Incubation	1	2.5	1.5 ± 0.35
Larval period	12	13	12.5 ± 0.5
Pupal period	12	15	13.4 ± 0.80
Male longevity	17.5	23	21.0 ± 0.7
Female longevity	21	28	26.4 ± 0.89

The observed developmental periods show that females survived longer than males. The fecundity range was 200–235 eggs female⁻¹, while larval and pupal stages lasted 12–13 and 12–15 days, respectively.

3.4 Trap efficacy

Methyl eugenol treatments consistently recorded much higher catches than cue lure treatments. T_2 (1.5 + 2 ml) produced the highest overall mean catch of 30.72 flies trap⁻¹ month⁻¹, followed by T_3 (27.79) and T_1 (27.22). The highest monthly catch was 49.56 flies trap⁻¹ month⁻¹ in December under T_2 .

Trt.	Lure	Dose (ml)	Nov.	Dec.	Jan.	Overall
T ₁	Methyl eugenol + Malathion	1 + 2	31.25	45.25	5.00	27.22
T ₂	Methyl eugenol + Malathion	2 + 2	36.50	49.56	6.12	30.72
T ₃	Methyl eugenol + Malathion	1.5 + 2	33.50	44.87	5.00	27.79
T ₄	Cue lure + Malathion	1 + 2	0.56	1.31	2.31	1.39
T ₅	Cue lure + Malathion	1.5 + 2	0.62	1.25	2.25	1.37
T ₆	Cue lure + Malathion	2 + 2	0.47	0.98	1.98	1.14
T ₇	Untreated control	—	0.92	1.32	0.99	1.08

3.5 Marketable yield and economics

Trt.	Yield (q ha ⁻¹)	Gross re- ha ⁻¹)	(₹ Net re- ha ⁻¹)	(₹ B:C turn
T ₁	69.00	117250	110750	17.03
T ₂	60.35	103425	96925	12.38
T ₃	56.75	98025	91525	10.44
T ₄	48.50	84250	77750	6.00
T ₅	46.20	80700	74200	4.76
T ₆	46.50	81375	74875	4.92
T ₇	35.50	62250	62250	—

T₁ (1 ml methyl eugenol + 2 ml malathion 50% EC) produced the highest marketable yield of 69.00 q ha⁻¹ and the highest reported benefit:cost ratio of 17.03. T₂ had the highest trap catch but T₁ was superior in marketable yield and economic return, indicating that maximum attraction and maximum economic yield were not identical.

4. Conclusion

The study demonstrated marked seasonal variation in guava fruit fly incidence during winter at Kumarganj, Ayodhya. The detailed incidence series recorded the highest maggot population of 12.50 maggots per infested fruit in the 52nd SMW. Minimum temperature and sunshine hours were positively associated with population, while relative humidity was negatively associated. The biology study recorded a fecundity of 200–235 eggs female⁻¹, larval duration of 12–13 days, pupal duration of 12–15 days and longer female than male longevity. Methyl eugenol-based Rakshak traps were markedly more attractive than cue lure treatments. The 1.5 ml methyl eugenol + 2 ml malathion treatment gave the highest overall trap catch, while 1 ml methyl eugenol + 2 ml malathion produced the highest marketable yield and benefit:cost ratio. Under the conditions of this experiment, methyl-eugenol trapping combined with timely monitoring appears promising as a component of guava fruit fly management.

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6. Conflict of interest

The authors declare that there is no conflict of interest.

References

- Agarwal ML, Kumar P. Effect of weather parameters on population dynamics of peach fruit fly, *Bactrocera zonata* (Saunders). *Entomon.* 1999;24:81–84.
- Babu S, Viraktamath KS. Species composition and population dynamics of fruit flies (Diptera: Tephritidae) on guava. *South Indian Horticulture.* 2003;52(1–6):317–323.
- Bhowmik P, Mandal D, Chatterjee ML. *Bactrocera dorsalis* management through lure and kill traps. *Indian Journal of Entomology.* 2015;77:39–44.
- Deepa M, Agarwal N, Viswakarma R, Kumari K, Lal KM. Monitoring and weather parameters on *Bactrocera* complex through methyl eugenol traps. *Annals of Plant Protection Sciences.* 2009;17(2):624–629.
- Divya S, Kalyanasundaram M, Sidhanandham V. Studies on combination of different traps and lures in cucurbit fruit flies' attraction. *Journal of Entomology and Zoology Studies.* 2019;7(3):996–998.
- Fletcher BS. The biology of Dacine fruit flies. *Annual Review of Entomology.* 1987;32:115–144.
- Gill HS, Mann GS. Effect of management strategies for *Bactrocera dorsalis* and *Dichocrocis punctiferalis* infestation in guava orchards. *Journal of Insect Science.* 2008;21(2):133–138.
- Jalaluddin SM, Natarajan K, Sadakathulla S. Population fluctuation of the guava fruit fly, *Bactrocera correcta*, in relation to hosts and abiotic factors. *Journal of Experimental Zoology.* 2001;4(2):323–327.
- Mishra J, Singh S, Tripathi A, Gangwar DS, Yadav AK, Yadav PR. Effect of weather parameters on population dynamics of oriental fruit fly, *Bactrocera dorsalis*, on mango. *Journal of Experimental Zoology.* 2014;17(2):831–832.
- Pal S, Kumar S, Chandra S, Pati R, Singh DK. Fruit flies, *Bactrocera* spp.: relationship between trap captures and weather parameters. *Annals of Biology.* 2015;31(1):104–108.
- Rajitha AR, Viraktamath S. Monitoring fruit flies (Diptera: Tephritidae) in guava orchard in Dharwad, *Karnataka*. *Journal of Agricultural Sciences.* 2006;19:35–39.
- Rejirani OP, Paul A, Jiji A. Field evaluation of methyl eugenol trap for the management of Oriental fruit fly, *Bactrocera* spp. infesting mango. *Pest Management in Horticultural Ecosystems.* 2012;18(1):19–23.
- White IM, Elson-Harris MM. *Fruit Flies of Economic Significance: Their Identification and Bionomics.* CAB International, Wallingford; 1992.

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