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BIO-EFFICACY OF NEWER INSECTICIDE MOLECULES AGAINST INSECT PESTS OF CASTOR

H. T. Shambhavi, K. M. Srinivas Reddy*[1], Yamanura[2], R. Mohan Kumar[2], G. Keshava Reddy[3] and Gowrisankar Reddi

Department of Ag. Entomology, GKVK, UAS, Bengaluru - 560 065, India.
[1]AICRP on Sunflower, ZARS, GKVK, UAS, Bengaluru - 560 065, India.
[2]AICRP on Castor, ZARS, GKVK, UAS, Bengaluru - 560 065, India.
[3]AICRP on Pigeonpea, ZARS, GKVK, UAS, Bengaluru - 560 065, India.
University of Agricultural Sciences, Bengaluru - 560 065, India.
Corresponding author - K M Srinivas Reddy, *e-mail: srinivasreddykm@gmail.com

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ABSTRACT : Among six insecticides evaluated against leafhoppers on castor, cyantraniliprole 10.26% OD, was most effective giving 90.97 per cent reduction over control (ROC) by reducing the population from 9.33 to 0.87 leafhoppers/3leaves/plant followed by buprofezin 25% SC and dimethoate 30% EC each giving 78.79 per cent ROC. The highest cost-benefit ratio was recorded in buprofezin 25% SC (1:1.61) and dimethoate 30% EC (1:1.53). Flubendiamide 39.35% SC and chlorantraniliprole 18.5% SC gave 100 per cent ROC of castor spiny caterpillar by reducing the initial larval population to zero. Profenophos 50% EC was less effective with 77.29 per cent ROC of castor semilooper as against other insecticides giving 100 per cent ROC. Emamectin benzoate 5% SG and flubendiamide 39.35% SC recorded a cost-benefit ratio of 1:1.95 and 1:1.83, respectively.

Key words : Castor, leafhopper, defoliators, insecticides, cost-benefit.

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INTRODUCTION

Castor, *Ricinus communis* Linnaeus (Euphorbiaceae) is one of the important annual rainfed oilseed crops cultivated mostly in arid and semi-arid regions with seeds containing up to 48 per cent oil with 42 per cent extractable quantity, which has diversified uses in various sectors. India leads the globe with 70 per cent and 87 per cent of world area and production, respectively followed by Brazil and China (Agyenim-Boateng *et al*, 2018). The current castor production in India is 1647 thousand tonnes from 887 thousand hectares of area and productivity of 1,856 kg/ha (Anonymous, 2021). Biotic stresses cause more than 25 per cent losses, among which insects and mites cause yield loss of up to 40-89 per cent (Singh *et al*, 2020). Castor semilooper (*Achaea janata* Linnaeus) alone has up to 85.72 per cent of infestation rate (Shilpakala and Krishna, 2016). Soon after hatching, larvae start scraping the outer tissues, while the later instars defoliate the plants and can leave only veins in severe conditions (Sujatha *et al*, 2011) Around 17.2 to 63.3 per cent yield loss caused by castor insect pests is avoidable (Ranga *et al*, 2022). Adults and nymphs of leafhoppers besides sucking the sap from under surface of the the leaves, inject toxins giving characteristic hopper burn symptoms. When the pest incidence is severe, stunting of the plant, loss of vitality and poor capsule formation are more pronounced (Sujatha *et al*, 2011). Castor spiny caterpillar is gaining importance in recent days, as it can cause economic damage under congenial conditions. There are five larval instars defoliating castor plants from hatching till pupation (Nilesh *et al*, 2015). Repeated applications of broad-spectrum insecticides reduce the efficiency of chemicals thereby increasing the chances of development of resistance and posing a threat to natural enemies (Singh *et al*, 2020). Thus, identification and usage of chemicals with a novel mode of action, effectiveness at lower dosage requiring less frequent applications and selective action is crucial in Integrated Pest Management programmes. The present study was proposed to evaluate newer insecticide

molecules, flubendiamide 480 SC @ 0.2 ml/l was found significantly superior in reducing the leaf-eating caterpillar population and recorded the highest seed yield of soybean (23.95 q/ha) as compared to other treatments including untreated check in soybean. This report also supports the present results.

The highest CB ratio was recorded in emamectin benzoate 5% SG @ 0.3 g/l (1:1.95) followed by flubendiamide 39.35% SC @ 0.25 ml/l (1:1.83) and quinalphos 25% EC @ 2 ml/l (1:1.80) and the lowest value was recorded by chlorantraniliprole 18.5% SC @ 0.3 ml/l (1:1.19) and profenophos 50% EC @ 1 ml/l (1:1.20) (Table 3), which is contrast to findings of Duraimurugan and Alivelu (2017) where profenophos was one among the cost-effective insecticides with CB ratio of 1:1.61.

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REFERENCES

Agyenim-Boateng K G, Lu U J N, ShiHI Y Z and YinIN X G (2018) Review of leafhopper (*Empoasca flavescens*): a major pest in castor (*Ricinus communis*). *J. Genet. Genomic Sci.* **3**(1), 009. DOI:10.24966/ggs-2485/100009

Anonymous (2020) Crop protection. *Annual Report (2019-2020)*. Indian Institute of Oilseed Research, Hyderabad, pp. 41-54.

Anonymous (2021) Selected state-wise area production productivity. Available from: https://www.indiastat.com

Duraimurugan P and Alivelu K (2017) Field efficacy of newer insecticides against sucking insect pests in castor. *Indian J. Plant Prot*. **45**(3), 246-250.

Duraimurugan P and Lakshminarayana M (2015) Evaluation of integrated pest management module for insect pests of castor (*Ricinus communis* L.). *J. Oilseeds Res.* **32**(1), 68-71.

Duraimurugan P, Lakshminarayana M and ViImala Devi P S (2015) Comparative efficacy of microbial, botanical and chemical insecticides against lepidopteran pests in castor. *The Ecoscan* **9**(1&2), 07-10.

Gondaliya P M (2011) Population dynamics and bio-efficacy of bio-pesticides against major defoliators of castor. *M. Sc. (Agri.) Thesis*, Junagadh Agricultural University, Junagadh.

Henderson E F and Tilton E W (1955) Tests with acaricides against the brown wheat mite. *J. Econ. Entomol.* **48**, 157-161.

Manu N, Patil R H and Balikai R A (2014) Efficacy of newer insecticides, biopesticides and poison baits against leaf-eating caterpillars of soybean. *Karnataka J. Agric. Sci.* **27**(2), 139-144.

Narayanamma V L and Reddy K D (2015) Weather-based insect pest forewarning models in castor. *Indian J. Plant Protec*. **43**(1), 49-53.

Nilesh R, Haseeb M and Sharma D K (2015) Biology of castor spiny caterpillar, *Ariadne merione*. *Bioinfolet* **12**, 140-142.

Ranga P, Singh B, Guruwan D, Yadav S S, Chauhan A S and Dahiya P (2022) Impact of sowing dates on incidence of major insect pests of castor (*Ricinus communis* L.) in South Western Haryana. *Int. J. Trop. Insect Sci.* **42**(1), 685-696.https://doi.org/10.1007/s42690-021-00591-8

Sagar D and Balikai R A (2014) Insecticide resistance in cotton leafhopper, *Amrasca biguttula biguttula* (Ishida) – A review. *Biochem. Cell. Arch.* **14**(2), 283-294.

Sagar D and Balikai R A (2015) Toxicity of neonicotinoids against cotton leafhopper, *Amrasca biguttula biguttula* (Ishida) in Karnataka, India. *Res. Crops* **16**(1), 170-175.

Shilpakala V (2014) Studies on population dynamics and management of major insect pest complex in castor. *M. Sc. (Agri.) Thesis*, Acharya N.G. Ranga Agricultural University, Hyderabad, Andhra Pradesh, India.

Shilpakala V and Krishna T M (2016) Evaluation of new insecticide molecules against lepidopteran pests in castor (*Ricinus communis* L.). *Int. J. Agric. Sci. Res.* **6**(6), 29-36.

Singh S K, Patel N, Jadon K S and Sharma A K (2020) Bio-intensive prophylactic integrated pest management in castor for arid environment. *Proc. Natl. Acad. Sci. India Section B: Biol. Sci.* **90**(5),1017-1024. https://doi.org/10.1007/s40011-020-01174-2

Sujatha M, Vimala Devi P S and Reddy T P (2011) Pests and Pathogens: Management Strategies. In: *Insect Pests of Castor (Ricinus communis L) and their Management Strategies*. (eds. Dashavantha Reddy Vudem, Nagaraja Rao Poduri, Venkateswara Rao Khareedu), BS Publications, CRC Press, pp. 177-198.

Umbarkar P S (2012) Bio-ecology and management of major lepidopterous pests of castor (*Ricinus communis* Linnaeus). *Ph. D. Thesis*, Navsari Agricultural University, Gujarat, India.