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Bio-efficacy of newer insecticides against hadda beetle (*Epilachna vigintioctopunctata* Fab.) (Grub) in spine gourd under laboratory condition

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Abstract
The existing investigation changed into performed inside the laboratory of branch of Entomology, RMD university of Agriculture and research Station, Ambikapur (C.G.) all through Kharif 2020. Bio-efficacy of more recent insecticides towards the larvae (grubs) of hadda beetle underneath laboratory circumstance result revealed that some of the diverse treatment, the highest (70.2%) mortality percentage became located from emamectin benzoate +thiamethoxam three.0% + 12.0% WG accompanied by spinosad forty five % SC (sixty five. Zero %) and emamectin benzoate 5% SG (60. Nine %). The subsequent powerful remedies recorded for cartap hydrochloride 50% SP and chlorantraniliprole 18.5% SC with 41. Four % and 35.2% respectively as most advantageous percentage of larval mortality. While the least powerful treatment and minimum (24. Five %) percent of mortality changed into observed in flubendiamide 39.35% SC.

Keywords: Hadda beetle, spine gourd, grubs

Introduction
Spine gourd (*Momordica dioica* Roxb.) is a potential vegetable crop, which belongs to circle of relatives Cucurbitaceae (Trivedi and Roy, 1972) [13] it is a wild perennial dioecious climber with tuberous root and its fruit is less sour than sour gourd (*Momordica charantia* L.) spine gourd (*Momordica dioica* Roxb.) is a potential crop, which belongs to family Cucurbitaceae. It's far a dioecious climber with tuberous root and its fruit is normally used as vegetable. It's miles originated from Indo-Malayan region, and it's far now grown in India, Bangladesh, Japan, Srilanka, China, South East Asia, Malaysia, Tropical Africa and South the united states (Rashid, 1976; Rakh and Chaudhari, 2010) [10, 9]. In India, it's miles grown-up commercially in states of Chhattisgarh, Odisha, Uttar Pradesh, Jharkhand, Maharashtra, Assam, Gujarat, Karnataka and West Bengal. Backbone gourd is commercially and economically critical crop usually cultivated for its green culmination in addition to younger twigs and leaves, that is used as vegetable or cooked as a vegetable (Tiwari and Tigga, 2015) [12]. Backbone gourd gets laid low with numerous insect pests *viz*., fruit fly, inexperienced stink bug, epilachna beetle, fruit borer, fruit pores and skin feeder, crimson pumpkin beetle and leaf miner etc. That purpose varying ranges of damage, restricting the sustainable manufacturing and productiveness of the crop (Deshmukh *et al*. 2012; Sandilya *et al*. 2018) [3, 11]. Some of the numerous insect-pests, hadda beetle (*Epilachna vigintioctopunctata*) belongs to family Coccinelidae is a very important and destructive pest of this vegetable crop (Anant and Painkra, 2019) [1], and can cause significant damage as much as 80% of the host flowers relying on area and season (Rajagopal and Trivedi, 1989) [8]. It's also called Epilachna beetle, noticed ladybird beetle or spotted leaf-consuming beetle (Kumar and Kumar, 1998) [6]. Deshmukh *et al*. (2012) [3] reported that the grub and the adult of hadda beetle have been observed to be maximum extreme that cause skeletonation of leaves main to drying, defoliation and checked boom of the plants and sooner or later decreased yield of backbone gourd/wild sour gourd *M. dioica* Roxb. It is also called a leaf scrapping coccinellid beetle due to its feeding connection with epidermal tissues of the leaves with the aid of scrapping, ensuing in drying up and falling of the leaves (Imura and Ninomiya, 1978) [4].

Remedy info
The test changed into completed inside the laboratory of Entomology, RMD university of Agriculture and studies Station Ambikapur, Chhattisgarh for the duration of Kharif 2020. Information of the materials and methods of the observe are offered beneath:

Table 1: Treatment details

S. No.	Treatment details	Dose/ha
T_1	Spinosad 45% SC	150 ml
T_2	Flubendiamide 39.35% SC	150 ml
T_3	Chlorantraniliprole 18.5% SC	150 ml
T_4	Emamectin benzoate 5% SG	200 g
T_5	Cartap hydrochloride 50% SP	1000 g
T_6	Emamectin benzoate + Thiamethoxam 3.0%+12.0% WG	150 g
T_7	Control	-

Methods and Materials

As a way to study the effect of newer insecticides towards hadda beetle, the third and fourth instar grubs of hadda beetle were amassed from untreated subject of spine gourd during the season. Half of liters of spray solution of various insecticides had been organized. The clean leaves of backbone gourd became dipped in pesticides solution and allowed to dry below at room temperature for one hour. The treated leaves were stored in Petri dish and then 10 larvae (grubs) of hadda beetle had been brought. Parallel with out handled sparkling leaves had been kept on top of things treatment for assessment. The test was repeated for three instances. After the release of larva (grubs) observations had been made on exceptional hours and remove of lifeless larva from the remedies after every remark at hrs. For the assessment of poisonous consequences, the mortality percent of hadda beetle larva turned into determined at 12, 24 and 48 hours after release of larva.

Result and Discussion

The results are offered in table 2 confirmed that the evaluation of residual effect of newer pesticides uncovered to the glass petri-dish with endorsed doses in opposition to the larval population of hadda beetle, E. Vigintioctopunctata at various hours after remedy

12 Hours after treatment (HAT)

The effects showed that after 12 hrs publicity of pesticides, the mortality in keeping with cent turned into recorded most in Emamectin benzoate + thiamethoxam 3.Zero% + 12.0% WG (63. Three %), it was statistically advanced over manipulate accompanied through spinosad forty five % SC (30. Zero %) and emamectin benzoate 5% SG (26.7%), but, minimum mortality was recorded in cartap hydrochloride 50% SP (thirteen. Three %) and chlorantraniprole 18.5% SC (thirteen. Three %) observed with the aid of flubendiamide 39.35% SC (6.7%). Whereas in control remedy all the check samples were survived approach no longer discovered any mortality consistent with cent.

The order of toxicity of insecticides for larvae of hadda beetles were Emamectin benzoate + thiamethoxam > spinosad > emamectin benzoate > cartap hydrochloride > chlorantraniprole > flubendiamide.

24 hours after remedy

The in line with cent larval mortality of hadda beetle changed into determined most in emamectin benzoate + thiamethoxam 3.0% + 12.0% WG (eighty. 6%), observed through spinosad forty five% SC (76.2%) after 24 hrs of publicity of pesticides, and the subsequent effective remedy was determined in emamectin benzoate 5% SG (64. Three %) observed via chlorantraniprole 18.5% SC (31. Zero %), cartap hydrochloride 50% SP (26.9%) and flubendiamide 39.35% SC (21.5%) at 24 hours after treatment.

The order of toxicity of pesticides for hadda beetle larvae have been Emamectin benzoate + thiamethoxam > spinosad > emamectin benzoate > chlorantraniprole > cartap hydrochloride > flubendiamide.

Forty eight hours after remedy

After forty eight hrs of exposure, the larval mortality in keeping with cent become recorded most in Emamectin benzoate five % SG (91.7%) followed by means of spinosad forty five % SC (88.9%), cartap hydrochloride 50% SP (eighty four. 1%), even as best mortality in emamectin benzoate + thiamethoxam 3.0% + 12.Zero % WG (66.7%) observed with the aid of chlorantraniprole 18.5% SC (61.3%) and flubendiamide 39.35% SC (forty five. 2%).

The order of toxicity of pesticides for hadda beetle larvae have been emamectin benzoate > spinosad > cartap hydrochloride > emamectin benzoate + thiamethoxam > chlorantraniprole > flubendiamide.

Usual imply larval (grub) mortality (%)

The overall suggest records confirmed that a few of the numerous remedy, the highest mortality percent (70.2) turned into determined inside the treatment of emamectin benzoate + thiamethoxam three.0% + 12. Zero % WG followed by means of spinosad forty five% SC (sixty five. Zero %) and emamectin benzoate 5% SG (60. Nine %), and the subsequent powerful remedies recorded as most desirable mortality percentage for cartap hydrochloride 50% SP (41. Four %) and chlorantraniliprole 18. Five % SC (35.2%). While the least effective treatment discovered as minimum mortality (24.5%) changed into observed in flubendiamide 39.35% SC.

The order of toxicity of pesticides for hadda beetle larvae had been emamectin benzoate + thiamethoxam > spinosad > emamectin benzoate > cartap hydrochloride > chlorantraniprole > flubendiamide.

The existing findings are less or greater comparable with work of Mala *et al*. (2012) [7] who reported that when 7th days the best mortality was determined on first instar larvae of hadda beetle (70.0 % in laboratory circumstance and sixty five. 0% in subject condition) treated via Siperin 10 EC (1. Five % conc.) and Neem oil (1.0% conc.). Das *et al*. (2002) [2] also mentioned that the very best toxicity towards larva and person of epilachna beetle turned into recorded for decis 2. Five EC (0.05% conc.) observed by sunsulfan 20 EC (0.15% conc.) and rison 60 EC (zero.24% conc.). Similarly Kodandaram *et al*. (2014) [5] additionally suggested that under control situation, the imidacloprid 17.8% SL @ 25 g a.I./ha and thiacloprid 21. Eight% SC @ 70 g a.I./ha were located to be most effective in opposition to grub and person ranges of hadda beetle, tested by means of leaf residue approach.

Table 2: Efficacy of newer insecticides against hadda beetle under laboratory condition during *Kharif* season 2019-20.

S. No.	Treatment details	Dose/ha	Mean larval mortality (%) at various hours after treatment (HAT)			Overall mean
			12 HAT	24 HAT	48 HAT	
T_1	Spinosad 45% SC	150 ml	30.0 (33.20)	76.2 (61.54)	88.9 (78.24)	65.0
T_2	Flubendiamide 39.35% SC	150 ml	6.7 (12.29)	21.5 (27.59)	45.2 (42.25)	24.5
T_3	Chlorantraniliprole 18.5% SC	150 ml	13.3 (21.14)	31.0 (33.7)	61.3 (51.52)	35.2
T_4	Emamectin benzoate 5% SG	200 g	26.7 (30.98)	64.3 (53.44)	91.7 (79.99)	60.9
T_5	Cartap hydrochloride 50% SP	1000 g	13.3 (21.14)	26.9 (31.12)	84.1 (66.51)	41.4
T_6	Emamectin benzoate + Thiamethoxam 3.0% + 12.0% WG	150 g	63.3 (52.75)	80.6 (68.23)	66.7 (60.0)	70.2
T_7	Control	-	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0
	SEm±		2.96	5.22	12.78	
	C.D.(0.05)		9.07	15.98	39.14	

Note: * Figure in the parenthesis are angular transformation value, HAT = Hours after treatment.

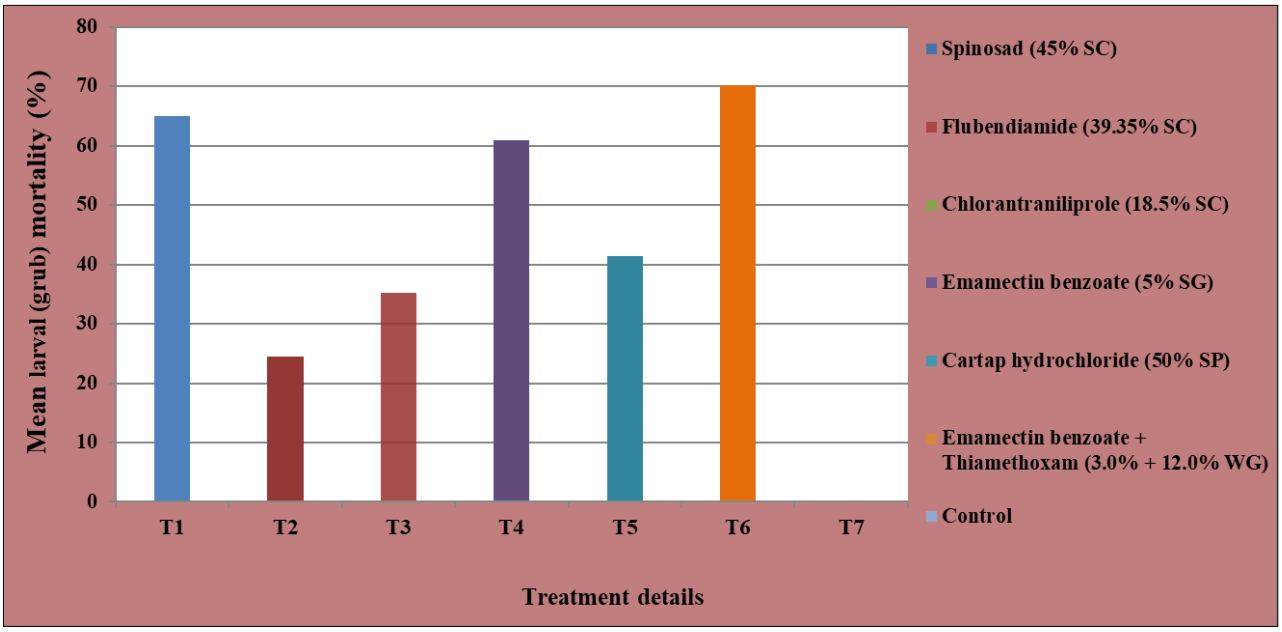

Fig 1: Efficacy of newer insecticides against hadda beetle under laboratory condition during *Kharif* 2020.

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