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Safety of cyazypyr and microbial pesticides against ladybird beetles and spiders in capsicum

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Abstract
Experiments were conducted during winter season, 2016-2017 at Central Research Station, Odisha University of Agriculture and Technology, Bhubaneswar to evaluate the safety of cyazypyr and microbial pesticides against natural enemies like ladybird beetles and spiders in capsicum. Reduction of ladybird beetle population ranges from 9.52% to 14.29% and 11.11% to 16.67% in different microbial pesticide treatments and 15.87% to 22.22% and 19.44% to 20.83% in different doses of cyantraniliprole treatments over control in first and second experiment respectively. Reduction of spider population ranges from 7.41% to 12.35% and 6.02% to 12.05% in different microbial pesticide treatments and 11.11% to 16.05% and 8.43% to 13.25% in different doses of cyantraniliprole treatments over control in first and second experiment respectively.

Keywords: Capsicum, spiders, ladybird beetle, pesticides

Introduction
The spice-cum vegetable crop capsicum belonging to the family Solanaceae is one of the important and commercial crop of India Parvathi [7]. It used in raw and ripe form for making many dishes and pickles. It is a rich source of various vitamins *viz*., vitamin B, vitamin A (8493 IU), vitamin C (283 mg), oleoresin and minerals like potassium (263.7 mg), phosphorus (28.3 mg), magnesium (14.9 mg), calcium (13.4 mg) per 100 g fresh weight. The fruit of the capsicum plant is used to make medicines also. It is having detoxifying properties, cardiovascular benefits, and anti-cancer properties. It supports the immune system, fights oxidative damage, reverses signs of ageing and cures iron deficiency.

Sorensen [10] reported that bell pepper is attacked by more than 35 species of insects and mite pests which includes fruit borers, tobacco caterpillar, thrips, aphids, whiteflies, broad mites, chilli midge and other minor pests. To control them the indiscriminate use of pesticides cause resurgence and resistance development in pests more over it also destroy the agro-ecosystem. So the only solution is to use such pesticides which have minimal effect on natural enemies.

Conservation of natural enemies plays a crucial role in pest management in the field as they are having the potential of self-perpetuation and are controlling pest population generation after generation in natural condition of field itself. But during pest management, along with the pests many predators and parasitoids are also killed due to indiscriminate use of pesticides.

Hence in the present investigation we have tested green triangle novel pesticide i.e. cyazypyr and microbial pesticide to determine their safety towards predators like ladybird beetles and spiders found in capsicum field.

Materials and methods
Two field experiments (transplanted on 4.11.16 and 22.11.16) were conducted during winter season, 2016-2017 at the Central Research Station, Orissa University of Agriculture and Technology, Bhubaneswar to evaluate the bio-efficacy of some novel and safer pesticides. The experiments were laid out in Randomized Block Design with eleven treatments including untreated control in three replications. The size of each plot was 3.5 m × 2.4 m. The seedlings of ‘F1 Royal Star Hybrid’ were transplanted with a spacing of 60cm × 50cm. Fertilizers were applied in the form of urea, diammonium phosphate and murate of potash @ 120:60:60 (N:P:K) Kg/ha. First spraying of pesticides was performed at 50 days after transplanting. Subsequent two sprays were given at 20 days intervals.

Population of the major predators i.e. spiders and ladybird beetles were recorded from five tagged plants per plot.

Population reductions in different treatments were calculated over untreated control at 10 days after spraying. The data so obtained for ladybird beetle and spider were subjected to square root transformation and analysed statistically to arrive at meaningful conclusion as suggested by Gomez and Gomez [3].

Results and Discussion

Ladybird beetles

Population of ladybird beetles (grub and adult) and its reduction in different pesticidal treatments recorded from the first and second experiment are presented in Table 1 and Table 2 respectively.

In the first experiment the population of ladybird beetles recorded at 10 DAS varied from 0.43 to 0.63 (grub and adult)/plant in different treatments including untreated control. Highest population of 0.63 ladybird beetle (grub and adult)/plant was observed in untreated control followed by *Lecanicillium lecanii* (T_7) (0.57), *Metarrhizium anisopliae* (T_6) (0.55), *Bacillus thuringiensis* (T_8) (0.54), *Beauveria bassiana* (T_5) (0.54), cyantraniliprole 10.26 OD @ 40 ml a.i./ ha (T_1) (0.53), cyantraniliprole 10.26 OD @ 50 ml a.i./ ha (T_2) (0.52), cyantraniliprole 10.26 OD @ 60 ml a.i./ ha (T_3) (0.51) and cyantraniliprole 10.26 OD @ 70 ml a.i./ ha (T_4) (0.49). Almost the same trend was observed in the second experiment.

The per cent reduction in ladybird beetle population (grub and adult)/plant at 10 DAS in different pesticidal treatments over control varied from 9.52 to 31.75 per cent among the treatments in the first experiment. The lowest reduction of 9.52% was recorded from T_7 followed by T_6 (12.70%), T_8 (14.29%), T_5 (14.29%), T_1(15.87%), T_2(17.46%), T_3(19.05%) and T_4(22.22%). Almost the same trend was observed in the second experiment.

Spiders

At 10 DAS, there was no significant difference among the treatments in respect of spider population. The population of spider varied from 0.63 to 0.81/plant in different treatments including untreated control. Among all the treatments, highest population of 0.81 spider/plant was observed in untreated control followed by *Metarrhizium anisopliae* (T_6) (0.75), *Beauveria bassiana* (T_5) (0.74), *Bacillus thuringiensis* (T_8) (0.72), cyantraniliprole 10.26 OD @ 40 ml a.i./ ha (T_1) (0.72), *Lecanicillium lecanii* (T_7) (0.71), cyantraniliprole 10.26 OD @ 50 ml a.i./ ha (T_2) (0.70), cyantraniliprole 10.26 OD @ 60 ml a.i./ ha (T_3) (0.69) and cyantraniliprole 10.26 OD @ 70 ml a.i./ ha (T_4) (0.68). Almost the same trend was observed in the second experiment.

The per cent reduction in spiders at 10 DAS in different pesticidal treatments over control are presented in Table 1. It varied from 7.41 to 22.22 per cent among the treatments. The lowest reduction of 7.41% was recorded from T_6 followed by T_5 (8.64%), T_8 (11.11%), T_1 (11.11%), T_7 (12.35%), T_2 (13.58%), T_3 (14.81%), and T_4 (16.05%). Almost the same trend was observed in the second experiment.

Results of the present investigation depicted that in both the experiments, the chemical insecticides *viz.,* cyantraniliprole 10.26 OD at all the doses and all the microbials were found safe to the predators (spiders and ladybird beetles). Mishra [6] remarked that the predatory coccinellids population were at par with that of the untreated control during post application period indicating safety of cyantraniliprole at tested doses. Patel *et al.* [8] reported that the population of coccinellids and spiders were on par with that of control after application indicating safety of cyantraniliprole 10 OD (45,60, 75, 90 and 105 g a.i./ha) to these predators. Jyoyi and Goud [4] tested microbial pesticide *Btk* 5% WP against natural enemies associated with insects pests of brinjal and were found completely safe to natural enemies (coccinellids, & spiders). Ma *et al.* [5] suggested that predators, like lady beetles and spiders were insensitive to *Bt* applications. Singh *et al.* [9] evaluated biopesticides like *Beauveria bassiana* @ 2.5 kg/ha, *Bacillus thuringiensis* @ 1.5 kg/ha, against natural enemies associated in rice field and they found that these biopesticides were significantly superior over synthetic insecticides in conserving the spider population. Bhumita *et al.* [1] reported that *Bacillus thuringiensis* 8L (500g ha-1) and *Beauveria bassiana* (Baba 2ml l-1) are safe to spider population. Yadav *et al.* [11] reported that bio-rationals and *Bacillus thuringiensis var. Kurstaki* were comparatively safe to coccinellids and spiders than the insecticides. Ghelani *et al.* [2] suggested that *Verticillium lecanii* (Zimmermann) @ 2.5 kg/ha and *Beauveria bassiana* (Balsamo.) @ 2.5 kg/ha) were safe to the coccinellid predators. All these findings of the previous workers are in full agreement with the present investigation.

Table 1: Population of predators in different treatments in capsicum at Bhubaneswar during winter, 2016-2017 (DOT: 4.11.16)

Tr. No.	Treatments	Dose/ha	Population of ladybird beetles (grubs and adults)/ plants at 10 DAS	Reduction (%) over untreated control	Population of spiders/plants at 10 DAS	Reduction (%) over untreated control
T_1	Cyantraniliprole 10.26 OD	40 ml a.i.	0.53 (1.01)	15.87	0.72 (1.10)	11.11
T_2	Cyantraniliprole 10.26 OD	50 ml a.i.	0.52 (1.01)	17.46	0.70 (1.10)	13.58
T_3	Cyantraniliprole 10.26 OD	60 ml a.i.	0.51 (1.00)	19.05	0.69 (1.09)	14.81
T_4	Cyantraniliprole 10.26 OD	70 ml a.i.	0.49 (0.99)	22.22	0.68 (1.09)	16.05
T_5	*Beauveria bassiana*	2.5 L	0.54 (1.02)	14.29	0.74 (1.11)	8.64
T_6	*Metarrhizium anisopliae*	2.5 L	0.55 (1.02)	12.70	0.75 (1.12)	7.41
T_7	*Lecanicillium lecanii*	2.5 L	0.57 (1.03)	9.52	0.71 (1.10)	12.35
T_8	*Bacillus thuringiensis var. kurstaki*	1.0 L	0.54 (1.02)	14.29	0.72 (1.10)	11.11
T_9	Fipronil 5 SC	50 ml a.i.	0.43 (0.96)	31.75	0.63 (1.06)	22.22
T_{10}	Emamectin benzoate 5 SG	10 g a.i.	0.46 (0.98)	26.98	0.66 (1.08)	18.52
T_{11}	Untreated control	_	0.63 (1.06)	_	0.81 (1.14)	_
	SE(m)±		(0.028)		(0.031)	
	CD(0.05)		(0.08)		(NS)	

- Figures in parentheses are $\sqrt{(x+0.5)}$ values.
- DOT: Date of transplanting, DAS : Days after spraying
- Ladybird beetle population comprises of *Micraspis discolour*, *Cheilomenes sexmaculata*, *Coccinella repanda* and *Brumoides suturalis.*
- Spider population comprises of *Peucetia viridians* and *Oxyopes salticus.*

Table 2: Population of predators in the treatments in capsicum at Bhubaneswar during winter, 2016-2017 (DOT: 22.11.16)

Tr. No.	Treatments	Dose/ha	Population of ladybird beetles (grubs and adults)/ plants at 10 DAS	Reduction (%) over untreated control	Population of spiders/plants at 10 DAS	Reduction (%) over untreated control
T_1	Cyantraniliprole 10.26 OD	40 ml a.i.	0.59 (1.04)	18.06	0.76 (1.12)	8.43
T_2	Cyantraniliprole 10.26 OD	50 ml a.i.	0.58 (1.04)	19.44	0.74 (1.11)	10.84
T_3	Cyantraniliprole 10.26 OD	60 ml a.i.	0.58 (1.04)	19.44	0.73 (1.11)	12.05
T_4	Cyantraniliprole 10.26 OD	70 ml a.i.	0.57 (1.03)	20.83	0.72 (1.10)	13.25
T_5	*Beauveria bassiana*	2.5 L	0.63 (1.06)	12.50	0.78 (1.13)	6.02
T_6	*Metarrhizium anisopliae*	2.5 L	0.61 (1.05)	15.28	0.76 (1.12)	8.43
T_7	*Lecanicillium lecanii*	2.5 L	0.64 (1.07)	11.11	0.73 (1.11)	12.05
T_8	*Bacillus thuringiensis var. kurstaki*	1.0 L	0.60 (1.05)	16.67	0.75 (1.12)	9.64
T_9	Fipronil 5 SC	50 ml a.i.	0.50 (1.00)	30.56	0.66 (1.08)	20.48
T_{10}	Emamectin benzoate 5 SG	10 g a.i.	0.52 (1.01)	27.78	0.69 (1.09)	16.87
T_{11}	Untreated control	_	0.72 (1.10)	_	0.83 (1.15)	_
	SE(m)±		(0.026)		(0.031)	
	CD(0.05)		(0.08)		(NS)	

- Figures in parentheses are $\sqrt{(x + 0.5)}$ values.
- DOT: Date of transplanting, DAS : Days after spraying
- Ladybird beetle population comprises of *Micraspis discolour, Cheilomenes sexmaculata, Coccinella repanda* and *Brumoides suturalis.*
- Spider population comprises of *Peucetia viridians* and *Oxyopes salticus.*

Conclusion

Among all the treatments, microbial pesticides and cyantraniliprole 10.26 OD at all the tested doses (40, 50, 60 and 70 ml a.i./ha) are proved to be the safe against the beneficial insects like ladybird beetles and spiders. Though cyantraniliprole is a chemical insecticide it is highly effective for pest management of chilli and other Solanaceous vegetable crops. Again as it is a newer molecule insect pests will face difficulty and will take longer time to develop resistance, so it is highly recommendable.

References

1. Bhumita P, Kumar D, Thakur NSA. Eco-Friendly Management of Brinjal Shoot and Fruit Borer, *Leucinodes orbonalis* Guen. In Meghalaya. Pesticide Research Journal. 2013; 25(1):12-17.
2. Field. International Journal of Pest Management. 2000; 46(3):237-240.
3. Ghelani MK, Kabaria BB, Chhodavadia SK. Field Efficacy of Various Insecticides against Major Sucking Pests of *Bt* Cotton. Journal of Biopesticides. 2014; 7:27-32.
4. Gomez KA, Gomez AA. Statistical procedure for Agricultural Research with Emphasis on Rice. IRRI, Los Banos, Philippines, 1984, pp. 294.
5. Jyoti DP, Goud KB. Safety of organic amendments and microbial pesticides to natural enemies in brinjal ecosystem. Annals of Plant Protection Sciences. 2008; 16(1):111-114.
6. Ma DL, Gordh G, Zalucki MP. Toxicity of Biorational Insecticides to *Helicoverpa* Spp. (Lepidoptera: Noctuidae) and Predators in Cotton.
7. Misra HP. Cyantraniliprole (Cyazypyr) - A new anthranilic diamide insecticide against tomato fruit borer, *Helicoverpa armigera*. Indian Journal of Plant Protection. 2015; 43(1):1-5.
8. Parvathi S, Yurnus AHJ. Chilli an economically profitable crop of Malaysia, Spice India. 2000; 13(7):18-19.
9. Patel RD, Bharpoda TM, Prajapati HV, Patel NB, Borad PK. Cyantraniliprole 10 OD: a second generation anthranilic diamide insecticide and its safety to natural enemies in cotton ecosystem. Indian Journal of Plant Protection. 2015; 43(3):290-293.
10. Singh S, Prasad CS, Nath L, Tiwari GN. Eco-friendly Management of *Scirpophaga incertulas* (Walk.) and *Cnaphalocrocis medinalis* (Guen.) in Basmati Rice. Annals of Plant Protection Sciences. 2008; 16(1):11-16.
11. Sorensen KA. Vegetable inect pest management, 2005, edu/dept/ent/notes/vegetables/veg37.html-11k
12. Yadav GR, Srivastava P, Mishra VK, Chauhan D, Rajveer. Impact of Various Insecticides on Natural Enemies in Cowpea Ecosystem. Journal of Entomological Research. 2017; 51(1):57-62.