Research Paper :

Bioefficacy of rynaxypyr (Coragen) 20 SC against fruit borer *Helicoverpa armigera* (Hubner) in okra

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SUMMARY

Rynaxypyr (coragen) 20 SC, a new insecticide was evaluated against okra fruit borer, *Helicoverpa armigera* (Hubner) during 2009-2010 at Main Agricultural Research Station, University of Agricultural Sciences, Raichur, Karnataka, India. The experiment was laid out in RBD with three replications. Among the newer insecticide molecules evaluated, rynaxypyr 20 SC @ 30 g a.i. /ha and rynaxypyr 20 SC @ 20 g a.i. /ha were superior in recording less larval populations, lower fruit damage and higher fruit yield, followed by spinosad @ 56 g.a.i/ha, emamectin benzoate @15 g.a.i/ha and flubendiamide @ 45 g.a.i/ha.

Key words :
Rynaxypyr (coragen), Fruit borer, Okra

Okra [*Abelmoschus esculentus* (L.) Moench] is an important vegetable crop providing a good source of income to farmers. In India, okra is grown extensively all over the country in an area of 4.32 lakh hectares with a production of 45.2 lakh tones of fruits with a productivity of (Anonymous, 2009). In Karnataka it is cultivated on an area of 8,100 hectares with a production of 73.1 thousand tones (Anonymous, 2009). The important insect pests during early stage of crop growth are leaf hoppers (*Amrasca bigutulla bigutulla* Ishida), aphids (*Aphis gossypii* Glover), and white fly (*Bemisia tabaci* Genn.) while at later stage fruit borers like *Earias* spp. and *Helicoverpa armigera* (Hb.) cause considerable losses to the crop to the tune of 91.6 per cent (Shah *et al*., 2001). Of the various pests infesting okra, fruit borers (*Earias* spp. and *Helicoverpa armigera* (Hubner), leaf hopper, aphid and red spider mite are more devastating, which reduce the yield and vitality of the plant (Sivakumar *et al.,* 2003)

Among the different insect pests, fruit borers take upper hand by causing direct damage to tender fruits. Though many non-chemical control strategies are advocated under the IPM umbrella, still farmers rely on chemical insecticides. Repeated use of same chemical may lead to development of resistance in insects. To over come these problems, a new insecticide rynaxypyr, belonging to anthranilic diamide group has larvicidal activity. The insecticide is selective in action against wide range of lepidopteran insect pests. Therefore, efforts have been made in the present study to evaluate the efficacy against fruit borer, *H. armigera*.

MATERIALS AND METHODS

Field experiment was conducted at Main Agricultural Research Station, University of Agricultural Sciences, Raichur, Karnataka, with an okra variety, Arka Anamika during 2009-2010 cropping season. The field trial was laid out in a Randomized Block Design with three replications with a plot size of 5.0 x 5.0 m and a spacing of 60 x 30 cm. The seeds were sown after seed treatment with imidacloprid 70 WS @ 10 g per kg seeds against early sucking insect pests. Except for plant protection schedule, all the agronomic practices followed were similar as recommended in package of practices. There were eight treatments, *viz.,* two different dosages of rynaxypyr 20 SC (20 and 30 g a.i/ha) and compared with spinosad (Tracer) 45 SC, indoxacarb (Avaunt) 14.5 SC, flubendiamide (Fame) 48 SC, emamectin benzoate (Proclaim) 5 SG, quinalphos (Ekalux) 25 EC and untreated control. The insecticides in different dosages were sprayed twice based on the ETL of the

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pest. The observations were recorded on number of *H. armigera* larvae per plant as well as fruit damage on five tagged plants in each plot. These observations were recorded one day prior to spray and after 3rd, 7th and 10 days of each spray. Similarly, observation on fruit yield from each plot was also registered and further converted into hectare basis. The data taken at each imposition were collected, subjected for statistical analysis by following the Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

Observations recorded a day before, population of larvae ranged from 1.93-2.03, 1.27-1.93 per plant in first and second spray, respectively which were statistically non-significant indicating uniform distribution of larval population (Table 1).

Three days after spray larval population was significantly lowest in the treatment rynaxypyr @ 30 g.a.i/ ha (1.00 larvae per plant) followed by its lower dosage (20 g.a.i/ha) which recorded 1.40 larvae per plant and differed significantly. The other treatments, spinosad @ 56 g. a. i/ha, emamectin benzoate @ 15 g.a.i/ha and flubendiamide @ 45 g.a.i/ha were on par with each other. Untreated check recorded highest population of 3.83 larvae per plant.Three days after second spray, significantly lowest population was recorded in both the dosages of rynaxypyr (0.00 larvae per plant) and were at par with each other. Whereas the treatments indoxacarb and quinalphos recorded 0.40 and 0.93 larvae per plant and untreated check recorded highest larval population (1.67 larvae per plant) (Table 1).

On seven days after spray, significantly lowest population was observed in rynaxypyr @ 30 g.a.i/ha (0.12 larvae per plant) it was at par with rest of the treatments except indoxacarb and quinalphos treatments, respectively. Similarly, in second spray lowest population was observed in rynaxypyr @ 30 g.a.i/ha (0.05 larvae per plant) while rynaxypyr @20 g.a.i/ha and flubendiamide @ 45 g.a.i/ha were on par with each other (Table 1).

Ten days after spray, the larval population was increased in all the treatments and ranged from 0.07 to 3.87, 0.00 to 1.20 larvae per plant in first and second spray, respectively. However, lowest population was observed in rynaxypyr @ 30 g.a.i/ha and maintained its superiority in reducing larval population even after ten days of first and second spray. The highest population was recorded in untreated check 3.87 and 1.20 larvae per plant in first and second spray, respectively (Table 1).

Table 1 : Efficacy of rynaxypyr 20 SC on larval population of *Helicoverpa armigera* on okra in 2009-10

Sr. No.	Treatments	Dosage (g. a. i/ha)	Larvae per plant*							
			First spray				Second spray			
			1DBS	3DAS	7DAS	10 DAS	1DBS	3DAS	7DAS	10 DAS
1.	Rynaxypyr 20 SC	20	2.00	1.40	0.20	0.10	1.27	0.00	0.13	0.20
			(1.58)	(1.37)c	(0.83)c	(0.77)f	(1.33)	(0.70)e	(0.79)de	(0.83)e
2.	Rynaxypyr 20 SC	30	1.93	1.00	0.12	0.07	1.30	0.00	0.05	0.00
			(1.55)	(1.22)d	(0.78)d	(0.75)f	(1.34)	(0.70)e	(0.74)e	(0.70)f
3.	Spinosad 45 SC	56	2.03	1.80	0.30	0.33	1.27	0.20	0.20	0.27
			(1.59)	(1.51)bc	(0.89)c	(0.91)de	(1.33)	(0.83)d	(0.83)cd	(0.87)de
4.	Indoxacarb 14.5 SC	75	2.03	1.98	0.40	0.73	1.33	0.40	0.27	0.47
			(1.59)	(1.57)b	(0.94)bc	(1.10)c	(1.35)	(0.94)c	(0.87)c	(0.98)b
5.	Emamectin benzoate	15	2.00	1.60	0.20	0.43	1.50	0.13	0.20	0.27
	5 SG		(1.59)	(1.44)bc	(0.83)c	(0.96)d	(1.41)	(0.79)d	(0.83)cd	(0.87)cd
6.	Flubendiamide 48 SC	45	1.97	1.80	0.40	0.27	1.23	0.13	0.23	0.27
			(1.57)	(1.51)bc	(0.94)bc	(0.87)e	(1.31)	(0.79)d	(0.85)cd	(0.87)cd
7.	Quinalphos 25 EC	500	2.13	2.00	0.90	0.93	1.67	0.93	0.73	0.40
			(1.62)	(1.58)b	(1.18)b	(1.19)b	(1.47)	(1.19)b	(1.10)b	(0.94)bc
8.	Control	--	2.03	3.83	3.00	3.87	1.93	1.67	1.13	1.20
			(1.59)	(2.08)a	(1.87)a	(2.09)a	(1.55)	(1.47)a	(1.27)a	(1.30)a
	S.E. ±		0.12	0.06	0.03	0.04	0.08	0.04	0.06	0.03
	C.D. (P=0.05)		NS	0.18	0.10	0.12	NS	0.12	0.16	0.10

DAS- Days after pray DBS- Days before spray NS- Non significant *Mean of five plants

Figures in parentheses are $\sqrt{x+0.5}$ transformed values

Means followed by the same letter(s) in a column are not significantly different by DMRT (P=0.05)

Table 2 : Efficacy of rynaxypyr 20 SC on per cent fruit damage and yield in okra

Sr. No.	Treatments	Dosage (g. a. i/ha)	Fruit damage (%)*	Yield (t/ha)**
1.	Rynaxypyr 20 SC	20	10.51 (18.91)^{e}	10.89^{ab}
2.	Rynaxypyr 20 SC	30	7.80 (16.20)^{f}	11.60^{a}
3.	Spinosad 45 SC	56	19.35 (26.10)^{d}	9.70^{de}
4.	Indoxacarb 14.5 SC	75	22.81 (28.50)^{c}	8.85^{e}
5.	Emamectin benzoate 5 SG	15	18.70 (25.59)^{d}	10.19^{c}
6.	Flubendiamide 48 SC	45	19.03 (25.86)^{d}	9.9^{cd}
7.	Quinalphos 25EC	500	27.71 (31.76)^{b}	7.13^{f}
8.	Control	--	35.44 (36.53)^{a}	4.83^{g}
S. E. ±			1.14	0.45
C. D. (P=0.05)			3.47	1.35

**Sum of seven pickings * Figures in parentheses are arcsine-transformed values
Means followed by the same letter(s) in a column are not significantly different by DMRT (P=0.05)

Significantly low per cent fruit damage was observed in the treatment rynaxypyr @ 30 g.a.i/ha (7.80%) followed by its lower dosage (20 g.a.i/ha) which recorded 10.51 per cent fruit damage. While the treatments emamectin benzoate 15 g. a. i/ha, flubendiamide @ 45 g. a. i/ha, spinosad @ 56 g.a.i/ha and indoxacarb @ 75 g.a.i/ha recorded 18.70, 19.03, 19.35 and 22.81 per cent fruit damage, respectively. Highest per cent fruit damage was in untreated check. Higher fruit yield was recorded in rynaxypyr @ 30 g.a.i/ha (11.60 t ha^{-1}) followed by its lower dosage treatment (10.89 t ha^{-1}) and differed significantly over emamectin benzoate @ 15 g. a. i/ha, flubendiamide @ 45 g.a.i/ha and spinosad @ 56 g.a.i/ha (10.19, 9.91 and 9.70 t ha^{-1}) treatments which differed with each other and untreated check recorded the lowest yield (4.83 t ha^{-1}) (Table 2).

The present results were in agreement with findings of Hosamani *et al*. (2008) who reported that rynaxypyr at 30g a.i/ha recorded in minimum per cent larval population of *Spodoptera litura*, *Spodoptera exigua* and *Helicoverpa armigera* (5.16-5.43, 1.08-1.35, and 0.78 %) in chilli. According to Bhosale *et al*. (2009) rynaxypyr at 30g a.i/ha was found to be most effective in controlling the pod borer, *Helicoverpa armigera*, plume moth, *Exelastis atomosa* and was at par with its higher dose of rynaxypyr @ 40g a.i/ha. Similarly, results were also in aggregation with the work of Jarrod *et al.*(2008) and Bheemanna *et al.*(2008).

The overall results revealed that rynaxypyr 20 SC is the new potential insecticide, effective against okra fruit borer complex apart from spinosad 45 SC, flubendiamide 48 SC and emamectin benzoate 5 SG.

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