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EVALUATION OF EFFICACY OF INSECTICIDES AGAINST CASTOR SHOOT AND CAPSULE BORER *CONOGETHES PUNCTIFERALIS*

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ABSTRACT

An experiment was conducted to evaluate the efficacy of ten insecticides against castor shoot and capsule borer *Conogethes punctiferalis*. Pooled efficacies of treatments revealed that combination treatment of chlorantraniliprole 18.5SC + azadirachtin 1EC @ 0.3 ml l^{-1} + 1 ml l^{-1} was recorded as the most effective treatment which exhibited highest efficacy against *C. punctiferalis* (77.26% reduction over control) followed by chlorantraniliprole 18.5SC @ 0.3 ml l^{-1} which recorded 73.46% reduction over control. The highest yield was obtained with chlorantraniliprole 18.5SC (0.0055%) + azadirachtin 1EC (0.01%) @ 0.3 ml l^{-1} + 1 ml l^{-1} (2369 kg ha^{-1}).

Key words: Efficacy, castor, castor shoot and capsule borer, *Conogethes punctiferalis*, combination, chlorantraniliprole 18.5SC, azadirachtin 1EC, reduction over control, capsule yield.

Castor *Ricinus communis* (L) is mostly cultivated in the semiarid and arid regions of India as a non-edible oilseed crop. Insect pests, particularly the lepidopteran defoliators and capsule borer, play a major role and cause 35-40% yield loss. Of them, *Conogethes punctiferalis* causes drastic yield losses. Therefore, it is necessary to manage this pest to increase the productivity. Application of newer insecticides has an opportunity in the management of pests as they are ecofriendly, pest-specific and less persistent. However, information regarding efficacy of novel molecules against castor shoot and capsule borer is very limited (Narayanamma et al., 2013). Hence the current study is to evaluate some novel insecticides against *C. punctiferalis* of castor.

MATERIALS AND METHODS

An 8x 5 m plot with eleven treatments and three replications was carried out in a randomised block design. The seeds were dibbled with a spacing of 90 x 45 cm and all recommended practices were carried out except plant protection measures. The treatments include T_1: spinetoram 11.7SC @ 0.5 ml l^{-1}, $T_{2:}$ cyantraniliprole 10.26OD @ 1.2 ml l^{-1}, T_3: chlorantraniliprole 18.5SC @ 0.3 ml l^{-1}, T_4: chlorfluazuron 5.4EC @ 0.3 ml l^{-1}, $T_{5:}$ azadirachtin 1EC @ 1 ml l^{-1}, T_6: spinetoram 11.7SC + azadirachtin 1EC @ 0.5 ml l^{-1} + 1 ml l^{-1}, T_7: cyantraniliprole 10.26OD + azadirachtin 1EC @ 1.2 ml l^{-1} + 1 ml l^{-1}, T_8: chlorantraniliprole 18.5SC + azadirachtin 1EC @ 0.3 ml l^{-1} + 1 ml l^{-1}, T_9: chlorfluazuron 5.4EC + azadirachtin 1EC @ 2.0 ml l^{-1} + 1 ml l^{-1} and T_{10}: quinalphos 25EC and $T_{11:}$ untreated check. The insecticidal treatments were applied when the pest reached economic threshold level (3-4 larvae $plant^{-1}$). Insecticidal treatments were applied twice viz., at capsule formation stage and at capsule development stage with 30 days interval. Ten randomly selected plants were tagged and observations were taken on total number of capsules and damaged capsules and % worked out one day before spraying (DAS) and at one, five, ten and fifteen DAS. The data was subjected to arc sine transformations and ANOVA prescribed for randomized block design with the help of SPSS statistical package (SPSS, 2020) was carried out.

RESULTS AND DISCUSSION

The efficacies of *C. punctiferalis* after two sprays indicated that the plots which were treated with chlorantraniliprole 18.5SC (0.0055 %) + azadirachtin 1EC (0.01 %) @ 0.3 ml l^{-1} + 1 ml l^{-1} recorded highest reduction of capsule damage and remained significantly superior. The next effective in the descending order of efficacy were chlorantraniliprole 18.5SC (0.0055 %) @ 0.3 ml l^{-1} and cyantraniliprole 10.26OD (0.0123 %) + azadirachtin 1EC (0.01 %) @ 1.2 ml l^{-1} + 1 ml l^{-1} with 73.46 and 71.31% reduction over control, respectively and statistically at par. The highest reduction was obtained with chlorantraniliprole 18.5SC + azadirachtin

Table 1. Efficacy of insecticides against *C. punctiferalis* (rabi, 2021-22)

S.No.	Treatments	% reduction of larval incidence									
			Pooled data					Yield (Kg ha^{-1})			
		PTC	1 DAS	5 DAS	10 DAS	15 DAS	Mean % reduction	I Picking	II Picking	III Picking	Mean
T_1	Spinetoram 11.7 SC 0.5 ml l^{-1}	14.93	60.91^{d} (51.30)	72.31^{de} (58.27)	64.31^{f} (54.30)	56.00^{e} (52.51)	62.27^{e} (53.05)	1325.58^{d}	1790.70^{cd}	1558.14^{de}	1505.43^{e}
T_2	Cyantraniliprole 10.26 OD 1.2 ml l^{-1}	12.88	64.96^{bc} (54.60)	77.06^{b} (61.40)	70.30^{d} (55.91)	61.19^{c} (55.11)	68.63^{c} (55.74)	1506.98^{cd}	1917.83^{cd}	1685.27^{d}	1703.36^{d}
T_3	Chlorantraniliprole 18.5 SC 0.3 ml l^{-1}	11.95	69.70^{ab} (56.59)	79.85^{ab} (63.32)	73.75^{b} (59.81)	69.72^{b} (60.44)	73.46^{b} (59.00)	1772.09^{b}	2237.21^{b}	2179.84^{b}	2063.05^{b}
T_4	Chlorfluazuron 5.4 EC 2.0 ml l^{-1}	16.95	55.74^{f} (48.30)	66.78^{g} (55.41)	56.86^{g} (50.00)	49.01^{g} (48.02)	56.02^{g} (49.49)	1074.42^{f}	1539.53^{e}	1306.98^{f}	1306.98^{fg}
T_5	Azadirachtin 1 EC 1 ml l^{-1}	18.40	51.95^{h} (46.11)	62.23^{hi} (53.22)	49.82^{i} (47.53)	42.04^{i} (43.12)	50.35^{i} (46.80)	852.71^{g}	1317.83^{f}	1085.27^{g}	1085.27^{h}
T_6	Spinetoram 11.7 SC + Azadirachtin 1 EC 0.5 ml l^{-1} + 1 ml l^{-1}	15.05	60.76^{c} (51.22)	73.85^{d} (59.29)	65.72^{e} (55.68)	59.59^{d} (53.86)	65.17^{d} (54.09)	1398.45^{d}	1863.57^{cd}	1631.01^{de}	1631.01^{de}
T_7	Cyantraniliprole 10.26 OD + Azadirachtin 1 EC 1.2 ml l^{-1} + 1 ml l^{-1}	12.92	67.93^{b} (55.51)	77.94^{b} (61.98)	71.65^{c} (58.67)	67.13^{bc} (58.37)	71.31^{bc} (57.72)	1603.10^{c}	2068.22^{c}	1835.66^{c}	1835.66^{c}
T_8	Chlorantraniliprole 18.5 SC + Azadirachtin 1 EC 0.3 ml l^{-1} + 1 ml l^{-1}	11.84	69.17^{a} (56.29)	82.60^{a} (65.33)	78.91^{a} (61.86)	75.05^{a} (63.85)	77.26^{a} (60.76)	1993.80^{a}	2458.91^{a}	2655.81^{a}	2369.51^{a}
T_9	Chlorfluazuron 5.4 EC + Azadirachtin 1 EC 2.0 ml l^{-1} + 1 ml l^{-1}	16.60	56.54^{e} (48.76)	69.38^{f} (57.04)	64.12^{fg} (48.30)	51.21^{fg} (49.64)	59.26^{f} (49.89)	1249.61^{de}	1714.73^{de}	1482.17^{ef}	1395.35^{f}
T_{10}	Quinalphos 25EC (Check) 2.0 ml l^{-1}	18.64	51.30^{g} (45.74)	63.94^{h} (54.27)	54.36^{h} (50.31)	46.81^{h} (46.61)	53.51^{h} (48.33)	1000.00^{f}	1465.12^{ef}	1232.56^{f}	1186.05^{g}
T_{11}	Untreated control	30.89	-	-	-	-	-	663.57^{h}	1128.68^{g}	873.00^{h}	873.00^{i}
SEm±			0.61	0.68	1.12	1.26	0.40	32.73	34.47	35.06	32.29
CD (p=0.05)		NS	1.80	2.01	3.30	3.71	2.11	96.56	101.68	103.42	95.26
CV (%)			2.26	2.19	3.93	4.83	2.24	8.03	6.26	7.05	6.66

Figures in parentheses angular transformed values; PTC: Pre-treatment count; DAS: Days After Spraying;

1 EC @ 0.3 ml l^{-1} + 1 ml l^{-1} might be due to the combined mode of action. The capsule yield was highest in chlorantraniliprole 18.5SC (0.0055 %) + azadirachtin 1EC (0.01 %) @ 0.3 ml l^{-1} + 1 ml l^{-1} (2369 kg ha^{-1}). The next best were chlorantraniliprole 18.5SC (0.0055 %) @ 0.3 ml l^{-1} (2063 kg ha^{-1}), and cyantraniliprole 10.26OD (0.0123 %) + azadirachtin 1 EC (0.01 %) @ 1.2 ml l^{-1} + 1 ml l^{-1} (1836 kg ha^{-1}).

These results are in line with those of Ranganath (2020) that chlorantraniliprole 18.5SC was the best with highest yield. The results on yield are in line with Jayanth and Kumar (2022) who found that maximum yield in chickpea was recorded with chlorantraniliprole 18.5SC Chaudhari et al. (2020), Dhuraimurgan and Lakshminarayana (2014) and Prashant (2016) also obtained similar results. Narayanamma et al. (2013) indicated that chlorantraniliprole was found to be the most effective. In case of cyantraniliprole 10 OD the results were in accordance with the findings of Harshita et al. (2021) in pigeonpea. Kumar and Mohan (2020) reported that highest grain yield was recorded in spinetoram 11.7SC in maize. Therefore, the combination of insecticides with neem formulations such as azadirachtin (0.01 %) fits very well in IPM of castor.

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AUTHOR CONTRIBUTION STATEMENT

Keerthana conducted the original experiment and wrote the original manuscript and done the data analysis. Chalam and Radhika contributed the editing, conceptualization, visualization and supervision during the writing of manuscript. Lavanya kumari helped in statistical analysis.

CONFLICT OF INTEREST

No conflict of interest.

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