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Natural Parasitisation of Castor Semilooper, *Achaea janata* Lin. by Hymenopteran Parasitoid, *Snellenius (Microplitis) maculopennis* (Szepligeti)

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Abstract The larvae of *Achaea janata* were parasitized by hymenopteran parasitoid, *Snellenius (Microplitis) maculopennis* (Szepligeti) and its activity was observed from September to December. However, peak parasitisation was observed during September which was slowly declined later. Maximum parasitisation of 60.00% was observed when crop was sown early during July whereas 50.09% was observed in late sown crop during August.

Keywords Castor Semilooper, *Achaea Janata* Lin., Hymenoptenan parasitoid,

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Introduction

Castor (*Ricinus communis* Lin.) is an important non edible oilseed crop which is grown in arid and semi arid regions. In India, castor is sown during July or August and harvested around December or January. More than 20 species of insect pests were found associated with castor, but many of them were highly irregular in occurrence over years, distributed in patches with low population causing no remarkable damage to the crop. Only 10 species belonging to Lepidoptera, Hemiptera, Orthoptera and Thysanoptera showed variable economic importance and of them, five species were found regular with high degree of severity as major pests. Most of the insect pests were either defoliators or sucking pests [1]. The magnitude of insect pest problem is quite high in Southern India where castor is grown mainly as rainfed crop, resulting in lower seed yield. The major pest problems in castor include the defoliators, semilooper, *Achaea janata* L., tobacco caterpillar, *Spodoptera litura* Fab. capsule borer, *Conogethes punctiferalis* Guen and the sucking pests, leafhopper,*Empoasca flavescens* Fab.thrips, *Retithripssyniacus* Mayet and whitefly, *Trialeurodes ricini* Misra [2]. The study undertaken to know the extent of parasitisation of semilooper, so that it will help to avoid of indiscriminate use insecticides.

Materials and Methods

Twenty one varieties and hybrids were selected for

Table 1. Parasitisation of *Achaea janata* by *Snellenius (Microplitis)maculopennis* in early sowing of castor genotypes. Figures in parentheses are arcsine values. SEm=Standard error of mean, CD (p=0.05) = Critical difference at 5% level of significance.

Genotypes	Parasitisation (%) 30 DAS (30.09.2013)	60 DAS (30.10.2013)	90 DAS (30.11.2013)	120 DAS (30.12.2013)	150 DAS (30.01.2014)	Mean
DPC-9	0.00 (0.00)	80.00 (89.3)	33.33 (57.5)	33.33 (57.5)	0.00 (0.00)	35.29 (36.5)
DCS-9	0.00 (0.00)	0.00 (0.00)`	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	35.29 (36.5)
48-1	33.33 (41.4)	75.00 (87.8)	50.00 (50.0)	45.45 (66.8)	50.00 (70.9)	48.78 (44.3)
Haritha	50.00 (33.3)	60.00 (76.6)	40.00 (63.4)	14.29 (21.9)	0.00 (0.00)	29.17 (32.7)
PCH-288	25.00 (27.5)	75.00 (87.5)	50.00 (50.0)	50.00 (70.5)	0.00 (0.00)	50.00 (45.0)
PCH-111	33.33 (33.3)	50.00 (70.6)	50.00 (73.1)	0.00 (0.00)	33.33 (33.3)	33.33 (35.3)
PCH-254	0.00 (0.00)	33.33 (41.4)	33.33 (33.3)	33.33 (33.3)	0.00 (0.00)	21.43 (27.6)
M-574	0.00 (0.00)	33.33 (33.3)	33.33 (41.4)	40.00 (63.4)	20.00 (26.8)	29.41 (32.8)
Kiran	0.00 (0.00)	60.00 (78.3)	50.00 (70.6)	0.00 (0.00)	0.00 (0.00)	31.58 (34.2)
PCH-248	0.00 (0.00)	33.33 (33.3)	33.33 (66.7)	0.00 (0.00)	0.00 (0.00)	33.33 (35.3)
PCH-294	50.00 (0.00)	66.67 (87.0)	33.33 (57.5)	0.00 (0.00)	25.00 (29.3)	31.25 (33.1)
PCH262	0.00 (0.00)	50.00 (58.6)	0.00 (0.00)	50.00 (50.0)	0.00 (0.00)	27.27 (31.5)
GCH-4	0.00 (0.00)	55.56 (73.5)	40.00 (44.9)	28.57 (45.2)	33.33 (47.1)	39.29 (38.8)
PCH-282	0.00 (0.00)	66.67 (66.7)	33.33 (33.3)	0.00 (0.00)	25.00 (29.3)	28.57 (32.3)
RG-2835	0.00 (0.00)	40.00 (63.4)	40.00 (52.2)	40.00 (63.4)	0.00 (0.00)	28.57 (32.3)
PCH-106	25.00 (23.5)	63.64 (79.3)	50.00 (72.2)	25.00 (29.3)	20.00 (26.1)	43.33 (41.2)
PCH-222	50.00 (66.7)	50.00 (58.5)	50.00 (58.5)	44.44 (65.5)	0.00 (0.00)	41.67 (40.2)
RG-2928	0.00 (0.00)	71.43 (84.2)	60.00 (77.5)	33.33 (33.3)	50.00 (70.6)	58.06 (49.6)
RG-1180	40.00 (54.9)	100.0 (100)	33.33 (33.3)	50.00 (69.8)	16.67 (23.5)	44.00 (41.6)
RG-776	0.00 (0.00)	50.00 (70.6)	33.33 (41.4)	40.00 (52.2)	33.33 (48.1)	33.33 (35.3)
Kranthi	50.00 (33.3)	66.67 (65.0)	66.67 (66.7)	25.00 (35.3)	20.00 (31.7)	41.18 (39.9)
Mean	23.40	60.20	44.30	32.69	20.24	38.35
SEm	0.85	0.81	1.07	0.85	0.45	0.83
CD= (0.05%)	2.43	2.33	3.05	2.42	1.28	2.33

the present studies viz. DPC 9, DCS 9, 48-1, Haritha, PCH 288, PCH 111, PCH 254, M 574, Kiran, PCH 248, Kranthi, PCH 294, PCH 262, GCH 4, PCH 282, RG 2835, PCH 106, PCH 222, RG 2928, RG 1180 and RG 776. The seed material of various cultivars/genotypes/hybrids was obtained from Regional Agricultural Research Station, Palem, Mahaboobnagar District, AP and Directorate of Oilseeds Research (DOR), Rajendranagar, Hyderadad. The genotypes were sown in two rows with a susceptible/local check after every ten entries. The field was ploughed throughly thrice to obtain fine tilth and properly levelled after removing stubbles, weeds and trash. Two sowings were taken up on 30.07.2013 and 30.08.2013 hy dibling the seed with a spacing of 90 × 60 cms and ten plants per each row. Good agricultural practices taken up through the crop seaso. Data on total number of larvae and parasitized larvae were recorded from randomly selected three plants at 30, 60, 90, 120 and 150 days of crop at 30 days interval and it converted into percent parasitisation.

$$\text{Percent parasitisation} = \frac{\text{Total larvae-parasitized larvae}}{\text{Total larvae}} \times 100$$

Results and Discussion

Natural parasitisation of castor semilooper, *Achaea janata* in early sowing

Table 1 reveals that when 21 castor genotypes were sown early during July, RG-2928 recorded a maximum of 58.06% parasitisation by *Snellenius (Microplitis) maculopennis* followed by 50.00% on PCH-111. Parasitisation ranging from 40.00 to 50.00% was recorded on the genotypes including 48-1 (48.78%), PCH-106 (43.33%), RG-1180 (44.00%), PCH-222 (41.67%) and Kranthi with 41.18%. Similarly, parasitisation ranging 30.00 to 40.00% was recorded in genotypes viz. GCH-4 (39.29%), DPC-9 (35.29), PCH-248 and RG-776 with 33.33%. Howewer, parasitisation ranging from 20.00 to 30.00% was observed in Haritha, M-574, PCH-262, PCH-282 and RG-2835. It is quite

Table 2. Parasitisation of *Achaea janata* by *Snellenius (Microplitis) maculopennis* late sowing of castor genotypes. Figures in parentheses are arcsine values. SEm = Standard error of mea. CD (p = 0.05) = Critical difference at 5% level of significance.

Genotypes	Parasitisation (%) 30 DAS (30.09.2013)	60 DAS (30.10.2013)	90 DAS (30.11.2013)	120 DAS (30.12.2013)	Mean
DPC-9	33.33 (35.0)	50.00 (70.59)	0.00 (0.00)	0.00 (0.00)	25.00 (30.00)
DCS-9	0.00 (35.0)	66.67 (66.67)	50.00 (57.91)	50.00 (70.59)	50.00 (45.00)
48-1	33.33 (50.00)	0.00 (0.00)	28.57 (43.75)	40.00 (53.51)	31.25 (33.99)
Haritha	33.33 (50.00)	60.00 (80.26)	33.33 (33.33)	0.00 (0.00)	38.46 (38.33)
PCH-288	33.33 (33.33)	50.00 (50.00)	0.00 (0.00)	0.00 (0.00)	30.00 (33.21)
PCH-H1	50.00 (55.06)	0.00 (0.00)	33.33 (57.54)	0.00 (0.00)	28.57 (32.31)
PCH-254	0.00 (0.00)	50.00 (50.00)	0.00 (0.00)	0.00 (0.00)	12.50 (20.70)
M-574	50.00 (55.06)	66.67 (82.76)	33.33 (41.38)	33.33 (33.33)	45.45 (42.39)
Kiran	0.00 (0.00)	33.33 (33.33)	50.00 (70.59)	0.00 (0.00)	28.57 (32.31)
PCH-248	66.67 (66.67)	50.00 (50.00)	33.33 (57.54)	0.00 (0.00)	44.44 (41.81)
PCH-294	50.00 (44.79)	0.00 (0.00)	66.67 (47.22)	0.00 (0.00)	30.00 (33.21)
PCH-262	0.00 (0.00)	50.00 (70.59)	40.00 (52.18)	33.33 (33.33)	33.33 (35.26)
GCH-4	50.00 (44.79)	33.33 (33.33)	0.00 (0.00)	0.00 (0.00)	25.00 (30.00)
PCH-282	0.00 (0.00)	50.00 (70.59)	60.00 (80.26)	33.33 (41.38)	41.67 (40.20)
RG-2835	50.00 (63.38)	40.00 (36.96)	28.57 (45.18)	0.00 (0.00)	33.33 (35.26)
PCH-106	50.00 (70.59)	60.00 (64.65)	42.86 (65.63)	50.00 (70.59)	50.00 (45.00)
PCH-222	50.00 (44.90)	100.0 (100.1)	50.00 (70.54)	33.33 (57.54)	52.94 (46.69)
RG-2928	33.33 (33.33)	62.50 (78.35)	16.67 (24.07)	0.00 (0.00)	38.89 (38.58)
RG-1180	60.00 (89.20)	66.67 (47.22)	37.50 (61.32)	50.00 (50.00)	50.00 (45.00)
RG-776	0.00 (0.00)	50.00 (50.00)	50.00 (41.46)	0.00 (0.00)	42.86 (40.89)
Kranthi	0.00 (0.00)	50.00 (70.59)	33.33 (47.06)	20.00 (31.70)	26.67 (31.09)
Mean	37.50	50.79	35.00	25.64	37.98
SEm	0.94	0.93	0.94	0.60	0.75
CD = (0.05%)	2.68	2.66	2.68	1.73	2.11

interesting to report that the only genotype, DCS-9 on which no parasitisation of *A. janata* couldn't be recorded due to lack of pest incidence.

Natural parasitisation of castor semilooper, *Achaea janata* in late sowing

Table 2 reveals that in case of late sown castor by one month i.e. during August, there was relatively high percent of parasition i.e. 52.94% on PCH-222 followed by 50.00% on cultivars viz. DCS-9, PCH-106 and RG-1180. Similarly parasitisation ranging from 40.00 to 50.00% could be observed in the case of genotypes, M- 574 (45.45%), PCH-294 (44.44%), RG-776 (42.86%) and PCH-282 (41.67%)). In the case of genotypes, RG-2928. Haritha, PCH-262 and RG-2835 parasitisation ranged 30.00 to 40.00%. Least parasitisation of 12.50% was recorded in PCH-254, followed by 25.00% in DPC-9 and GCH-4 and 26.67% in kranthi. An average of 28.57% parasitisation was recorded on two genotypes PCH-111 and Kiran.

Comparison of parasitisation of *Achaea janata* by *Snellenius (Microplitis) maculopennis* in early and late sown crop

Table 3 reveals that *Snellenius (Microplitis) maculopennis* parasitized the larvae of *A. janata* where the parasitoid activity was observed from September to December. However, peak parasitisation was observed during September which was slowly declined later. Maximum parasitisation of 60.00% was observed when the crop was sown early during August at 30 days after sowing where it was found to be maximum of 50.79% when the crop was sown late. Present results confirm the findings of Somasekhar et al. [3], who have reported that high parasitisation during September, might be due to the favorable weather conditions as well as stage of the crop recording high host population. In general, through only 23.40% parasitisation was observed during initial stages of the crop growth which later increased to 60.20% parasitisation during September. However, as

Table 3. Comparison on parasitization of *Achaea janata* by *Snellenius (Microplitis) maculopennis* in two dates of sowing.

Date of sowing	30.08.2013 Mean larvae/ plant	Parasitized larvae/ plant	% parasitized larvae	30.09.2013 Mean larvae/ plant	Parasitized larvae/ plant	% parasitized larvae	30.10.2013 Mean larvae/ plant	Parasitized larvae/ plant	% parasitized larvae	30.11.2013 Mean larvae/ plant	Parasitized larvae/ plant	% parasitized larvae	30.12.2013 Mean larvae/ plant	Parasitized larvae/ plant	% parasitized larvae
30.07 2013	0.75	0.17	23.40	1.56	0.94	60.20	1.25	0.55	44.30	1.65	0.54	32.69	1.33	0.27	20.24
30.8. 2013	-	-	-	0.89	0.33	37.50	1.00	0.50	50.79	1.59	0.56	35.00	0.62	0.16	25.64

the number of larvae reduced only 44.30% parasitisation as observed during October followed by 32.69% parasitisation, though 1.33 larval populations during December has resulted in 20.40% parasitisation. On an average, when the crop was sown during July, only 38.35% parasitisation was observed. However, when the crop was sown later by one month, it resulted in only 37.50% parasitisation. Similarly, during October maximum of 50.99% parasitisation was recorded, which was reduced to 13.00% parasitisation during November. During December only, 25.64% parasitisation was recorded. The fluctuation in percent parasitisation in the present study due to change in the host larval population as evidenced by more pest occurrence during September when the crop was sown early and during October in late sown crop. Parasitized larvae fail to undergo moulting and reduced size where reduction in size due to feeding cessation in *A. janata* as supported by earlier workers [4—6].

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