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Effectiveness of different storage bags against *Caryedon serratus* (Oliver) (Coleoptera: Bruchidae) in storage condition

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ABSTRACT

Laboratory experiments on effectiveness of different storage bags against the groundnut Bruchid, Caryedon serratus in storage condition was carried out at Main Oilseeds Research Station, Junagadh Agricultural University, Junagadh during 2016 and 2017. All the treatments were significantly superior over untreated check (i.e., Traditional jute gunny bags). Results of the experiment indicated that the lowest per cent pod damage was recorded in the treatments of high-density polythene (HDPE) bags (Adults unreleased), polythene layered gunny bags (Adults unreleased), fertilizer bags (Adults unreleased) and triple layered gunny bags (Adult unreleased) at 30, 60, 90 and 120 days days of trial installation. The high-density polythene (HDPE) bags (Adult unreleased) have also higher net gain as well as ICBR (1: 52.52) followed by high density polythene (HDPE) bags (Adult released) (1: 43.99) and polythene layered gunny bags (Adult unreleased) (1: 30.01).

Keywords: Groundnut, Bruchid, Caryedon serratus and storage bags

INTRODUCTION

Groundnut bruchid *Caryedon serratus* (Oliver) is one of the major and important storage insect species causing approximately 17-47 per cent of the pods damage (Shukla and Rathore, 2007)[1]. The *Caryedon serratus* has wide host range which includes *Bauhinia monandra* (Kurz.), *Prosophis juliflora* (SW.) (Beeson, 1918)[2], *Acaia tomentosa* (Benth) (Van Hall, 1919)[3], *A. nilotica* (L.), *Cassia fistula* (L.) (Pruthi and Singh, 1950)[4], *Pongamia pinnata* (L.) (Singal and Toky, 1990)[5]. The beetle damage not only reduces the weight and nutrient value but also adversely affects the quality of seed and oil. Infestation causes loss in dry mass of the kernels, increased levels of free fatty acids in the oil (thereby lowering the quality) and reduction in germination potential (Howe, 1952)[6]. The heat and moisture generated by large insect population within heaps or stacks of groundnut may also increase the risk of mould growth. *C. serratus* is a major insect pest of stored groundnut causing severe damage, preventing long term storage; meagre information is available on management of this pest using different types of bags under storage. Hence, the present investigation was undertaken on effectiveness of different storage bags against *C. serratus* in storage condition.

MATERIALS AND METHODS

With a view to find out the effect of different insecticides against foliar thrips infesting in summer groundnut, a field experiment was conducted in randomized block design with three replications at Main Oilseeds Research Station, Junagadh Agricultural University, Junagadh during consecutive three year. Spraying of insecticides was applied after initiation of the pest population. The observations number of thrips per three terminal leaves was recorded from randomly selected five plants from each plot before 24 hours and at 3,7 & 10 days after spray. The second spray was applied at 10 days interval of first spray application. The observations of number of thrips /3 terminal leaves/plant and pod and haulm yield per plot were recorded. Data were subjected to ANOVA after following square root transformation.

RESULTS AND DISCUSSION

The per cent pod damage by Bruchid, *C. serratus* was found lowest in all storage bags over control (*i.e.*, Traditional jute gunny bags) after 30, 60 and 90 days of storage.

Pooled data of the year 2016 and 2017 (Table 1) showed that per cent pod damage was observed significantly differed in all the treatments over control (Traditional bag) up to the end of trial (180 days).

However, significantly the lowest per cent pod damage was recorded in the treatments of high-density polythene (HDPE) bags (Adults unreleased), polythene layered gunny bags (Adults unreleased), and polythene layered gunny bags (Adults unreleased) at 60 days, 90 days, 120 days and 150 days of trial installation. Baributa et al. (2010)[7] suggested use of triple layer plastic bags for long term storage of maize grains for the control of Prostephanus truncates due to their simplicity, durability, low cost with proper thickness and its manufacture using high density polythene consisting three layers of which inner two layers acting as oxygen barriers and outer layer is a normal polypropylene woven sack providing strength to the unit. Vidyashree et al. (2014)[8] results revealed that spinosad 45 SC @ 100 ppm a.i. treated to porous HDPE bags was most effective against C. maculatus in chickpea by recording minimum seed damage (0.67 percent) of highest germination (84.81 per cent) and least adult survival rate (0.42 no./400 seeds) at nine months after treatment imposition,

Considering the economics of different bags treatments, the treatment of high-density polythene (HDPE) bags (Adult unreleased) recorded the higher net gain as well as ICBR (1: 52.52) followed by high density polythene (HDPE) bags (Adult released) (1: 43.99) and polythene layered gunny bags (Adult unreleased) (1: 30.01). Chakraborti (2011)[9] reported that methods of storage significantly affect the insect infestation and higher infestation was observed in synthetic cement bags. Harish *et al.* (2014)[10] reported that Super grain bag was significantly superior over other storage bags and recorded minimum number of eggs laid (216.1); damage to pods (37.7%) and kernels (33.7 %) and weight loss in pods (38.2 %) and kernels (33.8 %). However, maximum number of eggs laid, in fertilizer bag (2325.2) followed by gunny bag (1988.3).

CONCLUSION

It was concluded that the lowest per cent pod damage caused by *Caryedon serratus* was recorded in the treatments of high-density polythene (HDPE) bags (Adults unreleased), polythene layered gunny bags (Adults unreleased), fertilizer bags (Adults unreleased) and triple layered gunny bags (Adult unreleased) at 30, 60, 90 and 120 days days of trial installation in storage condition.

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Table 1: Effect of different storage bag on bruchid, *C. serratus* infestation

Sr No	Treatments	Per cent pod damage								
		30 Days			60 Days			90 Days		
		2016	2017	Pooled	2016	2017	Pooled	2016	2017	Pooled
1	Triple layered gunny bags (Adults released)	0.95* (2.25)	1.07 (2.99)	1.01 (2.61)	1.72 (8.51)	1.83 (9.7)	1.77 (9.04)	2.75 (22.52)	2.79 (23.19)	2.77 (22.85)
2	Triple layered gunny bags (Adults unreleased)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.99 (2.49)	1.10 (3.19)	1.05 (2.86)	2.08 (12.67)	2.21 (14.37)	2.14 (13.44)
3	Polythene layered gunny bags (Adults released)	0.70 (0.99)	0.80 (1.45)	0.75 (1.21)	0.79 (1.40)	0.80 (1.45)	0.80 (1.45)	1.20 (3.89)	1.31 (4.73)	1.25 (4.26)
4	Polythene layered gunny bags (Adults unreleased)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)
5	High density polythene (HDPE) bags (Adults released)	0.55 (0.42)	0.63 (0.71)	0.59 (0.56)	0.80 (1.45)	0.72 (1.08)	0.76 (1.26)	0.85 (1.70)	1.04 (2.79)	0.94 (2.19)
6	High density polythene (HDPE) bags (Adults unreleased)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)
7	Fertilizer bags (Adults released)	0.75 (1.21)	0.86 (1.75)	0.80 (1.45)	1.40 (5.47)	1.37 (5.22)	1.38 (5.30)	1.81 (9.48)	1.98 (11.44)	1.90 (10.49)
8	Fertilizer bags (Adults unreleased)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	1.07 (2.99)	1.18 (3.74)	1.12 (3.32)	1.34 (4.97)	1.54 (6.72)	1.44 (5.82)
9	Traditional jute gunny bags (control) (Adults released)	1.14 (3.46)	1.28 (4.49)	1.21 (3.96)	1.96 (11.2)	2.06 (12.42)	2.01 (11.80)	3.14 (29.5)	3.30 (32.64)	3.22 (31.05)
10	Traditional jute gunny bags (control) (Adults unreleased)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	1.62 (7.49)	1.79 (9.26)	1.70 (8.30)	2.38 (16.74)	2.46 (17.92)	2.42 (17.33)
T	SEM ±	0.04	0.04	0.03	0.06	0.07	0.05	0.10	0.11	0.07
	C.D. at 5%	0.11	0.12	0.08	0.17	0.20	0.13	0.28	0.31	0.20
Y xT	SEM±			0.01			0.02			0.03
	C.D. at 5%			NS			NS			NS
	C.V. %	12.00	12.40	12.20	10.40	11.80	11.20	11.70	12.30	12.00

* Arc Sign transformed value (The data in parenthesis are retransform value)

Conti…

Sr No	Treatments	Per cent pod damage								
		120 Days			150 Days			180 Days		
		2016	2017	Pooled	2016	2017	Pooled	2016	2017	Pooled
1	Triple layered gunny bags (Adults released)	3.44* (35.5)	3.51 (36.98)	3.48 (36.35)	4.38 (57.83)	4.45 (59.7)	4.41 (58.63)	4.52 (61.61)	4.58 (63.26)	4.55 (62.43)
2	Triple layered gunny bags (Adults unreleased)	2.93 (25.63)	3.02 (27.26)	2.98 (26.53)	3.56 (38.06)	3.63 (39.59)	3.60 (38.93)	4.07 (49.87)	4.14 (51.62)	4.10 (50.62)
3	Polythene layered gunny bags (Adults released)	1.27 (4.41)	1.46 (5.99)	1.37 (5.22)	1.54 (6.72)	1.76 (8.93)	1.65 (7.79)	1.93 (10.84)	2.10 (12.93)	2.01 (11.8)
4	Polythene layered gunny bags (Adults unreleased)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)
5	High density polythene (HDPE) bags (Adults released)	1.13 (3.39)	1.31 (4.73)	1.22 (4.03)	1.41 (5.55)	1.60 (7.3)	1.50 (6.35)	1.74 (8.72)	1.88 (10.26)	1.81 (9.48)
6	High density polythene (HDPE) bags (Adults unreleased)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)	0.41 (0.01)
7	Fertilizer bags (Adults released)	2.03 (12.05)	2.17 (13.84)	2.10 (12.93)	2.59 (19.92)	2.70 (21.69)	2.64 (20.72)	2.87 (24.57)	3.01 (27.07)	2.94 (25.81)
8	Fertilizer bags (Adults unreleased)	1.73 (8.61)	1.85 (9.92)	1.79 (9.26)	1.83 (9.7)	1.98 (11.44)	1.90 (10.49)	2.32 (15.89)	2.42 (17.33)	2.37 (16.6)
9	Traditional jute gunny bags (control) (Adults released)	3.68 (40.7)	3.77 (42.73)	3.73 (41.82)	4.62 (64.38)	4.66 (65.5)	4.64 (64.94)	4.71 (66.92)	4.77 (68.65)	4.74 (67.78)
10	Traditional jute gunny bags (control) (Adults unreleased)	2.76 (22.69)	2.86 (24.4)	2.81 (23.53)	3.74 (42.05)	3.81 (43.65)	3.77 (42.73)	4.36 (57.29)	4.44 (59.43)	4.40 (58.36)
T	**SEM ±**	0.11	0.11	0.08	0.10	0.10	0.07	0.12	0.13	0.09
	C.D. at 5%	0.33	0.32	0.22	0.30	0.30	0.21	0.35	0.36	0.25
Y x T	**SEM ±**			0.04			0.03			0.04
	C.D. at 5%			NS			NS			NS
	C.V. %	11.40	10.70	11.00	8.40	8.10	8.30	8.80	8.90	8.90

* Arc Sign transformed value (The data in parenthesis are retransform value)

Table 2: Economics of different storage methods for storage of groundnut

Sr. No	Treatment detail	Cost of Treatment (Rs.)	Expected life of container/Year	Depreci-Ation cost Rs/year	Annual cost for 100 kg storage (Rs.)	Healthy pod obtained kg/100 kg	Price of Healthy seed Rs 45 /kg	Net gain over gunny bag (Adults unreleased)	ICBR
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10 (9/6)**
1	Triple layered gunny bags (Adults released)	Rs 150/40 kg bag	4	37.5	94	37.57	1691	-183	1 : -1.95
2	Triple layered gunny bags (Adults unreleased)	Rs 150/40 kg bag	4	37.5	94	49.38	2222	348	1 : 3.72
3	Polythene layered gunny bags (Adults released)	Rs 70/40 kg bag	2	35.0	88	88.2	3969	2095	1 : 23.95
4	Polythene layered gunny bags (Adults unreleased)	Rs 70/40 kg bag	2	35.0	88	99.99	4500	2626	1 : 30.01
5	High density polythene (HDPE) bags (Adults released)	Rs 20/40 kg bag	1	20.0	50	90.52	4073	2200	1 : 43.99
6	High density polythene (HDPE) bags (Adults unreleased)	Rs 20/40 kg bag	1	20.0	50	99.99	4500	2626	1 : 52.52
7	Fertilizer bags (Adults released)	Rs 35/20 kg bag	2	17.5	88	74.19	3339	1465	1 : 16.74
8	Fertilizer bags (Adults unreleased)	Rs 35/20 kg bag	2	17.5	88	83.4	3753	1879	1 : 21.48
9	Traditional jute gunny bags (control) (Adults released)	Rs 50/40 kg bag	4	12.5	31	32.22	1450	-424	1 : -13.56
10	Traditional jute gunny bags (control) (Adults unreleased)	Rs 50/40 kg bag	4	12.5	31	41.64	1874	-	-