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Morphological characters of stored groundnut as effected by ground nut seed beetle

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ABSTRACT

Ground nut seed beetle is a serious pest of ground nut in stored condition. Thirteen ground nut cultivars were selected to study their resistance and susceptibility to *Caryedon serratus* in the laboratory at 70% RH and 28 ± 1 °C. The physical characters of ground nut pod like length and breadth of pod, pod colour, pod size, pod weight, pod texture, shell thickness were directly influencing intensity of the attack of ground nut beetle. Pod circumference of ground nut were varied from 3.44 to 4.38 cm. Variety having thicker shell are resistant to the pest.

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Keywor ds

Resistance, Pod texture, Shell thickness, Pod colour, Ground nut beetle.

Introduction

Groundnut is one of the most important cash crops of our country. Groundnut (Arachis hypogea L.) also known as peanut, earthnut etc. belongs to the family leguminosae (Fabacea) (Beghnin and Sewadah, 2003). It is a low priced commodity but a valuable source of all the nutrients. Groundnut is the sixth most important oilseed crop in the world. It contains 48-50% of oil and 26-28% of protein, and is a rich source of dietary fiber, minerals, and vitamins. About 10 percent of the harvested produce is lost during post harvest operations. Farmer, seed agencies and the other storage organizations used to keep more than 65% percent of their produce for consumption, seed and oil extraction for more than 9months. However , the gap between production and consumption only can be bridged by efficient handling of postharvest operation. Groundnut pods harvested in the field passes through various stages to reach the ultimate consumer and are subjected to appreciable losses during storage. The losses due to abiotic factors such as temperature and humidity as well as biotic factors viz. insects, pathogen, rodents, mites and birds The extent of post harvest losses has prompted several studies of insects pests population development on groundnut in store. It is evident that, the groundnut bruchid Caryedon serratus (Olivier) is potential and a serious insect pest of groundnut.. It can damage both groundnut (shelled) and unshelled) in store to an unacceptable state and rendering it unfit for consumption for both humans and livestock when control measures are no applied. According to the results obtained, there was up to 90% damage more than 60% weight loss. (Oaya et al.,2012). However, few or no attempts have been made to measure the degree of losses caused by these insects (Caryedon serratus) either in farmers store or in a large scale commercial storage. Therefore, it is imperative to look at the damage potential and the loss caused by this insect pest (Caryedon serratus) on stored groundnut, which is a important economic crops.

Material and Methods

Studies were conducted and attempts have also been made to screen out the popular groundnut cultivars against the pest attack and factors of resistance contributed by those cultivars. Matured dried harvest pods of groundnut cultivation were collected from groundnut scheme, "Breeder seed production". Prior to start the culture of insects, dried pods were disinfested with Aluminium Phosphide tablets for 7 days. A weekly interval of fresh culture was set, so as to get a steady supply of freshly emerged beetles which were used in different experiments.

Test insect.= *Caryedon serratus (Oliv.)*,(Bruchidae : Coleoptera)

The groundnut seed beetle is one of die obnoxious pest and multiplies rapidly under Orissa climatic conditions inflicting damage both in die larval and adult stages. The test insect is defined by its very broad hind femur, serrated antenna and elytra that do not completely cover the last part of die abdomen.

Groundnut seed beetle Beetles of both the sexes were collected with the help of aspirator and specimen tubes from the infested stocks of groundnut. Rearing and multiplication of the insects were carried out in specimen bottles of 15×10 cm size in the storage laboratory of the Department of Entomology. For mass collection of insects flat bottom flasks of 10 lit capacity containing sufficient groundnut pods and mouth of the flask was covered by a piece of muslin cloth and tied firmly with the rubber bands. These flasks containing insects were kept in dark till the next generation was completed and sufficient number of adults available for further investigations.

13 cultivars of groundnut popularly grown were selected for studies against the beetle, *Caryedon serratus*, (Table 1).

The pods were fumigated with Aluminium Phosphide and healthy pods of different cultivars were collected for the experimental purpose.

Table 1.	Details of groundnut cultivars screened for	
	Caryedon serratus (Oliv.).	

SI.	Cultivars	Origin	Maturity duration in days			
No.			Kharif	JRabi		
1.	SB-XI	Junagadh	110	120		
2.	KISAN	Chiplima	105	115		
3.	GG-2	Junagadh	105	115		
4.	KADIRI-3	Kadiri	120	135		
5.	OG52-1	Chiplima	100	110		
6.	ICGS-11	ICRISAT	120	135		
7.	TG-3	Trombay	105	115		
8.	JL-24	Jalgaon	105	115		
9.	OG-9§3	Chiplima	105	115		
10.	J-ll	Junagadh	105	115		
11.	ICGS-44	ICRISAT	120	135		
12.	TAG-24	Trombay	105	115		
13.	AK-12-24	Anakapalli	100	110		

Groundnut pods of the test entries were studies in the laboratory basing on the length, circumference, length breadth ratio, colour, shape, number of seeds per pod, surface characters of the pod etc.

Chemical constituents of kernel was studied by taking 13 selected groundnut entries were used. These were SB XI, KISAN, GG - 2, KADIRI - 3, OG 52 - 1, ICGS-11, TG- 3, JL - 24, OG - 933, J - 11, ICGS - 44, TAG - 24, and AK - 12 - 24 selected for oil content (%) and shelling (%) studies.Type of pods were judged according to its length and breadth, colour of pods and smoothness of pod surface.

Result and Discussion

Groundnut pods of the test entries were studies in the laboratory basing on the length, circumference, length breadth ratio, colour, shape, number of seeds per pod, surface characters of the pod etc.

Pods of thirteen test entries were measured and expressed in centimeter. Measurement of pods confined to length and circumference and showed that length of pods varied from 2.3 to 3.5cm and significantly differed among the test entries. From table-2, it was revealed that pod length of KISSAN cultivar is minimum i.e. 2.3cm where as maximum pod length is 3.5cm in case of JL-24.Pod circumference of test groundnuts were varied from 3.44 to 4.38cm in JL- 11 and OG 52-1 respectively. Statistical analysis showed that pod circumference did not differ significantly and apparently there was no relation between circumference and pod damage by C. Serratus.

The colour of pod is one of the factors for attracting pest to the food and egg laying pods of test groundnut cultivars were white, light brown, dark brown and light brown with dark brownish spots. Through the pod colour of resistant cultivar i.e., OG 52 - 1 is white but in some entries, the colour differentiation was not marked in respect of resistance / susceptibility of pest attack.

Size of groundnut pods of test cultivars were observed and smallest pods were noted in KISAN and AK 12 - 24 among all the test entries. Medium sized pods were found in SB-XL, GG - 2, ICGS - 11 and J - 11. The comparison to other cultivars KADIRI - 3, OG52-1, TG - 3, JL - 24, OG -933, ICGS - 44 and TAG - 24 have large size pods. Pod infestation due to C. *serratus* on test cultivars did not show distinct differentiation on regard to their resistance/ susceptibility.

Plumpy and hardness of pods depends on their weight. Average weight of groundnut pod of test cultivars recorded separately and varied from 1.3 to 2.3gm. Minimum pod weight was noted in JL - 11 i.e., 1.3gm and maximum pod weight was found in OG 52-1 i.e., 2.3gm which did not signify the difference among the cultivars. Therefore, pod weight may not be contributing factor to ascertain the resistance/ susceptibility of the pest to the test groundnuts.

Texture of pods were considered as one of the factors of egg laying by the pest. Surface of pods were examined either smooth or rough. Shell surface of almost all cultivars are found as rough but, the cultivar JL - 24 has smooth surface where as OG 52 - 1 has very rough surface. Though there is no role of pod texture in respect of pod damage by a pest JL - 24 recorded 29 and OG 52-1 had few beetles which have smooth and very rough pod surface respectively.

The groundnut seed beetle lays eggs on pod surface and immediately after hatching the larva bores the shell and enter into the kernel. Therefore, thickness of shell may be the factors of resistance.

Thickness of shell of test cultivars varied from 0.05 to 0.13cm which show any significant difference to the pest attack. But apparently is seen from table -2 that test cultivars having thicker shells showed less pod damage.

Table 2. Comparative morphological characters of selected pods of test groundnut enteries as per the susceptibility to Caryedon serratus attack

	Selfatus attack								
S1.	Cultivate	No. of adult	Pod	Pod circum	Thickness of	Pod	Pod colour	Pod	Pod size
No.		emerged after 30	length	fercence	shell (cm)	weight		texture	
		days	(cm)	(cm)		(gm)			
1.	SB-XI	14.60	2.80	3.67	0.07	1.40	Light Brown	Rough	Medium
2.	KISAN	28.60	2.30	3.69	0.07	2.10	Light brown	Rough	Small
3.	GG-2	10.00	2.50	3.93	0.08	1.40	Light brown with dark	Rough	Medium
							spot		
4.	KADIRI-	6.30	3.00	4.12	0.13	1.90	Light brown	Rough	Big
	3								
5.,	OG-52-1	0.00	3.10	4.38	0.13	2.30	Dark brown	Very	Big
								rough	
6.	ICGS-II	12.60	2.80	3.70	0.06	2.10	Brown light	Rough	Medium
7.	TG-3	24.60	3.15	3.78	0.09	2.15	Light brown	Rough	Big
8.	JL-24	29.00	3.50	4.12	0.11	1.95	White	Smooth	Big
9.	OG-933	17.30	3.00	4.20	0.13	2.10	Light brown	Rough	Big
10.	J-II	8.00	2.50	3.44	0.08	1.30	Light brown	Rough	Medium
11.	ICGS-44	25.30	2.50	4.21	0.05	1.75	Light brown	Rough	Big
12.	TAG-24	10.00	3.26	4.30	0.11	2.00	Light brown	Rough	Big
13.	AK-12-24	25.00	2.30	3.66	0.10	1.85	Dark brown	Rough	Small
	SEm(±)	0.094	0.123	0.030	0.005	0.114			
	CD(0.05)	0.276	0.358	NS	NS	NS			

Length, breadth of 13 groundnut entries showed a significant difference in pod length but no correlation existed between length of pod and pest damage.

Thickness of pod shell among the test cultivars recorded non-significant, though the pest damage on those cultivars were significant. Number of adults emerged after one month on the variety OG 52-1 was nil as its pod circumference is highest, pod weight and shell thickness were maximum as compared to others.(Table-2).Similar results were recorded by Kapadia (1995) and Prevette(1996). The variety having rough pod texture was resistance to the ground nut beetle. Biswas & Maity recorded the similar results with regard to physical characters of seven groundnut pods.

Table 3.Correlation co-efficient of physical factors of test groundnuts vrs *Caryedon serratus* emergence after one

SI. No.	Attributes	Correlation Co-efficient	Value	Test of significant
1.	Pod length	-0.12	-0.4008	NS
2.	Pod circumference	-0.23	-0.6836	NS
3.	Pod weight	0.17	0.5720	NS
4.	Shell thickness	-0.34	-1.198	NS

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