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RELATIVE RESISTANCE OF GROUNDNUT GERMPLASMS TO THE BRUCHID, *CARYEDON SERRATUS* OLIVIER

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ABSTRACT

Twenty selected germplasm of groundnut were evaluated in the laboratory for their susceptibility to *C. serratus* infestation. Maximum eggs (96.13) were laid on ICGV- 93133 in free choice chamber tests, while the least preferred germplasm was BAU-13 with only (0.89 eggs). ICGV-92040, ICGV-93133, ICGV-93134 and ICGV-93388 were preferred for egg laying with 92.04, 67.23, 64.79 and 62.07 eggs, respectively in no choice test. Maximum incubation period was recorded on ICGV-92222 and ICGV-93420 showing 8.56 days on each. The developmental period varied from 39.82 to 59.72 days with maximum time being on ICGV-93420 and minimum on ICGV-92040. Similarly, maximum weight loss (18.17 per cent) was recorded for ICGV-92040 and minimum for ICGV-93420 (0.07 per cent), indicating that ICGV-93420 was relatively resistant to the damage of the bruchid.

Key words: Groundnut germplasm, *Caryedon serratus*, relative resistance.

Stored groundnut pods are prone to the attack of a number of insect pests (Pattee and Young, 1982), amongst which the groundnut bruchid, *Caryedon serratus* (Olivier) is the most serious pest and is a potential threat to stored groundnut (Wightman *et al.*, 1987; Mital, 1991). Different cultivars of groundnut showed low to high losses due to this pest (Ghorpade *et al.,* 1998; Mital, 1969). Hence it becomes essential to control the pest for reducing the post harvest losses. To combat this problem, genotypic resistance to the bruchid seems to be a potential weapon for reducing these losses. The present study, therefore, was undertaken to evaluate the relative resistance to different germplasm of groundnut against *C. serratus* under laboratory conditions.

MATERIALS AND METHODS

Twenty groundnut germplasm were taken from the regional center of All India Coordinated Research Project on Groundnut, Rajasthan College of Agriculture, Udaipur, to work out the relative resistance to *C. serratus* on the basis of ovipositional preference, developmental preference and per cent weight loss. The experiment was conducted at Stored Product Section of Division of Entomology, IARI, New Delhi during 2002 to 2003.

Ovipositional Preference: To study the ovipositional preference of this bruchid on nineteen groundnut cultivars, compartments were made using drawing sheet strips in steel dish (28 cm dia.). The numbers of compartments were equal to the number of germplasm taken and all the compartments were of same size. A small area common to all the compartments was left in the center of the dish for releasing the groundnut bruchid. Ten sound and healthy pods of each germplasm were placed separately in different chambers of dish. Ten pairs of the bruchid (0-24 hour-old or hr-old) were released in the central area of the dish leaving the beetles free to enter any compartment to oviposit and the dish was covered with a transparent glass. The experiment was replicated three times with nineteen treatments in each replicate under controlled conditions of 29 ± 3°C temperature and 50 ± 5 % r. h. under controlled conditions of temperature (29 ± 3°C) and relative humidity (50 ± 5%) the total number of eggs laid per ten nuts of each cultivar was counted 10 days after the release of the bruchid in each replication.

***Developmental preference*:** To work out the developmental preference of *C. serratus* on twenty germplasm, 25 g nuts of each were taken in glass petridish (15 cm dia.) in three replications. One pair of newly emerged (0-24 hrs old) adults was released in each petridish. After ten days the adults were drawn out from the petridish. For hatching period, ten eggs of same date were taken and the hatching date was determined by the formation of larva beneath the eggshell that was observed under the microscope. The larval period was counted from date of hatching to formation of pupa. Pupal period was worked out from the date of pupa formation to date of adult emergence.

Per cent weight loss: Pods of germplasm weighing 50 g each on analytical balance were kept in plastic container (12 × 5 cm.). Two pairs of freshly emerged adult beetles

were released in each container and were allowed to lay eggs for a period of 10 days and were later removed. The plastic containers were kept at ambient room conditions. After adult emergence, the adults were removed from the containers and weighing was done to work out the percentage weight loss as per the method suggested by Adams and Schulten (1978).

RESULTS AND DISCUSSION

That maximum oviposition of 96.13 eggs of *C. serratus* was recorded on ICGV-93133, while minimum on BAU-13 (0.89 eggs). The remaining germplasm showed intermediate preference to oviposition, ranging from 4.16 to 76.06 eggs in the free choice chamber test (Table-1). Earlier, Mittal (1969) showed that maximum number of eggs were laid by *C. gonagra* on improved Spanish variety of groundnut. In the no-choice test, ICGV-92040 was most preferred for egg laying with 92.04 eggs and BAU-13 was least preferred with 4.43 eggs. When experiment conducted in separate container (Table-2). Devi and Rao (2000) found that significantly higher number of eggs was laid on TCGS-91 followed by ICGS-11. Ghorpade *et al.* (1998) recorded minimum number of eggs laid by *C. serratus* on ICGS-11 and maximum on JL – 24.

Table 1: Ovipositional preference of bruchid, *C. serratus* among different groundnut germplasm under free choice method

Germplasm	Mean number of eggs laid* / 10 pods of groundnut germplasm	
ICGV-92015	23.31	$(4.88)^{ef}$
ICGV-93420	31.65	$(5.67)^{cdef}$
ICGV-92028	47.94	$(6.96)^{ab}$
ICGV-93370	27.27	$(5.27)^{def}$
ICGV-92222	51.63	$(7.22)^{a}$
ICGV-93388	5.55	$(2.46)^{j}$
ICGV-93128	42.27	$(6.54)^{abc}$
ICGV-92040	11.13	$(3.41)^{hi}$
ICGV-94361	14.63	$(3.89)^{gh}$
ICGV-92267	76.06	(8.75)
ICGV-93133	96.13	(9.83)
ICGV-92229	32.56	$(5.75)^{cde}$
ICGV-92218	21.97	$(4.74)^{fg}$
ICGV-93134	24.20	$(4.97)^{ef}$
ICGV-92022	8.20	$(2.95)^{ij}$
BAU-13	0.89	(1.18)
GG-2	34.66	$(5.93)^{cd}$
TKG-19A	4.16	$(2.16)^{j}$
ICGV-95136	36.47	$(6.08)^{bcd}$
SEm±	0.24	
CD at 5%	0.68	

* Mean of three replications
Figures in parentheses are $\sqrt{n+0.5}$ transformation
Treatment mean with the letter in common are at par

The time taken for hatching of eggs varied from 4.56 to 8.56 days on different germplasm with no significant variation. However, the maximum time taken for hatching was observed on ICGV-92222 and ICGV-93420 showing 8.56 days on each and minimum 4.56 days each on ICGV-93388 and ICGV-92022. Kapadia (1995) observed 2.63 days of incubation period of *C. serratus* on groundnut germplasm.

The bruchid larvae least preferred the germplasm ICGV-93420 (34.54 days), while ICGV-92040 was most preferred for larval development (21.12 days). We recorded no significant variation in pupal period among different germplasm of groundnut. The maximum pupal period was found on ICGV-93420 (16.48 days) and minimum on ICGV-93370 (12.17 days). Mittal (1969) observed maximum larval period of 60.25 days on TMV-3 and minimum on TMV-2 (33.50) days. Kapadia (1995) found maximum larval period on J-11 (30.94 days) and minimum on GG-2 (26.78 days). Kapadia (1995) found minimum pupal period of JL-11 (15.82 days), and there was no significant variation observed in pupal period on JL-24, GG-2 and GAUG-10.

The developmental period of *C. serratus* varied from 39.82 days to 59.72 days with maximum period of 59.72 days on ICGV-93420 and minimum periods of 39.82 days on ICGV-92040. This supports the view that ICGV-92040 was the most favorable germplasm for development. Ghorpade *et al*. (1998) found that development period of *C. serratus* was minimum on SB-11 (62.22 days), while it was maximum on RVB-1 (98.17 days). Shiwalingaswamy and Balasubramanium (1992) reported that development of *C. serratus* was 45.22 and 46.70 days on ICGS-11 and JL-24, cultivars, respectively. The pod reticulation seems to be the major biophysical character that influences the bruchid development beside other parameters of the host (Devi and Rao, 2000).

The per cent weight loss was maximum on ICGV-92040 (18.17 %) and minimum on ICGV-93420 (0.07 %). The germplasm ICGV-92040 happened to be more susceptible on the basis of egg laying, developmental period and percent weight loss caused by *C. serratus*. Mittal (1969) found that maximum per cent weight loss on TMV-2 (7.36 per cent) and minimum on RS-1 (0.26 per cent). Similarly, Ghorpade *et al.* (1998) observed maximum and minimum loss on RVB-1 (22.93 per cent) and ICGS-11 (3.17 per cent), respectively. Devi and Rao (2000) exhibited that TCGS-88 showed minimum weight loss (0.57 per cent) and TPT-4 showed maximum weight loss (8.51%).

Table 2: Biology of bruchid, *Caryedon serratus* on different germplasm of groundnut

Germplasm	No. of eggs laid*	Hatching period*	Larval period*	Pupal period*	Developmental period*	Per cent weight loss*
ICGV-92015	47.80 (6.95)^{cd}	5.80 (2.51)	25.21 (5.07)^{cde}	14.17 (3.83)	45.33 (6.77)^{bcd}	5.67 (13.78)^{h}
CHICO	49.48 (7.07)^{c}	5.55 (2.46)	28.12 (5.35)^{abcd}	15.58 (4.01)	49.34 (7.06)^{abcd}	12.63 (20.82)^{bcd}
ICGV-92028	27.17 (5.26)^{hi}	7.91 (2.9)	24.50 (5.00)^{cde}	14.79 (3.91)	47.52 (6.93)^{bcd}	10.72 (19.11)^{bcdef}
ICGV-93370	36.10 (6.05)^{efgh}	5.90 (2.53)	28.55 (5.39)^{abcd}	12.17 (3.56)	46.70 (6.87)^{bcd}	11.14 (19.5)^{bcde}
ICGV-92040	92.04 (9.62)	5.26 (2.4)	21.12 (4.65)^{e}	13.26 (3.71)	39.82 (6.35)^{d}	18.17 (25.23)^{a}
ICGV-93388	62.07 (7.91)^{ab}	4.56 (2.25)	24.20 (4.97)^{cde}	13.49 (3.74)	42.40 (6.55)^{cd}	8.80 (17.26)^{efg}
ICGV-93128	38.44 (6.24)^{defg}	6.79 (2.70)	27.17 (5.26)^{abcde}	12.82 (3.65)	46.97 (6.89)^{bcd}	6.03 (14.21)^{gh}
ICGV-92222	47.52 (6.93)^{cd}	8.56 (3.01)	25.82 (5.13)^{cde}	14.55 (3.88)	49.20 (7.05)^{abcd}	7.73 (16.14)^{fgh}
ICGV-94361	29.09 (5.44)^{gh}	6.21 (2.59)	23.90 (4.94)^{cde}	13.19 (3.70)	43.59 (6.64)^{cd}	4.98 (12.9)^{h}
ICGV-92267	50.48 (7.14)^{bc}	6.47 (2.64)	33.26 (5.81)^{ab}	15.26 (3.97)	55.30 (7.47)^{ab}	0.16 (2.34)^{i}
ICGV-93133	67.23 (8.23)^{a}	7.57 (2.84)	23.22 (4.87)^{de}	16.23 (4.09)	47.25 (6.91)^{bcd}	9.33 (17.78)^{def}
ICGV-92229	43.59 (6.64)^{cde}	5.55 (2.46)	30.19 (5.54)^{abc}	14.87 (3.92)	50.77 (7.16)^{abc}	9.00 (17.46)^{efg}
ICGV-92218	28.12 (5.35)^{h}	5.45 (2.44)	29.53 (5.48)^{abcd}	14.25 (3.84)	49.63 (7.08)^{abcd}	12.15 (20.4)^{bcde}
ICGV-93134	64.79 (8.08)^{a}	8.26 (2.96)	26.13 (5.16)^{bcde}	13.56 (3.75)	48.22 (6.98)^{bcd}	10.23 (18.65)^{cdef}
ICGV-92022	31.20 (5.63)^{fgh}	4.56 (2.25)	24.90 (5.04)^{cde}	13.86 (3.79)	43.46 (6.63)^{cd}	12.37 (20.59)^{bcde}
ICGV-93420	19.93 (4.52)^{i}	8.56 (3.01)	34.54 (5.92)^{a}	16.48 (4.12)	59.72 (7.76)^{a}	0.07 (1.55)^{i}
GG-2	51.20 (7.19)^{ab}	4.98 (2.34)	23.22 (4.87)^{de}	15.02 (3.94)	43.59 (6.64)^{cd}	2.06 (8.26)
TKG-19A	40.46 (6.40)^{cdef}	5.26 (2.40)	26.54 (5.20)^{bcde}	14.25 (3.84)	46.15 (6.83)^{bcd}	13.05 (21.18)^{bc}
ICGV-95136	45.20 (6.76)^{cde}	8.14 (2.94)	29.31 (5.46)^{abcd}	13.04 (3.68)	50.91 (7.17)^{abc}	14.39 (22.29)^{ab}
BAU-13	4.43 (2.22)	6.56 (2.66)	24.80 (5.03)^{cde}	14.48 (3.87)	46.01 (6.82)^{bcd}	9.00 (17.46)^{efg}
SEm±	0.28	0.23	0.23	0.24	0.26	1.17
CD at 5%	0.81	NS	0.66	NS	0.73	3.34

* Mean of three replications
Figures in parentheses are $\sqrt{n+0.5}$ transformation
\# Figures in parentheses are arc sine value
Treatment mean with the letter in common are at par

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