

Ovipositional Preference of Pulse Beetle *Callosobruchus maculatus* L. on Different Varieties of Chickpea

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ABSTRACT

The ovipositional preference of *C. maculatus* on selected varieties of chickpea was studied under free choice condition. The minimum number of eggs was recorded on the varieties NBeG-49 (3.33) followed by NBeG-47 (5.00) were on par with each other. The maximum number of eggs was recorded on the varieties JG-11 (9.67) followed by NBeG-458 (11.00) and NBeG-399 (12.00) were on par with each other. The varieties Vihar (8.67) and NBeG-3 (8.00) were intermediate between minimum and maximum number of eggs. Results indicated that the varieties with differential reaction had influenced the oviposition preference of adult female beetle. The female beetle preferred the varieties which are creamy white in colour, tuberculated smooth surface and high chemical constituents of aminoacid, carbohydrate and proteins over the varieties with brown colour, rough surface and low chemical constituents of aminoacid, carbohydrate and proteins. The varieties NBeG-458, NBeG-399 and JG-11 were most preferred by the adult female beetle for oviposition.

Key words: *Callosobruchus maculatus*, Oviposition and Chickpea.

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is one of the oldest and most widely consumed legume in the world, particularly in tropical and subtropical areas. India ranks first in the world in terms of area (70.90 %) and production (67.41 %), followed by Pakistan, Australia and Iran. The highest productivity of 6120 kg/ha is observed in Isreal followed by Yemen, Canada and Egyot. India's productivity is 920 kg/ha yields.² Chickpea is the rich source of protein (21.1 %), carbohydrate (61.5 %) and fat (4.5

%). It is also a rich source of calcium (10 %), iron (12 %) and aminoacids too. Pulse beetle *C. maculatus* causes 5-10 per cent damage in temperate region and 20-30 per cent damage in tropical region. It causes 32.64 per cent and 56 per cent damage under field and storage conditions respectively. The life cycle of this insect is 25-35 days in summer and 45-55 days in winter. In general, the damage starts in the field, where adult female lays eggs on the green pods.

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The grubs feed through the pod cover and remain concealed within the developing seed. When such seeds are harvested and stored, the insect continues to feed as hidden infestation and emerges as an adult, causes secondary infestation. This insect causes 55-60 per cent loss in seed weight and 45.5- 66.3 per cent loss in protein content and thus the seeds become unfit for human consumption as well as planting³. The study of *C. maculatus* on chickpea varieties will help us to reveal the susceptible as well as tolerant varieties to the infestation of pulse beetle in storage condition.

MATERIAL AND METHODS

Rearing of the test insect

The parental culture of *C. maculatus* emerged from green gram seeds was procured from the local market. The same was multiplied on locally available chickpea seeds. About 20 pairs of adult beetles were released into plastic boxes containing 500 g of disinfested chickpea seeds at (55 °C for 4 h). Fifteen of such jars were maintained for mass culturing of test insect. The boxes were kept

undisturbed under laboratory conditions till the emergence of F1 adults. The pest was mass cultured in the laboratory for 2-3 generations and the freshly emerged adults were used in the experimental study.

The chickpea seeds of seven promising varieties were procured from Regional Agricultural Research Station, RARS, Nandyal. The details of the varieties was given in the Table 1.

Seeds of selected chickpea genotypes was arranged radially in the petriplate and three pairs of freshly emerged adults was released in the centre for oviposition for a period of seven to eight days. After eight days, data was recorded on number of eggs laid. This experiment was done in free choice technique to evaluate the oviposition preference of adults of *C. maculatus*. After removing the adult beetles from test varieties, the number of eggs laid on the surface of the seeds of each treatment was counted with the help of hand lens and the mean number of eggs laid was calculated for each variety.

Table 1: Physical characters of chickpea varieties used in the present experimental study

Varieties	100 seed weight in gram	Seed shape	Surface texture	Seed colour
NBeG-458	48.70	Owl's head	Tuberculated	Creamy white
NBeG-49	30.00	Angular	Rough	Brown
NBeG-47	32.00	Angular	Rough	Brown
NBeG-399	41.50	Owl's head	Tuberculated	Creamy white
Vihar	33.80	Owl's head	Tuberculated	Creamy white
JG-11	25.90	Angular	Rough	Blackish brown
NBeG-3	30.70	Angular	Rough	Dark Brown

RESULT AND DISCUSSION

During the present study on the ovipositional preference of *C. maculatus* on seven varieties of chickpea was carried out under free choice technique. The data of the present experiment was depicted in the Table.2

The ovipositional preference of *C. maculatus* were expressed in terms of number of eggs deposited by the test insect. The number of eggs laid by test insect was ranged from 3.33 to 12.00. The highest number of eggs were recorded on NBeG-399 (12.00)

followed by NBeG-458 (11.00), JG-11 (9.67), Vihar (8.67) and NBeG-3 (8.00) which were on par with each other. The lowest number of eggs were recorded on NBeG-49 (3.33) followed by NBeG-47 (5.00) which were on par with each other.

The results depicted in the Table 2 indicated that the white colour, bold seeded and tuberculated smooth surfaced varieties were most preferred host for oviposition. The varieties with brown colour, thin seeded and rough surface varieties were least preferred

host for oviposition. The results are in accordance with findings of Kamble *et al.*⁴ who reported that the minimum number of eggs was laid on the variety Vijay (17.75 eggs/30 seeds) while the maximum number of eggs (31.33 eggs /30 seeds) on the variety PG-5 followed by Virat and PG-12 (28.33 and 31.33). The morphological seed characters and egg laying preference indicated that the variety Digvijay and Vijay exhibited wrinkled seed coat, rough, yellowish brown colour and

medium size seed characteristics that found to be least preferred for oviposition compare to bold seeded varieties viz, PG-12, Virat and PG-5 having white to brown colour seed coat. Raghuwanshi *et al.*⁷ who reported that less average number of eggs was recorded on variety ICCV-990126 (17.76) and high average number of eggs was recorded on variety ICCV-07301 (34.35). On an average high number of eggs were deposited on *kabuli* genotypes then that of *desi* genotypes.

Table 2: Ovipositional preference of *C. maculatus* on selected varieties of chickpea

Varieties	Number of eggs laid
NBeG-49	3.33 ^a
NBeG-47	5.00 ^{ab}
NBeG-3	8.00 ^{bc}
Vihar	8.67 ^{bc}
JG-11	9.67 ^c
NBeG-458	11.00 ^c
NBeG-399	12.00 ^c
SE(m)±	0.92
C.D(p=0.01)	2.83

Values with the same alphabet are not significantly different as per DMRT.

Table 3: Chemical constituents of chickpea varieties used in the experimental study

Varieties	Aminoacids (µg/g)	Carbohydrates (g/g)	Proteins (mg/g)
NBeG-49	265.73	0.03	0.13
NBeG-47	271.46	0.03	0.17
NBeG-3	445.53	0.07	0.15
Vihar	338.80	0.02	0.17
JG-11	263.23	0.05	0.41
NBeG-458	732.43	0.13	0.14
NBeG-399	727.33	0.13	0.56

The overall results indicated that the varieties NBeG-458, NBeG-399 were having more test weight (30.00 and 41.50 g), smooth surface, creamy white colour and high chemical constituents like amino acids (732.43 and 727.33 µg/g), carbohydrates (0.13 and 0.13 g/g) and proteins (0.14 and 0.56 mg/g) (Table. 3) were recorded more number of eggs which are highly preferred by adult beetle for oviposition over NBeG-49 and NBeG-47 which was having less test weight (30.00 and 32.00 g), rough surface, brown colour and low chemical constituents of amino acids (265.73 and 271.46 µg/g), carbohydrates (0.03 and

0.03 g/g) and proteins (0.13 and 0.17 mg/g) respectively. The varieties Vihar and NBeG-3 were intermediate in position which was having test weight (33.80 and 30.70 g), amino acids (338.80 and 444.53 µg/g), carbohydrates (0.02 and 0.07 g/g) and proteins (0.13 and 0.17 mg/g) respectively. The varieties NBeG-458, NBeG-399 and JG-11 are the most preferred host by adult beetles, this might be due to presence of higher quantity of growth promoting factors such as amino acids, proteins and carbohydrates which provide food for developing embryos and also facilitate the growth and development of grubs inside the

seed and the presence of more surface area in these varieties would facilitate the adult female beetle for laying more number of eggs. Kar and Ganguli⁵ reported that the female of *C. maculatus* preferred seeds having more

quantity of resources to meet the nutrition of her offspring, seeds having healthy seed coat over damaged ones, fresh seeds over infected seeds for laying higher number of eggs under normal day light condition over the total dark.

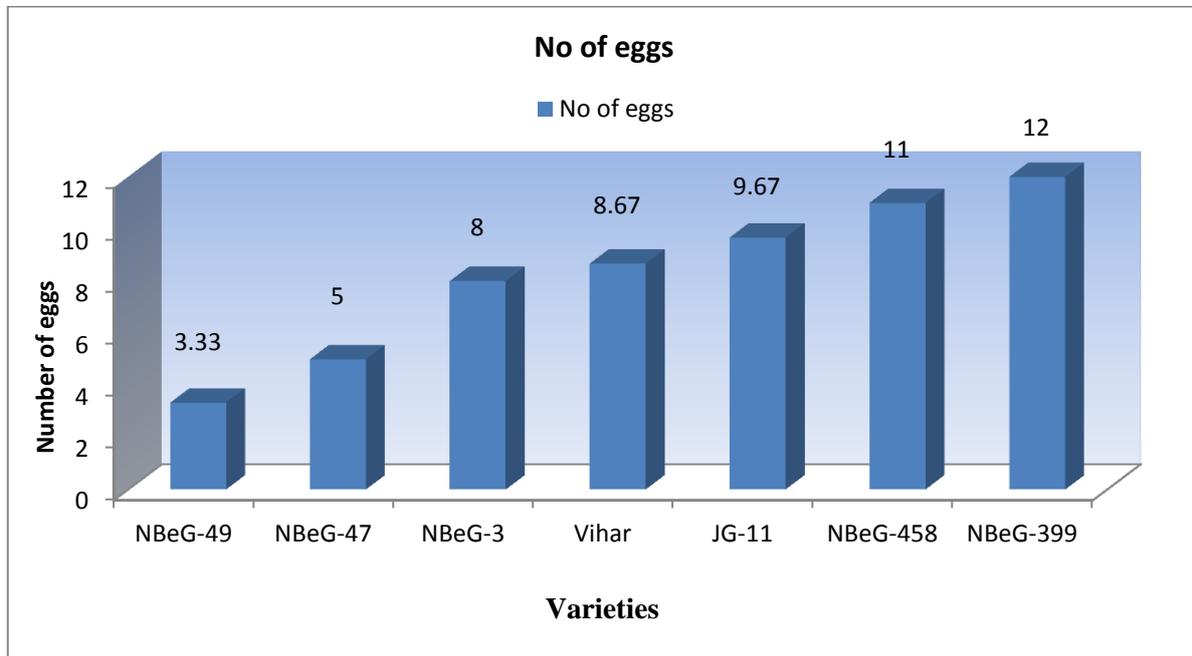


Fig. 1: Ovipositional preference of *C. maculatus* on selected varieties of chickpea

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