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# To screen out less preferred genotypes of chickpea against pulse beetle on the basis of orientation and Oviposition

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**Abstract**
Studies on the influence of chickpea genotypes on orientational and ovipositional preference of pulse beetle, *Callosbruchus maculatus* (Fab.) were conducted under laboratory condition in the Department of Entomology, College of Agriculture, Gwalior (M.P.) during 2013–14. The adult orientation on different genotypes ranged from 5.0 to 9.0 adults with significant differences among them. Minimum adult orientation recorded on genotypes JGG-1 showed less susceptibility for orientation of the pulse beetle, followed by JG-16, JG-317, JKG-3 and JG-92-1. On the other hand genotypes JG-130 and JSC-43 were found most preferred for orientation of the beetle. The egg deposition (oviposition) on different genotypes under free choice condition ranged from 12.0 to 20.0 eggs with significant differences among different genotypes. Minimum egg deposition on genotypes JG-16 and JGG-1 indicated that these genotypes were less preferred by the beetle for egg deposition, followed by JG-317, JKG-3 and JG-92-1. Whereas, maximum egg deposition (oviposition) on genotypes JG-130 and JSC-43 indicated their higher preferency for egg deposition by the pulse beetle.
The egg deposition on all the genotypes under free choice condition was observed in correspondence to the orientation of the beetle on different genotypes.
The number of eggs deposited on different genotypes under forced condition ranged from 44.0 to 114.3 eggs with significant differences among them. Minimum egg deposition on genotype JKG-3 indicated less suitability for oviposition by the beetle. The egg deposition on genotypes JG-16, JG-317 and JG-92-1 under free choice condition was less, whereas deposition of eggs in these genotypes under forced conditions were comparatively higher. The less deposition in these genotypes under free choice condition may be due to their less preferency for orientation by the beetle. The number of adults oriented on the genotypes of different seed size was ranged 6.4 to 7.7 adults with no significant differences between them.

**Keywords:** *Callosbruchus maculatus*, loss in weight

## Introduction
Pulse beetle popularly known as Dhora is an important storage pest of chickpea in India. This includes three bruchid species, *Callosobruchus maculatus* (Fab.) (Salunkhe and Jadhav, 1982) [16], *C. chinensis* Lin. (Reddy and Singh, 1972) [14] and *C. analis* (Raina, 1971) [13]. The general biology of the insect indicates that, on an average each female lays 50 to 70 eggs during her life span. Eggs are generally laid singly on the grain and more than one egg is also laid on each grain. Eggs are small and oval in shape and are white in colour. The eggs hatch in about a week's time and new young larva laid on the grains or crevices. Larval and pupal stages are completed inside the grain and start adults emerging out of the grains after a fort night. The adult emerges out through a fairly large emergence hole. The losses in seed by insect infestation due to improper storage in India has been reported to be lower in chickpea (4.8%) in comparison to pigeonpea (32.68%), cowpea (18.5%), urd (14.9%) (Mookherjee *et al*., 1970) [6]. Therefore, chickpea varieties having variation in seed size and seed colour were screened. Keeping these points in view, the present study was conducted to screen chickpea genotypes against pulse beetle.

## Materials and Methods
Pulse beetle (*Callosobruchus maculatus*) (Fab.) was reared in the laboratory to raise experimental culture of the insect. For rearing the insect in large numbers, about 500 g seed of

local variety of chickpea was taken in glass jar and 100 pair of newly emerged adults were released in Jar. Jar was covered with muslin cloth and kept in incubators at $29^0 \pm 1^0$C temperature. After egg laying dead adults were removed by skiving. Fresh adults started emerging after 22 to 28 days. The newly emerged adults were used for experiment.

**The genotypes of chickpea listed below**

| S. No. | Genotypes |
|---|---|
| 1. | JKG-3 |
| 2. | JGK-1 |
| 3. | JG-130 |
| 4. | JSC-43 |
| 5. | JG-16 |
| 6. | JGG-1 |
| 7. | JG-315 |
| 8. | C-235 |
| 9. | JG-325 |
| 10. | JG-92-1 |
| 11. | JG-317 |
| 12. | JG-89-3 |

Two experiments were conducted during the present investigation. The experiment was laid out in completely randomized design and replicated three times with twelve genotypes. The details of which are as under:

**Experiment 1**

Orientation and ovipositional preference were assessed under free choice conditions. Fifty seeds of each genotype were kept in open Petridishes and arranged randomly in glass trough. Fifty pairs of freshly emerged beetles were released in the centre of the trough and the glass trough was then covered with muslin cloth. The adults oriented in every genotype were counted at 72 hours after their release and then were removed. The experiment was replicated three times. Seven days after removing the adult, the eggs laid in each genotype were counted to note the ovipositional preference.

**Experiment No. 2**

Fifty seeds of each genotype were kept in Petridishes replicated three times. Five pairs of pulse beetle were released in each Petridish for 72 hours and then removed. Number of eggs laid on the grains of every genotype were counted at seven days after the release. Petridishes were observed daily to record the beetle emerged. The developmental period, survival and extent of grain damage were worked out. Weight of healthy and damaged seed was also recorded to work out the per cent loss in grain weight. The effect of seed size and seed coat colour was also studied. The data were subjected to $\sqrt{n}$ or angular (arc sin) transformation as the case may be for statistical analysis. The data obtained were statistically analysed by using the analysis of variance as described by Fisher (1958).

**Result**

The adult orientation on different genotypes ranged from 5.0 to 9.0 with significant differences among them. Minimum adult orientation recorded on genotypes JGG-1 showed their less susceptibility for orientation of the pulse beetle followed by JG-16, JG-317, JKG-3 and JG-92-1. The egg deposition on different genotypes under free choice condition ranged from 12.0 to 20.0 with significant differences among different genotypes. Minimum and similar egg deposition on genotypes JG-16 and JGG-1 indicate that these genotypes were less preferred by the beetle for egg deposition, followed by JG-317, JKG-3 and JG-92-1. The egg deposition on all the genotypes under free choice condition was observed in correspondence to the orientation of the beetle on different genotypes. The number of eggs deposited on different genotypes under forced condition ranged from 44.0 to 114.3 with significant differences among them. Minimum egg deposition on genotype 'JKG-3' indicated their less suitability for oviposition by the beetle. The egg deposition on genotypes JG-16, JG-317 and JG-92-1 under free choice condition was less, whereas deposition of eggs in these genotypes under forced conditions were comparatively higher. The egg deposition on genotype JGG-1 under forced condition was significantly higher, whereas under free choice condition the egg deposition was significantly less, this indicate that JGG-1 was most preferred for oviposition and less preferred for orientation. The adult emerged on different genotypes ranged from 21.0 to 42.7 with significantly differences among them.

Genotype JGG-1 found less preferred for orientation and oviposition by the pulse beetle, followed by JG-16, JG-317, JKG-3 and JG-92-1.

Genotypes JG-130 and JSC-43 were found highly preferred for orientation and oviposition by the pulse beetle, followed by JG-89-3 and JG-325.

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