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Short Communication

Host preference of the pulse beetle (*Callosobruchus chinensis* L.) on different pulses

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Pulses are important source of plant protein in many developing countries of the tropics and sub-tropics and considered as the second most important group of crops worldwide. Globally, 840 million people are undernourished mainly on account of inadequate intake of proteins, vitamins and minerals in their diets. Out of total 12.6 million tons, 5.5% is lost due to the non-availability of proper storage facilities with the farmers and vulnerability of pulses to stored grain pests (4) which inflict severe losses mainly in the storage. Among the storage pests, bruchids particularly the pulse beetle, *Callosobruchus chinensis* L. incur greater importance as the pest having cosmopolitan distribution and causing serious damage to pulses from the field (5). Hence, in order to achieve higher yield, it is necessary to minimize losses both at field and storage conditions. Considering the economic importance of this pest, an attempt has been made to study the host preference of *C. chinensis* on some major pulses. The experiment on host preference of *C. chinensis* was conducted for consecutive two generations in the laboratory at 30±1^{0}c and 70±5% R.H. Adult beetles were collected from stock culture for first generation while second generation study was carried out by using first generation adults. Healthy seeds of different pulses *viz*., cowpea (*Vigna unguiculata* L.), greengram (*Vigna radiata* L.), kidneybean (*Phaseolus vulgaris* L.), pea (*Pisum sativum* L.) and blackgram (*Vigna mungo* L.) were collected from local market. The newly emerged adult beetles of *C. chinensis* were collected from the stock culture and sexing was done under microscope. One pair of male and female beetles was released on each pre-weighed (100g) pulse grains kept in the plastic containers (4 cm dia x 5 cm) fitted with screw caps. The experiment was replicated thrice. The observation for oviposition by the female was recorded daily after the release of adult beetles and continued up to 10 days. For this study, extra three replications were taken as after each observation the counted eggs were destroyed to avoid repetition while adult emergence was recorded daily after the emergence of first adult and the observation was taken for next 10 days. Percent adult emergence and mean developmental period were calculated from the above observation. Whereas, loss in grain weight was recorded at the end of experiment and percent weight loss of the grains was calculated using the following formula (1),

$$\text{Percent weight loss of grains} = \frac{\text{UND} - \text{DNU}}{\text{U (ND + NU)}} \text{X } 100$$

ND = Number of damaged grains

D = Weight of damaged grains

NU = Number of undamaged grains

U = Weight of undamaged grains

The mean number of eggs laid by each female on different pulses ranged from 79.2 - 160.2 in the first generation while in second generation the range was 83.5 – 111.0 eggs/female. Perusal of Table 1 revealed that among different pulses, greengram recorded significantly lowest number of eggs (79.2/female) which was on par with pea (92.7 eggs/female) as against the highest number of eggs observed in kidneybean (160.2 eggs/female) followed by cowpea and blackgram (109.2 & 102.0 eggs/female, respectively) in first generation. Similar results were also observed in the next generation. Based on fecundity the order of preference was kidneybean > cowpea > blackgram > pea > greengram (Table 2). Kidneybean and cowpea having smooth skinned seed texture and bigger in size that probably encourage the beetle to prefer more for egg laying. The present findings are in conformity with Girish *et al.* (3) who concluded that ovipositional preference of the bruchid might be guided by smoothness of seed coat and size of the grain. The mean developmental period ranged from 26.7 - 32.2 days in different pulses in first generation and cowpea recorded significantly lowest developmental period followed by pea, greengram, blackgram and kidneybean (Table 1). Similarly, in second generation lowest developmental period was recorded on cowpea (26.0 days) and highest developmental period on kidneybean (35.2 days). Greengram (27.2 days) proved better than pea (28.0 days) and blackgram (29.5 days) (Table 2). In a similar experiment, Shivanna *et al.* (6) recorded maximum larval mortality and prolonged developmental period in *C. maculatus* and *C. analis* in kidney bean. The mean adult emergence on different pulses ranged from 56.69 - 93.23%. Significantly the lowest percent of adult emergence was recorded in kidneybean while highest survival was observed in cowpea followed by green gram, pea and blackgram (90.61, 87.35 and 71.69%, respectively) in first generation. In the second generation, highest and lowest insect survival was recorded in cowpea (96.21%) and kidneybean (41.82%), respectively. Among other legumes, the order of sequence was greengram > pea > blackgram. The results suggested that cowpea was the most suitable host for *C. chinensis* (Table 2). This finding is in agreement with Bhaduria and Jakhmola (2) who reported that cow pea was the most preferred host for the insect while kidneybean proved non-suitable host as in subsequent generation survival rate of the beetle much reduced. The loss in grain weight among different pulses ranged from 2.61 - 5.21% in first generation and 2.76 - 6.22% in second generation. Blackgram recorded significantly lowest weight loss while maximum weight loss was recorded from cowpea followed by kidneybean, greengram and pea

(4.21, 3.86 and 3.36%, respectively) (Table 1). In second generation, kidneybean recorded the minimum weight loss and cowpea again recorded maximum weight loss but highest adult survival (Table 2).

Therefore, the present investigation concluded that kidneybean was the least preferred host for the bruchid as the developmental period was prolonged and adult emergence was lowest might be due to some secondary substances which need further investigation. Cowpea was the most preferred pulse while greengram and pea also proved good host for the insect but blackgram recorded as moderately susceptible.

Literature Cited

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Table 1.
Host preference of first generation *C. chinensis* on different pulses

Host	*No. of eggs/ female	*Developmental period (Days)	**Adult emergence (%)	**Wt. loss of grains (%)
Kidneybean	160.2 (12.3)	32.2 (5.6)	56.69 (48.70)	4.21 (11.72)
Pea	92.7 (9.1)	27.7 (5.2)	87.35 (68.87)	3.36 (10.9)
Blackgram	102.0 (9.3)	30.2 (5.5)	71.69 (57.70)	2.61 (9.89)
Cowpea	109.2 (10.2)	26.7 (5.2)	93.23 (73.74)	5.21 (13.68)
Greengram	79.2 (9.1)	29.7 (5.5)	90.61 (75.12)	3.86 (11.55)
SEm (±)	0.54	0.17	1.15	0.57
CD (P=0.05)	1.7	NS	3.51	1.75
CV (%)	9.41	5.63	3.55	9.99

* Figures in parentheses indicate square root transformed values
** Figures in the parentheses indicate angular transformed values

Table 2.
Host preference of second generation *C. chinensis* on different pulses

Host	*No. of eggs/ female	*Developmental period (Days)	**Adult emergence (%)	**Wt. loss of grains (%)
Kidneybean	111.0 (14.3)	35.2 (6.5)	41.82 (48.70)	2.76 (11.72)
Pea	95.2 (9.1)	28.0 (5.2)	85.44 (68.87)	2.90 (10.90)
Blackgram	106.2 (9.3)	29.5 (5.5)	72.74 (57.70)	3.26 (9.89)
Cowpea	110.5 (10.2)	26.0 (5.19)	96.21 (74.74)	6.22 (13.68)
Greengram	83.5 (9.1)	27.2 (5.5)	95.32 (75.12)	5.00 (11.55)
SEm(±)	0.57	0.12	1.22	0.51
CD (P=0.05)	NS	0.37	3.72	1.54
CV (%)	11.49	4.44	3.82	8.92

* Figures in parentheses indicate square root transformed values
** Figures in the parentheses indicate angular transformed values