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RESEARCH NOTE

Dose response of *Beauveria bassiana* (Balsamo) Vuillemin against *Helicoverpa armigera* (Hubner) on pigeonpea

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ABSTRACT

A laboratory experiment was conducted to determine the effective dose of *Beauveria bassiana* (Balsamo) Vuillemin against *Helicoverpa armigera* (Hubner) on pigeonpea at Bio-control Laboratory, Department of Entomology, College of Agriculture, JAU, Junagadh during 2011. The results revealed that the higher dose of *B. bassiana* 10^8 conidia/g @ 3.5 g/litre proved to be the most effective dose among five doses(1.5 to 3.5 g/lit) tested against the third instar larvae of *H. armigera*. The mortality was increased with the increase in the doses of *B. bassiana*.

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Pigeonpea is an important pulse-cum-grain legume crop in semi-arid tropical and subtropical areas of the world. A preliminary survey around Junagadh revealed that the *Helicoverpa armigera* (Hubner) is a cosmopolitan and highly polyphagous insect, which is serious pest of pigeonpea too. Pesticides are undoubtedly effective for averting pest attacks on pigeonpea, but leaving toxic residues that rendered pigeonpea unsafe for consumption. To overcome these problems, it is highly necessary to explore the effective method of insect control without having harmful effects and can be well suited in the Integrated Pest Management programme. Among several entomopathogenic fungi, *B. bassiana* is an important natural mortality factor of many lepidopteran pests on variety of crop ecosystem. Looking to the importance of *B. bassiana* as microbial control agent, and its highly necessity to determine the effective dose of this mycoinsecticide against *H. armigera* on pigeonpea and hence, the present laboratory investigation was carried out at Junagadh.

The laboratory experiment on pigeonpea (var. BDN-2) was conducted at Bio-control Laboratory, Department of Entomology, College of Agriculture, Junagadh Agricultural University, Junagadh during 2011.

Fresh immature pods of pigeonpea collected from the unsprayed pigeonpea field were washed properly with clean water and air-dried. The spray of each treatment was applied to pods of pigeonpea separately with the help of atomizer. Care was taken to obtain uniform coverage of insecticide. Treated pods were allowed to dry under ceiling fan for 15 minutes. The one day starved third instar larvae of *H. armigera* were kept individually in plastic boxes (8 cm in diameter x 4.5 cm in height) along with lid made of small holes for ventilation. Then the treated leaves were provided as food for them. Ten larvae per treatment in each repetition were tested and kept individually in plastic boxes. The larvae were provided with fresh untreated food after 24 hours of feeding on the treated food. Mortality counts were recorded 1, 2, 3 and 5 days after the treatment. The data obtained in testing of larval stages were analyzed statistically.

Perusal of data presented in Table 1 at 1 day after treatment indicated that the higher dose of *B. bassiana*, 3.5 g/litre proved to be most effective treatment (36.88 %). The doses, *B. bassiana*, 3.0 g/litre and 2.5 g/litre were found next best in order to larval mortality as they registered 33.33 and 27.77 per cent larval mortality, respectively. *B. bassiana* 2.0 g/litre and 1.5 g/litre resulted lower larval mortality 24.99 and 22.22 per cent, respectively and found comparatively less toxic.

The mortality at 2^{nd} day of treatment (Table 1) indicated that *B. bassiana* 3.5 g/litre recorded significantly higher larval

Table 1 : Effect of *B. bassiana* doses through topical spray on developmental stages of *H. armigera*

Sr. No.	Dose (g/litre) (10^8 conidia/g)	Larval mortality (%) days after treatment				
		1 days	2 days	3 days	5 days	Mean
1.	1.5	28.11* (22.22)	33.31* (30.24)	48.51 (56.10)	51.18 (60.71)	40.29 (42.31)
2.	2.0	29.95 (24.99)	35.88 (34.35)	50.26 (59.15)	53.34 (64.28)	42.36 (45.69)
3.	2.5	31.80 (27.77)	39.21 (39.97)	52.17 (62.40)	55.49 (67.85)	44.66 (49.49)
4.	3.0	35.26 (33.33)	41.17 (43.33)	54.12 (65.65)	57.68 (71.42)	47.05 (53.43)
5.	3.5	37.39 (36.88)	46.15 (51.99)	57.92 (71.80)	62.55 (78.56)	50.96 (59.80)
S.Em.±		0.57	0.84	0.95	1.24	0.90
C.D. (P=0.05)		1.70	2.49	2.84	3.69	2.68
C.V.%		3.80	4.71	3.96	4.76	4.30

* Angular transformation. Figures in parentheses are original values

mortality (51.99 %). The doses of *B. bassiana* 3.0 g/litre and 2.5 g/litre were found next best in order to larval mortality as they registered 43.33 and 39.97 per cent larval mortality, respectively. *B. bassiana* 2.0 g/litre (34.35%) and *B. bassiana* 1.5 g/litre (30.24%) resulted lower larval mortality.

The larval mortality of *H. armigera* at 3rd day of application revealed that *B. bassiana* 3.5 g/litre exhibited significantly superior in larval mortality (71.80 %). The doses, *B. bassiana* 3.0 g/litre and 2.5 g/litre were found next best in order to larval mortality as they registered 65.65 and 62.40 per cent larval mortality, respectively. *B. bassiana* 2.0 g/litre and 1.5 g/litre resulted lower larval mortality of 59.15 and 56.10 per cent, respectively and found comparatively less toxic.

The mortality at 5th day of treatment indicated that *B. bassiana*, 3.5 g/litre recorded significantly higher larval mortality (78.56 %). The doses, *B. bassiana* 3.0 g/litre and 2.5 g/litre were found next best in order to larval mortality as they registered 71.42 and 67.85 per cent larval mortality, respectively. *B. bassiana* 2.0 g/litre (64.28%) and *B. bassiana* 1.5 g/litre (60.71%) resulted lower larval mortality.

Looking to the results of *B. bassiana* toxicity in relation to concentration on 3rd instar larvae of *H. armigera* indicated that *B. bassiana* 3.5 g/litre proved to be the most effective, followed by 3.0 g/litre and 2.5 g/litre. The lower concentration of 2.0 g/litre and 1.5 g/litre showed comparatively poor effect but better than untreated control.

Gopalakrishnan and Narayanan (1990) studied the dose mortality relationship between the *B.bassiana* and *H.armigera*, and observed 60 to 100 per cent mortality and cent per cent mortality of eggs with 1.0×10^7 conidia per milliliter suspension. Prasad *et al.* (1990) reported that *B. bassiana* was the most virulent, recording the lowest LC_{50} of 2.17×10^5 conidia per milliliter against second instar larvae of *H. armigera*. Manjula and Padmavathamma (1999) concluded from laboratory experiment that the mortality of *H. armigera* larvae was highest (76.84 %) at high concentration (1×10^9 spores/ml) of *B. bassiana*. Gundannavar *et al.* (2006) reported that the mortality of *H. armigera* larvae was generally increased with increasing concentration of *B. bassiana*. Rachna *et al.* (2008) also reported that the highest concentration of *B. bassiana* (2×10^{12} conidia/ml) caused maximum mortality of *H. armigera*. Thus, the present findings are more or less similar to the results reported by earlier workers.

The study concluded that the higher dose of *B. bassiana* @ 3.5 g/litre proved to be the most effective dose against third instar larvae of *H. armigera* as compared to lower doses (1.5 to 3.0 g/lit). The mortality was increased with increasing in dose of *B. bassiana.*

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