

IN VITRO BIO-EFFICACY OF ENTOMOPATHOGENIC FUNGI *BEAUVERIA BASSIANA* (BALS.) VUILL., AGAINST GRAM POD BORER, *HELICOVERPA ARMIGERA* HUBNER ON CHICKPEA

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Abstract: The present study was conducted at Bio-control lab, Department of Entomology, College of agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur during 2015-16 and 2016-17. The results of *in vitro* experiments revealed that the 2-3rd instars larvae of *Helicoverpa armigera* susceptible to different doses of *Beauveria bassiana*. Mortality of larvae was started after 2-3 day of treatment. Among the doses of *B. bassiana* T₄ (*B. bassiana* @5000g/ha) 0.00-75.00% show the maximum mortality followed by T₃ (*B. bassiana* @3000g/ha) 0.00-45.00%, T₂ (*B. bassiana* @2500g/ha) 0.00-32.00% and T₁ (*B. bassiana* @2000g/ha) 0.00 to 15.00 % but superior than control T₇ (0.00 %) in both the year.

Keywords: Chickpea, *Helicoverpa armigera*, *Beauveria bassiana*

REFERENCES

- Ahmed, K., Khalique, F. and Malik, B. A.** (1998). Modified artificial diet for mass rearing of chickpea pod borer, *Helicoverpa armigera* (Hub.). *Pakistan Journal of Biological Sciences*, 1(3):183-187.
- Anonymous** (2016). India Stat, 2016, Ministry of Agriculture and Farmers Welfare, Govt. of India. pp.1-2.
- Elizabeth, R., H., Brown, P. M. J., Rothery, P., Ware, R. L. and Majerus, M. E. N.** (2008). Interaction between the fungal pathogen *Beauveria bassiana* and three species of coccinellid: *Harmonia axyridis*, *Coccinella septempunctata* and *Adalia bipunctata*. *Biocontrol*, 53: 265-276.
- Fields, P. G.** (1998). Diatomaceous earth: advantages and limitations. Proceedings of the 7th International Working Conference on Stored product Protection, Beijing China, 1: 781-784.
- Hatting, J. L.** (2012). Comparison of three entomopathogenic fungi against the bollworm, *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae), employing topical vs per os inoculation techniques. *African Entomology*, 20 (1):91-100.
- Hong, W.** (2003). Molecular biology of the entomopathogenic fungus *Beauveria bassiana*: Insectcuticle Degrading enzymes and development of a new selection marker for fungal transformation. PhD. Thesis, University of Heidelberg, Germany, pp. 147.
- Kontsedalov, S., Abu-Moch, F., Lebedev, G., Czosnek, H., Horowitz, R., Ghanim, M.** (2012). *Helicoverpa armigera* biotype dynamics and resistance to insecticides in Israel during the years 2008-2010. *J Integrative Agric.*, 11:312-320.
- Krishnareddy, B. and Hanur, S. V.** (2015). Enhanced synthetic diet for rearing of *Helicoverpa armigera* under laboratory conditions. *Journal of Entomological and Zoology studies*, 3(1):165-167.
- Kumar, V. and Chowdhry, P. N.** (2004). Virulence of entomopathogenic fungi *Beauveria bassiana* and *Metarhizium anisopliae* against tomato fruit borer, *Helicoverpa armigera*. *Indian Phytopathology*, 57(2): 208-212.
- Langle, T.** (2006). *Beauveria bassiana* (Bals.Criv.) Vuill.: A biocontrol agent with more than 100 years of history of safe use. REBECA, pp. 37.
- Li, Y. W. and J. H. Yang** (1988). Prospects for the use of entomogenous fungus against forests pests, In: Study and application of entomogenous fungus in China, (Y. W. Li, Z. Z. Li, Z. Q. Liang, J. W. Wu, Z. K. Wu and Q. F. Xu ed.). Periodical Press, Beijing, pp. 10-14.
- Lingappa, S., Saxena, H. and Devi Vimala, P. S.** (2005). Role of biocontrol agents in management of *Helicoverpa armigera* (Hubner). In: Recent advances in *Helicoverpa armigera* Management (Hem Saxena, A. B. Rai, R. Ahmad and Sanjeev Gupta eds.). Indian Society of Pulses Research and development, IIPR, Kanpur, pp 159-184.
- Mccaffery A. R., Head, D. J., Jianguo, T., Dubbeldam, A. A., Subramaniam, V. R. and Callaghan, A.** (1998). Nerve insensitivity resistance to pyrethroids in Heliiothine lepidoptera. *Pestic Sci*, 51: 315-320.
- Namasivayam, S. K. R., Aarthi, R. and Anbazhahan, P.** (2015). Studies on factors influencing the viability of entomopathogenic fungi *Metarhizium anisopliae* in soil adapting culture dependent method. *J. Biopest.*, 8(1):23-27.
- Nauen R, and Bretschneider T.** (2002). New modes of action of insecticides. *Pesticide outlook*, 13:241-245.
- Neoliya, N. K., Singh, D. and Sangwan, R. S.** (2007). Azadirachtin-based insecticides induce alternation in *Helicoverpa armigera* Hub. head polypeptides. *J. Current Science*, 92 (1):94-99.

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- Prakash, M. R., Ram, U. and Tariq, A.** (2007). Evaluation of chickpea (*Cicer arietinum* L.) germplasm for the resistance to gram pod borer, *Helicoverpa armigera* Hubner (Lepidoptera: Noctuidae). *J. entomol. Res.*, **31**: 215-218.
- Prasad, A., Syed, N. and Purohit, S.** (2010). *Beauveria bassiana* (Balsamo) vuillemin: a successful biopesticide against key pest *Helicoverpa armigera* (Hubner). *Internat. J. of Pharma and Bio Sciences*, **1** (2):30.
- Prasad, V. D., Jayaraj, S. and Rabindra, R. J.** (1990). Susceptibility of gram caterpillar, *Heliothis armigera* Hbn. (Noctuidae: Lepidoptera) to certain entomogenous fungi. *J. of Biological Control*, **4**(1): 44-47.
- Senthamizhselvan, P., Alice J., Sujeetha, R. P. and Jeyalakshmi, C.** (2010). Efficacy of the native entomopathogenic fungal isolates with different inoculation methods. *J. of Biopesticides*, **3**(3): 550 – 552.
- Senthamizhselvan, P., Alice J., Sujeetha, R. P. and Jeyalakshmi, C.** (2010). Efficacy of the native entomopathogenic fungal isolates with different inoculation methods. *J. of Biopesticides*, **3**(3): 550 – 552.
- Sigsgaard, L., Greenstone, M. H. and Duffield, S. J.** (2002). Egg cannibalism in *Helicoverpa armigera* on sorghum and pigeonpea. *Biological control*, **47**: 151-165.
- Tefera, T. and Pringle, K. L.** (2003). Effect of exposure method to *Beauveria bassiana* and conidia concentration on mortality, mycosis, and sporulation in cadavers of *Chilo partellus* (Lepidoptera: Pyralidae). *Journal of Invertebrate Pathology*, **84**:90–95.