Trends in Life Sciences
An International Peer-reviewed Journal
www.sciencejournal.in

BIOEFFICACY OF *BEAUVERIA BASSIANA* AGAINST NYMPHS OF *MACONELLICOCCUS HIRSUTUS*

Sambhaji S. Shinde
Department of Zoology, Vivekanand College, Aurangabad
Email:- sambhaji4499@gmail.com

ABSTRACT
Higher dose of *Bassiana bassiana* (1%) shows higher effectiveness against *Maconellicoccus hirsutus* with percent mortality of mealy bug up to 14 DAT. The efficacy inclined gradually with advancement of time but persisted up to 14 days after treatment to induce 72.22 percent mortality. The *B. bassiana* (0.1%) showed 21.11 percent mortality after 2DAT and its mortality increased up to 66.66% at 14 days after treatment. The mortality was time dose dependent. As dose increased the mortality was also increased and vice versa.

KEYWORDS: *B. bassiana*, DAT, *M. hirsutus.*

INTRODUCTION

Maconellicoccus hirsutus belongs to family Psudococcidae and order Hemiptera. Adults are pinkish covered with mealy white secretion. Eggs and crawlers are orange in colour. Both nymphs and adult suck the cell sap from leaves, shoots and bunches. Due to feeding sooty mould developed on bunches and cause severe damage.

The failure of chemical pesticide on one hand and health hazards on other hand, have compelled agricultural entomologist to develop economically viable, eco-friendly and sustainable pest management strategies, in this direction, biological control is especially desirable because it is safe to ecosystem, sustainable, economical and advocated as the first line of attack. Microbial control is the biological suppression of insect pests employing microbial world. It has advantage of higher host specificity, virulence, safety to natural enemies and ease in mass production, multiple benefits in Bioefficacy due to accelerating and spreading epizootics in pests, shelf life and compatibility with other methods.

Agastino Bassi (1835) was the first to demonstrate entomopathogenic fungus; *B. bassiana* could cause an infectious disease in silkworm and suggested the concept that, an infectious micro-organism might be used to control insect pests. Steinhaus (1965) reported that *B.bassiana* cause mycosis in 175 host insect from order Lepidoptera, coleoptera and Hemiptera.

B. bassiana the white muscardine fungus belongs to Division: Eumycota, subdivision: Deuteromycotina, class: Deuteromycetes, order: Monilials and family: Moniliaceae, Genus. *Beauveria* and species *Bassiana*. It is globally occurring soil born mycelia fungus. It produces conidiophores (exospores) and a low molecular weight toxin. These are beauvericin, bassianin, beauveriolides, bassianolide and tenellin. It also produces antibiotic oosporein and degrading enzymes. A fungus, unlike insect bacteria and viruses does not require ingestion for infection in the host. The infection of insect by entomopathogenic fungi occurs following germination of conidia or blastopores on the cuticle and its penetration through the integument (Clarkson et al 1998). In several cases infection through mouth parts, anal orifice, digestive and genital tracts have also been reported. (Ferron, 1978). Fungal pathogenesis begins with adhesion of conidia to the cuticle of host, their germination, penetration in cuticle through germ tube. Finally, fungus develops inside the body of the host which results in the death of the host insect. The death of the host insect may result due to physical blockage of the gut, tracheal circulatory system, non-availability of nutrients, invasions of organs by fungus and toxicosis due to toxins produced by *B.bassiana* under suitable environmental conditions, death is followed by external sporulation of fungus (Moore and prior, 1996).This fungus also found useful for the control of various sucking pests of important field crops. Aphid, *Aphis craccivora* Koch, *A.gossypii* and *Rhapalosiphum maidis* were found to be attacked by *B.bassiana* causing 16-80% mortality (Nirmala et al, 2006). Cannord et al (2002) reported Pathogenicity of *M. anisopliae* and *B.bassiana* to citrus mealy bug (*Phenococcus citri*). Srivastava and Fasih (1998) and Haseeb et al (1998) found that *B.bassiana* was pathogenic to mango mealy bug, *Droschia mangiferae.*

Excessive and indiscriminate use of chemical pesticide which is required to be formulated usually give rise to development of resistance to insecticides in the insect pest which become a severe problem due to unawareness of the farming communities to handle insecticide resistance problem. Pesticide active ingredients would not be used in pure form due to difficulty and is in application therefore they are required to be formulated. So the microbial pesticide which is ecofriendly will be more appropriate for farming community and ecosystem leading to the balance of nature.

Srivastava and Fasih (1988) reported for the first time in February 1986 that *B.bassiana* was found infecting nymphs of *Drosicha mangiferae* in the field. Dead infected mealy bug were found on mango and on the weed *Clerodendron infortunatum* in Lucknow, India. In field trials on infested mango panicles, spray application of a suspension having 4.8 x 10^6 conidia ml^{-1} reduced populations of *D.mangiferae* by 33.3 -100% in 10 days.

Haseeb *et al.* (1998) carried out laboratory tests on the effects of various conidial concentrations of *Beauveria bassiana* on 1^{st} instar nymphs of the mango pest, *Droschia mangiferae* mortality was noticed after 3 days and cumulative mortality was found to increase with time for all concentrations. The highest percentage mortality (100%, 14 days after treatment) was obtained with the highest Concentration (6 x 10^9 conidia ml^{-1}) .Cannard *et al* (2002) proved pathogenicity of *B.bassiana* (FI-1312) against second instar citrus mealy bugs (*P.citri*) under conditions of 26 ± 1^0c and 85 ± 1% RH.

Looking to the eco-friendly properties of *B.bassiana* the studies were undertaken on the Bioefficacy of *B.bassiana* against *Maconellicoccus hirsutus*

MATERIALS AND METHODS

The laboratory experiment was conducted with 5 different concentrations and three replication. In each replication 3 sprouted potatoes was used. The 3 sprouted potatoes were dipped in each concentration of *B.bassiana* solution and dried under the shade. Then on each potato 30 nymphs of *Macanolicoccus hirsutus* were released and potatoes were kept in plastic bags, separately under proper temperature and humidity. The nymphal mortality was recorded for every 2 days interval after treatment i.e. 2, 4,6,8,10,12 and 14 days after treatment for each concentration and control. The Percent mortality of the pest was worked.

RESULTS AND DISCUSSION

The data shown in Table-1 revealed that higher dose of *B. bassiana* (1.1%) shower higher effectiveness against *M. hirsutus* with percent mortality of mealy bug upto 14 DAT. The efficacy inclined gradually with advancement of time but persisted upto 14 days after treatment to induce 72.22 percent mortality.

The *B. bassiana* (0.1%) showed 21.11 percent mortality after 2 DAT and its mortality was increased upto (66.66%) at 14 days after treatment. The *B. bassiana* (0.01%) showed 61.11 percent mortality at 14 DAT. However, the treatment of *B. bassiana* (0.001%) showed 13.33 to 54.44 percent mortality. Then the *B. bassiana* (0.0001%) showed 9.26 to 51.11 percent mortality upto 14 DAT. The mortality was time dose dependent. As dose increased the mortality was also increases and vice-versa.

Srivastava and Fasih (1988) reported that spray application of a suspension having 4.8×10^6 conidia ml^{-1} reduced population of mango mealy bug *D. mangiferae* by 33.3 to 100% in 10 days.

Haseeb *et al* (1998) tested the effect of conidial concentration of *B. bassiana* on nymphs of mango mealy bug, *Droschia mangiferae* and reported that mortality was found to increase with time for all concentration .The highest percentage mortality (100%) was obtained with the highest concentration (6×10^9 conidia ml^{-1}), Canard *et al* (2002) also proved pathogenicity of *B. bassiana* (FI- 1312) against second instar citrus mealy bugs (*P.citri*) under condition of 26± 1^0c and 85± 1% R.H.

Table-1 Bioefficacy of *Beauveria bassiana* against nymphs of *Maconellicoccus hirsutus* at different doses.

Sr. no.	Dose%	2 DAT	4 DAT	6 DAT	8 DAT	10 DAT	12 DAT	14 DAT
1	1	24.44	34.44	42.22	48.88	58.88	62.22	72.22
2	0.1	21.11	31.11	38.88	44.44	52.22	58.88	66.66
3	0.01	15.55	26.66	36.66	42.22	51.11	54.44	61.11
4	0.001	13.33	23.3	33.33	36.666	42.22	47.77	54.44
5	0.0001	9.26	17.77	24.44	31.11	38.88	42.22	51.11

Figures mentioned are converted into percent mortality.

REFERENCES

Bassi A. (1835). Del Mal del sengo, calcinaccio, O. Mascardino, Malattia cheafflige I bacci da serta, E sul mado dil Li 61 Libernarnele le bigattiqque anche, Iodf. Biotech. Italliana, 78:246 – 248.

Cannard M. P., Spooner-Hart R.N. and Milner R.J. (2002). Pathogenicity of water and oil based suspension of *Metarrhizium anisopliae* (Metchnikoff) Sorokin and *Beauveria bassiana* (Balsamo) vuillemin to citrus mealy bug, Planococcus citri (Risso) (Hemiptera: Psudococcidae), Cien. *Appl. Entomol*. 31:75-79

Clarkson J., Screen S., Bailey A., Cobb B. and Chrnley K., (1998). Fungal pathogenesis in insect. In: Molecular Variability of fungal pathogens. (Eds) P. Bridge, Y. Couteaudier and J. clarkson, CAB international, U.K. PP. 83-84.

Fasih M. and Srivastava R.P., (1998). Natural Occurance of *B. Bassiana* and entomophagous fungus on bark eating caterpillar, Inderbella spp. *Indian J. Plant. Pathol*. 6(1): 11-16

Ferron P. (1978). Biological control of insect pests by entomogenous Fungi. Annu. Rev. Ent., 23:409-442

Haseeb, M., Srivastava R. P. and Haseeb M. (1998). Dose mortality relationship of entomogenous fungus, *Beauveria bassiana* (Bals.) Vuill. Against mango mealy bug, Droschia mangiferae (Green). *Insect Environ* 4(3): 74 – 75.

Moore D. and Prior C. (1996). Mycoinsecticide. In: IPM system in Agriculture Vol. II: Biocontrol in Emerging Biotechnology (Eds.) R. K. Upadhyay, K. G. Mukherji and R. I. Rajak. Aditya Books Private Ltd.; New Delhi. PP. 25 – 26

Nirmala R., Ramanujam B., Rabindra R.J. and Rao N.S. (2006). Effect of entomofungal Pathogens on mortality of three aphid species. *J. Biol. Control*. 20(1): 89-94

Srivastava R. P. and Fasih M. (1988). Natural Occurance of Beauveria bassiana, an entomogenous fungus on mango mealy bug, Drosicha mangiferae Green. *Indian J. Plant. Pathol.* 6(1): 8 – 10.

Steinhaus E.A. (1965). Microbial diseases of insects. In: Biological control of Insect Pests and weeds. (Ed) Paul De Bach, Reinhold Publishing Corp, New York, PP. 515-547.

