

Effect of Different Media and pH on the Growth of *Beauveria bassiana* and Its Parasitism on Leaf eating Caterpillars

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Abstract: Experiments were conducted in the laboratory to find out optimum pH and growth pattern of *Beauveria bassiana* on different media such as ground nut cake broth, coconut water broth and potato dextrose broth. The pH of 6-8 was found to be the most suitable for growth and spore formation. The highest VSC was obtained in potato dextrose broth. Fungi with 96.6×10^5 were capable of infecting all the stages of the pest including adult and pupae. Confirmation of spore formation was observed by a series of reinoculations of fungus obtained from inoculated caterpillars.

Key words: *Beauveria bassiana*, parasitism, Caterpillar, Viable Spore Count (VSC)

INTRODUCTION

Leaf eating caterpillars (*Ambadra* spp.) are the important pests of oil and palms through out the world, causing heavy yield losses^[4]. Severe infestations lead to heavy defoliation and premature drying of leaves^[7]. This was found in the West Godawari and Krishna districts of Andhra Pradesh (India) during winter. So far two types of pest species *Ambadra* spp. and *Ostrinia nubilalis* were recorded in these districts. The percentage of infestation was observed in the range of 80- 100% in some orchards.

The pest has become endemic in some of the areas where the palms attain tallness and leaves of adjacent palms are intermingled creating a congenial climate for spread of the infection. The infestation was further aggravated in those orchards where the palms were given basin as well as flood irrigation^[9]. So the present study was undertaken to control these pests with the aid of an entomopathogenic fungus *B.bassiana*.

MATERIALS AND METHODS

To study the growth pattern of *B.bassiana* on different media. Ground nut cake broth (Ground nut cake extract with dextrose 20 mg/L), Coconut water broth (Coconut water with dextrose 20 mg/L) and Potato dextrose broth (Peeled potato dextrose 20 mg/L) were sterilized at 15 lbs for 15 mins with a varied pH range of 3, 4, 5, 6, 7, 8 and 9. After sterilization streptomycin with a concentration of 50 mg/ L was added to the media at 40°. Replicates of conical flasks containing 100 ml of media were inoculated with a

loopful of fungal culture and the flasks were incubated at room temperature for 5 -7 days. The growth was measured at 530 nm. The broth culture containing 96.6×10^5 VSC/ml was used to treat the pest of corn. Finally the results were recorded and tabulated.

RESULTS AND DISCUSSION

Among the trials conducted with PDA broth, Groundnut cake broth and Coconut water broth, the largest number of colonies (59.66×10^3 with 96.6×10^5 was observed on PDA broth (Table 1&2). The optimum pH of 6-7 was found satisfactory (Table 3). During the application of *B.bassiana* on leaf eating caterpillars of corn there was no appressorium-like structures at the penetration site. Further no evidence was seen of a host response to these penetration sites. But it has been shown to form an appressoria on the cuticle of some host insects, such as *Melolontha* sp. and *Leptinotarsa decemlineata*^[2]. The present study reveals that *B.bassiana* Penetrates directly through the corn leaf with the infection hyphae sharply constricted in the passage area through the cuticle by forming a hole. Penetration of *B.bassiana* on the host plant cuticle may be aided by the mechanical force exerted by the infection structure or may require the enzymatic dissolution of the cuticle. This was also reported in several other plant species by several other workers^[1,3]. Attachment the fungus to a host plant cuticle is essential for penetration, development and successful infection. Many fungal pathogens of plants and insects produce dry, wind borne conidia that must attach to the hydrophobic outer surface of their intended host before

Table 1: *B.bassiana* plate counts on different media.

S. No	Types of Media	Replicates(10^{-1})	Replicates(10^{-2})	Replicates(10^{-3})	Average number of colonies $\times 10^3$
1.	Potato Dextrose Broth	98	43	38	59.66
2.	Ground nut Cake Broth	57	34	29	40.00
3.	Coconut water Broth	46	28	19	31.00

Table 2: Sporulation efficiency of *B.bassiana* on different media.

S. No	Types of Media	Replicates(10^{-1})	Replicates(10^{-2})	Replicates(10^{-3})	Average number of spores $\times 10^5$
1.	Potato Dextrose Broth	213	172	98	96.6
2.	Ground nut Cake Broth	192	115	81	77.6
3.	Coconut water Broth	63	31	12	21.2

Table 3: Effect of different pH on the growth of *B.bassiana* in PDA broth

S.No	pH	Replicates(nm)	Replicates(nm)	Average	Growth rate
1.	3	1.90	1.82	1.86	LG
2.	4	2.65	1.76	2.21	MG
3.	5	4.17	3.91	4.04	MG
4.	6	5.17	4.09	4.63	AG
5.	7	6.81	4.17	5.49	AG
6.	8	3.17	2.19	2.68	MG
7.	9	1.71	0.49	1.10	LG

LG – Less Growth; MG – Medium Growth; AG – Abundant Growth



Fig. 1: Leaf eating caterpillar of *Ambadra spp.*

germination and after colonization. In addition to that the conidia of *B.bassiana* were deposited on the leaf surface^[5]. The germination may follow two characteristic forms, a relatively short hyphal growth followed by penetration or extensive mycelial growth and branching, which may or may not terminate in penetration sites^[6]. But in the present study, after initial attachment, the dry conidia imbibed moisture for a period of 24 – 48 hrs. At the second stage of conidia development, there was no adhesive material on the

corn's cuticular surface. The final stage of conidia development was delineated by the emergence of germ tube. When corn stem was infected with *B.bassiana* the stem shows colonization and movement of *B.bassiana* in to the stem^[8]. The above fact was also found to be true in our findings and this data proves that the succulent pith of corn is ideal for the colonization of *B.bassiana*. When it was applied to the plants by foliar spray or through injection; it gave a prolonged suppression of *O.nubilalis* and *Ambadra sp.*



Fig. 2: Microphotograph of *B.bassiana*.

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