

## Three Promising Fungal Strains Pathogenic to Fruit Flies

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**ABSTRACT:** Pathogenicity of the fungi *Paecilomyces lilacinus*, isolated from *Bactrocera cucurbitae*, and *Aspergillus candidus*, isolated from *B. dorsalis*, was tested. Cross infectivity of *P. lilacinus* on *B. dorsalis* and *A. candidus* on *B. cucurbitae* and cross infectivity of a local isolate of *B. bassiana* from bhindi leaf roller (*Sylepta derogata*) on fruit flies (*B. cucurbitae* and *B. dorsalis*) were also studied. These fungi were new records in these hosts. *P. lilacinus* at  $10^9$  spores / ml caused 96.67% and 100 % cumulative mortality in fruit flies on the second and on the third days.  $LC_{50}$  values of *P. lilacinus* on *B. cucurbitae* were  $5.0 \times 10^6$ ,  $8.0 \times 10^5$ ,  $7.0 \times 10^5$  spores/ ml on 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> day, respectively. The fungus was found to cross infect *B. dorsalis*.  $LC_{50}$  values of *A. candidus* on *B. cucurbitae* were  $1.29 \times 10^8$ ,  $1.22 \times 10^7$ ,  $2.27 \times 10^6$  spores / ml on 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> day, respectively. The fungus was found to be cross infective to *B. cucurbitae*. *B. bassiana* at  $10^8$  spores/ ml on *B. dorsalis* was found to cause 70%, 80% and 90% mortality on 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> day.  $LC_{50}$  values of *B. bassiana* on *B. dorsalis* were  $7.0 \times 10^8$ ,  $2.0 \times 10^7$ ,  $5.0 \times 10^6$  spores/ ml on 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> day, respectively. Formulation of *P. lilacinus* as wettable powder and granules and *B. bassiana* as wettable powder, were also prepared and their efficacy was tested on hosts.

**Key Words:** *Paecilomyces lilacinus*, *Bactrocera cucurbitae*, *Aspergillus candidus*, *Bactrocera dorsalis*, Entomopathogens

### INTRODUCTION

Fruit flies are a serious economic pest affecting horticultural production world wide. *Bactrocera cucurbitae* is an important pest of cucurbits and *B. dorsalis* (Hendel) is a major pest of mango and guava in Kerala, India. Pathogenicity of three fungi *Paecilomyces lilacinus* isolated from *B. cucurbitae* and *Aspergillus candidus* isolated from *B. dorsalis* and local isolate of *B. bassiana* isolated from bhindi leaf roller (*Sylepta derogata*) were tested in the present study.

### MATERIALS AND METHODS

#### Fungal strains

Fungal strains *P. lilacinus* (ITCC No. 6064), *B. bassiana* (ITCC No. 6063) and *A. candidus* (ITCC No. 5428) were used for the study.

#### Survey

Survey conducted in the Southern districts of Kerala to identify potential pathogens.

#### Isolation

Pathogens were isolated from the infected insect specimens using potato-dextrose-agar (PDA) medium. Kochs postulates were proven.

#### Identification

Pathogens were identified by the Indian Type Culture Collections (ITCC), Indian of Agricultural Research Institute, New Delhi.

#### Pathogenicity

The pathogenicity of spore suspensions of *B. bassiana*, *P. lilacinus* and *A. candidus* were sprayed on pupae and adults of fruit fly. Spore suspension of the test fungus was prepared by shaking fungal discs in sterile water blanks. Daily observations on disease symptom development and mortality were recorded.

#### Bioassay studies

Spore suspensions of *B. bassiana*, *P. lilacinus* and *A. candidus* at different concentrations were sprayed on fruit flies. To prepare stock spore suspension, Seven millimeter fungal discs from well developed sporulating fungal cultures were shaken in 10 ml water blank. The spore count was estimated using haemocytometer. Different spore concentrations were prepared by adding additional fungal discs or sterile water. Serial dilution

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was done to prepare the suspensions at lower concentration.

The test insects of uniform age taken from laboratory culture were selected for bioassay. Flies were sprayed with different spore concentrations of fungus using an atomizer, allowed to dry and then kept in a dry rearing jar. Flies sprayed with sterile water served as control. Replications were maintained for each treatment. Observations were recorded on insect mortality at daily intervals. The dosage mortality data obtained were subjected to probit analysis and  $LC_{50}$  values of each fungus were calculated.

### Preparation of formulation

Formulation of *B.bassiana* (wetttable powder) and *P. lilacinus* (wetttable powder and granules ) were prepared.

## RESULTS AND DISCUSSIONS

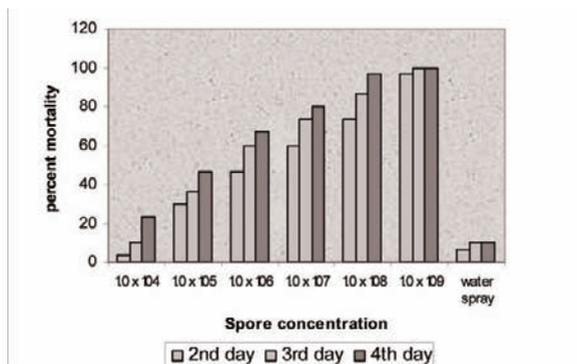
Adult fruit flies sprayed with *P. lilacinus* died within 2-3 days. Pinkish violet puffy mycelial growth of the fungus appeared on dead insects. *P. lilacinus* @  $1.0 \times 10^9$  spores/ml caused 96.67%, and 100 % cumulative mortality in fruit flies on second and third day respectively (Fig 1). Fungus @  $1.0 \times 10^7$  was found to cause more than 50% cumulative mortality on second day  $LC_{50}$  values of

*P. lilacinus* on *B. cucurbitae* were  $5.0 \times 10^6$ ,  $8.0 \times 10^5$ ,  $7.0 \times 10^5$  spores / ml on 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> day, respectively. *P. lilacinus* treated pupae were black in colour and failed to emerge.

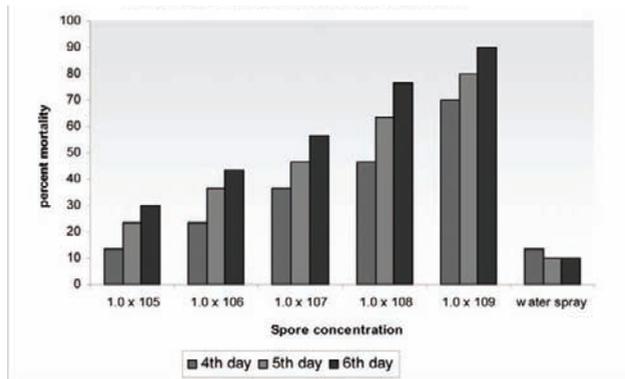
Local strain of *B. bassiana* developed disease symptoms on *B. cucurbitae* and *B. dorsalis*. Adult fruit flies sprayed with *B. bassiana* died within 4-5 days. White puffy mycelial growth of the fungus covered these dead flies. *B. bassiana* @  $1 \times 10^9$  was found to cause 70%, 80% and 90% mortality on fourth, fifth and sixth day respectively (Fig 2).  $LC_{50}$  values of *B. bassiana* on *B. dorsalis* were  $7.0 \times 10^8$ ,  $2.0 \times 10^7$ ,  $5.0 \times 10^6$  spores / ml on 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> day , respectively .

Adult fruit flies sprayed with *A. candidus* were found to die within three to four days. on the dead insect dull yellowish coloured fungal growth appeared within two days with sporulating heads of the fungus. Pupae treated with *A. candidus* also showed yellowish powdery growth of the fungus. *A. candidus* @  $1.25 \times 10^9$  spores/ ml caused 63.33%, 83.33% and 100 % cumulative mortality in fruit flies on third, fourth and fifth day respectively (Fig. 3).  $LC_{50}$  values of *A.candidus* on *B.cucurbitae* were  $1.29 \times 10^8$ ,  $1.22 \times 10^7$ ,  $2.27 \times 10^6$  spores / ml on third, fourth and fifth day respectively.

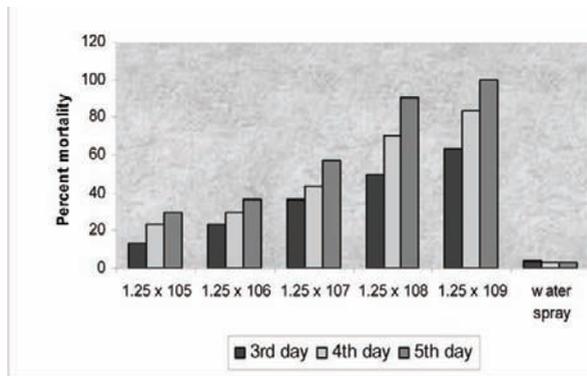
The formulations of *B.bassiana* and *P.lilacinus* were effective when tested under laboratory condition .



**Fig 1.** Cumulative per cent mortality of *Bactrocera cucurbitae* treated with *Paecilomyces Lilacinus*



**Fig 2.** Cumulative per cent mortality of *Bactrocera dorsalis* treated with *Beauveria bassiana*



**Fig 3.** Cumulative percentage mortality of *Bactrocera cucurbitae* treated with *Aspergillus candidus*

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