showing attractancy in all the tests. The two butylesters, butyl-3,5-dinitro benzoate and butyl-2,4-dihydroxybenzoate had their OAI values reduced to 0.25 and 0.32 from 0.67 and 0.52 in presence of pheromone. Only ethyl crotonate is found to retain its attractancy with an OAI value of 0.51 even in the presence of pheromone. This study shows that ethyl crotonate can stimulate the oviposition response of gravid *C. quinquefasciatus*. These effective ester compounds may play a useful role in control operations as baits and to monitor vector population.

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A NEW HOST RECORD FOR THE TEAK DEFOLIATOR, HYBLAEA PUERA (LEPIDOPTERA: HYBLAEIDAE)

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HYBLAEA PUERA is an important defoliator of teak (*T. grandis*) in India. Beeson[1] recorded 28 host tree species of *H. puera* belonging to the families Araliaceae (1 sp), Bignoniaceae (13 spp), Juglandaceae (1 sp), Oleaceae (1 sp) and Verbenaceae (12 spp)

Vitex altissima (Verbenaceae) is newly recorded as a host plant of *H. puera*, an important defoliator of *Tectona grandis* (Verbenaceae). *V. altissima* is a large deciduous tree found growing naturally, commonly in semi-evergreen, occasionaly in evergreen and sporadic in moist deciduous forest type up to an altitude of 1200 m.

In April 1984, larvae of *H. puera* were first noticed feeding on tender foliage of saplings of *V. altissima* (Verbenaceae) growing naturally near a teak seed orchard at Arippa, Trivandrum (Kerala State). Larvae collected from the field were reared successfully on *V. altissima* leaves. Subsequent experiments in the laboratory confirmed that *H. puera* completed developments successfully from egg to adult on *V. altissima* leaves. To compare the developments, newly emerged larvae were released simultaneously on tender leaves of *V. altissima* and *T. grandis*. Two replicates with 20 larvae each were used and the leaves were changed daily. The larval and pupal development periods and pupal weights were determined and compared statistically.

The data (table 1) showed that there was no significant difference in the developmental periods between insects reared on the two hosts. However pupal weight was slightly smaller in insects reared on

Table 1 *Development of H. puera on leaves of T. grandis and V. altissima*

Tree species	Mean larval period days ± SE	Mean pupal period days ± SE	Mean pupal weight g ± SE	% survival of: larva to pupa	% survival of: pupa to adult
Tectona grandis	10.7 ± 0.2^a	5.7 ± 0.2^a	23.49 ± 1.01^a	100	88
Vitex altissima	11.2 ± 0.2^a	5.9 ± 0.1^a	19.02 ± 0.96^b	95	76

[a, b] significantly different at 1% level.

V. altissima. The percentage of survival from larvae to pupa and from pupa to adult was also slightly lower in insects reared on *V. altissima*.

The present study shows that *V. altissima* can support populations of teak defoliator under natural conditions. However, shorter larval and pupal periods, greater pupal weight and high survival percentage of *Hyblaea* on teak show that *T. grandis* is a better host plant than that of *V. altissima*. This is the first report of *V. altissima* as a host plant of the teak defoliator, *H. puera*.

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ANTAGONISTIC EFFECTS OF PHYLLOPLANE MICRO-ORGANISMS AGAINST *CERCOSPORA MORICOLA* COOKE

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STUDIES on the antagonistic relationships of phylloplane micro-organisms against foliar pathogens have received much attention from the point of view of biological control. Many attempts have been made in recent years for isolating and evaluating microbes inhibitory to plant pathogens[1]. *Cercospora moricola* causes severe leaf spot disease of mulberry (*Morus indica* L), the chief source of food for silkworms[2]. Use of fungicides to control the disease results in extreme residual toxicity to the silkworms. Under such conditions biological control of the disease using leaf surface antagonists is highly beneficial. The present study reports the screening of such antagonists isolated from mulberry leaves against *C. moricola* both *in vitro* and *in vivo* conditions.

In vitro screening was conducted by germinating the pathogenic conidia in cell-free culture filtrate of the test organism grown in 50 ml potato dextrose broth (PDB) for 15 days. Data on the germination and post-germination development of the conidia were collected after 24 hr of incubation. PDB used in place of culture filtrate served as control. *In vivo* studies were conducted by inoculating the leaves simultaneously with the pathogenic conidia and the test organism, harvested from a seven-day-old culture grown on PDB. Plants receiving pathogenic conidia alone served as control. The treated plants were incubated under high humidity overnight and the data were collected on the 10th day after inoculation. Triplicates were maintained for each treatment and the percentage inhibition was calculated using the formula of Heuvel[3].

A total of 14 types of micro-organisms were screened (table 1). Based on the percentage inhibition of spore germination, the antagonists were classified into low (1–25%), moderate (26–50%) and strong (51-100%) inhibitors. *Sporobolomyces roseus*, *Drechslera sorokiniana*, *Chaetomium globosum*, *Pullularia pullulans*, *Cryptococcus laurentii* and *Tilletiopsis minor* exerted low inhibition. *Nigrospora sphaerica* and *Trichoderma viride* were moderate inhibitors while *Cladosporium cladosporiodies*, *Staphylococcus* sp, *Corynebacterium* sp, *Curvularia lunata*, *Pseudomonas maltophila* and *M. leucotrichum* behaved as strong inhibitors. The number of germ tubes produced and the length of germ tubes did not show any correlation with the degree of inhibition of spore germination.

The majority of the organisms tested under *in vivo* conditions retained their inhibitory activity in an increased proportion except *Corynebacterium* sp, *Staphylococcus* sp and *Trichoderma viride* which showed reduced inhibition compared to their behaviour under *in vitro* conditions. *M. leucotrichum*, though it completely inhibited leaf spot development, behaved as a pathogen when inoculated in sufficient concentration indicating the danger of its use as a biocontrol agent. However, significant reduction in the number of leaf spots was observed on the leaves receiving *P. maltophila*, *C. cladosporioides* and *C. lunata* while the rest of the organisms showed moderate to low inhibition.

Use of antagonistic action is currently one of the most important resources of biocontrol and a number of microbes have been used to control plant diseases[4]. Direct parasitism, production of antibiotics and other substances, competition for nutrients on the host and stimulation of host defences are stated to be the chief mechanisms of antagonism[5].