Preliminary evaluation of fungal metabolites as natural herbicides for the management of *Lantana camara*

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*Lantana camara* L. (Verbenaceae) is a perennial obnoxious weed posing a threat to the forest trees especially Sal (*Shorea robusta*) and Teak (*Tectona grandis*) in the state of M.P. due to its allelopathic effects. Conventional methods have failed in the management of this weed (8,10,11). Chemical herbicides are cost effective tools. However, due to growing environmental and health concerns these are gradually being phased out and newer ecologically safe and environmental benign methods are being tested (6,7).

One of the recent approach is exploitation of secondary metabolites of fungi as phytotoxins in integrated weed management strategy (1,3,5,9,14). In the present communication, we report the effect of secondary metabolites of different indigenous fungi on the weed *Lantana camara*.

Five different fungi, viz., *Fusarium oxysporum*, *Alternaria alternata*, *Sclerotium rolfsii*, *Aspergillus* sp., *Penicillium* sp. were recovered from phyllosphere, phylloplane and rhizosphere of infected *Lantana camara* using method of Agrawal and Hasija (2). Different strains of these fungi were grown on a synthetic liquid medium for 18 days at 26°±2°C. Composition of Synthetic Liquid Medium (S.L.M.) in g/L: KNO₃=10, KH₂PO₄=5, MgSO₄·7H₂O = 2.5, FeCl₃=Trace, Sucrose=35, distilled water = 1 litre. The metabolized broth was passed through Whatman No.1 filter paper to obtain crude culture filtrate (CF). This was subsequently passed in vacuo through a Seitz filter using sterilised nitrocellulose membrane having 0.2 μm pore size, making it cell free culture filtrate (CFF)(15).

Cut shoot bioassay was carried out using a gradient of CFF from 10 % to 100% under aseptic conditions. All treatments in the bioassay were incubated in Yorco Plant Growth Chamber at 26°±2°C for 24 hrs. with 12 hrs. photoperiod and then brought to laboratory conditions. The experiments were terminated at end of 48 hrs. Phytotoxicity of the filtrates was monitored visually by scoring technique on a 5 point scale where 0 represented No Symptoms and 5 represented complete necrosis and collapse of the shoot (13). It is evident from (Fig. 1) that among the isolates tested *Alternaria alternata* LC-110 and LC-104 and *Aspergillus* sp.(LC-113) caused maximum damage to Lantana shoots at 36 h.p.t. (hours post treatment) and at 50% concentration of the culture filtrate. Further, the fungal strains exhibiting maximum phytotoxicity by cut shoot bioassay were subjected to leaf drop bioassay using 50% CFF's of selected strains.

Leaves were detached from preflowering stage of the weed. These were divided in three test sets. Each set contained three subsets comprising three leaves. 5 μL drop of 50% CFF concentration of LC-1

![Fig. 1. Phytotoxic effect of cell free culture filtrate of different fungi on *Lantana camara* L. by shoot cut bioassay](image-url)
04, LC-110 and LC-113 were placed on the leaves using sterile capillary placed in a moist chamber (9 cm petridishes) using a sterile forceps. A single control set having three subsets comprising three leaves per subset was used to compare the herbicidal activity. The control set received uninoculated synthetic liquid medium. These treatments were carried out within 15 minutes after the detachment from the mother plant. All the treatments were kept in controlled conditions i.e 26° ± 2°C; 75 ± 15% relative humidity, 7350 lux illumination for 15 hours for a period of two weeks. These were rated for their disease severity after every 12 hours on a five point scale as per Chiang et al. (4). The experiment was terminated after 10 days. As evident from Fig. 2 that Alternaria isolate LC110 induced more phytotoxic symptoms than LC-104 (Alternaria alternata) and LC-113 (Aspergillus sp.). The initial symptoms of phytotoxic activity was development of a dark brown spot after 12 hours post treatment, which increased in size with respect to the time of treatment. This is probably because of the absorption and dispersion of toxic metabolites. Alternaria alternata being a pathogenic isolate, is of considerable value in development of parabiological or a bioherbicide and therefore carries precedence over Aspergillus sp. which is a non pathogen. Observations regarding the role of phytotoxins in the seedling chlorosis of Coffon and citrus by Alternaria alternata f. sp. tenuis have been reported by other workers (3,16). Thus, present investigation establishes that two strains of Alternaria alternata LC-110 and LC-104 can be exploited for the production of parabiologicals in integrated management of Lantana camara L.

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