Allelopathic effects of *Lantana camara* Linn. on spore germination of
*Asterella angusta* Steph. — A liverwort

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Extract from root, stem and leaf of *L. camara* proved inhibitory for germination of the spores of *A. angusta*. Leaf extract was found to exhibit maximum allelopathic potentiality followed by stem and root extract and may be interpreted to be the result of phytotoxic substances which are possibly synthesized in the leaf and translocated to other organs.

*Lantana*, a fast growing perennial woody shrub is a serious weed in India. It is listed as one of the world’s worst weeds. Its proliferation and spread are attributed to a number of factors including natural propagation, reduced use of hand weeding, high tolerance to currently available herbicides, non-suitability for bruising by grazing animals and decreased competition from other weeds. Leaves and seeds of this species are toxic to grazing animals and also poisonous to humans. Toxin released by seeds, living plants or their residues are toxic to crop plants. It has been suggested that allelopathy may be involved in shifts in species distribution and increase of dominance by certain annual and perennial weeds in a variety of arrangements.

Mt Abu (24°36'N and 72°45'E), with its highest peak Gurushikhar at 1727 M, is one of the richest locality for Bryophytes in Rajasthan. Spread of *Lantana* in the forests of Mt. Abu is adversely affecting the survival of angiosperms in general and bryophytes in particular. Vast area under this deadly shrub may lead to the complete destruction of the sizeable bryophytic component in this natural habitat of this group of cryptogamic flora. Spread at an alarming rate of this weed lead us to presume that *Lantana* spread may be adversely affecting the spore germination and regeneration etc.

There has been a rapid advance in our knowledge of mechanism of action of known allelopathic compounds. Research has been particularly active in relation to the roles of allelopathy in agriculture, forestry, phytopathology, patterning of vegetation and algal succession. Understanding of allelopathic interaction of various plant species has already been used in reforestation. Like most other plants *Lantana* is an aggressive invader of natural ecosystems in many countries. Very little work has been done on allelopathic effect of *Lantana* against Bryophytes in India.

Fresh material of *Lantana camara* was collected locally and root, stem and leaves of this plant. were kept in an oven and dried at 80°C for 24 hr. These plant parts were then chopped into small pieces and 10 g of each of these was soaked in 100 ml. double distilled water for 24 hr. This extract of each organ was filtered and autoclaved at 15 lb pressure for about 15-20 min. and required percentage was prepared by the addition of Half Knop’s liquid medium. Similarly different concentrations of the extract were also prepared by the addition of double distilled water.

Spores of *Asterella angusta* Steph. (Family-Rebouliaceae) a liverwort occurring at many localities in Rajasthan, were collected from Mount Abu, India. For the preparation of spore suspension in double distilled sterilized water, the capsules were surface sterilized with 2% solution of calcium hypochlorite before being ruptured to liberate the spores. 0.01 ml of the well shaken spore suspension which contains approximately 30-40 spores was spread in petri-dishes lined with Whatman’s filter paper No. 1, moistened with different concentrations of *Lantana* root, stem and leaf extract in Half Knop’s medium and double distilled water. Half Knop’s medium and double distilled water treatment served as control. The cultures were maintained at 22°C ± 2°C temperature. Three replicates were used in each case and observations were recorded using stereoscopic binocular microscope (Olympus).

The inhibitory effects of various concentrations of extract of root, stem and leaf of *L. camara* on spore
Fig. 1 — Effect of different concentration of leaf, stem and root extract of *Lantana camara* in Half knop's medium and double distilled water on spore germination of *Asterella angusta*.
Plate I: Figs 1 & 2-Germination of spore in 15% and 10% of Lantana leaf extract in Half Knop’s liquid medium respectively. Fig. 3-Germination of spore in 20% of Lantana stem extract in Half Knop’s liquid medium. Fig. 4-Germination of spore in 40% of Lantana root extract in Half Knop’s liquid medium. Fig. 5-Germination of spore in Half Knop’s liquid medium.
germination, are presented in Fig. 1. It is obvious from the observations that the phases of spore germination are individually affected by the Lantana extract, supporting the suggestion made by Raghavan, that the process of spore germination is divisible into several steps each of which is affected individually by environmental variables after initial exine bursting has occurred. Further it is also evident that the leaf extract is most potent inhibitor, while at 60%, extract of stem and root allows a certain percentage of spores to germinate. This process was substantially inhibited by an equal concentration of leaf extract. Also,
comparable dilutions of stem and root extract were less potent in their inhibitory activity compared with the leaf extract. In view of the known occurrence of phytotoxic substances in plants it is suggested that some sporotoxic substance in evidently synthesized metabolically in L. camara. Figure also show that with the increase in the concentration, the process of spore germination was progressively decreased, but with the increase in the time period the percentage of spore germination increases. This may be due to the degrading effect of the extract with increase in the time period. Maximum spore germination was observed in control. Extract diluted with double distilled water was more inhibitory than the extract diluted by Half Knop’s medium, which proves that the presence of nutrients in the Half Knop’s culture medium counteract the inhibitory effect of allelochemicals present in the extract. (Plates I and II).

Phytochemically the extract has been found to contain phenols and alkaloids that seem to act as sporotoxic substances. The extract is heat stable as indicated by the fact that the germination of spore was obtained after autoclaving.

The absence of even widely distributed liverworts in the immediate vicinity of Lantana camara shrub is, therefore due to the allelopathic potential of the latter. Thus, Asterella angusta, known to be very common in moist and shady places, has practically disappeared, from the places where L. camara now grows densely. Unchecked growth of this shrub is bound to adversely affect the survival and spread of bryophytes in this region.

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