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Extraction of Inhibitors from Lantana Infested Soil

R K Kohli and R K Arora

ABSTRACT

Lantana, releases soil inhibitors probably through above ground parts, roots or by both. The amount of soil inhibitors varies from upper to lower layers and below canopy. The presence of soil inhibitors and their deleterious impact on the growth of other plants, support the allelopathic behaviour of Lanatana.

Key words: Lantana, soil inhibitors, allelopathy.

INTRODUCTION

Lantana camara L. (Verbenaceae) recognised as an incorrigible weed, is a forest menace that grows in many temperate and subtemperate regions of the world. Its proliferation and spread are attributed to a number of factors including easy natural propagation, high tolerance to herbicides, resistance against various diseases (Phillips and Tucker 1976) and allelopathy (Kushal Bala *et al.* 1986).

Allelopathic behaviour of any plant is due to toxic substance(s) released by the plant into the environment. The present study was aimed at assessing the impact of the plant through the soil under it. The quantity and distribution of the allelochemic(s) in the soil were, therefore, determined.

The inhibitory nature of the extract made from the soil was evidenced from the bioefficacy studies conducted on the parameters of seed germination, seed vigour, seedling growth and cellular survival.

MATERIAL AND METHODS

The thickets of *Lantana camara* var camara from three localities, viz. Chandigarh, Pinjore and Kalka were identified. Selection of the sites was made at random in each locality. At each site, 5 cm wide circular bands were marked on the soil below the humus layer, at the distances 0-5, 20-25, 40-45, 80-85 and 120-125 cm from the basal point of the plant. From each of the marked portion, soil was collected after removal of the litter from the depths of 0-5, 7-12 and 20-25 cm. Thus, a total of 15 samples were collected from each site. The collections from different sites were pooled separately and then processed for inhibitors extraction.

The soil inhibitors were extracted from 1 kg soil samples separately from different sites following the method given by Kanchan and Jayachandra (1980). The dry brown powdered inhibitors thus obtained were weighed on micro electronic balance.

RESULTS AND DISCUSSION

The extractions (inhibitors) were seen to reduce the germination of *Impatiens balsamia, Cajanus cajan* and *Lantana camara* var camara seeds by 90, 95 and 70 per cent compared to their respective controls. Similar trend was observed in germination trials of the three seeds in soil samples from which inhibitors were extracted. Likewise, the seed vigour and

Dept of Botany, Panjab University, Chandigarh-160 014, India

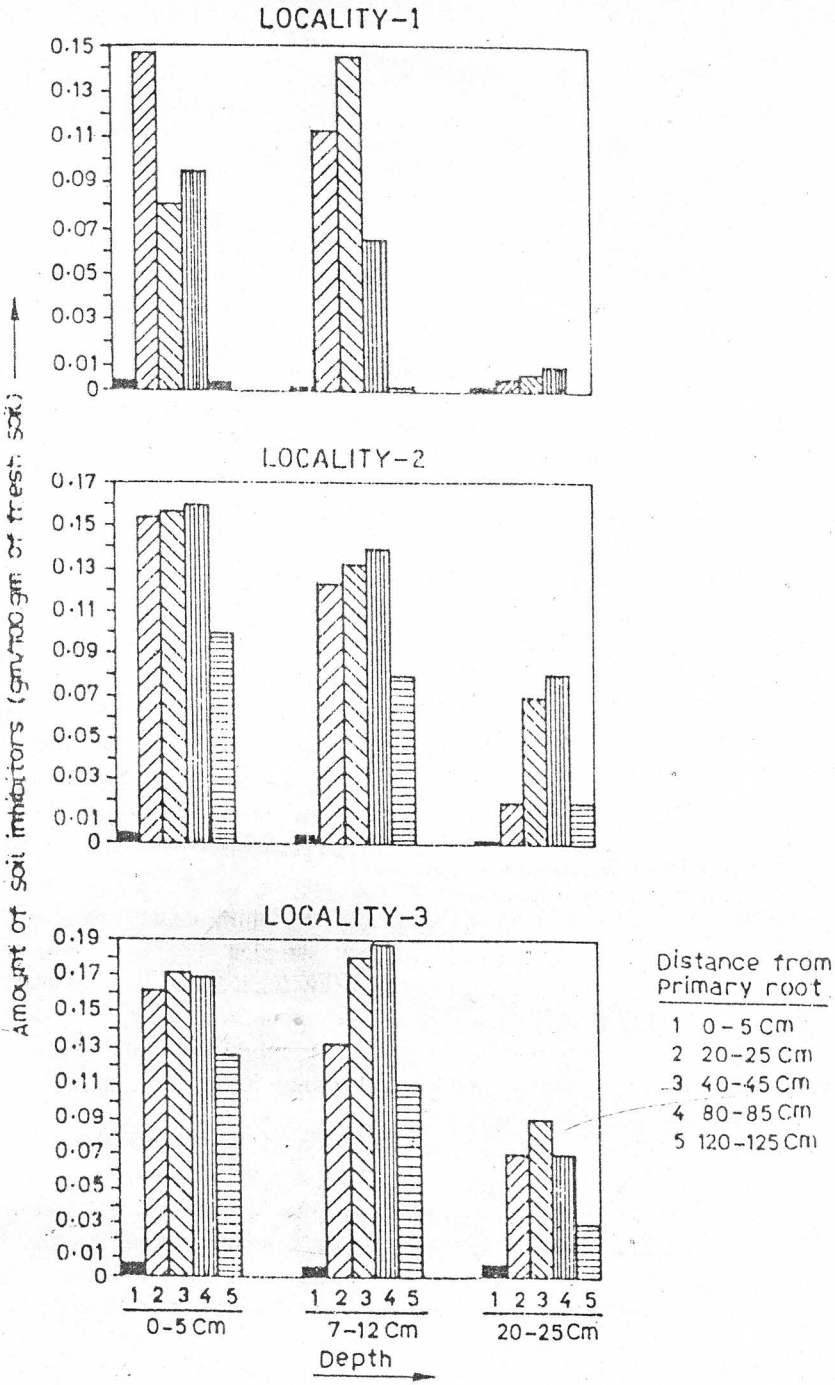

Fig. 1 Amount of inhibitors from *Lantana camara* var camara infested soil

seedling growth of the seeds that germinated in the inhibitor rich soil or the inhibitor treated medium was extremely low. The extraction also reduced the cell survival of the target plant.

Almost similar trend with regard to the amount of inhibitors was discernible at all the three localities under study at different depths and at the site distances from the plant. The upper strata of the soil, compared to the lower layers, possessed more amount of inhibitors. This suggests that the release of inhibitors to the soil may be the function of the aerial parts of the plant.

The fall of leaves and other aerial parts on death and decay add to the inhibitor content of the soil. Various plant's foliage, e.g. *Parthenium hysterophorous* (Anita Kumari *et al.* 1985), *Erica australis* L. and E. *arborea* L. (Ballester *et al.* 1979) also induce toxic substances into the soil, thereby inhibiting the growth of other plants. This contention could be correlated with the observation that on moving away from the basal point of the plant the amount of inhibitor increases (to a certain limit), thereafter, it decreases. This pattern and the limits depend on the crown dimension of the plant.

Secondly, primary roots seem to contribute little towards the release of inhibitors to the soil, as the soil adhering or close to the plant, irrespective of its depth, has shown a negligible content. This could not be attributed to the little surface area of the primary root system. In Lantana, the primary root is very small compared to the lateral, secondary and tertiary roots. However, the comparatively increased inhibitor contents up to certain distance in the soil (80-85 cm) tend one to believe so. Since at the 20-25 cm depth the inhibitor content, is least it seems plausible that the lateral root system may also be contributing towards the release of inhibitors.

In the absence of any report suggesting the role of roots in Lantana-caused allelopathy, it could also be presumed that the leachates/ inhibitors from the soil surface travel down and act/or get degraded. In various plants like *Araucaria cunninghamii* Aiz. (Bevage 1968), *Helianthus annus* (Wilson and Rice 1968), *Sporobolus pyrannidatus* (Rasmussen and Rice 1971), and *Ambrosia pstlostachia* (Niell and Rice 1971), root exudations are inhibitory in nature.

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