Role of allelopathy in invasion of an exotic plant *Robinia pseudo-acacia* L.

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**Introduction:** Invasive plant species threaten the integrity of natural ecosystem through out the world by displacing native plant communities and establishing monocultures in new habitats. *Robinia pseudo-acacia* L. is commonly known as black locust tree. Its widely distributed species have interesting biological properties and medicinal activities. It has been observed that places where these trees dominate others plants are lacking and the vegetation beneath the tree is poor. Fresh leaves were extracted with aqueous methanol. Chromatographic separation of methanolic extract of fresh and fallen leaves of *Robinia pseudo acacia* lead to the isolation of (+) Catechin identified by nuclear magnetic resonance spectroscopy, which inhibited the growth of various weeds and edible crop plants.

**Method and Material:** The fresh leaves (1.5 kg) of *Robinia pseudo-acacia* were extracted with 80 % aqueous Methanol. The extract was concentrated to a crude dark brown gum (100 g). The crude fraction Fr-1 assayed using lettuce as test plant and was found significantly inhibitory to the root and shoot growth. Bioassay directed silica gel column chromatographic resolution of this crude fraction, gave 14 main fractions (Fig. 1), which were bioassayed using lettuce seeds and among these Fr-1-9, Fr-1-10 and Fr-1-6 were found to be the highly active (Fig.2) as these fractions strongly inhibited the root and shoot growth of lettuce seedling. A portion of fraction Fr-1-6 (500 mg) eluted with ethyl acetate was purified on Sephadex gel LH-20 using EtOH: H2O (9:1) followed by silica gel column chromatography using MEOH : CHCl3 (9.5:0.5) as eluting solvents. Four main fractions were obtained, which were again assayed, (Fig.3) and the eluant showing biological activity was further purified by HPLC.

**Result and Discussion:** The ethyl acetate fraction Fr1-6 was purified on repeated column chromatography. 4 main fractions obtained thereof, were assayed and the eluant showing biological activity was further purified by HPLC to yield white powder identified as catechin (Fig.4) by NMR spectroscopic analysis. Previously we have reported robinetin from this plant1. Present study reveals that leaves contain another biologically active component in enormously high concentration and is significantly inhibitory. Its biological activity was also compared with its other commercially available anantiomer (-) Catechin and their recemic mixture (Fig.5a-c), and (+) Catechin (Fig.5-a) was found to account for the allelochemical activity of *Robinia psuedoacacia* as at a dose as low as 78 µg ml⁻¹ 50 % inhibition in growth of lettuce seedling occurred. Its plant growth inhibitory activity was also tested against weeds and crop species and was found species selective in action (Fig.6). The Isolation and identification of considerably high concentration of (+) Catechin as an allelochemical demonstrates how Robinia *pseudo-acacia* L. displaces native species by releasing this chemical with other phytotoxins in their neighborhood. The present study thus unravels its exceptional potential for invasiveness and explains how allelopathy could play role for the success of these invader plants.

Figure 1
Inhibitory effects of crude extract and its subfractions on root growth of lettuce seedlings

Figure 2
Inhibitory effect of subfractions of Fr-1-6 on root growth of lettuce seedlings

Figure 3

Figure 4
(+)-Catechin

Figure 5a
(+)-Catechin

Figure 5b
(-)-Catechin

Figure 5c
(±)-Catechin

Figure 6
Effect of (+)-catechin on the root elongation of various crop and weed species

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