



Research Article

Comparative field performance of some agricultural crops under the canopy of *Populus deltoids* and *Ulmus wallichiana*

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ABSTRACT : The performance of some agricultural crops viz., maize, beans and sunflower was evaluated under the canopy of *Populus deltoids* and *Ulmus wallichiana* at FOA, Wadura. The germination, growth and yield of the three test crops was suppressed under both the tree species. The reduction; however, decreased when the cultivation of test crops was continued for a period of three years. The inhibition potential generally followed the order of *P. deltoids* < *U. wallichiana* for maize and sunflower and *Populus deltoids* > *Ulmus wallichiana* for beans. The soil variables exhibited an appreciable increase, which could be related to accelerated decomposition of organic matter due to continuous soil working under the canopy of selected tree species. The chromatographic investigation of extracts shows that the soils under *Populus deltoids* and *Ulmus wallichiana* differed in their composition of phenolic acids and phenolic glycosides. The results further reveal that except for caffeic acid, all other allelochemicals disappeared and were no longer recovered in soil samples obtained after second or third year of cultivation. The tree crop compatibility reported in this paper could thus be explored more precisely for improved management of traditional agro-ecosystems of Kashmir to increase the overall productivity of the land.

KEY WORDS : Allelopathy, Agroforestry, Phenolic acids, Phenolic glycosides, Growth performance, Yield

How to cite this Article : Masood, T.H., Masoodi, N.A., Gangoo, S.A. and Murtaza, S. (2012). Comparative field performance of some agricultural crops under the canopy of *Populus deltoids* and *Ulmus wallichiana*, *Internat. J. Forestry & Crop Improv.*, 3 (2) : 80-85.

Article Chronical : Received : 07.01.2012; Revised : 03.08.2012; Accepted : 10.08.2012

INTRODUCTION

Agroforestry is relatively younger area of research wherein the productivity is governed by a complex number of factors. Apart from physical factors, the naturally occurring phenomenon of allelopathy is being viewed to play a crucial role in determining the success of tree - crop associations (Inderjit and Weston, 2001). Reports on allelopathic phenomena most frequently focus on effects that are readily observed under

controlled conditions. However, studies on soil ecology; which have not received the attention it deserved, not only help to understand a particular mechanism, but are of greater scope to argue the exact phenomena of allelopathy in nature. These allelopathic components play an important role by influencing the growth and establishment of plants and availability of soil inorganic ions (Bowen and Rovira, 1999). However; after entering soil, allelochemicals encounter millions of microbes, which generally degrade them to less toxic forms (Cheng, 1989). Thus the presence of allelochemicals per se does not necessarily demonstrate similar qualitative status that actually existed in the plant debris (Blum, 1998). The fate of a chemical in the soil environment will as such depend upon the kinetics and interactions of many processes in the course of time at a particular site under a set of natural conditions. Analyzing allelochemicals in the soil medium over a period of time will thus provide useful information about the interaction of these compounds in explaining the observed growth responses of

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