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Allelopathic effect of leaf leachate of *Melia composita* Willd on the growth of Mustard

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Abstract
The present study was conducted at seed technology laboratory of Forest Research institute, Dehradun for understanding the inhibitory effect of leaf leachetes of *Melia composita* on growth and germination of Mustard crop under the laboratory conditions. For the study we have prepared the leaf leachate of five different concentrations namely 10%, 20%, 30%, 40%, 50% and 100%. From the data it has been observed that there is not significant effect of different concentration levels of leaf leachates of *Melia composita* on germination percentage, root length and shoot length of Mustard crop. It can grow as the combination of wheat and *Melia composita* in agroforestry system.

Keywords: Leaf leachate, *Melia composita*, concentrations, Mustard etc.

Introduction
Melia composita Willd. belongs member of the family Meliaceae. *M. composita* bears clean cylindrical bole attaining height 15-20 ft and sometimes up to 40 ft with big branches. The species originated from southern Asia (India-Pakistan-Iran). Now the speiecs introduced and widely cultivated in South Africa, Middle East, America (Bermuda, Brazil and Argentina), Australia, SE Asia-Pacific islands, and southern Europe. For growing the tree deep red gravelly soil, high light intensity, rainfall of about 800-1000 mm and an elevation of 800-1000 meters are suitable climatic and soil conditions. The species requires deep red gravelly soil, high light intensity, rainfall of about 800-1000 mm with an elevation of 800-1000 mtrs. Seedlings can tolerate frost, however, severe frost can result in plant death. It is a fast growing multipurpose tree species, which bears or has an optional demand in plywood industries. The plant has wide range of activities reported (Koul *et al*., 2000; Nagalakshmi MAH *et al*., 2003 and Vijayan *et al*., 2004) [8, 9, 21], chemical constituents and incriminated properties (Han *et al*., 1991; Sharma *et al*., 2000; Khare, Sahag et at., 2003) [5, 17, 7]. The farmers was encouraged to plant a *Melia dubia* with different agricultural crops in large scale just because of its industrial and ecological importance (Parthiban *et al*., 2009; Nuthan *et al*., 2009) [12, 11].
Plants Contains some Chemicals with inhibitory activity in many of their organs, including leaves, fruits, flowers, bark, roots, and buds (Inderjit, 1996; Ashrafi *et al*., 2007) [6, 1]. In some of the woody species used in agroforestry models shows allelopathic effects on under storey crops have been reported (Gupta *et al*., 2007; Narwal *et al*., 2011; Gunarathne & Perera, 2016) [4, 10]. Allelopathy is derived from Greek word *allelon*, 'of each other', and *pathos*, 'to suffer'; hence it means: the injurious effect of one upon another. The term denotes that body of scientific knowledge which concerns the production of biomolecules by one plant, mostly secondary metabolites, that can induce suffering in, or give benefit to, another plant. The phenomenon considered as a biochemical interaction among plants. (Rizvi *et al*. 1992) [22] Compounds are released into the environment through different way like litter decomposition, leaching, direct volatilization or root exudation, and affect (either by positively or negatively) growth and germination of other species (Gross & Parthier, 1994; Seligler, 1996) [3, 15]. Present study carried out for understanding the inhibitory effect of leaf leachetes of *Melia composita* on growth and germination of wheat crop under the laboratory conditions.

Material Method
The leaves of *Melia composita* were collected during the month of April. The sampled leaves of the plants were dried and soaked in distilled water in the ratio of 1:5 (w:v) and kept in refrigerator at 8 °C for 48 hours.

The leachates were filtered with muslin cloth and Whatman No. 1 filter paper. They were raised to original volume by adding distilled water and were treated as leachates of 100% concentration. Leachates of graded concentration of 10, 20, 30, 40, 50, and 100% were prepared by diluting the mother leachates. These leachates were transferred in capped bottles and kept in refrigerator at 7- 8 °C (Richardson and Williamson, 1988) [13] and applied finally for tests.

In agro-forestry systems following characters (Germination %, Root length and shoot length) of suitable agriculture crops may be compared between the experimental plots i.e agriculture crop with *Melia composita* and controlled plots i.e agricultural plot without *Melia composita* (Shalpa *et al.* 2011) [16].

Result and Discussion

1. Germination Percent

Percent germination was significantly different all the leaf extracts in each test crops compared to control. Maximum percent of germination (70%) was found in 10% concentration level of leaf extracts and minimum (25%) was recorded in 50% concentration (Table 1).

2. Shoot length

The data presented in table 1 shows that the there has no significant effects on of leaf leachates on shoot growth. Maximum (3.47 cm) shoot length was recorded at 20% of concentration and minimum (2.40 cm) in control treatment.

3. Root length

The statistical analysis of data presented in table 1 shows that there is no significant effect on root length at different concentration of leaf leachates of *Melia composita* were recorded. The maximum root length (4.80cm) was recorded at 10% concentration of leaf leachates and minimum (2.20 cm) were recorded at 50% of concentration.

The Present study reported that *Melia composita* leaves have certain allelopathic effect only on germination percentage of mustard crop while in case of root length, shoot length and root-shoot ratio an irregular trend was observed. *Azadirachta indica* which share the same family as *Melia Composita*, reduced the germination, shoot length and root length of different agriculture crop (cow pea, sesame, horse gram and sorghum) was reported by Divya nad Yassin (2003) [2]. Shapla *et al*., 2011 [16] also reported that *M. azedarach*, application of mulch on pot inhibited the biomass and growth of mung bean and soyabean crop. Similar inhibitaory effect of leaf leachate of timber and fruit tree species on other cereal and pulse crops have also been reported (Sale & Oyun 2013; Thakur, 2014) [14, 19]. *Melia dubia* aqueous leaf extracts (0, 25, 50, 75 and 100% concentration) and leaf litter (0, 5, 10, 15 and 20 g/pot) inhibited the growth, germination, and initial biomass of black chickpea and green gram was reported by Thakur *et al*., 2017 [20].

Table 1: Effect of leaf leachates of *Melia composita* on growth parameter of Mustard Crop

Concentration level (%)	Germination Percent (%)	Shoot length (cm)	Root Length (cm)	Root: Shoot Ratio (cm)
10%	70.00	3.37	4.80	1.43
20%	49.00	3.47	3.60	1.04
30%	35.00	3.20	2.67	0.84
40%	46.00	2.80	2.98	1.07
50%	25.00	2.65	2.20	0.83
100%	28.00	2.40	2.63	1.10
Control Treatment	65.00	2.80	3.71	1.33
SD	17.46	0.40	0.88	0.22
Max	70.00	3.47	4.80	1.43
Min	25.00	2.40	2.20	0.83
C.V.	1.55	1.99	2.39	3.23
CD (0.05)	1.038	0.086	0.113	0.052

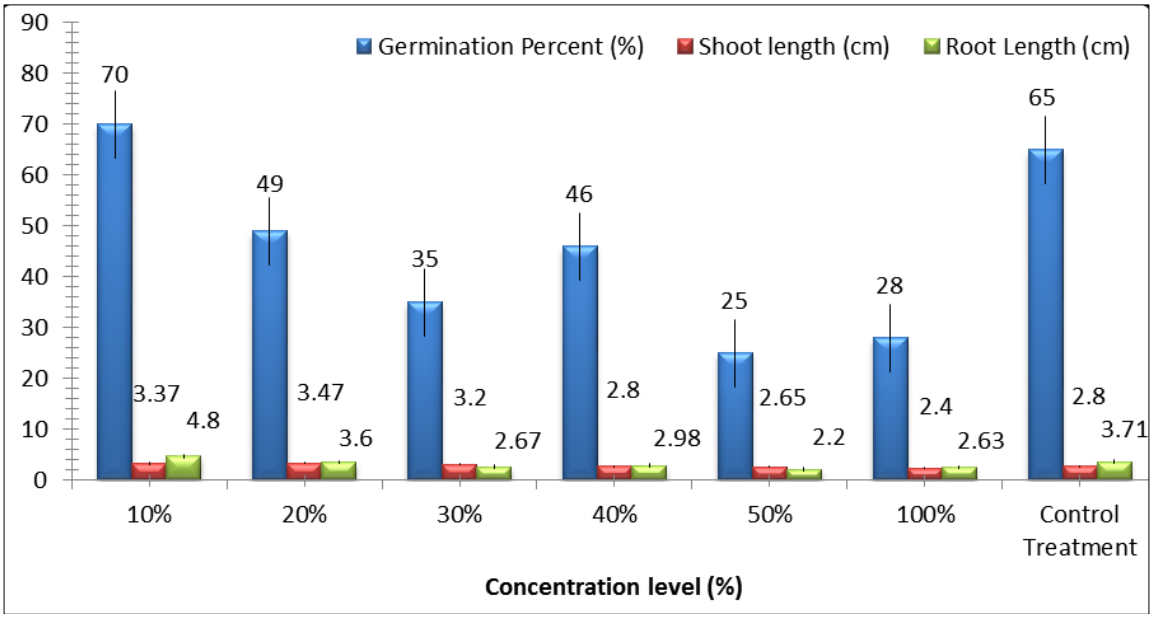

Fig 1: Effect of leaf leachates of *Melia composita* on growth parameter of *Mustard*.

Conclusion

Allelopathic study of *Melia composita*, it was clearly showed that the germination of *Mustard* was hampered only at the early stage with the increase in the concentration level of leaf leachate. But in case of root length and shoot length irregular trend of growth was observed with the increase in the concentration level leachate. Hence it has proven that the increase in the concentration level of leaf leachate of *Melia composita* has no inhibitory effect on root length and shoot length growth. After statistically analyzing the allelopathic effect of leaf leachate of *Melia composita*, the result has revealed that there was no significant inhibitory effect of *Melia composita* on the germination of Mustard crops. So it can be concluded that the *Melia composita* is suitable for agroforestry plantation in combination with Mustard based agroforestry model.

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