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EFFECTS OF LEAFS AND *Leucaenea leucocephala* DIFFERENT TREE DEPTH SOIL ON THE ALLELOPATHY OF AGRICULTURAL CROPS

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ABSTRACT

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A pot experiment was conducted at the Agroforestry Farm, Hajee Mohammad Danesh Science and Technology University during May 2009 to July 2009 to observe the allelopathic effects of *Leucaena leucocephala*, two agricultural crops *viz.* mungbean and soybean. There were five treatments *viz.*: T_1 (top soil); T_2 (root zone soil); T_3 (soil mulched with dry leaf); T_4 (soil watered with aqueous leaf extract); T_5 (control/fresh garden soil). The experiments were laid out in the Randomized Complete Block Design (RCBD) with four replications. The results of the present studies revealed that inhibition of germination and growth parameters of mungbean and soybean were varied according to different parts of plants and soil from different place. *Leucaena leucocephala*: T_4 (soil watered with aqueous leaf extract) > T_1 (top soil) > T_3 (soil mulched with dry leaf) > T_5 (control / fresh garden soil) >T_2 (root zone soil).

Key words: *different soil depth, allelopathic effects, agricultural crops*

INTRODUCTION

Allelopathy has traditionally been considered only the negative chemical warfare of one organism upon another (Bansal 1994). Modern research suggests that allelopathic effects can be both positive and negative, depending upon the dose and organism affected (Bhene *et al.* 1977). Allelopathic is the active or passive effects of chemicals released into the environment, which influences the releaser, itself or other organs (Chou 1986; Hale and Orcutt, 1987; Miller 1983). Allelopathy signifies that interactions between plants might lead to either stimulation or inhibition of growth. Agroforestry is an integrated approach of using the interactive benefits from combining trees and shrubs with crops and/or livestock. It combines agricultural and forestry technologies to create more diverse, productive, profitable, healthy and sustainable land-use systems USDA National Agroforestry Center (NAC). According to the World Agroforestry Centre, Agroforestry is a collective name for land use systems and practices in which woody perennials are deliberately integrated with crops and/or animals on the same land management unit. The integration can be either in a spatial mixture or in a temporal sequence. There are normally both ecological and economic interactions between woody and non-woody components in agroforestry. In agroforestry systems, trees or shrubs are intentionally used within agricultural systems, or non-timber forest products are cultured in forest settings. Knowledge, careful selection of species and good management of trees and crops are needed to optimize the production and positive effects within the system and to minimize negative competitive effects. *Leucaena leucocephala*, is the common tree species which are planted with agricultural crops e.g. Mungbean, soybean, wheat, maize, rice, vegetables etc. There must be significant interaction (positive or negative) between these components of Agroforestry i.e. woody perennials and agricultural crops. Therefore, it seems essential that the allelopathic compatibility of crops with trees should be checked before introducing in agroforestry system (Khan and Alam, 1996; Hossain *et al*. 2002). So, the study was performed to fulfill the following objectives: to assess about the allelopathic effects of *Leucaena leucocephala* used tree species on agricultural crops.

MATERIALS AND METHODS

The experiment was conducted in the Agroforestry research field, Department of Agroforestry, Hajee Mohmmad Danesh Science and Technology University, Dinajpur, located between 25°13' latitude and 88º23' longitude and about 37.5m above sea level. The climate of the study area is characterized by scanty rainfall during Rabi season (November to February) and minimum rainfall during this period of the year. The mean of maximum temperature in winter (November to February) was 27.69^0C and the mean of minimum temperature 17.06^0C. The mean humidity during this period was 86.69. The mean rainfall was found 8.8 mm during this period from November to February. Duration of the experimental period was from May to July.

The experiment was conducted with single factor. RCBD (Randomized Complete Block Design) were applied with four replications. These are: 5 (Five) treatments i) T_1=Top soil (depth of top soil is 15 cm.), ii) T_2=Root zone soil (depth of root zone soil is 2 feet), iii) T_3=Soil mulched with dry leaves (sun dry), iv) T_4=Soil watered with aqueous Leaf extract (5% fresh aqueous leaf extract) and v) T_5=Ordinary/Fresh garden soil. The selected test crops were Mungbean (*Vigna radiata*) and Soybean (*Glycine max*). The experimental pot size was 28.5 cm. × 22.5 cm and each pot containing 5 kg of soil as germination media. The treatment T_1-Top soil was collected from the native woodlots of the tree crops (depth of top soil is15cm), T_2- root zone soil collected from the root

systems of tree crops from native woodlots (depth of root zone soil is 2 feet), T_3- Garden soil collected from experimental garden and oven dried crushed leaves (20 gms) mulched in the upper layers of each pot, T_4- Garden soil watered with aqueous extract of fresh leaves of tree crops, and T_5- Garden soil watered with ordinary water served as control. The pots were carried in the experimental field in 20th April. After cleaning the weeds in the experimental field by spade, the pots were placed. 32 pots were filled with top soil and 20 pots were filled with root zone soil in 7th May. 20 pots were filled with garden soil in 8th May.5% aqueous wash of the fresh leaves of tree was made in 21th May and 100ml of this extract was added to each of 20 pots which containing garden soil. Leaves of the trees were sun dried for 5 days. 20 g crushed leaves were added in each 20 pots as mulched in 20th May. Other 4 pots were used as control and the pots were filled with ordinary garden soil. Source of the crops seed were BADC, Dinajpur and varieties were BINA Mung 5 and BARI Soybean 5. 20 Seeds of crops were sown in each pot in 22th May. The pots were watered regularly. Weeding was done periodically whenever necessary. Seed germination (%) was recorded after 14 days of sowing. Then all plants were uprooted except 5 plants in each pot. seedling attributes, such as length of shoot(cm), no. of leaves, leaf length(cm), leaflet breath(cm), shoot diameter(cm) were recorded at 26,36,46 and 56 days after sowing and root length(cm), root fresh weight(gm), shoot fresh weight(gm) were recorded at 62 days after sowing. Fresh roots and shoots were oven dried for three days and dry weights were recorded at 65 days after sowing. By using the sum of root dry weight and shoot dry weight, total biomass of the plants were found. The collected data on various parameters under different experiments were statistically analyzed using statistical program MSTAT to find out the statistical significance of the treatment effects. The means for all the treatments were calculated, and analysis of variance for all the characters were performed by the F-test. The significance of difference between the pair of means was evaluated by the Least Significant Difference (LSD) test (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

The results obtained from the present studies along with statistical analysis of data have been presented here.

Allelopathic effects of *Leucaena leucophala* on Mungbean (*Vigna radiata*)

Germination Percentage

The germination percentage significantly varied in all the treatments over control (Fig. 1). Among the five treatments, the maximum inhibition (-5.47) was found in the treatment T_4 (soil with aqueous leaf extracts) followed by the treatment T_1 (top soil) and T_3 (soil mulched with dry leaf). A little stimulatory effect (+7.14) was gained in the treatment T_2 (root zone soil).

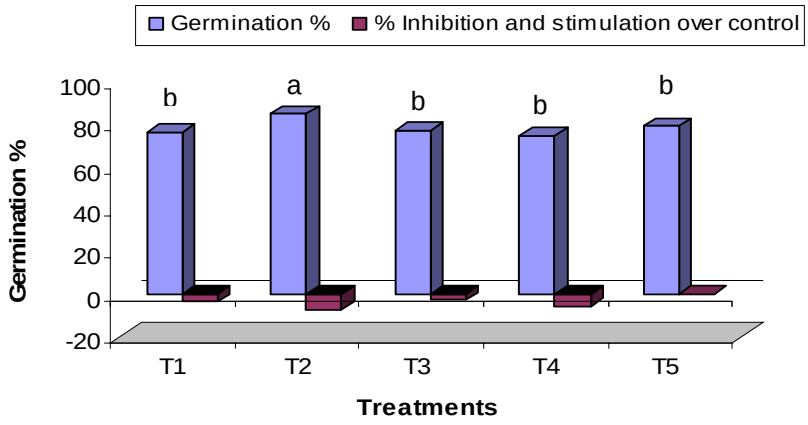

Fig.1. Allelopathic effects of *Leucaena leucocephala* on germination of Mungbean
Note: Mean followed by a common letter is not significantly different at the 5% level by DMRT

Number of Leaf

No. of leaf of mungbean was significantly influenced in all the treatments in respects to control (Fig. 2). Significantly the maximum suppression (-17.80 at 26 DAS; -7.24 at 36 DAS; -16.44 at 46 DAS and -12.06 at 56 DAS) was recorded in the treatment T_4 (soil watered with aqueous leaf extracts) and the minimum was observed (-5.94 at 26 DAS; -2.36 at 36 DAS; -1.49 at 46 DAS and -0.71 at 56 DAS) in T_3 (soil mulched with dry leaf). Significantly stimulatory effect (+23.02 at 36 DAS; +18.74 at 36 DAS; +14.80 at 46 DAS and +16.88 at 56 DAS) was found in the T_2 treatment (root zone soil).

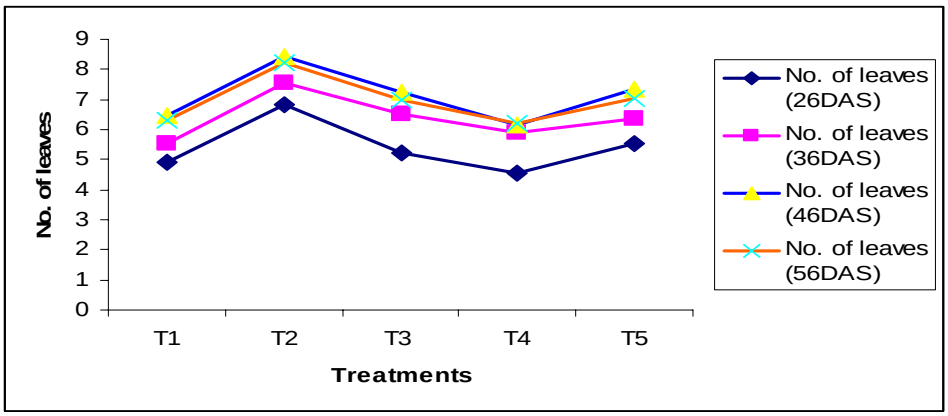

Fig.2 Allelopathic effects of *Leucaena leucocephala* on no. of leaf of Mungbean

Shoot Length (cm)

In respects to control shoot length of mungbean was significantly varied in all the treatments (Fig. 3). Significantly the maximum suppression (-7.03 at 26 DAS; -9.6 at 36 DAS; -16.08 at 46 DAS and -12.33 at 56 DAS) was observed in the treatment T_4 (soil watered with aqueous leaf extracts) and the minimum was noted (-0.8 at 26 DAS; -4.12 at 36 DAS; -6.02 at 46 DAS and -4.84 at 56 DAS) in T_3 (soil mulched with dry leaf). Significantly stimulatory effect (+9.9 at 36 DAS; +9.78 at 36 DAS; +12.64 at 46 DAS and +8.27 at 56 DAS) was found in the T_2 treatment (root zone soil).

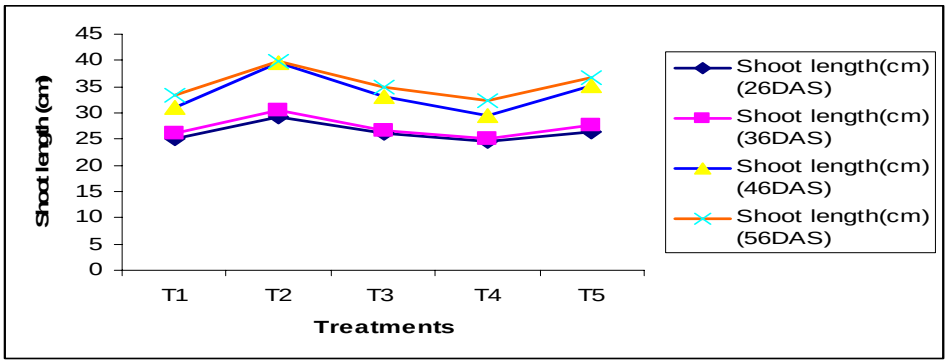

Fig.3. Allelopathic effects of *Leucaena leucocephala* on Shoot Length of Mungbean

Leaf Length (cm)

Leaf length of mungbean was significantly influenced in all the treatments in comparism to control (Fig.4). Significantly the maximum suppression (-14.83 at 26 DAS; 10.93 at 36 DAS; -18.02 at 46 DAS and -16.09 at 56 DAS) was observed in the treatment T_4 (soil watered with aqueous leaf extracts) and the minimum was reported (-2.58 at 26 DAS; -1.79 at 36 DAS; -10.36 at 46 DAS and -12.32 at 56 DAS) in T_3 (soil mulched with dry leaf). Significantly stimulatory effect (+14.46 at 36 DAS; +17.89 at 36 DAS; +12.02 at 46 DAS and +16.67 at 56 DAS) was found in the T_2 treatment (root zone soil).

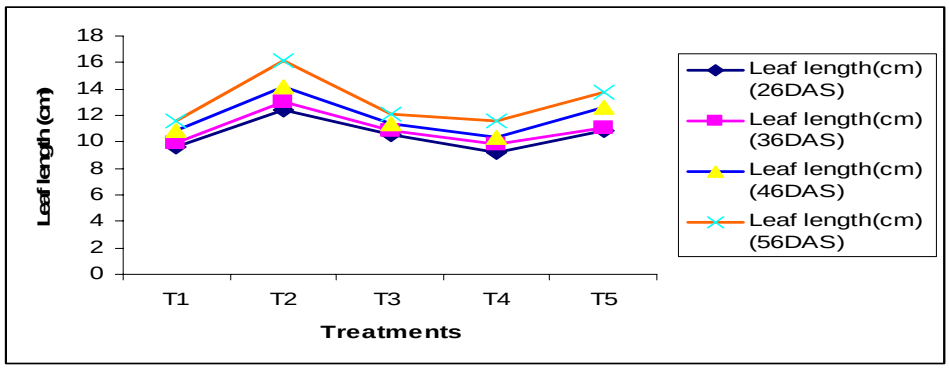

Fig.4. Allelopathic effects of *Leucaena leucocephala* on Leaf Length of Mungbean

Leaflet Breath (cm)

All the treatments significantly influenced the leaflet breath of mungbean in respects to control (Fig. 5). Significantly the highest suppression (-18.96 at 26 DAS; -12.06 at 36 DAS; -16.97 at 46 DAS and -5.23 at 56 DAS) was observed in the treatment T_4 (soil watered with aqueous leaf extracts) and the lowest was found (-1.81 at 26 DAS; -2.51 at 36 DAS; -14.14 at 46 DAS and -6.44 at 56 DAS) in T_3 (soil mulched with dry leaf). Significantly stimulatory effect (+9.09 at 36 DAS; +12.06 at 36 DAS; +16.36 at 46 DAS and +20.93 at 56 DAS) was reported in the T_2 treatment (root zone soil).

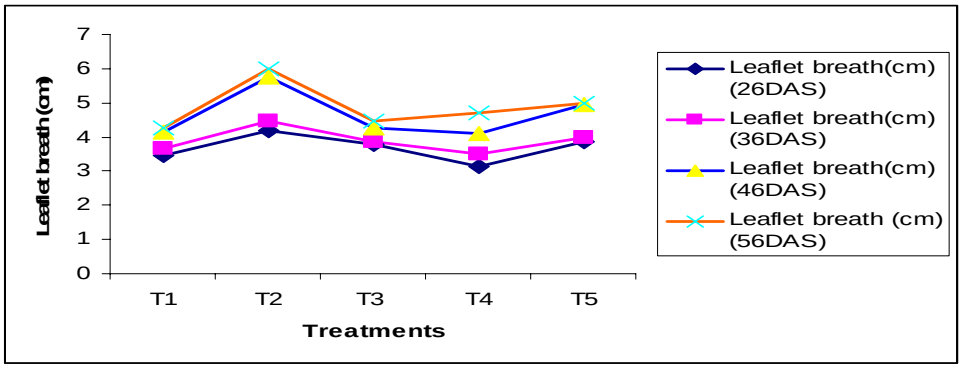

Fig.5. Allelopathic effects of *Leucaena leucocephala* on Leaflet breath of Mungbean Shoot Diameter (cm)

Shoot diameter of mungbean was significantly influenced in all the treatments over control (Fig.6). Significantly the maximum suppression (-1.72 at 26 DAS; -1.87 at 36 DAS; -4.55 at 46 DAS and -7.69 at 56 DAS) was observed in the treatment T_4 (soil watered with aqueous leaf extracts) and the minimum was observed (-0.00 at 26 DAS; -0.93 at 36 DAS; -2.27 at 46 DAS and -1.78 at 56 DAS) in T_3 (soil mulched with dry leaf). Significantly stimulatory effect (+5.17 at 36 DAS; +0.93 at 36 DAS; +0.76 at 46 DAS and +0.59 at 56 DAS) was found in the T_2 treatment (root zone soil).

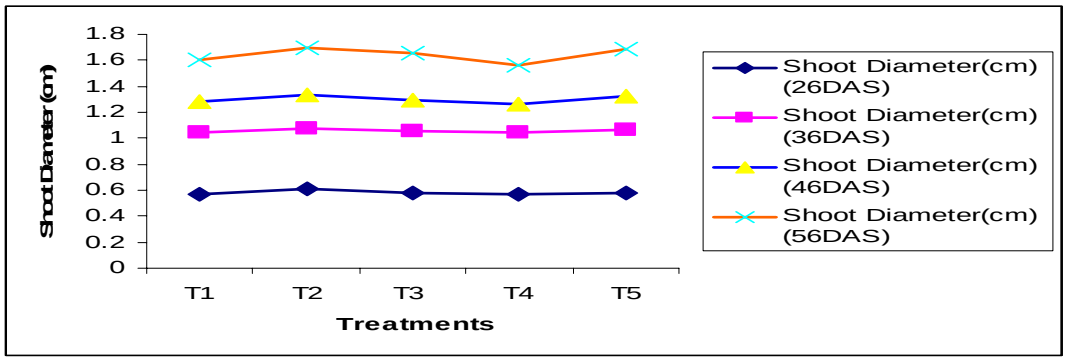

Fig.6. Allelopathic effects of *Leucaena leucocephala* on Shoot diameter of Mungbea

Table 1. Allelpoathic effects of *Leucaena leucophala* on Germination and Growth of Mungbean

Treatments	Root length (cm)	Shoot Fresh Weight(g)	Shoot Dry Weight(g)	Root Fresh Weight(g)	Root Dry Weight(g)	Total Dry Matter(g)
T_1	44.50b (-4.09)	6.36bc (-23.19)	3.56b (-11.00)	6.00b (-22.58)	3.75bc (-32.10)	7.31bc (-23.29)
T_2	49.52a (+6.72)	9.57a (+15.57)	6.39a (+59.75)	9.76a (+25.94)	6.53a (+18.08)	12.92a (+35.57)
T_3	45.04b (-2.93)	7.78b (-6.04)	3.98b (-0.50)	6.67b (-13.94)	4.48b (-18.99)	8.46b (-11.23)
T_4	36.54c (-21.25)	5.58c (-32.61)	3.10c (-22.5)	5.78c (-25.42)	3.30c (-40.33)	6.40c (-32.84)
T_5	46.40b (0.00)	8.28a (0.00)	4.00b (0.00)	7.75b (0.00)	5.53a (0.00)	9.53b (0.00)
Level of sig.	*	*	*	*	*	*
CV%	14.36	8.69	16.38	7.59	14.52	10.25

Note: Mean followed by a common letter is not significantly different at the 5% level by DMRT
* = Significant at 5% level of probability; NS = Not Significant

Root Length (cm)

It was showed that all the treatments significantly suppress the root length of that crop (Table 1). Among five treatments, only T_2 (root zone soil) shows little stimulatory effect (+6.72) on root length of mungbean. The longest inhibitory effect (-21.25) was obtained in soil treated with T_4 treatment (aqueous leaf extract) over control whereas, the shortest inhibitory effect (-2.93) was found in the treatment T_3 (soil with dry leaf).

Shoot Fresh Weight (g)

Shoot fresh weight of mungbean significantly suppressed under all the treatments in comparison to control (Table 1). Significantly the highest inhibition (-32.61) was recorded in the treatments T_4 (soil with aqueous leaf extract) which was statistically similar to that of T_1 (top soil). The treatment T_2 (root zone soil) promotes (+15.57) the shoot fresh weight over control of that crop.

Shoot Dry Weight (g)

The highest suppression (-22.5) of shoot dry weight was obtained in the treatment of T_4 (soil with aqueous leaf extract). But the lowest inhibition (-0.50) was reported in the treatment T_3 (soil with dry leaf) which statistically followed by top soil over control. All the treatments significantly inhibit the shoot dry weight of mungbean except root zone soil (Table 1).

Root Fresh Weight (g)

Significantly the highest inhibition (-25.42) of root fresh weight was observed in the treatment T_4 (soil with aqueous leaf extract). But the lowest inhibition (-13.94) was found in the treatment T_3 (soil with dry leaf) followed by top soil. Stimulatory effect (+25.94) was gained in the treatment T_2 (root zone soil). It was observed that all the treatments show significant different (Table 1).

Root Dry Weight (g)

Root dry weight significantly inhibited in all treatments except root zone soil (Table1). The highest suppression (-40.33) of root dry weight was observed in the treatment T_4 (soil with aqueous leaf extract) which was statistically similar to treatment T_1 (top soil) in respects to control. But the lowest suppression (-11.23) was recorded in the treatment T_3 (soil treated with dry leaf). The treatment T_2 (root zone soil) significantly promoted (+18.08) the root dry weight of mungbean.

Total Dry Matter (g)

All the treatments significantly inhibit the shoot dry weight of mungbean except T_2 (soil collected from root zone) which promoted the total dry matter. Mungbean total dry matter inhibition (-32.84) was high in the treatment T_4 (soil watered with aqueous leaf extract) followed by T_1 (top soil). But the lowest inhibition (-11.23) was reported in the treatment T_3 (soil treated with dry leaf) in comparison to control (Table 1).

Allelopathic effects of *Leucaena leucophala* on Soybean (*Glycine max*)

Germination Percentage

The germination percentage significantly varied in all the treatments over control (Fig. 7). Among the five treatment, the maximum inhibition (-5.53) was found in the treatment T_4 (soil with aqueous leaf extracts) followed by the treatment T_1 (top soil) and T_3 (soil mulched with dry leaf).There was a little stimulatory effect (+7.23) was gained in the treatment T_2 (root zone soil).

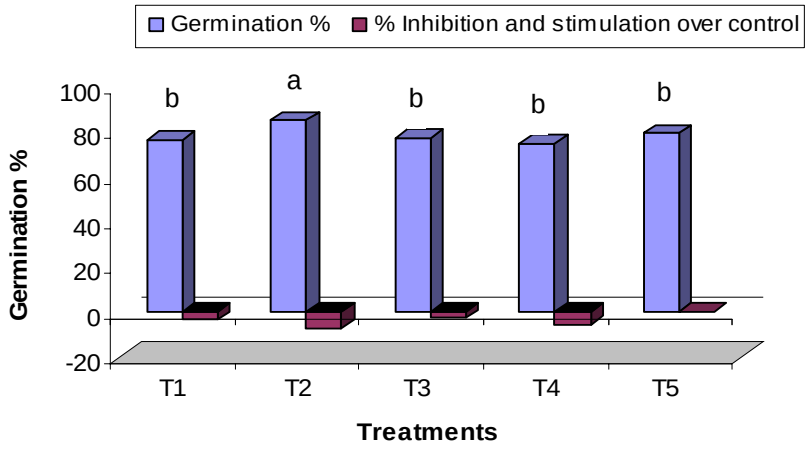

Fig. 7. Allelopathic effects of *Leucaena leucocephala* on germination of Soybean

Number of Leaf

No. of leaf of soybean was significantly influenced in all the treatments in respects to control (Fig.8). Significantly the maximum suppression (-21.71 at 26 DAS; -8.6 at 36 DAS; -19.03 at 46 DAS and -14.05 at 56 DAS) was observed in the treatment T_4 (soil watered with aqueous leaf extracts) and the minimum was observed (-7.24 at 26 DAS; -2.80 at 36 DAS; -1.73 at 46 DAS and -0.83 at 56 DAS) in T_3 (soil mulched with dry leaf). Significantly stimulatory effect (+28.07 at 36 DAS; +22.24 at 36 DAS; +17.14 at 46 DAS and +19.67 at 56 DAS) was found in the T_2 treatment (root zone soil).

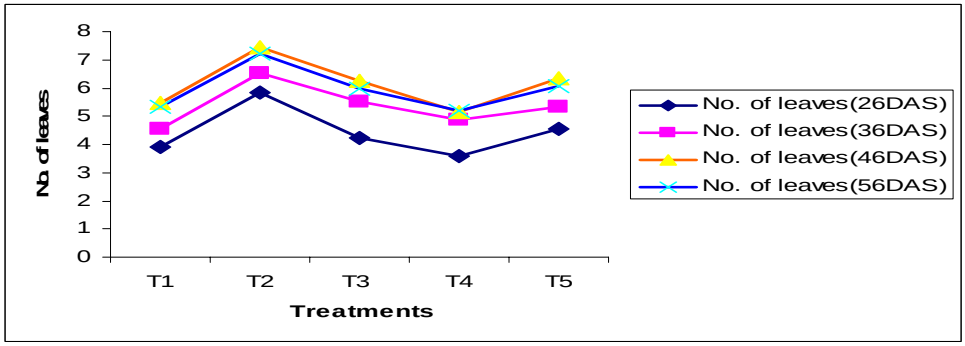

Fig.8. Allelopathic effects of *Leucaena leucocephala* on no. of leaf of Soybean

Shoot Length (cm)

All the treatments significantly influenced the shoot length of soybean in comparism to control (Fig. 9). Significantly the highest suppression (-7.31 at 26 DAS; -9.96 at 36 DAS; -16.55 at 46 DAS and -12.67 at 56 DAS) was reported in the treatment T_4 (soil watered with aqueous leaf extracts) and the lowest was observed (-0.83 at 26 DAS; -4.27 at 36 DAS; -6.20 at 46 DAS and -4.98 at 56 DAS) in T_3 (soil mulched with dry leaf). Significantly stimulatory effect (+11.46 at 36 DAS; +10.15 at 36 DAS; +13.01 at 46 DAS and +8.50 at 56 DAS) was found in the T_2 treatment (root zone soil).

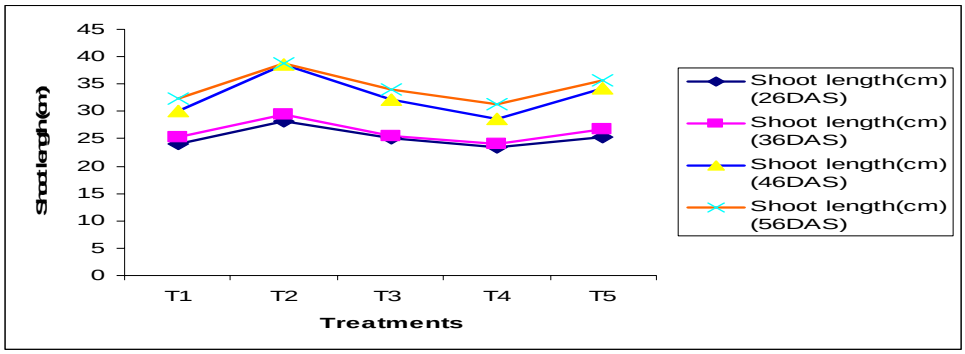

Fig.9. Allelopathic effects of *Leucaena leucocephala* on Shoot Length of Soybean

Leaf Length (cm)

Leaf length of soybean was significantly influenced in all the treatments in respects to control (Fig. 10). Significantly the maximum suppression (-16.33 at 26 DAS; -11.47 at 36 DAS; -18.02 at 46 DAS and -16.09 at 56 DAS) was observed in the treatment T_4 (soil watered with aqueous leaf extracts) and the minimum was noted (-2.84 at 26 DAS; -1.63 at 36 DAS; -10.36 at 46 DAS and -12.32 at 56 DAS) in T_3 (soil mulched with dry leaf). Significantly stimulatory effect (+15.92 at 36 DAS; +17.89 at 36 DAS; +12.02 at 46 DAS and +16.67 at 56 DAS) was found in the T_2 treatment (root zone soil).

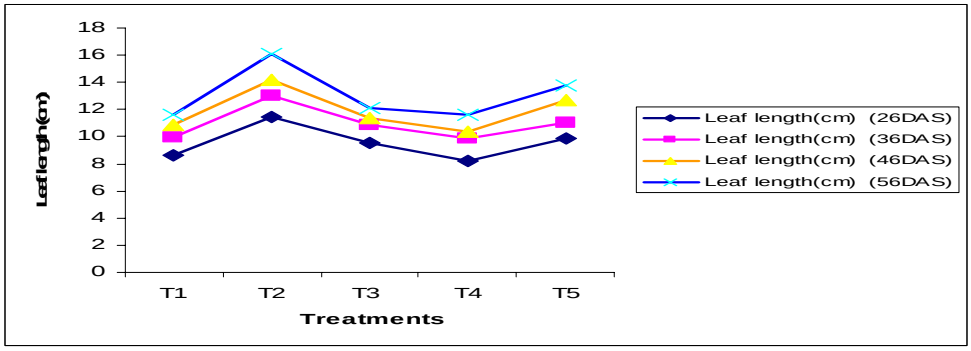

Fig.10. Allelopathic effects of *Leucaena leucocephala* on Leaf Length of Soybean

Leaflet Breath (cm)

Leaflet breath of soybean was significantly influenced in all the treatments over control (Fig. 11). Significantly the maximum suppression (-25.61 at 26 DAS; -16.11 at 36 DAS; -21.27 at 46 DAS and -6.55 at 56 DAS) was recorded in the treatment T_4 (soil watered with aqueous leaf extracts) and the minimum was observed (-2.46 at 26 DAS; -3.36 at 36 DAS; -17.72 at 46 DAS and -12.59 at 56 DAS) in T_3 (soil mulched with dry leaf). Significantly stimulatory effect (+12.28 at 36 DAS; +16.11 at 36 DAS; +20.51 at 46 DAS and +25.44 at 56 DAS) was found in the T_2 treatment (root zone soil).

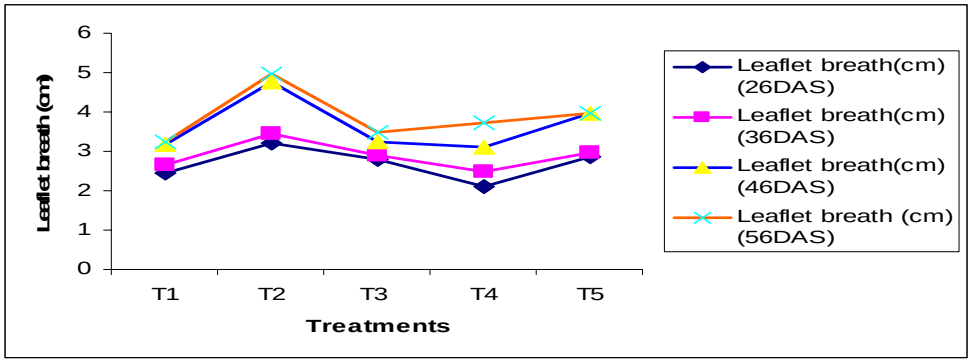

Fig.11. Allelopathic effects of *Leucaena leucocephala* on Leaflet Breath of Soybean

Shoot Diameter (cm)

There was significant variation was ovserved of shoot diameter of soybean in all the treatments (Fig. 12). Significantly the maximum inhibition (-1.75 at 26 DAS; -1.89 at 36 DAS; -2.29 at 46 DAS and -7.74 at 56 DAS) was observed in the treatment T_4 (soil watered with aqueous leaf extracts) and the minimum was reported (-0.90 at 26 DAS; -0.95 at 36 DAS; -2.29 at 46 DAS and -1.79 at 56 DAS) in T_3 (soil mulched with dry leaf). Significantly stimulatory effect (+5.26 at 36 DAS; +0.94 at 36 DAS; +0.76 at 46 DAS and +0.69 at 56 DAS) was found in the T_2 treatment (root zone soil).

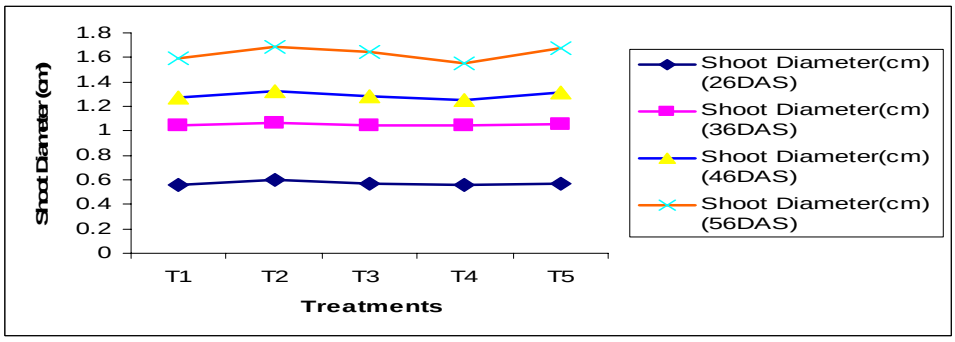

Fig.12. Allelopathic effects of *Leucaena leucocephala* on Shoot diameter of soybean

Table 2. Allelpoathic effects of *Leucaena leucocephala* on Germination and Growth of Soybean

Treatments	Root length(cm)	Shoot Fresh Weight(g)	Shoot Dry Weight(g)	Root Fresh Weight(g)	Root Dry Weight(g)	Total Dry Matter(g)
T_1	43.50b (-4.19)	5.36bc (-26.37)	2.56b (-14.67)	5.00b (-25.93)	2.75bc (-39.29)	5.31bc (-29.48)
T_2	48.52a (+6.87)	8.57a (+17.72)	5.39a (+79.67)	8.76a (+29.78)	5.53a (+22.08)	10.92a (+45.02)
T_3	44.04b (-3.00)	6.78b (-6.87)	2.98b (-0.67)	5.67b (-16.00)	3.48b (-23.18)	6.46b (-14.21)
T_4	35.54c (-21.93)	4.58c (-39.09)	2.10c (-30.00)	4.78c (-29.19)	2.30c (-49.23)	4.40c (-41.57)
T_5	45.40b (0.00)	7.28a (0.00)	3.00b (0.00)	6.75b (0.00)	4.53a (0.00)	7.53b (0.00)
Level of sig.	*	*	*	*	*	*
CV%	10.52	7.58	15.85	6.63	15.79	9.68

Root length (cm)

Among the five treatments, T_2 (soil collected from root zone soil) revealed the stimulatory effect (+6.87) on root length of soybean (Table 2). The treatment T_4 (soil with aqueous leaf extract) has largest inhibitory effect (-21.93) on root length of soybean over control whereas, the shortest inhibitory effect (-3.00) was found in the treatment T_3 (soil mulched with dry leaf). It was showed that all the treatments significantly suppressed the root length of that crop.

Shoot Fresh Weight (g)

Shoot fresh weight of soybean significantly suppressed under the three treatments in respects to control (Table 2). Significantly the highest inhibition (-37.09) was observed in the treatment T_4 (soil with aqueous leaf extract) which was statistically similar to that of T_1 top soil. Treatment T_2 (root zone soil) promoted (+17.72) the shoot fresh weight over control of that crop.

Shoot dry weight (g)

All the treatments significantly inhibit the shoot dry weight of soybean except root zone soil (Table 2). Soybean shoot dry weight inhibition (-30.00) was high in the treatment T_4 (soil with aqueous leaf extract). Significantly the lowest inhibition (-0.67) was reported in the treatment T_3 (soil mulched with dry leaf) followed by T_1 (top soil) over control.

Root Fresh Weight (g)

All the treatments have significant allelopathic on root fresh weight (Table 2). The highest inhibition (-29.19) of root fresh weight was observed in the treatment T_4 (soil with aqueous leaf extract). But the lowest inhibition (-16.00) was found in the treatment T_3 (soil mulched with dry leaf) which was significantly followed by top soil. Stimulatory effect (+29.78) was showed in the treatment T_2 (root zone soil).

Root dry weight (g)

Root dry weight significantly inhibited in all treatments except root zone soil. The highest suppression (-49.23) was recorded in the treatment T_4 (soil watered with aqueous leaf extract) followed by top soil in comparison to control and lowest (-23.18) was found in the treatment T_3 (soil mulched with dry leaf). The treatment T_2 (root zone soil) promote (+22.08) the root dry weight of soybean (Table 2).

Total Dry Matter (g)

All the treatments significantly inhibit total dry matter of soybean except T_2 (root zone soil) which shows promotory effects (+45.02) (Table 2). Soybean total dry matter inhibition (-41.57) was high in the treatment T_4 (soil with aqueous leaf extract) which was statically similar to that of T_1 (top soil). But the lowest inhibition (-14.21) was reported in the treatment T_3 (soil treated with dry leaf) in respects to control.

DISCUSSION

The present study suggests that phytotoxic effects were observed in *Leucaena* on germination and growth of test plants. From the experiment, among the five treatments, leaf extracts of *Leucaena* cotain more allelochemicals e.g. phenolic compounds and mimosine as well as unknown flavanoids (Pires *et al*. 2001). It is aggred in accordance Sahoo *et al*. (2007). They reported that the leaf extract were more toxic than bark and seed and *Leucaena* was more inhibitory to germination. The toxic effects of *Leucaena* followed the order: crushed seeds > leaf litter > soil root zone. Root zone soil had little stimulatory effect over control because it contain small amount of mimosine and small amount of mimosine stimulate the germination and growth of test crops (Neelam and Bisaria, 2002) wherease dry leaf and top soil had inhibitory effects on germination and growth of mungbean and soybean. They also observed that seed germination, root length and dry matter production were depressed both in *Leucaena* top soil and in aqueous extracts of the plant.

CONCLUSION

Significantly the highest suppression of mungben germination percentage (-5.47), no. of leaf (-17.81), shoot length (-16.08), leaf length (-18.02), leaflet breath (-18.96), shoot diameter (-7.69), root length (-21.25), root fresh weight (-25.42), root dry weight (-40.33), shoot fresh weight (-32.61), shoot dry weight (-22.50), total dry matter (-32.84) were obtained in the treatment T_4 (soil watered with aqueous leaf extracts). Little stimulatory effects were gained in the treatment T_2 (root zone soil). For soybean, the lowest suppression of germination percentage (-5.53), no. of leaf (-21.71), shoot length (-16.55), leaf length (-18.02), leaflet breath (-25.61), shoot diameter (-7.74), root length (-6.87), root fresh weight (-29.19), root dry weight (-49.23), shoot fresh weight (-37.09), shoot dry weight (-30.00), total dry matter (-41.57) were obtained in the treatment T_4 (soil watered with aqueous leaf extracts). There were promotory effects were recorded in the treatment T_2 (root zone soil).

Leucaena leucocephala: T_4 (soil watered with aqueous leaf extract) > T_1 (topsoil) > T_3 (soil mulched with dry leaf) >T_5 (control/fresh garden soil)>T_2 (root zone soil).

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