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Herbicidal Properties of the Extract of Gliricidia Sepium, A *Fabaceae*

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Abstract: The herbicidal efficacy of the crude extract (5% aqueous suspension) of Gliricidia sepium was investigated in Petri dish assays. The extract was tested on 3 monocots: Maize (zea mays), cowpea (vigna unguiculata) and okro (okra spp). The extract acted as contact herbicide by inhibiting the germination and shoot growth of maize and cowpea but had no inhibitory effect on the germination and shoot growth of okra.

Key words: Gliricidia, herbicides, maize, cowpea, okra

INTRODUCTION

Gliricidia Sepium commonly known as Agunmaniye in southwest Nigeria is a leguminous tree and belongs to the family *fabaceae* (Allen and Allen, 1981).

Gliricidia can be found in tropical and sub-tropical countries as live fencing that is, planted along the side of fields. The tree are usually medium size with composite leaves and has pink to lilac colored flowers tingled with white.

Gliricidia sepium affords many compounds; chief among them is tannin, which varies with the location of the tree (Jackson *et al*., 1995).

Most of the research with Gliricidia and its compounds have focused on its nutritive quality (Van, 1982). It is generally agreed that it is high quality forage but of low palatability when first introduced to animals. The smell of the leaves has been identified as the reason for the reluctance of animals to eat Gliricidia. However some studies have focused on the ability of the plant and/or root to decrease soil nematodes populations and control insects or fungi (Ganesen, 1994).

Research has equally been conducted on the antifungal and antimicrobial properties of gliricidia extracts. Medicarpin, one of the compounds in the leaves and heartwood of gliricidia is supposed to be antifungal. In a study, the extracts inhibited the germination of Drechslera Wyzae by 6% (Caceres *et al*., 1991).

Indiscrimate use of chemical herbicides had given rise to many serious environmental problems as the chemicals find their way into the food chain (Ashton and Crafts, 1981).

In view of this, the present study was initiated to elucidate the herbicidal properties of the crude extract of Gliricidia Sepium in order to make preliminary evaluation of its potential as an herbicide.

MATERIALS AND METHODS

The apparatus used include blending machine (Kenwood major), 500 cm^3 separating funnel, measuring cylinder and funnel. Other materials include petroleum ether (40-60°C), 95% ethyl alcohol, Petri dishes and cotton wool, which were all obtained from standard supplier of laboratory materials.

The plant materials used were locally obtained. The Gliricidia leaves were harvested from a farm at the campus of the Federal University of Technology, Akure, Nigeria. Maize (Zea mays) seeds variety Swam1, cowpea (vigna unguiculatus) seeds and okro seeds NH_4 (7-4) variety wereobtained from Ondo State Agricultural Development Project, horticulture section, Akure, Nigeria.

Extraction of gliricidia: The constituent of Gliricidia were extracted using the method of Alex Emodi (1978). Fifteen gram of Gliricidia leaves was weighed into a blending machine containing 200 cm^3 of 95% ethyl alcohol and 150 cm^3 of petroleum ether (40-60°C). The blender was run for 3 min to extract the constituent of the leaves. The residue was allowed to settle and the supernatant liquid was transferred into a separating funnel sufficient water was then added to make the alcohol concentration equal to about 80%, after which the hypo phase was separated from the epiphase (at 80% conc. Of alcohol, the alcohol becomes immiscible with petroleum ether). The residue was then washed about four times (so as to remove the alcohol completely from the mixture) and was then concentrated to get the crude extract of *Gliricidia.*

Seed germination and seedling growth Bioassay with fresh extract of *Gliricidia:* Five percent aqueous suspension of the oil extracted from the leaves of Gliricidia

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sepium was used for the screening for herbicidal activity in Petri dish bioassay using the modified method of Arnason *et al*., (1981). The Petri dishes were lined with cotton wool and soak with 2 cm^3 of distilled water. The seeds were mixed separately with the prepared aqueous suspension of the *Gliricidia* extract and then spaced evenly on the cotton wool around the Petri dishes (10 seeds per dish) germinated seeds were counted after 24 and 48 h etc. The seedling growth was determined by measuring the length of shoot for each seedling using a ruler. The controls were set up in like manner but without mixing with the *Gliricidia* extract.

RESULTS AND DISCUSSION

The data obtained on the effect of crude extract of Gliricidia Sepium on the seed germination of maize (Zea mays), cowpea (vigna unguiculata) and okro (okra sp.) seeds are shown on Table 1-3, respectively. The result shows that the extract acted as contact herbicide by retarding the seed germination of maize and cowpea but had no effect on okro seeds. On the 7th day, only 30% of the maize seeds treated with gliricidia extract germinated compared to 100% germination recorded for the control. The same trend was recorded for cowpea (Table 2). Twenty gram germination was recorded in the case of seeds treated with Gliricidia extract whereas 70% was recorded for the control where only 40% germination for the treated seeds.

Table 3 shows the results of the extract of Gliricidia on the germination of okro seeds. It can be seen that okro seeds germination was unaffected by the Gliricidia extract as 100% germination was recorded both for the treated and the control seeds by the 5th day of the experiment.

To further elucidate the potentials of the extract of Gliricidia, as contact herbicide, its effect on the seedling growth of the tested plant species were equally studied.

Table 4-6 show the inhibitory effect of the Gliricidia extract on the growth of maize (Zea mays), cow pea (vigina unguiculata) and okro (okra spp). Seeding, respectively.

Table 4 and 5 results show that the extract of Gliricidia sepium affected the shoot growth of maize (Zea mays) and cowpea (vigna unguiculata) since the shoot length of the seedling treated with Gliricidia extract where consistentently shooter in length than the control throughout the duration of the experiment which is consistent with the previous study on the seed germination for both plants. Table 6 results on the shoot of okro are also consistent with the earlier results because the okro seedlings were not inhibited by the extract. Infact, the extract actually improved the growth rate of the shoot of the okro seedlings.

Table 1: Effect of crude extract of Gliricidia Sepium on the seed germination of maize (zea mays)

Duration in day (s)	%Seed germination with G sepium	%Seed germination day (s) without G sepium (control)
1	-	-
2	-	40
3	20	50
4	20	70
5	30	100
6	30	100
7	30	100

Table 2: Effect of crude extract of Gliricidia sepium on the seed germination of cowpea (vigna unquiculata)

Duration in day (s)	% Seed germination with G sepium	% Seed-germination without G sepium
1	20	70
2	20	70
3	20	100
4	40	100
5	40	100
6	40	100
7	40	100

Table 3: Effect of crude extract of Gliricidia sepium on the seed germination of okro seeds (okra sp.)

Duration in day (s)	% Germination with G sepium	% Germination without G sepium (control)
1	0	0
2	0	0
3	0	0
4	90	100
5	100	100
6	100	100
7	100	100

Table 4: Effect of the extract of Gliricidia sepium on the growth of the shoot of maize (zea mays)

Duration in day (s)	Shoot length with extract of G sepium (mm)	Shoot length without extract of G sepium(mm)	% growth of shoot
1	-	-	-
2	-	1.2	0
3	1.3	2.6	50.0
4	3.6	5.8	62.1
5	7.2	9.6	75.0
6	8.1	11.8	68.6
7	8.8	12.4	70.9

Table 5: Effect of the extract Gliricidia sepium on the growth of the shoot of cowpea (vigna unguiculata)

Duration in day (s)	Shoot length with extract of G sepium (mm)	Shoot length without extract of G sepium(mm)	% growth of shoot
1	-	-	-
2	0.8	1.8	44.4
3	1.3	2.6	50.0
4	5.1	6.2	82.3
5	12.3	14.5	84.8
6	14.6	18.4	79.0
7	15.8	20.6	76.7

Table 6: Effect of the extract of Gliricidia sepium on the shoot growth of okro (okra sp.)

Duration in day (s)	Shoot length with extract of G sepium (mm)	Shoot length without extract of G sepium(mm)	% growth of shoot
1	-	-	-
2	0.8	-	-
3	3.6	1.8	200.0
4	11.8	7.1	166.2
5	14.6	12.7	120. 7
6	14.8	12.7	166.5
7	15.2	12.9	177.8

From the results obtained in the 2 experiments, it is hereby inferred that Gliricidia sepium extract acted as contact herbicide because it affected the seed germination and shoot growth of maize (zea mays) and cowpea (vigna unguiculata). Its lack of effect on the germination and seed growth of okro (okra sp.) may be indicative of species selectivity.

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