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PRELIMINARY INVESTIGATION ON THE HERBICIDAL POTENTIALS OF THE EXTRACTS FROM MAIZE INFLORESCENCE ON SEEDS OF THREE TROPICAL COMPOSITAE WEEDS

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The herbicidal potentials of extracts derived from maize inflorescence were collected at 48, 96, 144, 196 and 240 h after formation were examined on the weeds, Siam-weed (*Chromolaena odorata*), Node-weed (*Synedrella nodiflora*) and Tridax (*Tridax procumbens*). Two sets of aqueous extracts (A and B) were prepared. Treatment A involved the dispersion of the powdered extracts from the inflorescence in distilled water, while treatment B involved the addition of sodium chloride to the dispersed powder in distilled water. The extracts inhibited growth of the seeds of the weeds used when compared to the control. In both treatments 48 h extract tends to be the most effective. The effectiveness of the extracts decreases with an increase in the age of the inflorescence. Hence, more extract-treated seeds germinate with an increase in the age of the inflorescence. The addition of sodium chloride to the extracts tends to increase the potency of the extracts in delaying germination of weed seeds.

Key words: Herbicide, Inflorescence, Weeds.

Introduction

The loss incurred as a result of weeds infestation on farms has made the invention of herbicides the miracle of the last millennium. Unfortunately, most of the formulations have low biodegradability rates (Adesina *et al* 1998) hence were detrimental to the flora and fauna species of the environment (Taylor 1998). Also, herbicides are expensive and often beyond the reach of resource of poor farmers who invariably constitute the major stakeholders (Arendsen *et al* 1996).

The search for a sustainable approach to weed control technique that would be environmentally friendly and readily accessible to the resource-poor farmers has now been the focus of ecologists and environmental scientists (Akoroda 2000; Chikoye 2000). Recently, Trebuil (2002) reported the development of a household weed killer by the paddy farmers in northern Thailand. The present study is a part of the ongoing attempt to develop a sustainable weed control method from materials that would be accessible to the stakeholders for growing crops in the field.

Materials and Methods

Maize *(Zea mays)* inflorescences were collected at 48, 96, 144, 196 and 240 h after formation. They were ground in a mortar and later blended with powders in an electric blender.

Portions of 6g each of the 48, 96, 144, 196 and 240h inflorescence powders were measured out. Each of the portions were dispersed in 100 ml of distilled water. The mixtures were then filtered using Whatman No.1 filter paper and the filtrates used for the experiment named as treatment A.

Similary, Portions of 5 g each of the 48, 96, 144, 196 and 240 h inflorescence powders were measured out. Each portion was mixed with 1 g sodium chloride (NaC1, common salt) and dispersed in 100 ml distilled water. The mixtures were then filtered and the filtrates used for the experiment named as treatment B.

Matured weed seeds of *C.odorata, S. nodiflora and T. procumbens* were collected from the campus of the University of Ado-Ekiti. Two sets of Petri dishes were double layered with Whatman No. 1 filter papers. A set of the Petri dishes that consists of 75 Petri dishes were used for treatment A and the other set of 75 Petri dishes for treatment B.

Each set of the Petri dish was divided into 3 sub-sets of 25 Petri dishes each. A sub-set was used for each weed. Five seeds of each of the weeds were placed in each Petri dish and moistened daily with filtrates of the 48, 96, 144, 195 and 240 h of treatments A and B.

Control experiments were set up for the two treatments without adding the extracts. Control experiments for treatment A were moistened with distilled water. In treatment B, 1g of NaC1 was dissolved in 100 ml of distilled water and the resulting solution was used for the control experiments. Thus, each of the extract treatments and the control were replicated five times.

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Table 1
Herbicidal effects of the extracts from maize inflorescence on the germination of *Chromolaena odorata*

Extracts (hs)	Treatment	Herbicidal Effects*					
		C. odorata		*S.nodiflora*		*T.procumbens*	
		1	2	1	2	1	2
48	A	NG	-	NG	-	12	15
	B	NG	-	NG	-	23	11
96	A	10	6	12	38	8	23
	B	NG	-	NG	-	22	13
144	A	9	18	10	54	7	25
	B	NG	-	NG	-	20	15
196	A	9	32	9	63	5	38
	B	NG	-	NG	-	16	28
240	A	8	36	6	71	2	49
	B	NG	-	NG	-	12	36
Control	A	2	93	2	76	2	80
	B	3	50	2	62	2	73

*NG; No Growth, 1; Number of days germination was first observed, 2; Proportion (%) of seed that germinated.

All the petri dishes were kept at room temperatures (28˚C ± 2˚C) and the proportion of germination in them were recorded at an interval of 24h.

Results and Discussion

The effects of the extracts from the maize tassel on the germination of the weed seeds of *C. odorata* is shown in Table 1. The extracts inhibited germination of the seeds when compared to the growth recorded in the control. In both treatments, no growths were recorded in the seeds treated with extracts from the 48h old inflorescence.

The extracts containing NaC1, i.e. treatment B, tends to be more effective than those without NaC1, i.e. treatment A. While there was no germination recorded in all the extracts containing NaC1, germination were recorded in 96, 144, 196 and 240 h extracts that lacked NaC1 where 6, 18, 32 and 36% of the seeds germinated respectively. Table 1 also revealed that the potency of the extracts tend to decrease with an increase in the age of the inflorescence. While germination was first observed on the the 10th day in the 96h extract, it was 9 days in both 144 and 196h extracts and 8 days in the 240h extract. Thus, as the age of the inflorescence increases, there were decreases in the number of days. The germination was first observed in the extract-treated seeds while the proportion of germinated extract-treated seeds increased.

The effects of the extracts on the germination of the weed seeds of *S. nodiflora* are also shown in Table 1. While germination was not recorded in all the seeds treated with salt containing extracts. Also, growths were not observed in the seeds treated with the salt free extract derived from the 48h old inflorescence, but in older inflorescences, growths were observed and the total proportions of germination were directly proportional to the age of the inflorescence.

Similarly, the effects of the extracts on the germination of the weed seeds of *T. procumbens* have been shown in Table1. Though, germination was recorded in all the extracts of both treatments and the trend of the effects were still similar to those obtained in *C.odorata and S. nodiflora*. Extracts containing salts (i.e treatment B) appeared to delay germination considerably than the extracts without salts (i.e treatment A). This might be responsible for the considerable reduction in the proportion of germination of the extract B-treated seeds.

Results from this study suggest that aqueous extracts derived from maize inflorescence possess the potentials to prolong seed dormancy in these weeds. A number of studies had been carried out on the seed physiology of tropical weeds. The range of phenomena discovered amongst them indicated that they possessed short dormancy periods that are easily broken by light which appeared to be the most important germimination trigger in them (Longman 1969; Auld and Martins 1975; Kayode 1999). The depressions in growths might be due to possible release of allelochemicals. The addition of salts to the extracts tends to enhance its potency. Salts were the major components of the household weed killer recently developed in Thailand (Trebuil 2002). The effectiveness of the extract from the 48 h old inflorescence suggests that the active ingredients present in the inflorescence are more likely to be concentrated in the pollen grains of young tassels. Though this study does not consider the effects of the extracts on the already germinated seedlings of these weeds yet field observations had revealed that whenever the maize inflorescence releases the pollen grains, other plants around it do not thrive well. Thus the consideration of the extracts on growing weed seedlings and the determination of the active ingredients in the inflorescence could constitute subjects of further research activities.

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