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ORIGINAL ARTICLE

Evaluation of Allelopathic Effects of Aqueous extract of Sorghum crops (*Sorghum bicolor L.*) on Germination Red root pigweed (*Amaranthus retroflexus* L.)

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ABSTRACT

In recent years the uses of allelopathic potential of crops to control weeds in agricultural ecosystems have been important. Sorghum (Sorghum bicolor L.) by sorgoleone production with herbicide properties can used for weed control in addition to forage production. Thus in order to investigate the effect of sorghum aqueous extract on redroot pigweed (Amaranthus retroflexus) germination, a factorial experiment conducted based on completely randomized design with four replications. Experimental factors include sorghum plant parts at two levels (shoots and roots) and extract concentration at four levels (0, 33, 66 and 100%). Poly ethylene glycole (PEG) was used to distinguish between the inhibitory effect of possible allelopathic substances and effects caused by the osmotic potential of the extracts. The results showed that sorghum aqueous extract has a significant effect (P≥ 0.01) on pigweed germination percentage and rate. The aqueous extract of shoot at 100% concentration showed the maximum Inhibitory effects on pigweed germination.
Keywords: *Shoots, roots, concentration, germination rate, germination percentage.*

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INTRODUCTION

Weeds are plants that only one percent of the world that are causing severe economic damage. It has been reported that weeds sometimes cause damage to crops will be 100% [8]. Allelopathy is defined as any beneficial effect or harmful effect on the secretion of biochemical materials, plant-by-plant receptors is created on the server (7).

Most studies show that it is possible to use the potential of allelopathic plants in reduced germination and weed damage [9].

Many of allelopathic crop secretions from live tissue or plant residue decomposition after death can affect adjacent plant life [4].

Allopat plant sorghum and Surgab as a biological product that is used for weed control [1].Studies in Pakistan showed that incorporation of Forage Sorghum residue to the soil and the planting of 40 to 50 percent effective in controlling weeds and to increase yield was 15% [3].

This study was performed to investigate some of the properties pigweed, treated water extracts of sorghum.

MATERIALS AND METHODS

This study is a factorial randomized complete block design with four replications was carried Research Laboratory, Faculty of Agriculture, Islamic Azad University, Karaj. The experimental factors of the two organs of shoots and roots and different concentrations, at levels of zero (distilled water), 33, 66 and 100 percent, respectively. In order to prepare the aqueous sorghum crop residue after planting in the field of University collected after separation of shoot and root were dried in the shade for a week and then in an oven at 40 °C for 48 hours. For extract, preparation based in different parts of the sorghum mill smaller

pieces and then 5 g per 100 ml of distilled water was added plant residues and at room temperature for 24 hours, the device was placed in a stirrer speed of 200 rpm. Sorghum plant water extract after passing through four layers of Whitman filter paper number one, was centrifuged for 30 minutes at a speed of 3000 rpm, was passed through a layer of filter paper Whitman No. one, and then was kept at refrigerator temperatures. 25 seeds per Petri were placed on two layers of filter paper and then 10 ml of extract was added to each experimental unit. Petri were placed in a growth chamber in darkness and at 25 and 18 ° C day and night. In addition, aerated static sprouts daily counts were performed according to the instructions. To set standards to determine the effect of osmotic pressure in sorghum extracts on germination and growth rate of red root pigweed and separation of allopathic influence experiments polyethylene glycol was performed concurrently. To calculate the correlation between germination percentage (n/ N) PG = 100 is used, where n is the number of germinated seeds and N is the total number of seeds planted. Determine the nature germination using the formula ($R = \Sigma n / \Sigma d.n$) is calculated, where n is the number of seeds germinated on day d and d is the number of days elapsed since the start of the experiment. SAS programs for data analysis and Duncan test to compare the mean of the 0.50 and the Excel program was used to plot graphs.

RESULTS AND DISCUSSION

Analysis of variance showed that the percentage and rate of germination of pigweed were significantly affected limb, the concentration factors, and their interaction ($P \geq 0.01$). According to data from the comparison of the water extract, and liquid polyethylene glycol treatment was observed in the osmotic potential of the aqueous extract, had no effect on reducing traits. Factor in the organs of green shoots than the root extract had more severe effects on weed germination rate and percentage. Percentage and germination rate in Sorghum shoot extract to reat 31.58% and 0.087154 at germination and root extracts, respectively, 53.5% and 0.146277 germ h (Table 1). It can be concluded that probably Allocomical quality or concentration in shoots of sorghum, operates more efficiently at the root of the matter. The report stated that the aqueous extract of Sorghum shoot more than root growth restrictions may apply [5]. The results showed that with increasing concentration, percentage and germination rate decreased. Most of the traits studied at zero concentration control. The lowest germination percentage with 5.16% and the rate of 0.051128 seed per hour were observed at concentrations of 100 percent juice. It can be concluded that the concentration is increased, the amount of material in the extract Allelochemical more and as a result, are more toxic. The research was announced that extracted from rapeseed, red root pigweed seed germination of weeds, grass, and shepherd's bag of cotton candy and decreased with increasing concentration, the percentage inhibition increased [6]. Interaction data showed that regardless of the control (distilled water), Pigweed seed germination at a concentration of 33% root extract and its highest germination rate were achieved in 33 and 66% of root extracts and extracts 33% of the sorghum shoot. Each two traits, high concentrations of shoot extract a greater impact in reducing them to the high concentration of roots (Fig. 1 and 2). Body type and concentration of the two-factor interactions increased in the same line of their independent effects. In a study of different concentrations of aqueous extract of saffron corms and leaves were studied on pigweed, , It was observed that higher concentrations of saffron extract, pigweed germination rate and percentage more than bane concentrations above will be affected [2]. The results showed that sorghum juice could use to control pigweed ecology.

Table 1 - Effect of sorghum extract on germination of pigweed organs

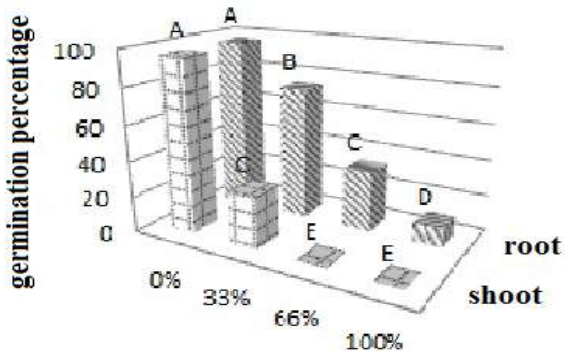
Type of extract	germination percentage(PEG)	germination percentage The aqueous extract	Germination rate PEG	Germination rate The aqueous extract
Shoot	90.250 A	31.583 B	0.1621472 A	0.087154 B
Root	90.167 A	53.500 A	0.1620061 A	0.146277 A

* The numbers in each column with the same letter are not significantly different statistically from each other.

Table 2 - Effect of sorghum Extract concentration on seed germination of Amaranths

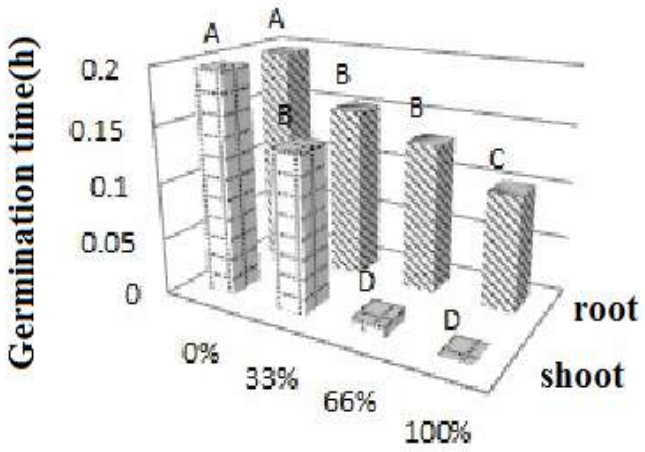
Extract concentration (%)	germination percentage(PEG)	germination percentage The aqueous extract	Germination rate PEG	Germination rate The aqueous extract
0	93.000 A	96.000 A	0.1634452 A	0.197181 A
33	88.667 A	51.667 B	0.1622779 AB	0.146284 B
66	89.500 A	17.333 C	0.1611508 B	0.072269 C
100	89.667 A	5.167 D	0.1614329 B	0.051128 D

* The numbers in each column with the same letter are not significantly different statistically from each other.



	0%	33%	66%	100%
shoot	96	29.333	1	0
root	96	74	33.667	10.333

Figure 1 - Interaction between body type and concentration of the aqueous extract on germination percentage, sorghum pigweed



	0%	33%	66%	100%
shoot	0.19718	0.13977	0.01167	0
root	0.19718	0.1528	0.13287	0.10226

Figure 2 - Interaction between body type and concentration of the aqueous extract on Germination rate of sorghum pigweed

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