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REGULAR ARTICLE

ALLELOPATHIC EFFECTS FOR THREE PLANTS EXTRACTS ON WEEDS OF WHEAT (*TRITICUM AESTIVUM* L.)

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ABSTRACT

An investigation was carried out to evaluate the allelopathic effects of aqueous extracts of *Eucalyptus obligo*, *Chrysanthemum indicum* and *Eruca sativa* on weeds of wheat in the research field of Kanan region, province of Diyala, Iraq during 2016-2017. A minimum number of weeds and Dry weight of weeds were significantly recorded (3.3 m-2, 15 g) respectively in *Eruca sativa* extract while maximum control of weeds % and inhibition of weeds % (71.2, 87.5%) were significantly recorded in *Eruca sativa* extract. Different yield components of wheat, such as crop height and 1000-grain weight showed maximum significantly difference 109.0 cm and 42.9 g respectively in *Eucalyptus obligo* whereas spike length, number of grains/spike, number of plants/m² and grain yield revealed maximum significantly difference 11.8 cm, 52.6, 341and 1568 g respectively in *Chrysanthemum indicum*.

Keywords: Aqueous extract, *Eucalyptus obligo*, *Chrysanthemum indicum* and *Eruca sativa*

INTRODUCTION

Wheat (*Triticum aestivum* L.) is one among the cerals which is very important in all countries, as one-third of population depends on it for the caloric requirements [1, 2]. What is cultivated in most of the countries, but the problems from weeds is the major issue which creates heavy yield losses [3]. There are many traditional ways like hand weeding which are useful, but time-consuming. And, the application of chemical weedicides creates negative impact on human and environment [4].

Management of weeds is still a major trouble for the farmers as it is not easy to control them due to their potential risks and costs. Preventive methods are not so practical always [5]. Allelopathic potential of plants to control weeds in wheat field is always getting much interest [6]. There are chances to explore natural products from plants to control weeds, which in turn healthy way to control the weeds and is an ecofriendly approach as well [7]. In this study, an attempt has been made to elaborate the suppressive effect of allelopathic substances of three plant extracts via. *Eucalyptus obligo*, *Chrysanthemum indicum* and *Eruca sativa* on weeds of wheat.

MATERIALS AND METHODS

The study was carried out during 2016-2017in the research field of Kanan region, province of Diyala, Iraq. The experiment was laid out in RCB design with 3 replications. Wheat variety Iba 99 was used as a test crop. A net plot size was kept 10 × 10 m². The seeds were sowed on 10th December 2016. Dap (diammonium phosphate) and Urea were applied in different plant stages at the rate of 30and 65 kg/acre, respectively. Three plant extracts namely *Eucalyptus obligo*, *Chrysanthemum indicum* and *Eruca sativa* (fig. 1) were sprayed as post-emergence application after 2nd irrigation 54 d after sowing of seeds in rate 30 kg\acre whereas treatment of control was sprayed with water only.

Data on different weed species and wheat growth parameters were recorded near crop maturity at 150 DAS (Days after sowing) by using the quadrate measuring 1m x 1m. Weeds were identified and counted (Table1) whereas dry weight of weeds (gm) was taken after 12 d of drying under the sun. For the determination wheat growth parameters, 10 plants were randomly selected in each plot. Data were recorded on plant height (cm), spike length (cm), number of grains per spike, 1000-grain weight (g), number of plants/m², grain yield (ton ha-1), number of weeds/m²and dry weight of weeds (g). Weed control Efficiency % and dry weeds inhibition % were calculated according to the following formulas.

The weed control efficiency% (WCE) was calculated by using formula suggested earlier [8].

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Table 1: Weeds of wheat

Name of weeds species	Scientific name	Family	Life span
Milk thistle	*Silybum marianum* L.	Compositae	Annual
Dwarf mallow	*Malva praviflora* L.	Malvaceae	Annual
Wild oats	*Avena fatua* L.	Poaceae	Annual
lady's lace	*Ammi majus*	Umbiliferae	Annual
wild radish	*Raphanus raphanistrum*	Cruciferae	Annual
annual beard-grass	*Polypogon monspeliensis*	Poaceae	Annual

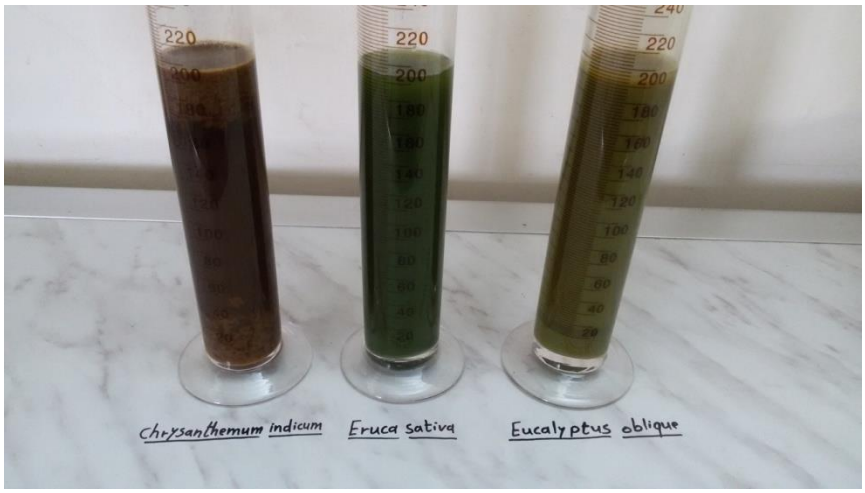

Fig. 1: Aqueous extracts of *Chrysanthemum indicum*, *Eruca sativa* and *Eucalyptus obligo*

RESULTS AND DISCUSSION

Number and dry weight of weeds

The application of plant extracts result in significant differences among the treatments in a number of weeds and Dry weight of weeds, a maximum number of the rate (11.6 m-2, 120.0 g) respectively were recorded in control (weedy check). A minimum number of weeds and Dry weight of weeds were significantly recorded (3.3 m-2, 15 g) respectively in *Eruca sativa* (table 2).

Weeds control% and Weeds inhibition%

The statistical analysis of the data showed that the maximum control of weeds % and inhibition of weeds % (71.2, 87.5%) respectively were significantly recorded in *Eruca sativa* extract while the minimum rate was recorded in control (0.0%) (table 2).

Spike length and crop height (cm)

The highest spike length and crop height (cm) were recorded (11.8, 109.0 cm) in *Chrysanthemum indicum* and *Eucalyptus obligo* respectively with significant differences from other treatments. The minimum rates were recorded in weedy check (9.6, 82.2 cm) respectively (table 3).

1000-grain weight (g)

The 1000 grain weight was significantly affected by the plant extracts among the treatments, maximum grain weight of 42.9 g was recorded in *Eucalyptus obligo* followed by *Eruca sativa* 39.2 g. The minimum 1000 grain weight of 34.0 g was observed in weedy check (control) (table 3).

Number of grains/spike and number of plants/m²

The highest number of grains per spike and number of plants/m²were recorded 52.6 and 341respectively in *Chrysanthemum indicum* extract with significant differences from other treatments. The lowest rates were recorded 36.8 and 313 in weedy check (table 3).

Grain yield g \ Acre

Grain yield was affected by treatments and application of *Chrysanthemum indicum* increased the grain yield (1568 g $acre^{-1}$) as compared to all other treatments. The weedy check recorded significantly lower grain yield (985 g $acre^{-1}$) (table 3).

Table 2: Main effect of plant extracts on weeds growth parameters

Treatments	Number of weeds/m²	Dry weight of weeds g	Weeds control %	Weeds inhibition %
control	11.6	120.0	0.0	0.0
Eucalyptus obligo	4.3	72.5	62.5	39.5
Chrysanthemum indicum	9.0	72.5	23.2	39.5
Eruca sativa	3.3	15.0	71.2	87.5
CD 0.05	2.4	6.3	19.0	1.631

Table 3: Components of wheat growth and yield as influenced by various weed control treatments

Treatments	Spike length cm	Crop height cm	1000-grain weight g	Number of grains/spike	Number of plants/m²	Grain yield g \ Acre
Control	9.6	82.2	34.0	36.8	313	985
Eucalyptus obligo	10.5	109.0	42.9	41.0	295	1298
Chrysanthemum indicum	11.8	93.7	34.9	52.6	341	1568
Eruca sativa	7.7	90.8	39.2	30.6	239	1015
CD 0.05	0.9	4.9	0.0	11.6	1.9	2.9

Our results are in agreement with the previous reports [10]. The Eucalyptus showed similar results and its reduced normal weed population by 60 to 95% [11-13]. Previous studies showed that *Eruca sativa* seed powder as a bio herbicide which effectively to control weeds [14, 15].

CONCLUSION

From the results, it can be concluded that the weed control can be achieved by the usage of water extract of *Eruca sativa*, *Eucalyptus obligo* and *Chrysanthemum Indicum* in wheat cultivation.

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AUTHORS' CONTRIBUTIONS

HAS planned and coordinated the research, participated in setting up, analysis and data interpretation, and wrote the article, AAA, HAK, HSE, BR and WKA participated in carried out the field experiment, collected data.

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