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Change Total Flavonoid and Some Trace Elements Contents of two Iraqi Wheat Species after Spraying Pallas 45 OD Herbicide .

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ABSTRACT

An important plant ; wheat which used daily in human mail, forms a major content of bread and pasta. Wheat is known as a rich source for phenolic, flavonoid, and some trace elements that considered as antioxidant contents. These contents are mainly contributed in protection from degenerative diseases that are stimulated by reactive species. The aim of this project was to study the effect of Pallas 45 OD herbicide on the phenolic, flavonoid, and some trace elements contents of Wheat.In this work,Wheat seeds (cultivar Abu Ghraib 3= group 1;G1 ,and cultivar Iba 99 = group 2;G2) , they are sprayed with Pallas 45 OD herbicide (125 mL/donum), the samples (with and without spraying) harvested after 5and 100 day .Aflame Atomic Absorption Spectrometry was used for measurements of Mn, Cu, and Zn concentrations after digestion of wet samples also Total phenols was measured using folin method .Results show the antioxidants that measured in this work were negatively influencedbyPallas 45 OD herbicide treatment. This effect was obviously appearance by the significant dropped in most of the levels ofantioxidants. Therefore, wheat products after treating with Pallas 45 OD herbicide would be less in healthy levels and it would be beneficial to thinking to prepare an alternative solution to obtain good products of this important wheat with elevate yield.

Keywords: Pallas 45 OD, Wheat,Zinc ,Copper , Manganese ,Total phenols

Introduction

Since decades, wheat (Triticumaestivum L.) and cereal grains have been represented as an essential source for food worldwide. They are characterized as a food with high nutrient content that rich in fat, carbohydrates, and other high energy compounds[1, 2]. Globally, wheat trade is greater than other crops combined, and this indicates the wheat importance in our life[3, 4]. This importance leads to push the increasing of the wheat yield to meet the consumer's requisitions. However, the rising in wheat product has been corresponded by decrease in trace elements and vitamins which are valuable for human health as a nutrient and antioxidant [5]. Recently, plants brought much attention as one of main sources for natural antioxidants as food and medicinal plants[6]. One such plant is wheat which known to be rich in antioxidant compounds as much as rich in nutrients. Phenols and flavonoids as well as trace elements are the main antioxidant content in wheat [2, 7, 8]. In addition to act as antioxidant, trace elements can act as cofactor for many antioxidant enzymes that assist gain their activity such as Cu,Zn-SOD[9]. Antioxidants play important role in the protection against reactive oxygen species (ROS) that are

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usually produced as a result of cell metabolism regulation[10]. Furthermore, phenols, flavonoids and trace elements action as anti-aging, anti-atherosclerosis, anti-inflammatory and anticancer have also been proved by several studies[6, 11-14]. Cells are regularly kept the ROS and antioxidants in an equilibrium status. Under stress or pathological conditions the ROS production increased in quantity that makes the antioxidant activity inefficient to scavenge ROS and this phenomenon is known an oxidative stress [15, 16]. In this case the cell loss its ability to detoxification of ROS and consequently ROS attack cell contents such as DNA, proteins, lipids, and cell membrane. This mechanism leads to cell death through enhancing of cell apoptosis and stimulates wide range of damage [17-21]. Therefore, natural and synthetic products that rich in antioxidant compounds are widely used by consumers either as natural food, herbal therapy, medications, or cosmetics to maintain a healthy lifestyle[22-24].Herbicides can control weeds growing. Weeds growing are considered the main difficulties that faced the wheat cultivation. They are competed the wheat in cultivation and this leads to effect on wheat production and quality. Reduction in wheat production by weeds may reach to 80% depending on many factors such as weed type and density, wheat cultivar and density, timing of emergence, and environment and soil[25, 26].Treatment by herbicides has been highly recommended as one of the main solutions to overcome this challenge. Herbicide improves the wheat capability to grow through weed elimination. However, the using of herbicide can negatively effect on the wheat quality. Therefore, several research focusing on the study of wheat content (nutrients and antioxidants) after exposure to herbicides [27-29].

The aim of this study was to investigate the effect of treatment with herbicide on the antioxidant content of wheat, in this study changes in total flavonoid and some trace elements contents of two Iraqi Wheat species after spraying pallas 45 OD herbicide was investigated.

Materials and Methods

Wheat seeds (cultivar Abu Ghraib 3= group 1; G1, and cultivar Iba99 = group 2; G2) were planted in many lines with a distance of 20 cm, then they sprayed with Pallas 45 OD herbicide (125 mL/donum), the samples (with and without spraying) harvested after 5and 100 day. Dry samples of seeds and wastes of plants were dried and stored in the dark place for analysis. Aflame Atomic Absorption Spectrometry was used for measurementsof Mn, Cu, and Zn concentrations after digestion of wet samples. Total phenols was measured using folin is based on the reaction between phenol and oxidizing agent phosphomolybdate which results in the formation of blue complex [30]. Mean± SD of estimated parameters for the studied groups by ANOVA test depending on SPSS program (version 21).

Results

Pallas 45 OD was chosen as one of common herbicides that are usually used to improve wheat grains cultivation. In this study, two types of Iraqi wheat AG-3 and Ib-99 were treated with Pallas 45 OD herbicides. This was followed by determination of some important antioxidants levels which include trace elements (Mn, Cu, and Zn) and after 5 days as well as 100 days and compared to untreated wheat as (controls).

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Table 1. Mean ±SD of manganese, cupper, and zinc levels for both studied groups with and without spraying pallas 45 OD for two species.

Cultivar		Element concentrated Treatment (µg/ml)		
		Mn	Cu	Zn
Abu Ghraib 3 ((Group 1,G1))	G1a(5)	12.53±0.11	16.20±0.40	49.73±0.35
	G1b(5) S	7.40±0.26	15.03±0.25	58.96±0.32
	G1c (100)	30.70±0.10	9.83±0.05	41.56±0.11
	G1d (100) S	26.76±0.22	8.13±0.11	36.60±0.10
	G1e (100) W	56.96±0.20	13.50±0.20	41.76±0.15
	G1 f W S	30.50±0.17	7.13±0.20	40.26±0.25
Iba99((Group 2,G2))	G2 a	24.50±0.16	12.57±0.15	23.20±0.10
	G2 b S	21.20±0.10	8.03±5.74	20.10±0.10
	G2 c	25.57±0.15	13.63±0.21	48.87±0.058
	G2 d S	16.13±11.54	9.30±0.10	40.13±0.15
	G2 e W	25.30±0.10	8.10±0.10	13.43±0.15
	G2 f W S	21.33±0.12	12.50±0.10	21.63±0.15
Abu Ghraib 3 (Group1,G1):G1a= Wheat without spraying the herbicide collected at 5 days. G1b S = Wheat after spraying the herbicide collected at 5 days. G1c= Wheat seeds without spraying the herbicide collected at 100 days. G1d S= Wheat seeds after spraying the herbicide collected at 100 days. G1e W= Wheat wastes without spraying the herbicide collected at 100 days. G1f W S = Wheat wastes after spraying the herbicide collected at 100 days. While for Iba 99(Group2,G2), the same sequence , just G1 changed to G2.				

These above mentioned types were separated and studied into eight groups; four groups of AG-3 include wheat of 5 days, grain wheat of 100 days and waste wheat of 100 days after treatment with Pallas 45 OD and their controls. Another four groups belong to Iba-99 and these involve; wheat of 5 days, grain wheat of 100 days, waste wheat of 100 days after treatment with Pallas 45 OD with their controlsas shown in Table 1.

This research shows that trace elements in studied seeds (C100) plus waste (C100 waste) parts of wheat after 100 days of growing had been higher than their levels after 5 days of growing (C5) in both AG-3 and Ib-99 types. This was also noticed after treatment with Pallas 45 OD herbicides.Meanwhile,this study had also investigated and compares antioxidants levels in each part individually to make a detailed view about the advantageous of using of Pallas 45 OD herbicides on wheat cultivation. It was noticed that trace elements was significantly decreased in all samples of AG-3 type after treating with Pallas 45 OD herbicides, however, Zn in 5 days samples in 100 days samples show increase in its level after treatment compared to control, Figure 2. Interestingly, trace elements, except of Mn and Ni, show increase in Ib-99 waste samples after treatment compared to control. On the other hand, the rest Ib-99 samples behave the same manner to AG-3 samples where the elements markedly dropped after treatment

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compared to control, Furthermore, total phenols were significantly increased in all samples of AG-3and Ib-99 compared to their control, except of 5 days sample of Ib-99 which shows significant decrease after treatment with Pallas 45 OD herbicides. as shown in figure 1 and 2.

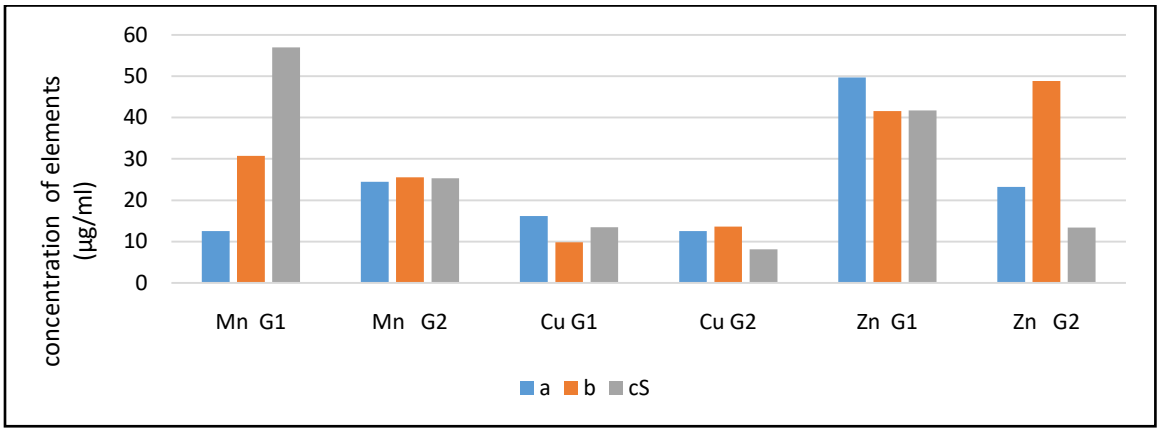

Figure 1. Comparison between the two species (G1 and G2) for the estimated elements without spraying pallas 45 OD .

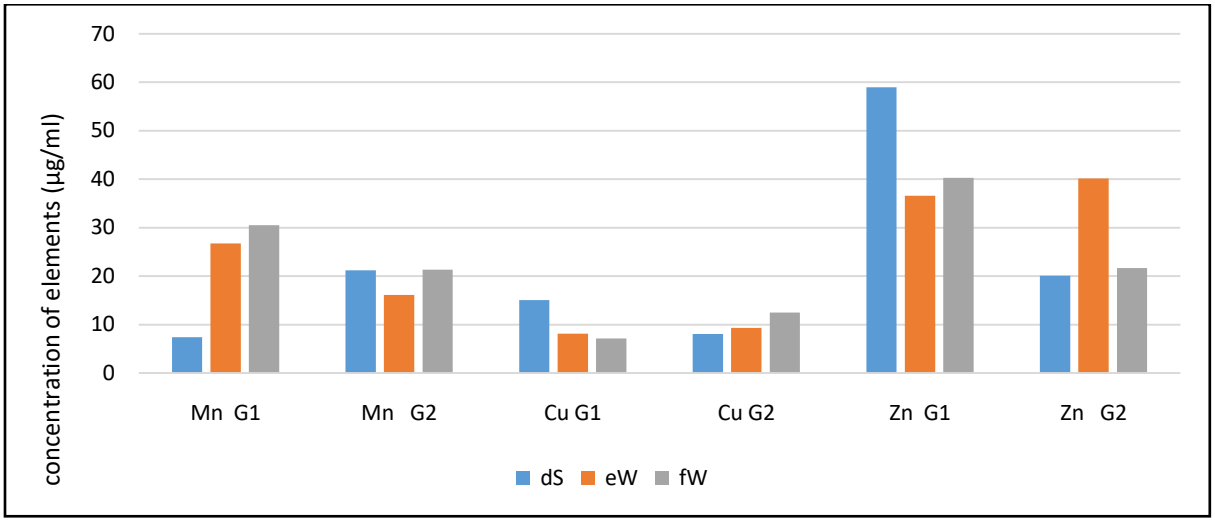

Figure 2. Comparison between the two species (G1 and G2) for the estimated elements with and sprayingpallas 45 OD .

Table 2. Mean ±SD of total phenol for both studied groups with and without spraying pallas 45 OD for two species.

Cultivar		Total phenol Tretment(mg/L)
Abu Ghraib 3 ((Group 1,G1))	G1a (5)	251.23±0.81
	G1b(5) S	263.50±2.70
	G1c (100)	94.56±0.15
	G1d (100) S	103.33±0.30

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	G1e (100) W	153.76±0.35
	G1 f W S	217.30±0.26
Iba99((Group 2,G2))	G2 a	240.13±0.15
	G2 b S	228.57±0.17
	G2 c	111.53±0.31
	G2 d S	116.60±0.20
	G2 e W	159.60±0.30
	G2 f W S	189.17±0.16
Abu Ghraib 3 (Group1,G1):G1a= Wheat without spraying the herbicide collected at 5 days. G1b S = Wheat after spraying the herbicide collected at 5 days. G1c= Wheat seeds without spraying the herbicide collected at 100 days. G1d S= Wheat seeds after spraying the herbicide collected at 100 days. G1e W= Wheat wastes without spraying the herbicide collected at 100 days. G1f W S = Wheat wastes after spraying the herbicide collected at 100 days. While for Iba 99(Group2,G2), the same sequence , just G1 changed to G2.		

Figures 3 show the comparison was carried out on total phenols levels. Interestingly, total phenols have a complementary role between each other. This can be obviously observed when a lower level in total phenols of C100 plus C100 waste compared to its level in C5 samples was compensated by total phenols which show a higher level in C100 plus C100 waste compared to C5 of AG-3samples,

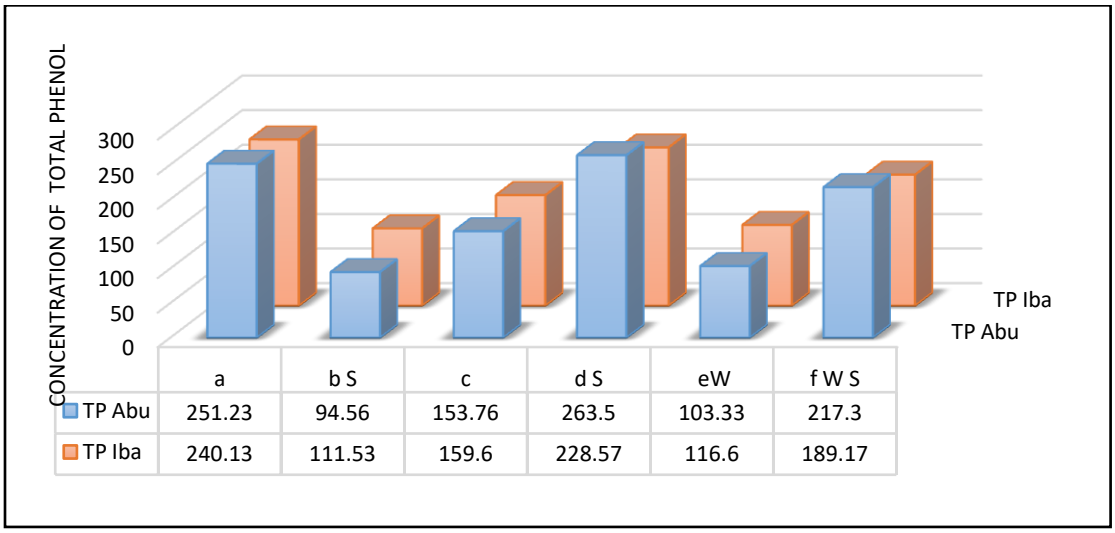

Figure 3. Comparison between the two species (G1 and G2) for the measured <u>Total phenolwith and without sprayingpallas 45 OD .</u>

Discussion

The effect of Pallas 45 OD herbicides on the antioxidant contents of wheat was deeply investigated due to the importance of results for wheat cultivation in Iraq. Our results indicate that trace elements in AG-3 type are higher than their levels in Ib-99. Conversely, total phenols were showed high levels in Ib-99 compared to AG-3. These outcomes give a general view about

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the integrity in the antioxidants action where the trace elements can compensate the lack in the total phenols levels and vice versa.

one previous study was designed to investigate the effect of using a selective herbicide for winter and spring wheat (Pyroxsulam) on co-enzyme (Ni) and antioxidant compounds (flavonoids) associated with heavy metals polluting compounds (cadmium and lead). Under stress or pathological conditions, the production of ROS increased in quantity rendering the antioxidant activity ineffective in eliminating the ROS. This phenomenon is known as oxidative stress. Therefore, cells are regularly kept with ROS and antioxidants in equilibrium [30].

Several studies have been conducted to evaluate the effect of herbicides on weeds. Ahmed and others. (1993) observed that the use of herbicides and weed removal significantly reduced the dry weight of weeds. Also, Akhtar et al. (1991) found that the use of broad-leaf herbicides increased the yield of grains and their components[31,32,33].

The other part of this study demonstrates that the treatment of wheat with Pallas 45 OD herbicides can cause a dramatic drop in the antioxidants of most samples which are measured through this study. It is well-Known that there is an inverse relationship between oxidants and antioxidants. Therefore, we suggest that when exposed to Pallas 45 OD herbicides, wheat plant undergoes from a stress and stimulate the oxidants production which is negatively affecting the antioxidant levels. However, total phenols were remarkably increased in AG-3 samples as a part of defense mechanisms against oxidants.

Zinc deficiency is a conclusive qualificationsto theremarkable grass (wheat) production. Soil zinc deficiency is the markedusually occurring micronutrient deficiency in cereal-cultivated soils, causing severe decreases in growth and grain yield. A bout fifty percentof the cultivated soils for wheat production globally are low in plant available zinc. Common zinc deficiency in soils causes great economic losses for farmers and significant reduction in nutritional quality of grain, Since,Mg is the focal atom in the chlorophyll molecule. Thusthis element is essential for photosynthesis. Also Mg plays other important roles in plant growth. The same trend was found with magnesium application on 12 sorghum genotypes [34,35]

CONCLUSION

It can be conclude that despite of the using of Pallas 45 OD herbicides can improve the wheat cultivation and reduce effect of weeds on wheat quality and production, Pallas 45 OD herbicides can also negatively affect on the antioxidant contents of wheat. Consequently, the wheat products will lose their healthy value.

Therefore, this study recommends to finding alternative solutions to control weeds effect on wheat cultivation. It also suggests to do further study in order to overcome the difficulties that are associated with using of Pallas 45 OD herbicides.

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