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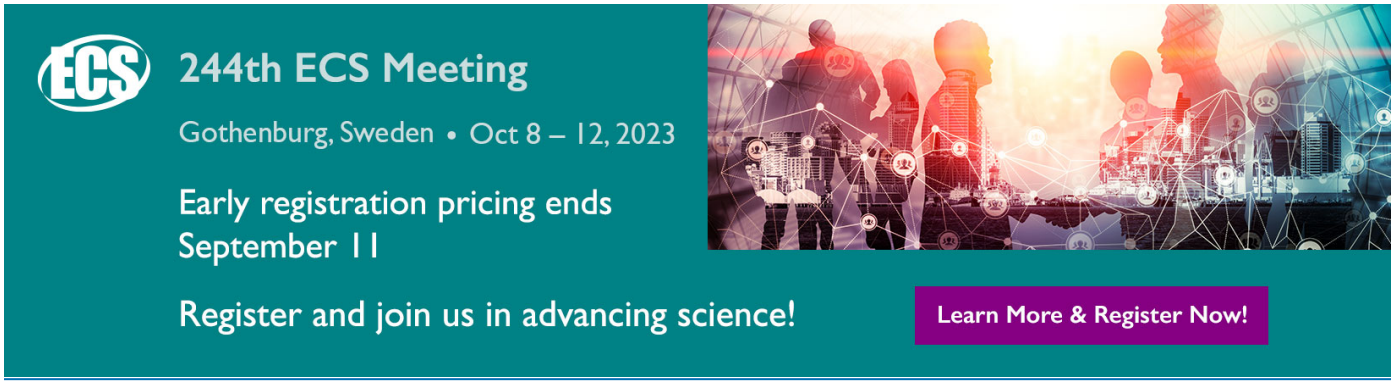

Effect of Tillage Systems and Fungicide (Trichozon) on Wheat (*Triticum aestivum* L.) Associated Weeds Growth Parameters

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Abstract. The investigation was conducted in the 2019–2020 agricultural season in the Al-Thaghr area, north of Basrah Governorate, Iraq (latitude 31.145288N and longitude 47.431334E), in clay soil. Two factors were used in the investigation. The first factor was the three tillage systems (heavy tillage by the mouldboard plow, low tillage by the chisel plow, and the no-till system). The second factor was three concentrations of the biocide Trichozon (4 g m^{-2}, 2 g m^{-2}, and without adding pesticide). The experiment was laid out in randomized complete block design (RCBD) with three replications. The results showed that the chisel plow recorded the lowest number and dry weight of weeds per square meter (16 plants m^{-2} and 0.24 g m^{-2} respectively). In contrast, the moldboard plow recorded the highest number and dry weight of weeds per square meter (79.6 plant m^{-2} and 14.17 g m^{-2}, respectively).

Keywords. Tillage systems; fungicide; wheat; weeds; growth parameters

1. Introduction

The present global population of 7.69 billion is expected to become greater than 9 billion by 2050. To feed these people, global food production must expand by 70 to 100 percent. In addition to socioeconomic and agricultural management difficulties, there are a number of biotic and abiotic limitations on crop yield [1]. Weeds are the most important biotic restrictions on agricultural output in both developing and industrialized nations. Pathogens (fungi, bacteria, etc.) and animal pests (insects, rodents, nematodes, mites, birds, etc.) provide a lesser threat to crop yields than weeds [2].

Weeds compete with crops for sunlight, water, nutrients, and space. In addition, they harbour insects and pathogens, which attack crop plants. The weed control reflects the effect of the tillage system used; therefore, the weeds in a conventional tillage system will be very different from those in a no-till system.

Tillage operations are a critical component of conventional agricultural strategies. Tillage operation is the mechanical manipulation of the soil to prepare appropriate soil for seeding. The benefits of tillage operations are many: it fragmentation of soil, enables to spread of roots, and absorbs important nutrients and moisture, which are essential for crop growth, destroys weeds, and regulates the movement of water and air in the soil body [3].

Tillage practices are one of the critical agricultural weed control techniques due to decreasing pollution of air, water, and soil. Tillage influences weeds by uprooting, disassembling, and burying

them deep adequately to prevent the emergence from reappearing, by altering the soil circumstances, thereby preventing the weeds' germination [4].
Tillage is also utilized to mix herbicides into the soil and to remove residues from the soil surface that may be reducing the herbicides 'effectiveness [5].
The main advantage of traditional tillage is a positive effect on to the reduction of perennial weeds, where 2.6 perennial weeds per meter square were found in conventional tillage as compared to 7.5–9.0 perennial weeds per meter square in reduced tillage treatments [6]. [7] found that the weed biomass under the conventional tillage system (CT) was lower than that of the no-tillage (NT) weed biomass of weed by 27.11% [8]. [9] reported that the dry weight of weeds decreased under (CT) and herbicide treatment (HT) by 24.17 %.30.43% respectively compared with (RT). [10] reported that pyraclostrobin and tebuconazole did not decrease the quantity of 14C-labeled clethodim or sethoxydim absorbed in big crabgrass. Although tebuconazole did not decrease the effectiveness of either graminicide under field experiments, pyraclostrobin decreased the effectiveness of clethodim and sethoxydim in some cases.
Pyraclostrobin is a strobilurin fungicide that prevents the respiration of fungi and works systemically within the plant. Therefore, the product is not likely to remain on the leaf surfaces of plants and inhibit herbicide absorption. With Palmer amaranth, antagonism was noted 33% of the time with aciflurofen plus either pyraclostrobin or tebuconazole, and 2,4-DB plus pyraclostrobin. Horse purslane also exhibited reduced control with herbicide-fungicide combinations, while smell melon showed no effects of these combinations. Peanut leaf phytotoxicity was most evident with combinations that included aciflurofen or lactofen, but this is to be expected since these two herbicides can cause bronzing and leaf spotting when applied alone [8].
Field experiments in Oregon revealed that the growth of several broadleaf weeds was reduced after multiple applications of the fungicide propiconazole (4 mg L-1), where common broadleaf and grassweeds were reduced by 63% [11].
The research aims to evaluate the effects of three tillage systems (intensive tillage system by moldboard plow, low tillage system by chisel plow, and no-tillage system), and three concentrations of the biocide Trichozon (4 g m^{-2}, 2 g m^{-2}, and without adding pesticide) on the number and dry weight of the weeds that grow in a wheat field.

2. Materials and Methods

2.1. Field Operation and Experiment Design

The research was conducted during the 2019-2020 agricultural season in the Al-Thaghr area, north of Basra Governorate / Iraq, 83 km away from its center, which lies between latitude 31.145288N and longitude 47.431334E in clay-textured soil. Two factors were used in the research, the first factor was three plowing systems (heavy tillage by the moldboard plow, low tillage by the chisel plow and the no-till system), while the second factor was three concentrations of the biocide TRICHOZON (4 g m^{-2}, 2 g m^{-2} and without adding pesticide). The experiment was designed in a split block according to the RCBD design, the tillage systems occupied the longitudinal bars, while the biocide concentrations occupied the horizontal bars. After preparing the soil and plowing it according to the tillage systems used in the research, the planting was carried out on 15/11/2019 with the Abu Ghraib wheat crop, and when the plants reached the tillers stage, they were sprayed with biocide and according to the concentrations used in the research after dissolving each concentration with one liter of water using a 4-liter hand sprayer After 75 days of planting, samples were taken from the weeds present with the wheat crop, with one sample for each experimental unit, in order to diagnose the types of weeds present, which were (Suwad, Silybum marianum, Raphanus raphanistrum, Lambs quarter, Sweet clover and Mallow), as well as the number of weeds per square meter and dry weight for weeds per square meter after drying them in an electric oven at 65 C° for 72 hours.

2.2. Tillage Implements

Four implements tillage was used in this study were:

2.2.1. Moldboard Plow

General purpose moldboard plow had three boards. Work width of plow was135 cm. Total weight of plow was 283.80 kg, depth of plow reached to 35 cm

2.2.2. Chisel Plow

Heavy duty chisel plow had 9 curved shanks in two rows, work width of plow was 180 cm. Total weight of plow was 406.25 kg, depth of plow reached to 30 cm.

2.3. Initial Soil Properties

The Initial soil properties are showen in table (1).

Table 1. Primary soil properties for the experiment field.

Soil characteristics Texture of soil	**Unit**	**Values Clay loam**
Soil bulk density	(mg kg^{-1})	1.22
Soil Cohesion	(kN m^{2})	11.51
Organic carbon	(g kg^{-1})	9.12
pH		7.50
EC	(dS m^{-1})	3.11
Elements available in the soil		
P	(mg kg^{-1})	11.75
K	(mg kg^{-1})	170
N	(mg kg^{-1})	35.12
Mn	(mg kg^{-1})	4.33
Zn	(mg kg^{-1})	1.40
Cu	(mg kg^{-1})	0.67

3. Results and Discussions

3.1. Number of Weeds Per Square Meter (plants m^{-2})

The data in Table 2. showed that the tillage systems had a significant effect (P<0.5) on the number of weeds. The low-tillage system by chisel plow achieved the lowest number of weeds per square meter of 16 plants m^{-2}, and there were no significant differences between the low-tillage system and the no-tillage system, where the no-tillage system recorded the second lowest dry number of weeds value of 28.40 plants $m^{-2.}$ The intensive tillage system by the moldboard plow recorded the highest number of weeds per square meter (79.6 plants m-2). This was because the soil contains a large store of different types of weed seeds, which on the basis of this stock are called (seeds bank), and intensive tillage with the moldboard plow led to the transfer of these seeds to the surface of the soil and thus their growth when the appropriate conditions are available for growth, while the system of low tillage with the chisel plow led to the reduction of visible bush seeds on the surface of the soil and thus low numbers of developing per square meter of soil. While the concentration of the biocide (Trichozon) and the interaction between it and the tillage system had no significant effect on this trait. These results agree with [8].

Table 2. Effect of tillage systems and the concentration of the biocide (TRICHOZON) on number of weeds per square meter (plant $^{-2}$).

Concentration of the biocide (TRICHOZON)	**4 g m^{-1}**	**2 g m^{-1}**	**0 g m^{-1}**	**Mean of tillage system**
heavy tillage by the moldboard plow	56.0	117.3	65.3	79.6
low tillage by the chisel plow	9.3	24.0	14.7	16.0
no-till system	18.7	33.3	33.3	28.4
Mean of concentration of the biocide (TRICHOZON)	28.0	58.2	37.8	

LSD (0.05) tillage system= 41.95, Concentration of the biocide (TRICHOZON)= no significant.

3.2. Dry Weight of the Weeds in Square Meters (g m^{-2})

The data in table 3. showed that the tillage systems had a significant effect on this trait, as the low-tillage system with the chisel plow recognized the lowest dry weight of the weeds per square meter amounted to (0 24 g m^{-2}), which did not differ significantly from the no-till system. In contrast, The intensive tillage system with the moldboard plow recorded the highest dry weight of the weeds per square meter, which amounted to (14.17 g m^{-2}). This may be because the low-tillage system with the chisel plow recorded the lowest number of weeds per square meter. In contrast, the intensive tillage system with the moldboard plow recorded the highest number of weeds per square meter for the reasons mentioned earlier. In contrast, the concentration of the biocide (TRICHOZON) and the interaction between it and the tillage system had no significant effect on the dry weight of the weeds. These results agree with [5,7,8].

Table 3. Effect of tillage systems and the concentration of the biocide (TRICHOZON) on dry weight of the weeds in square meters (g m^{-2}).

Concentration of the biocide (TRICHOZON)	4 g m^{-1}	2 g m^{-1}	0 g m^{-1}	Mean of tillage system
heavy tillage by the moldboard plow	20.35	11.32	10.84	14.17
low tillage by the chisel plow	0.07	0.52	0.13	0.24
no-till system	0.64	0.79	4.84	2.09
Mean of concentration of the biocide (TRICHOZON)	7.02	4.21	5.27	

LSD (0.05) Tillage system= 8.344 , Concentration of the biocide (TRICHOZON) = no significant.

Conclusions

It could be concluded from this research that the low-tillage system with the chisel plow led to a reduction in the dry weight and the number of growing weeds present with the wheat crop, so we recommend using it when preparing the soil prepared for planting the wheat crop**.**

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