CHEMICAL WEED CONTROL RECOMMENDATIONS FOR WHEAT

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ABSTRACT

A field study was conducted to evaluate the compatibility of herbicide tank mixtures in winter wheat (*Triticum aestivum* L.) Sagittario cv. in 2017-2019. Weed Index (VI) and Crop Injury (CI) of three mixtures prominent was recorded with mesosulfuron-methyl plus 2.4-D ethylhexyl ester + florasulam (5.8% and 1.5%) followed by pyroxsulam + florasulam + cloquintocet-mexyl plus 2.4-D dimethylamine salt (6.3% and 1.6%), and mesosulfuron-methyl + iodosulfuron-methyl-sodium plus bromoxynil + MCPA (7.1% and 0.0%), respectively. Weed Control Efficiency (WCE) was maximum with mesosulfuron-methyl + mefenpyr-diethyl plus 2.4-D ethylhexyl ester + florasulam so, *Cirsium arvense* (90%) heavily damaged; *Avena fatua* (98%), *Avena sterilis* (94%), and *Papaver rhoeas* (96%), *Sinapis arvensis* (95%) very heavy damaged (severe chlorosis and/or dead leaves); *Galium aparine*, *Phalaris brachystachys*, and *Ranunculus arvensis* were completely killed (100%, dead). Consequently, mesosulfuron-methyl + mefenpyr-diethyl plus 2.4-D ethylhexyl ester + florasulam herbicide mixture is recommended to provide weed control efficiency and wheat production safely. The compatibility of herbicides is necessary for sustainable weed management as it leads to reduced input costs, to prevent economic losses and to less pollution of the ecological environment. In addition, the conditions may require that the herbicides be applied with fungicides, insecticides or foliar fertilizers, and growers wish to know the safety of these mixtures. Therefore, studies on the compatibility of chemicals used in agriculture were considered to be needed.

Keywords: Wheat, Compatibility, Crop Injury, Weed Control Efficiency, Weed Index

1. INTRODUCTION

Wheat, which is one of the important grain, is a cool climate cereal belonging to the genus *Triticum* (Poaceae family) (Cooper, 2015; Reeves et al., 2016). It is produced 749 million tons in 220 million hectares of the world (BGIF, 2019; FAO, 2019). Turkey has 2.7% of world wheat production, also 65% of wheat grown in Turkey are of cultivation in winter (Braun et al., 2001). Studies have been conducted in the world to investigate the energy use efficiency of wheat, which is one of the basic foods in human nutrition (Marakoglu and Carman, 2017). Sustainable grain supply is the necessity of the modern age to meet the energy needs of the increasing world population each year (Abbas et al., 2017). Biotic (eg drought, salinity, cold, frost, and flood) and biotic (eg, pathogens, insects and weeds) factors notably decrease the quantity and quality of the wheat (Ramegowda and Senthil-Kumar, 2015; Pala and Mennan, 2017; Pala and Dilmen, 2020). When the studies are examined, it is seen that weeds cause an average wheat yield loss of 17-30% (Zand et al, 2007; Gaba et al, 2016). Weed management of wheat is a compound of measures, mechanic and chemical control (Pala et al., 2020). The use of chemicals (herbicides) is the fastest, easiest and most reliable method accustomed to controlling weeds in wheat (Klein et al, 2006; PPP, 2019). When used herbicides alone cannot provide the desired success control (Kaya-Altop et al., 2017). However, it is not known whether mixtures can achieve the desired success of selective force both grass and broadleaved in ecological cropping systems. In the future, the growth in crop production will depend to a large extent on the search for environmentally friendly and effective ways to manage the factors leading to loss of yield.

Sustainable crop production depends on the protection of the environment (water, soil and plant resources) and practices that do less harm or protect ecology (Khwidzhili and Worth, 2016; Pala and Mennan, 2019). Therefore, the study was carried out reduce unnecessary herbicide applications, also to determine the efficiency of herbicides and their mixes on weeds of wheat.

2. MATERIALS AND METHODS

In 2017-2018 and 2018-2019, field experiments were conducted in winter wheat fields in Diyarbakir wheat-growing regions of south-eastern Turkey (37°59'08 "N, 40°30'01" E). The soil analysis results; clay 34,27%, silt 53,62%, sand 10,16%, soil structure SiCL, pH 7.28, electrical conductivity (EC) 0.512 dS m^{-1}, salt content 0.033%, lime 8.1%, organic matter 1.68%, nitrogen (0.41% organic carbon), existing phosphorus 32 kg ha^{-1}, and existing potassium

350 kg ha^{-1} were found. As a result of the analysis, it was found that the trial area was suitable for wheat production. Traditional soil tillage practices were done with autumn rains and wheat was planted. Nitrogen, phosphorus, and potassium based fertilizer application were applied at the same time as suggested in the results of the sowing of wheat seed and soil analysis. Winter wheat was planted in a well-prepared seedbed in Diyarbakir on 12 November 2017 and 10 November 2018 as 250 kg ha^{-1} seed. The experiments were conducted in the same field for two years. In the wheat experimental plots, other managements were done according to the needs of the wheat crop as general farmer practices. The experiment was a randomized complete block with four replicates design and elementary plots 20 m^2. The herbicides and mixtures thereof were performed with a gasoline backpack sprayer calibrated to give 300 L ha^{-1}, constant pressure and fan sprayer with 2-meter working width and 4 fan spray nozzles and 18 liters storage volume.

The fifteen treatments included 1) mesosulfuron-methyl 3% + iodosulfuron-methyl-sodium 0.6% WG 30 ml da^{-1} and bromoxynil 300 g/l + MCPA 300 g/l EC 35 ml da^{-1}, 2) pinoxaden 50 g/l EC 90 ml da^{-1} and tribenuron 75% WG, 1 g da^{-1}, 3) pinoxaden 50 g/l EC 90 ml da^{-1} and 2.4-D *ethylhexyl ester* 452.42 g/l + florasulam 6.25 g/l SE 50 ml da^{-1}, 4) pinoxaden 50 g/l EC 90 ml da^{-1} and dicamba 50% + tritosulfuron 25% WG 20 ml da^{-1}, 5) clodinafop-propargyl 240 g/l + cloquintocet-mexyl 60 g/l EC 20 ml da^{-1} and dicamba 50% + tritosulfuron 25% WG 20 ml da^{-1}, 6) clodinafop-propargyl 240 g/l + cloquintocet-mexyl 60 g/l EC 20 ml da^{-1} and tribenuron 75% WG, 1 g da^{-1}, 7) clodinafop-propargyl 240 g/l + cloquintocet-mexyl 60 g/l EC 20 ml da^{-1} and 2.4-D ethylhexyl ester 452.42 g/l + florasulam 6.25 g/l SE 50 ml da^{-1}, 8) pyroxasulfone 85% WG 15 ml da^{-1}, 9) pyroxsulam 7.08% + florasulam 1.42% + cloquintocet-mexyl 7.08% WG 26.5 ml da^{-1} and 2.4-D dimethylamine salt 500 g/l SL 200 ml da^{-1}, 10) sulfosulfuron %75 WG, 2.6 ml da^{-1}, 11) mesosulfuron-methyl 30 g/l + mefenpyr-diethyl 90 g/l OF 40 ml da^{-1} and dicamba 50% + tritosulfuron 25% WG 20 ml da^{-1}, 12) mesosulfuron-methyl 30 g/l + mefenpyr-diethyl 90 g/l OF 40 ml da^{-1} and tribenuron 75% WG, 1 g da^{-1}, 13) mesosulfuron-methyl 30 g/l + mefenpyr-diethyl 90 g/l OF 40 ml da^{-1} and 2.4 D ethylhexyl ester 452.42 g/l + florasulam 6.25 g/l SE 50 ml da^{-1}, 14) weedy check, and 15) weed-free check (Table 1). All herbicides were used at the recommended doses in the label information. Weed and weed-free controls are also included as a comparison. Weed control plots were left untreated throughout the study. In the control plots without grass, weeds were controlled manually (Table 1).

Table 1: Treatmens in Wheat

Treatments	Active ingredients of herbicides
T_1	Mesosulfuron-methyl %3 + Iodosulfuron-methyl-sodium %0.6 WG 30 ml da^{-1} Bromoxynil 300 g/l + MCPA 300 g/l EC 35 ml da^{-1}
T_2	Pinoxaden 50 g/l EC 90 ml da^{-1} Tribenuron %75 WG, 1 g da^{-1}
T_3	Pinoxaden 50 g/l EC 90 ml da^{-1} 2.4 D EHE 452.42 g/l + Florasulam 6.25 g/l SE 50 ml da^{-1}
T_4	Pinoxaden 50 g/l EC 90 ml da^{-1} Dicamba %50 + Tritosulfuron %25 WG 20 ml da^{-1}
T_5	Clodinafop-propargyl 240 g/l + Cloquintocet-mexyl 60 g/l EC 20 ml da^{-1} Dicamba %50 + Tritosulfuron %25 WG 20 ml da^{-1}
T_6	Clodinafop-propargyl 240 g/l + Cloquintocet-mexyl 60 g/l EC 20 ml da^{-1} Tribenuron %75 WG, 1 g da^{-1}
T_7	Clodinafop-propargyl 240 g/l + Cloquintocet-mexyl 60 g/l EC 20 ml da^{-1} 2.4 D EHE 452.42 g/l + Florasulam 6.25 g/l SE 50 ml da^{-1}
T_8	Pyroxasulfone % 85 WG 15 ml da^{-1}
T_9	Pyroxsulam %7.08 + Florasulam %1.42 + Cloquintocet-mexyl %7.08 WG 26.5 ml da^{-1} 2.4 D dimethylamine salt 500 g/l SL 200 ml da^{-1}
T_{10}	Sulfosulfuron %75 WG, 2.6 ml da^{-1}
T_{11}	Mesosulfuron-methyl 30 g/l + Mefenpyr-diethyl 90 g/l OF 40 ml da^{-1} Dicamba %50 + Tritosulfuron %25 WG 20 ml da^{-1}
T_{12}	Mesosulfuron-methyl 30 g/l + Mefenpyr-diethyl 90 g/l OF 40 ml da^{-1} Tribenuron %75 WG, 1 g da^{-1}
T_{13}	Mesosulfuron-methyl 30 g/l + Mefenpyr-diethyl 90 g/l OF 40 ml da^{-1} 2.4 D EHE 452.42 g/l + Florasulam 6.25 g/l SE 50 ml da^{-1}
T_{14}	Weedy check (No herbicide)
T_{15}	Weed-free check (No herbicide)

Pyroxasulfone was performed as pre-emergent spray one day after sowing in the autumn on November 15, all other herbicides were applied post-emergent between the beginnings and last of the wheat tillering state, BBCH scale between 28 and 30, in the spring in the first week of March in the proportions recommended by the respective herbicide companies. Weeds count was calculated by using 0.25 m^2 frames in March.

Observations of weed species, effect on% of herbicides and weed index were recorded by accepting standard procedures and results (average of two years) were statistically analyzed. Wheat phytotoxicity and weed efficacy were evaluated with the observation on a rating measure of 0-100%; 0, which does not damage wheat plants or weed management and 100, the exact death of crop or weeds is completely to control (Frans et al., 1986). Visual estimates of wheat phytotoxicity percentage were estimated 3, 7, 14 and 21 days after treatment (DAT) A assessment measure of 0-100 percent was preferred, where 0 = no injury, >70% = receivable control, and 100 = entirely killed; weed control efficiency bottomed on chlorosis and necrosis for each plot was estimated at 28 DAT from one meter in a 2-year experimental period, the quadratic area with the aid of quadrate in each compartment in both regions (Burril et al., 1976).

Treatment wise crop and weed samples obtained and grain and straw samples of the respective crops taken at harvest were washed first with tap water and then with distilled water. These samples were sun-dried for 2-3 days and then oven-dried at 70 °C for 24 hours, the dried samples were milled to 40 meshes. At full maturity, wheat was manually harvested at ground level on an area of 1 m^2 per field. The yield was determined after harvest bottomed on grain weights containing 13% moisture. For both years, treatments in which Diyarbakir wheat production typically occurs in herbicides and hence represent producer practices and label recommendations were applied from time to time in March. No climatic abnormalities were observed after applications. The crop was harvested during the second week of June in both seasons when the color of the ear was totally changed and moisture of seed was below 10 percent. The product was collected by hand to determine the effect of herbicide mixtures on wheat. Throughout the season, repetitive handpicking of weeds was made on grassless land to purify the fields from weeds. For each treatment, a quadrant of 0.5 m x 0.5 m was reserved on the net plot to record the weed count. Grasses and broadleaf weeds were counted and recorded. Densities and frequencies of each weed species were calculated according to (Odum, 1971).

Weed control activity was calculated on a dry weight basis using the formula given by (Mani et al., 1976).

$$WCE(\%) = \frac{DWC - DWT}{DWC} \times 100$$

Where,

WCE = Weed control efficiency (%)

DWC = Dry weight of weeds in weedy check plot (g m^{-2})

DWT = Dry weight of weeds in the treated plot (g m^{-2})

The weed index, expressed as a percentage, expressed yield loss due to the presence of weeds compared to weed status and was calculated using the following formula (Gill and Kumar, 1969).

$$WI\ (\%) = \frac{a - b}{a} \times 100$$

Where,

WI = Weed index (%)

a = Grain yield of the best treatment

b = Grain yield of a particular treatment for which index is compared

Statistical analysis of the data obtained was subjected to ANOVA conducted by JMP 5.0.1 The significance of differences between mean values was tested by LSMeans Differences Tukey HSD test values at a probability (P <0.05). Weed control is an important farming practice. Integrated weed management should protect or improve the biodiversity of farmland weed communities for a better ecological environment with not only increased crop yield but also reduced the use of herbicides. This study could benefit crop growth, environmental protection spraying, and biodiversity of agricultural weed communities by identifying appropriate herbicide application.

RESULTS

Main weed species found in experimental areas were *Avena fatua, Avena sterilis,* and *Phalaris brachystachys* (among grasses); while among broadleaf weeds *Cirsium arvense, Galium aparine, Papaver rhoeas, Ranunculus arvensis,* and *Sinapis arvensis*. Weed control tactics importantly impressed the grass and broadleaf weeds density at harvest (Table 2). In the various herbicides, wild oat, wild mustard density was significantly lower in Mesosulfuron-methyl + 2.4 D ethylhexyl ester +Florasulam mixture. Farmers can practice this mixture. However, significantly In cases such as dry periods and frost stress should avoid applying these herbicides. Among the different herbicides application of Mesosulfuron-methyl 30 g/l + Mefenpyr-diethyl 90 g/l OF 40 ml da^{-1} + 2.4 D ethylhexyl ester 452.42 g/l + Florasulam 6.25 g/l SE 50 ml da^{-1}, Pyroxsulam %7.08 + Florasulam %1.42 + Cloquintocet-mexyl %7.08 WG 26.5 ml da^{-1} + 2.4 D dimethylamine salt 500 g/l SL 200 ml da^{-1}, and Mesosulfuron-methyl %3 + Iodosulfuron-methyl-sodium %0.6 WG 30 ml da^{-1} + Bromoxynil 300 g/l + MCPA 300 g/l EC 35 ml da^{-1} as early post-emergent recorded significantly lower grasses, broad-leaved weed density. Due to the low density of weeds the competitive inhibition of the inhibit acetolactate synthase (ALS) enzyme in susceptible grass plants thereby blocking protein biosynthesis. Weeds were counted before and after the application of the herbicides to determine which herbicide was better than the others to control the number of broad and narrow leaf weeds. The relevant data are presented in Table 2.

Effect on weeds as percent is a criterion used to determine the effectiveness of weed control methods in limiting weed growth. Crop yield is directly proportional to weed control efficiency (ECE) and inversely proportional to weed index (WI). At 28 DAT, application of Mesosulfuron-methyl 30 g/l + Mefenpyr-diethyl 90 g/l OF 40 ml da^{-1} + 2.4 D ethylhexyl ester 452.42 g/l+Florasulam 6.25 g/l SE 50 ml da^{-1} mixture as early post emergent recorded higher weed control efficiency (97 %) as the average of all weeds. This is due to better control of weeds as a result of the decrease in the dry weight of weed density during the wheat growth period (Table 2). In these mixtures, heavily damaged weeds (71-90%) were determined *Cirsium arvense* (90%). Very heavy damaged weeds (severe chlorosis and/or dead leaves) (91-99%) were determined *Avena fatua* (98%), *Avena sterilis* (94%), *Papaver rhoeas* (96%), *Sinapis arvensis* (95%), and complete killed weeds (dead) (100%) were determined *Galium aparine,* *Phalaris brachystachys*, and *Ranunculus arvensis*.

Table 2: Different weed control efficiency (WCE %) in wheat at 28 days after treatments (DAT)

Treatments	*Avena fatua*	*Avena sterilis*	*Cirsium arvense*	*Galium aparine*	*Papaver rhoeas*	*Phalaris brachystachys*	*Ranunculus arvensis*	*Sinapis arvensis*
T_1	93^{bcd}	92^{bc}	85^{bcde}	93^{cd}	91_{bcde}	98^{ab}	95^{bc}	92^{bc}
T_2	93^{cd}	89^{cd}	80^{fgh}	88^{efg}	85_{f}	92^{c}	91^{cdef}	90^{cd}
T_3	86^{e}	75^{ef}	78^{fgh}	87^{ef}	95_{ab}	94^{bc}	91^{cde}	74^{gh}
T_4	89^{de}	86^{de}	80^{efgh}	93^{cd}	94_{bc}	86^{d}	92^{cde}	91^{bc}
T_5	87^{e}	77^{ef}	65^{i}	96^{abc}	91_{bcde}	81^{e}	90^{def}	82^{ef}
T_6	78^{f}	74^{g}	84^{cdef}	85^{fgh}	89_{cdef}	81^{e}	88^{efg}	71^{h}
T_7	89^{de}	81^{ef}	76^{h}	83^{gh}	87_{ef}	92^{c}	87^{fg}	84^{e}
T_8	90^{de}	89^{bcd}	86^{bcd}	91^{de}	93_{bcd}	91^{c}	94^{cd}	92^{bc}
T_9	92^{cd}	90^{bcd}	86^{bcd}	93^{cd}	92_{bcde}	100^{a}	85^{g}	92^{bc}
T_{10}	93^{bcd}	81^{ef}	89^{bc}	92^{cde}	88_{def}	76^{f}	90^{def}	85^{de}
T_{11}	96^{abc}	92^{bc}	83^{defg}	95^{bcd}	94_{bc}	95^{bc}	93^{cd}	90^{bcd}
T_{12}	93^{bcd}	92^{bc}	78^{gh}	82^{h}	89_{cdef}	92^{c}	85^{g}	78^{fg}
T_{13}	98^{ab}	94^{b}	90^{b}	100^{ab}	96_{ab}	100^{ab}	100^{ab}	95^{ab}
T_{14}	0^{g}	0^{h}	0^{j}	0^{i}	0_{g}	0^{g}	0^{h}	0^{i}
T_{15}	100^{a}	100^{a}	100^{a}	100^{a}	100_{a}	100^{a}	100^{a}	100^{a}

The differences between the means indicated by the same letter in the same column are not significant (Alpha = 0.050, Q = 3.59958).

Weed index is a scale of the drop in the wheat yield owing to competition pressure offered by weeds as against weed-free plots. The weed competition was higher in the weedy check (35.6%). This was owing to smaller wheat yield connected with unchecked weed growth in the course of the crop growth period (Table 3).

Table 3: Wheat injury (%) as influenced by applied herbicides

Treatments	Weed index (WI %)	Wheat injury (%)			
		3 DAT	7 DAT	14 DAT	21 DAT
T_1	7.1^{j}	3.5^{de}	3.8^{bcd}	1.1^{f}	0.0^{c}
T_2	15.8^{f}	4.1^{bc}	3.6^{cde}	2.7^{bc}	1.5^{b}
T_3	18.9^{e}	3.9^{bcd}	3.3^{de}	2.3^{cd}	0.0^{c}
T_4	14.3^{g}	2.5^{f}	1.1^{g}	1.6^{ef}	0.0^{c}
T_5	25.7^{c}	4.2^{bc}	3.9^{bc}	2.2^{cd}	0.0^{c}
T_6	28.8^{b}	3.4^{de}	3.2^{ef}	1.8^{de}	0.0^{c}
T_7	23.6^{d}	3.2^{e}	2.7^{f}	2.4^{bc}	1.2^{b}
T_8	7.5^{j}	0.0^{g}	0.0^{h}	0.0^{g}	0.0^{c}
T_9	6.3^{k}	4.4^{b}	4.3^{ab}	2.9^{b}	1.6^{b}
T_{10}	13.8^{g}	5.1^{a}	4.8^{a}	2.2^{cd}	2.2^{a}
T_{11}	8.2^{i}	4.2^{bc}	3.4^{cde}	3.5^{a}	1.3^{b}
T_{12}	9.4^{h}	3.4^{de}	3.5^{cde}	1.2^{f}	0.0^{c}
T_{13}	5.8^{k}	3.8^{cd}	3.5^{cde}	2.7^{bc}	1.5^{b}
T_{14}	35.6^{a}	0.0^{g}	0.0^{h}	0.0^{g}	0.0^{c}
T_{15}	0^{l}	0.0^{g}	0.0^{h}	0.0^{g}	0.0^{c}

The differences between the means indicated by the same letter in the same column are not significant (Alpha = 0.050, Q = 3.59958).

However, lower weed index (5.8 to 7.1 %) was noticed in application of Mesosulfuron-methyl 30 g/l + Mefenpyr-diethyl 90 g/l OF 40 ml da^{-1} + 2.4 D ethylhexyl ester 452.42 g/l + Florasulam 6.25 g/l SE 50 ml da^{-1}, Pyroxsulam %7.08 + Florasulam %1.42 + Cloquintocet-mexyl %7.08 WG 26.5 ml da^{-1} + 2.4 D dimethylamine salt 500 g/l SL 200 ml da^{-1} and Mesosulfuron-methyl %3 + Iodosulfuron-methyl-sodium %0.6 WG 30 ml da^{-1} + Bromoxynil 300 g/l + MCPA 300 g/l EC 35 ml da^{-1} the result convincing control of weeds due to decline in the wheat-weed contest. The influential utilize of herbicides at optimum dosage and time of application might have served the crop to utilize available resources like light, nutrients, moisture, and space to a greater extent outcoming in higher yield.

The same basic principles apply to the evaluation of wheat tolerance (phytotoxicity). The evaluation should be performed again compared to the untreated control. It is much easier to assess crop tolerance in weed-free areas because the results are not affected by weed competition in unprocessed controls. If the crop tolerance is to be graded in a weed control activity study, then the person should include a weed control chart in the study. Higher wheat injury was obtained acetolactate synthase inhibitors such as Sulfosulfuron %75 WG, 2.6 ml da^{-1} (4.8%), Pyroxsulam %7.08 + Florasulam %1.42 + Cloquintocet-mexyl %7.08 WG 26.5 ml da^{-1} (4.3%), Mesosulfuron-methyl %3 + Iodosulfuron-methyl-sodium %0.6 WG 30 ml da^{-1} (3.8%), Dicamba %50 + Tritosulfuron %25 WG 20 ml da^{-1} (3.6%), Mesosulfuron-methyl 30 g/l + Mefenpyr-diethyl 90 g/l OF 40 ml da^{-1} (3.5%), and Tribenuron %75 WG, 1 g da^{-1} (3.3%) in 7 DAT, respectively. These herbicides inhibit ALS, a primary enzyme in the lane of biosynthesis of the branched-chain amino acids isoleucine, leucine, and valine. Usually, injury symptoms reasoned by ALS active ingredients are not obvious by a few days following treatment contrarily ACCase such as like 2.4-D ethylhexyl ester 452.42 g/l + Florasulam 6.25 g/l SE 50 ml da^{-1} (1.1%).

Crop damage reasoned by herbicides and their mixes was very low at 21 DAT in Pinoxaden treatments and did not overrun 1.50%. This outcome was waited for, as only herbicides listed for utilizing in wheat were performed and it is in conformity with findings from other studies.

DISCUSSION

El-Kholy et al. (2013) notified that the prevailed broad-leaved weeds in wheat field were *Anagalis arvensis*, *Beta vulgaris*, *Cichorium pumpilum*, *Medicago intertexta*, *Melilotus indica*, *Rumex dentatus* and *Sonchus oleraceus* as we have seen, the common weeds are completely different from our findings. Also, they reported Pyroxsulam (89%), Bromoxynil (87%), and Tribenuron (86%) significantly increased the weed control efficacy and at the time raised grain and straw yields of wheat. This situation shows that weed species that are problematic in different wheat production areas may be different. Pyroxsulam in our study similarly showed over 90% effect on other weeds except for ***C.*** *arvense*. The situation has been found in Bromoxynil. However, unlike the other two herbicides, the effect of Tribenuron on weeds was less than 90%, nevertheless, close results were obtained with this study.

Weed index of the weed-free plot gave the best results but, Zand et al. (2007) reported hand weeding is an ineffective technique and very expensive, so, herbicides evermore become a key factor for broad-leaved weed control. Singh et al. (2008) reported handpicking treatment recorded the least yield decrease parallel to our findings.

ACCase Inhibitors are mainly utilized for post-emergent grass repress in broadleaf crops. However, ACCase may cause symptoms on particular broadleaf crops. Inherent tolerance of some grasses is owing to a less sensible ACCase enzyme or a higher ratio of metabolic corruption. This result reported by Bailey et al. (2004) thifensulfuron/tribenuron performed to wheat exhibits a high extent crop protective, no injury or yield drops were detected, in fact when utilized at a high dose was similar to our findings. The data Weirsma et al. (2003) found spring and durum wheat has shown a high tolerance to fenoxaprop-p-ethyl, which has the same mechanism of action as the clodinafop-propargyl we tried, coincides with our results. Herbicide applications behind Z 40 may damage wheat, and ensure small profit to the crop as weeds go unchecked round most of the growing time (Martin et al., 1989). In this study, phytotoxicity caused by late application was not found, since post-emergence herbicide applications were carried out during the tillering period (Z 28-30).

Hofer et al. (2006) reported a 1.5% average phytotoxicity after pinoxaden treatment at the recommended ratio. The period of evaluation was not delivered in their study, yet. Crop damage reasoned by herbicide mixes was vaguely higher in some states, but it was till now remissible as subjectively assigned by growth reducing. Rolston et al. (2003) reported wheat and barley were tolerant to the herbicides appreciated with 2 exceptions; barley was sensitive to damage from clodinafop-proparagyl, but wheat not, the same, in our study, it was found that clodinafop did not injury the wheat. Sosnoskie et al (2009) takedown intense up to 40% wheat damage when *urea* ammonium nitrate fertilizer was combined with mesosulfuron practice. Nevertheless, we did not add any fertilizer to our study and wheat injury did not exceed 4.20% between 3-21 days after herbicide treatment.

CONCLUSION

Based on the data obtained in this field study, it is finalized that post-emergence practices (beginning of March) of i) mesosulfuron-methyl 30 g/l + mefenpyr-diethyl 90 g/l OF 40 ml da^{-1} + 2.4-D ethylhexyl ester 452.42 g/l + florasulam 6.25 g/l SE 50 ml da^{-1}, ii) pyroxsulam %7.08 + florasulam %1.42 + cloquintocet-mexyl %7.08 WG 26.5 ml da^{-1} + 2.4 D dimethylamine salt 500 g/l SL 200 ml da^{-1}, and iii) mesosulfuron-methyl %3 + iodosulfuronmethyl-sodium %0.6

WG 30 ml da^{-1} + bromoxynil 300 g/l + MCPA 300 g/l EC 35 ml da^{-1} may be successfully applied for controlling of the grass and broad-leaved weeds in wheat. Weed management is a substantial plant protection activity in wheat fields in Diyarbakir. To know which herbicides are to be sprayed and their effect on the main problem of wild oats and wild mustard and the time of application are the fields that producers want to know. In addition, the conditions may require that the herbicides be applied with fungicides, insecticides or foliar fertilizers, and growers wish to ensure the safety of these mixtures. In order to maximize winter wheat yield and profitability, Diyarbakir is significant to provide the producers with the most appropriate crop protection information in order to investigate the miscibility of herbicides with other insecticides, fungicides, and plant nutrition products. This study showed that when the tank mixtures of pesticides/herbicides found in different herbicide companies in the plant protection product market were made by the farmer's hand, pests control could be achieved correctly, the yield loss of the crop could be reduced and less pollution of the environment. Due to the lack of recognition of weeds that are problematic in agricultural areas or because they are easy and practical, the random use of herbicides has brought about agricultural and environmental problems. Over-reliance on herbicides over and indiscriminate sprayings leads to an increase in input costs on farms and a negative impact on the environment.

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