J. King Saud Univ., Vol. 1, *Agric. Sci.* (1,2), pp. 123–135 (1409/1989)

Evaluation of Some Herbicides for Weed Control in Wheat (*Triticum aestivum* L.)

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Abstract. Tests were conducted during 1984-85 season at two experimental sites near Riyadh to evaluate the efficiency of some post-emergence herbicides in the control of weeds in wheat (*Triticum aestivum* L.). The experimental sites were of loamy sand soil and were under sprinkler irrigation. The herbicides included bentazon, bromoxynil, chlortoluron, 2, 4-D, dichlorprop, diclofop-methyl, difenzoquat, isoproturon, MCPA, metoxuron, terbutryn and some of their combinations.

The bromoxynil-contained treatments (Brominal plus, Buctril M, Pardner and Brominal, each at 2.5 l/ha) were effective in controlling broad-leaved weeds, improved wheat growth and yield besides being safe and selective. Bentazon/dichlorprop (Basagran DP, at 1.5 l/ha) was almost similar in many aspects to those contained bromoxynil, but did not appreciably improve the wheat biological or grain yield. Diclofop-methyl (Illoxane) and difenzoquat (Avenge) each at 4.0 l/ha, showed effective control for grasses, and insignificantly improved the wheat growth and yield. Slight symptoms of crop phytotoxicity appeared after their application, but rapidly recovered. 2,4-D/MCPA (U-46 fluid Combi, at 1.0 l/ha) showed good control of broad-leaved weeds with slight symptoms of crop phytotoxicity and did not improve the wheat growth or yield. Isoproturon (Graminon, at 5 kg/ha), metoxuron (Dosanex, at 4.0 kg/ha), chlortoluron/MCPA (Dicuran MA60, at 2.5 kg/ha), chlortoluron (Dicuran, at 2.5 kg/ha) and terbutryn (Igran, at 2.5 kg/ha) showed excellent control of weeds, accompanied by severe symptoms of crop phytotoxicity, that adversely affected wheat growth and yield.

Introduction

Weeds, grown in wheat fields, are strong competitors for nutrients, light and moisture, and when allowed to compete with the crop up to harvest, depleted 91.2, 19.4 and 77.5 kg of N, P and K per hectar, respectively [1]. Control of weeds can avoid the drain of such a large amount of nutrients, that can be utilized efficiently by the crop

Weed competition to wheat, usually occurs from the two-leaf stage to the onset of reproductive growth, leading to reduction in tillering, ear formation and in stem weight and height, besides giving poor grain filling [3-4]. When the removal of *Chenopodium album* was delayed from 35 days (normal practice) to 140 days (to maturity), a reduction percentage of 23.3 in the effective number of tillers was obtained [5]. Canary grass (*Phalaris minor*) at a population of 85 plants per square feet, resulted in 60% reduction in wheat yield [6]. However, increasing competition from rye grass (*Lolium rigidum* Gaud) caused corresponding yield reduction in wheat, by decreasing fertile tillers and fertile spikelets production, and it was found to be more competitive in the late sown crops [7].

Wheat grain yield was linearly reduced by up to 1.025 g/m/day, throughout the duration of wild oats (*Avena* spp.) competition [8], and was also found to be directly proportional to the square root of the weed's density [7]. However, values of wheat tillers and dry matter yield measured at maturity, and the number of tillers per plant recorded at the 5-6 leaf stage, were also proportional to the time wild oats were allowed to compete with wheat [8].

Chemical weed control in wheat is being a common practice now-a-days, and many herbicides proved effective in the control of broad-leaved weeds and grasses. Among these, bromoxynil; 2,4-D; MCPA; bentazon; diclofop-methyl; difenzoquat; isoproturon, chlortoluron, metoxuron and terbutryn are well known herbicides in wheat production areas. The present work was conducted to evaluate the efficiency of these herbicides, and some of their combinations in the control of weeds in wheat fields and their effects on wheat growth and yield in Riyadh, Central Region of Saudi Arabia.

Materials and Methods

Two field experiements, were conducted during 1984-85 season in two sites at Dierab, 25 km south west of Riyadh; the Experimental Research station, College of Agriculture, King Saud University, and the Agricultural Experimental Station, Ministry of Agriculture and Water. The two sites were 25 km apart, and both of them were of loamy sand soil. Sprinkler irrigation by means of fixed sprinklers at distances of 12 m in the first experiment, and a central pivot in the second was used. Wheat (*Triticum aestivum* L.) cultivar yecora rojo, was sown in rows, and the recommended cultural practices were followed.

Four weeks after wheat emergence, post-emergence herbicides were sprayed at the rate of 400 l/ha of spray solution by a Knapsack sprayèr. The experimental design was complete randomized blocks, with six replications, each being 25 m^2 and 15 m^2 for both experiments, respectively. The herbicidal treatments and their rates of application are listed in Table 1. The test herbicides included the following:

Bentazon: *3 – iso*-Propyl – (1H) – *2, 1, 3* – benzothiadiazin – *4* (3H) – one. *2, 2* – dioxide.

Bromoxynil: *3, 5* – Dibromo - *4* – hydroxybenzonitrile, octanoate ester.

2, 4–D:2, 4– Dichlorophenoxyacetic, amine salt.

Dichlorprop: (±) – *2* – (*2, 4,* – Dichlorophenoxy) propionate, ethylamine salt.

Diclofop–methyl: *2* – (*4* –(*2, 4* – Dichlorophenexy) phenoxy) – propionate, methyl ester.

Difenzoquat: *1, 2* – Dimethyl – *3, 5* – diphenyl – pyrazolium, methyl sulphate.

Isoproturon: *3* – p – Cumenyl – *1, 1* – dimethyl urea.

MCPA: *4* – Chloro – *O* – tolyloxyacetate, octanoate ester, or amine salt.

Metoxuron: N – (*3* – Chloro – *4* – methoxy phenyl) – N, N – dimethyl urea.

Terbutryn: *2 – tert.* Butylamino – *4* – ethylamino – *6* – methylthio – *1, 3, 5* – triazine.

Table 1. Herbicidal treatments, composition, rates of application and formulations

Treatments No.	Trade names	Compositions and formulations	Rate per ha
1	Buctril M	Bromoxynil, 225g + MCPA, 225g/1L; EC.	2.5 l.
2	Pardner	Bromoxynil, 225g/1L; EC	2.5 l
3	Brominal	Bromoxynil, 240g/1L; EC	2.5 l
4	Brominal plus	bromoxynil, 120g + MCPA, 120g/1L; EC	2.5 l
5	U–46 Combi	2,4-D, 360g + MCPA, 315g/1L; SC	1.0 l
6	Avenge	Difenzoquat, methyl sulphate, 250g/1L; EC	4.0 l
7	Illoxane	Diclofop-methyl, 280g/1L; EC	4.0 l
8	Dicuran	Chlortoluron, 800g/1kg; WP	2.5 kg.
9	Dicuran MA	Chlortoluron, 400g + MCPA, 200g/1kg; WP	2.5 kg.
10	Graminon	Isoproturon, 500g/1kg; WP	5.0 kg.
11	Igran	Terbutryn, 800g/1kg; WP	2.5 kg.
12	Basagran DP	Bentazon, 260g + Dichlorprop, 340g/1L; EC	2.5 kg.
13	Dosanex	Metoxuron, 800g/1kg; WP	4.0 kg.
14	Non-treated	————————	———

For the assessment of the effects of the herbicidal treatments on weed control, wheat growth and yield, measurements were taken at an early stage of growth (5-

weeks after sowing), at the heading stage and at harvest. At the early stage the percentages of weed coverage and the density of wheat growth were estimated according to the visual rating system (0–100) adopted by Frans and Talbert [9, pp. 15-23] and Roberts [10, pp. 252,270-279]. In this system, (100) referred to complete coverage of the area with the plants, and (0) to complete absence of them. At the heading stage of the first experiment, wheat tillers and spikes were counted, wheat dry weight was determined. In the second experiment, the weed's percent coverage, their count and weight were measured. At harvest, records were taken of plant height, spike number, kernel number and weight, biological yield and grain yield.

Data were collected from two representative samples (0,25 m^2 each) for each plot.

The data were subjected to analysis of variance [11] and Duncan's Multiple Range Test [12] for comparison.

Results and Discussion

The results of the assessments are recorded in Tables (2 – 5).

1 – Effects on weeds

The four bromoxynil – contained treatments (Buctril M, Brominal, Pardner and Brominal plus) showed the least percentages of weed coverage, that were significantly less than that of the unweeded check (Table 2). With the exception of Brominal, the same behaviour has also been shown in the second experiment, as well as in the total weed counts and their fresh and dry weights (Table 3). Such behaviour could be attributed to the strong contact action of the bromoxynil in the four above-mentioned treatments, and also to the greater proportion of the broad-leaved weeds than that of the grasses. Majid *et al.* [13] and Vrabel and Bagley [14], reported that, bromoxynil (Buctril, 1.5 l/ha), or its combination with MCPA (0.43 kg from each/ha) gave better control and crop safety than 2,4–D. Bromoxynil was most effective in controlling broad–leaved weeds, as *Chenopodium album, Medicago* spp., and *Anagalis arvensis* [13]. However, such results are more pronounced in the bromoxynil/MCPA treatments (Buctril M and Brominal plus), in which the higher concentrations of the active ingredients in Buctril M formulation, than those in Brominal plus resulted in higher weed control efficiency for the former herbicide.

In the second experiment, bentazon/dichlorprop (Basagran DP) was nearly as equal as the four bromoxynil-contained treatments in reducing the weed coverage

Table 2. **Effect of herbicidal treatments on weeds and wheat growth, at early and heading stages of wheat growth (first experiment)**

Treatments	Early stage		Heading stage, wheat evaluation		
	Weed coverage %	Wheat density %	Tillers No./m^2	Spikes No./m^2	Dry Wt. g/m^2
1 Buctril M	21.7 d	76.3 ab	581.7 ab	543.3 a	755.3 ab
2 Pardner	26.7 cd	86.7 ab	577.7 ab	525.7 a	822.0 ab
3 Brominal	21.7 d	83.3 ab	542.0 ab	495.7 ab	801.3 ab
4 Brominal plus	26.7 cd	78.3 ab	543.0 ab	483.3 ab	669.6 bc
5 U–46 Combi	38.3 bcd	78.3 ab	541.0 ab	485.7 ab	725.7 ab
6 Avenge	43.3 abc	78.3 ab	594.3 ab	505.7 a	767.0 ab
7 Illoxane	63.3 a	75.0 ab	604.0 ab	556.7 a	755.7 ab
8 Dicuran	30.0 bcd	43.3 d	500.3 bc	448.0 ab	514.7 cd
9 Dicuran MA	35.0 bcd	58.3 c	501.7 bc	470.7 ab	685.0 ab
10 Graminon	36.7 bcd	40.0 d	383.0 d	316.3 c	381.0 d
11 Igran	26.7 cd	56.7 c	407.0 cd	377.3 bc	457.0 d
12 Basagran DP	38.3 bcd	85.0 ab	622.7 ab	567.7 a	870.0 a
13 Dosanex	46.7 abc	73.3 b	534.0 ab	449.3 ab	577.3 cd
14 Non-treated	51.7 ab	88.3 a	644.3 a	567.7 a	769.3 ab

N.B.: Means within a column, followed by the same letter, are not significantly different, at the 5% level of probability.

(Table 3), even though, in the first experiment, it showed an insignificant higher ratio of weed coverage than those observed in the bromoxynil-contained herbicidal treatments (Table 2). Bentazon (0.96 kg/ha) was reported by Fleck [15], as one of the most selective herbicidal treatments in wheat. The combination of bentazon and diclofop-methyl gave excellent control of *Lolium multiflorum* [16].

Terbutryn, showed an effective weed suppression in the two experiments, and generally its effect in this respect, was slightly less than those of the four bromoxynil-contained herbicides. Terbutryn was nearly as equal in its control of broad-leaved weeds as grasses, and was also one of the greatest effective herbicides in reducing the total weed count, and fresh and dry weights. However, terbutryn, as stated by Bhardwaj [17], gave very effective control of the grassy weed *Phalaris minor*. Rathore [18] and Singh and Dhaliwal [19] reported that, pre-emergence application of terbutryn (1 kg/ha) markedly decreased the populations of many broad-leaved and grassy weeds.

Table 3. Effect of herbicidal treatments on weeds and wheat growth, at early and heading stages of wheat growth (second experiment)

Treatments	Early stage		Heading stage, weeds evaluations					
				Counts, Plants/m²			Weights. g/m²	
	Weed coverage	Wheat density	Coverage %	Dictos	Grasses	Total	Fresh	Dry
1 Buctril M	4.2 e	75.0 ab	16.7 c	7.0	77.7	84.7 c	236.0 bc	39.3 bc
2 Pardner	5.8 e	83.3 ab	23.3 c	1.4	74.6	76.0 c	261.3 bc	40.7 bc
3 Brominal	16.7 e	73.3 ab	23.3 c	16.8	50.5	67.3 c	308.7 bc	46.0 bc
4 Brominal plus	5.8 e	80.0 ab	18.3 c	22.3	91.4	113.7 b	289.7 bc	36.7 bc
5 U–46 Combi	23.3 c	71.7 bc	20.0 c	40.4	51.6	92.0 c	211.3 bc	34.0 bc
6 Avenge	73.3 b	76.7 ab	68.3 b	51.9	28.1	80.0 c	764.7 ab	110.0 ab
7 Illoxane	75.0 b	78.3 ab	73.3 b	251.1	38.3	289.3 a	606.0 abc	90.0 abc
8 Dicuran	8.3 de	40.0 d	19.2 c	24.2	25.1	49.3 c	224.0 bc	35.3 bc
9 Dicuran MA	18.3 cd	55.0 cd	23.3 c	20.8	11.9	32.7 c	97.3 c	23.0 c
10 Graminon	—	—	—	—	—	—	—	—
11 Igran	6.7 c	43.3 d	12.5 c	38.6	22.1	60.7 c	126.7 c	22.7 c
12 Basagran DP	6.7 c	76.7 ab	17.5 c	1.4	100.6	102.0 bc	266.0bc	76.7 abc
13 Dosanex	—	—	—	—	—	—	—	—
14 Non-treated	95.8 a	90.0 a	91.7 a	168.4	59.6	228.0 a	897.9 a	117.3 a

N.B.: Means within a column, followed by the same letter, are not significantly different, at the 5% level of probability.

Chlortoluron and Chlortoluron/MCPA were strong effective treatments in reducing weed coverage and weed counts and weights (Tables 2 and 3). However, Majid *et al.* [13] reported that Chlortoluron (Dicuran) suppressed serious weeds of wheat and increased yield by up to 37%; and chlortoluron/MCPA (Dicuran MA60) as reported by Majid and Hussain [20], provided best weed control (96.8%) in Pakistan, and produced high grain yield.

Isoproturon and metoxuron were tested in the first experiment, and showed slight suppression of weed coverage, that were not significantly less than that in the unweeded check, at the level of 5% of probability. However, it is known as an effective herbicide for wheat in different locations. For example, Jain *et al.* [21], Dhaiman *et al.* [22], Bernal [23], Bajpai and Sharma [24], Dhaiman and Kairon [25], Singh *et al.* [26], Gill *et al.* [27], Rathore [28], Ravn [29] and Bhardwaj [17] all reported that post-emergence application of isoproturon, in the form of Graminon, Tolkan or Arelon, gave better control of wheat weeds than many other herbicidal treatments.

Compared with the untreated check, treatments of 2,4–D/MCPA in the second experiment showed significant reduction in the weed coverage and weeds count and weight (Table 3). 2,4–D and MCPA, known as early as the 1940's are selective herbicides for broad-leaved weeds, with negligible effect on grasses. Difenzoquat as well, is known as selective herbicide for grasses, especially wild oats (*Avena* spp), hence, it poorly affected the whole weed coverage, count and weight but affected the grasses only.

Diclofop-methyl, attracted much more attention as a selective herbicide for grasses especially rye grass (*Lolium* spp.) in wheat. Results in Table 3, showed that, diclofopmethyl appreicably reduced the percent coverage of grassy weeds, but did not reduce the whole weed counts or weights. This may be due to the vigour growth of the broad-leaved weeds in the absence of the grasses, that were efficiently suppressed by the herbicide. As has been stated by many investigators, diclofop-methyl, is an effective and selective herbicide against grasses, [16-17, 30-34]. For the control of grassy and broad-leaved weeds, Khodayari *et al.* [16] recommended diclofop-methyl or its bentazon combination while soil applied herbicides, in addition to diclofop-methyl were recommended by Lopez [35].

II – Effect on wheat growth and yield

A. At the early and heading stages

Compared with the unweeded check, chlortoluron, chlortoluron/MCPA and terbutryn caused significant decrease in wheat density. This was true in both experiments (Tables 2 and 3). Isoproturon and metoxuron behaved in a similar way. However, similar results have been reported by Tag-El-Din *et al.* [36] and Yadav *et al.* [1], who found that, higher rates of isoproturon, chlortoluron or chlortoluron/MCPA were phytotoxic to wheat, and decreased the grain yield. Isoproturon, as reported by Bernal [23], Bajpai and Sharma [24], Bhardwaj [17] and Jain *et al.* [21] and terbutryn as shown in the work of Rathore [18], Bhardwaj [17] and Jain *et al.* [21] behaved in the same way.

2,4–D/MCPA caused appreciable decrease in wheat density, at the early stage of wheat growth as shown in the second experiment only. However, Fleck [15] reported that, 2,4–D (0.72 kg) alone or combined with MCPA (0.4 kg); or MCPA (0.8 kg) alone/ha, adversely affected the wheat growth and yield. Whitesides [37] also reported that 2,4–D (1 lb) or MCPA (1 lb) or both (0.5 + 0.5 lb)/ac., reduced wheat growth and yield.

The bromoxynil-contained herbicides (Buctril M, Pardner, Brominal and Brominal plus) as well as bentazon/dichlorprop, diclofop-methyl and difenzoquat showed non-significant decrease in the growth density of wheat. Bromoxynil combination with MCPA, gave better control and crop safety than spraying application of 2,4–D or 2,4–D + dicamba [14].

At the heading stage of the first experiment, tillers and spikes counts, and wheat dry weights were significantly decreased (at 0.05 of probability) by the treatments of isoproturon and turbutryn, whereas, chlortoluron showed similar decrease in tillers and dry weights. Chlortoluron/MCPA decreased the tillers count while metoxuron adversely affected the wheat dry weight.

B. At harvest

The data presented in Tables (4) and (5) show that, isoproturon, metoxuron and terbutryn caused significant decrease in plant height, number of spikes, biological

Table 4. Effect of herbicidal treatments on wheat growth and yield at harvest (first experiment)

Treatments	Height cm	Spikes No./m^2	Kernel No./5S*	Kernel wt.g/5S*	10^3 grains wt./g	Biological yield kg./m^2	Grain yield g/m^2
1 Buctril M	59.2 abcd	557.3 bcd	203.2	9.3	44.6	1.63 abc	474.8 ab
2 Pardner	65.3 a	638.0 abcd	189.5	9.0	47.9	1.81 abc	557.8 ab
3 Brominal	61.2 abcd	670.7 abc	195.8	9.1	46.7	1.73.abc	513.2 ab
4 Brominal plus	62.4 abc	628.7 abcd	170.2	9.7	54.3	1.65 abc	542.3 ab
5 U–46 Combi	60.6 abcd	532.7 cde	150.8	8.0	53.2	1.82 abc	510.3 ab
6 Avenge	64.9 ab	684.7 ab	146.0	8.5	50.4	2.12 a	601.2 a
7 Illoxane	59.5 abcd	719.3 a	157.8	8.5	53.8	1.79 abc	545.5 ab
8 Dicuran	58.6 bcde	541.3 bcde	156.5	8.8	49.2	1.40 c	446.5 b
9 Dicuran MA	57.2 cde	523.3 de	198.0	9.9	50.0	1.50 bc	442.8 b
10 Graminon	53.1 e	420.7 ef	175.7	8.2	46.8	0.67 a	169.8 c
11 Igran	58.3 cde	377.3 f	149.5	7.6	49.6	0.81 d	228.3 c
12 Basagran DP	62.6 abc	612.7 abcd	159.2	7.8	48.0	1.61 abc	416.7 b
13 Dosanex	55.9 de	515.3 de	155.2	7.3	47.3	0.95 d	234.2 c
14 Non-treated	63.7 abc	682.0 ab	200.7	10.3	51.6	1.95 ab	550.7 a

*5S means per 5 spikes

N.B.: Means within a column, followed by the same letter, are not significantly different, at the 5% level of probability.

and grain yields. However, as reported by Fleck [15], plant height, dry weight, number of fertile spikelets and grain weight were among the characteristics adversely affected by herbicides.

Table 5. Effect of herbicidal treatments on wheat growth and yield at harvest (second experiment)

Treatments	Spikes No./m^2	Kernel No. / 5S*	Kernel wt.g/5S*	10^3 grains wt./g	Biological yield kg./m^2	Grain yield g/m^2
1 Buctril M	460.5	210.8	8.9	42.6	2.00	722.0
2 Pardner	452.7	224.7	8.1	35.6	1.87	617.2
3 Brominal	550.8	233.0	8.2	35.0	2.07	665.0
4 Brominal plus	470.8	222.3	8.3	38.0	1.63	544.5
5 U–46 Combi	487.3	211.7	8.9	42.3	1.72	543.7
6 Avenge	548.0	220.3	8.9	40.5	2.33	675.7
7 Illoxane	411.2	190.0	8.0	43.3	1.92	508.8
8 Dicuran	348.7	222.8	8.7	39.3	1.48	527.5
9 Dicuran MA	429.7	221.2	9.3	42.2	1.53	588.0
10 Graminon	—	—	—	—	—	—
11 Igran	297.3	261.7	9.3	35.2	0.80	343.0
12 Basagran DP	453.0	240.8	9.4	38.9	1.63	521.0
13 Dosanex	—	—	—	—	—	—
14 Non-treated	379.8	222.3	8.7	37.9	2.07	508.3

*5S means per 5 spikes

Phytotoxicity to wheat plants, due to the application of the above mentioned herbicidal treatments are in accordance with the results of several investigators. Isoproturon, at a rate of 5 kg/ha, caused slight injury to wheat [23], the crop-injury symptoms were also observed at a rate of 1 kg/ha, especially in loamy sand soils [24]. Terbutryn, applied post-emergence at a rate of 0.75 and 1 kg/ha, was phytotoxic to wheat [18], and decreased the grain yield [21]. The same effect was obtained with Chlortoluron and chlortoluron/MCPA when applied at higher rates, [1].

Contradicting results were, however, reported by several investigators. Dhiman and Kairon [25] reported that isoproturon (Tolkan), at 1 kg *a.i.*/ha, increased grain yield by 33% over the unweeded control. According to Singh *et al.* [26] its pre-emergence application, at 1.5 kg/ha, reduced the weeds and increased the wheat yield, due to the improved crop growth and less nitrogen uptake by weeds. The application of isoproturon and metoxuron to wheat, at 3– to 4– leaf stage, was more effective and gave higher grain yield. The increase with isoproturon (0.94 kg/ha) was 43%

higher than that obtained without weed control [27]. Chlortoluron (Dicuran) increased wheat grain yield by up to 37% [13]. Terbutryn showed distinct phytotoxicity to wheat [17] and its pre-emergence application, at a rate of 1 kg., [18], or even 0.75 kg/ha [19], gave the highest grain yields of wheat. In Pakistan, the best weed control was achieved by chlortoluron/MCPA (Dicuran MA., 96.8%), which produced the highest grain yield of 3.409 t/ha [20].

The plant height, number of spikes, biological and grain yields obtained with difenzoquat and diclofop-methyl were slightly, but insignificantly higher than those of the unweeded control. However, diclofop-methyl was found to be effective for wild-oats control and increased wheat yield [32]. Its combination with bentazon, gave excellent control of *Lolium multiflorum,* and increased wheat grain yield from 2.02 t/ha (control) to 3.25 t [16]. Increase in the grain yield due to the effect of diclofop-methyl was also reported by O'Sullivan and Kirkland [34] and Lopez [35]. Contrary to these results, Grachev and Nesterenko [30] reported that, diclofop-methyl at a rate of 1.08 and upto 1.80 a.i./ha, post-emergence, effectively controlled grassy weeds, and at 1.80 kg a.i./ha rate, it was toxic to the crop. At a rate of 0.54 kg a.i./ha, as reported by Fleck [15], diclofop-methyl caused some initial injury, but wheat recovered. In the present work, diclofop-methyl, was applied at the rate of 4.0 1/ha of a 280 g a.i./1 formulation (i.e. 1.12 kg a.i./ha), a rate that was less than that caused phytotoxicity [30] but was higher than that reported by Fleck [15].

Values taken for wheat evaluation at harvest did not differ significantly from the four bromoxynil-contained herbicides and bentazon/dichlorprop (Basagran DP) on one hand and the unweeded control on the other. These treatments could be considered among the best of all treatments, that improved wheat growth, development and yield. However, it has been reported that, bromoxynil [13], its combination with MCPA [14], or bentazon/dichlorprop [36] gave better control to broad-leaved weeds, and better wheat crop safety as well, than many other herbicides. The post-emergence application of bentazon/diclofop-methyl combination, gave excellent control of rye-grass, and increased wheat yield from 2.02 t/ha (control) to 3.25 t [16].

Acknowledgement. The authors acknowledge the technical assistance of F. Meneesy.

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تقويم فعالية بعض مبيدات الحشائش لمكافحة حشائش القمح

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ملخص البحث. أجريت الاختبارات في موقعين مختلفين حول مدينة الرياض خلال موسم ١٩٨٤/١٩٨٥ لتقويم فعالية بعض مبيدات الحشائش بعد الانبثاق في محصول القمح، حيث كانت التربة في موقعي الاختبارات رملية سلتية تحت نظام الري بالرش، وقد شملت المبيدات المختبرة بنتازون، بروموكسينيل، كلور تليورون، ٢ : ٤ ـ د، دايكلوربروب، دايكلوفوب ميثايل، دايفنزوكوات، أيزوبروتيرون، إم سى بى إيه، ميتوكسيورن، تيربيوترين و (أو) بعضًا من خلائطها.

وقد أظهرت معاملات المبيدات المحتوية على البروموكسينيل (برومينال بلاس، بكتريل ام، باردنر، برومينال) كفاءة واضحة في مكافحة الحشائش عريضة الأوراق وعملت على تحسين نمو القمح وزيادة انتاجيته، كما تميزت بكونها ذات أمان على القمح كاف ومتخصصة. كما أظهرت معاملة بنتازون/ دايكلوربروب (بازجران دى بى بمعدل ٥ر٢ لتر/هكتار) كفاءة مساوية للمعاملات المحتوية على البروموكيسنيل في مكافحة الحشائش، كما كان لها نفس القدر من الأمان على المحصول والتخصص إلا أنها لم تؤد إلى تحسن ملموس في الناتج البيولوجي للقمح أو ناتج الحبوب.

وقد أظهرت المعاملات دايكلوفوب ميثايل (إيلوكسان) و دايفنزوكوات (أفينج) عند معدل ٤ لتر/ هكتار من كل، كفاءة واضحة في مكافحة الحشائش النجيلية وحسَّنا من نمو القمح و إنتاجيته بدرجة ملموسة، إلا أن النباتات المعاملة قد ظهرت عليها مظاهر بسيطة لسمية نباتية بعد التطبيق غير أنها سرعان ما استرجعت قدرتها على النمو بعد ذلك. كما أظهرت المبيدات أيزو بروتيورون (جرامينون بمعدل ٥كجم/هكتار) ميتوكسيورون (دو زانكس بمعدل ٤ كجم/ هكتار) كلورتليورون/ إم سى بي إيه (ديكوران إم إيه ٦٠ بمعدل ٥ر٢كجم/هكتار) وتيروبيوترين (إجران بمعدل ٥ر٢ كجم/هكتار) قدرة ممتازة على مكافحة الحشائش إلا أن سميتها النباتية كانت شديدة بدرجة أثرت تأثيرًا سيئًا على نمو و إنتاجية القمح.