EVALUATION OF SOME SOYBEAN HERBICIDES
I- EFFECT ON WEED CONTROL

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ABSTRACT

Two field experiments were conducted at the Agricultural Research and Experiment Center, Faculty of Agriculture at Moshtohor, Kalubia, Egypt, during 1985 and 1986 seasons. The aim of the investigation was to study the efficiency of some herbicides in controlling soybean weeds.

The applied herbicides as well as hoeing treatment decreased significantly the fresh and dry weight of grass, broad-leaved and total weeds after 60 and 90 days from soybean sowing compared with un-weed treatment except Lasso (2.0 L.), AC (0.315 L) + surfactant, Scepter (1.05 L.), Stomp (1.7 L.) and Afalon S (1.0 kg/fad.) on broad-leaved weeds in the first period (60 days). The superiority of the herbicides in controlling weeds after 60 days was obtained from AC (0.42 L.), Amex (2.5 L.), hoeing, AC (0.315 L.) + surfactant and Seepter (0.7 L.) + Stomp (1.25 L./fad.). On the other hand herbicides with low efficiency were Afalon S (1.0 kg), Seepter (1.05 L.) and Lasso (2.0 L./fad.).

After 90 days from sowing, weed reduction over 70% was found by hoeing, AC (0.42 L.), Amex (2.5 L.), AC (0.21 L.), AC (0.315 L.), AC (0.315 L.) + surfactant and Ronstar (2.0 L./fad.); reduction between 55 and 70% was by Scepter (0.7 L.) + Stomp (1.25 L.), Lenamex (3.5 L.), Ronstar (1.5 L.), Lasso (1.5 L.) + Linuron (0.75 kg) and Lasso (2.0 L./fad.), reduction of less than 55% was by Scepter (1.05 L.), Stomp (1.7 L.) and Afalon S (1.0 kg/fad.).

INTRODUCTION

Soybean (Glycine max [L.] Merr.) is one of the most important sources of oil and protein. In Egypt, soybean area as well as production increased gradually. It is important to keep soybean field weed-free at early growth stages to reduce weed compitition and to increase the yield.

Satisfactory soybean chemical weed control reduced weed growth and increased the yield. Aldrich (1984), mentioned that herbicides are useful for three purposes in weed management; 1) to prevent weed emergence, 2) to minimize compitition of weeds associated with crops and 3) to reduce the number of viable propagules in the soil.

Many investigators reported that application of herbicides reduced weed growth, i.e. fresh, dry and total weight of associated weeds grown in soybean fields (Voevodin, 1969; El-Aishy et al., 1976; Moursi, et al., 1980; Fayed et al., 1983; El-Deek et al., 1986; Shaban et al., 1987 and Sary et al., 1988a).

The aim of the present investigation was to study the efficiency of some herbicides in controlling weeds in soybean field.

MATERIALS AND METHODS

Two field experiments were conducted in the Agricultural Research and Experiment Center, Faculty of Agriculture at Moshtohor, Kalubia, Egypt in a clay loam soil with a pH value of 7.8 and 2.5% organic matter content to evaluate the efficiency of some herbicides in controlling weeds associating soybean during 1985 and 1986 season. Each plot was 1/400 fad. (10.5 m^2) consisted of 5 ridges, 3.5 m long and 60 cm apart. The soil was irigated immdiately just after pre-emergence herbicide application, post-emergence herbicides were applied after 2 weeks from sowing (1-3 leaves/plant). The spray volume used was 400 L./fad. Names, rates, chemical composition and time of application for the applied herbicides are listed in table (1).

Sowing date for soybean cv. clark was May, 7th and April, 28th in 1985 and 1986 season, respectively. The normal cultural practices of growing soybean were followed. Weeds were hand-pulled from 1 m^2 per plot after 60 and 90 days from sowing and then classified into broad-leaved weeds and grasses. The fresh and dry weight of each group and total weight were recorded.

The combined analysis of the data was made according to Cochran and Cox (1957).

Table (1): Weed control treatments, common, trade name, chemical name, rate and time of application of herbicides used.

Common name	Trade name	Chemical composition	Rate/fad	Applic. time
AC 263, 499		(+-)-5-ethyl-2-(4-isopropyl-4-methyl-5-oxo-2 imidazolin-2-yl nicotinic acid	0.210 L.	Pre-emergence
AC 263, 499			0.315 L.	Pre-emergence
AC 263, 499			0.420 L.	Pre-emergence
AC 263, 499 + surfactant			0.315 L.	Post-emergence
AC 252, 214	Scepter	2-(4-isopropyl-4-methyl-5-oxo-2 imidazolin-2-yl-3 quinoline carboxylicacid	1.05 L.	Post-emergence
Pendimethalin	Stomp SO	N-(1-ethylpropyl) 3, 4-diamethyl 2, 6 dinitro benzenamine	1.7 L.	Post-emergence
Scepter + Pendimethalin			0.7 L. + 1.25 L.	Post-emergence
Linuron/Monolinuron	Aflon S 80%	(Monolinuron) N-(4-chlorophenyl N-methoxy-N-methylurea	1.0 kg	Pre-emergence
Alachlor 48%	Lasso	2-chloro-2-6-diethyl-N-(methoxymethyl) acetanilide	2.0 L.	Pre-emergence
Alachlor + Linuron		(Linuron) 3-(3, 4-dichloro phenyl)-1-methoxy-1-methylurea	1.5 L. + 0.75 kg	Pre-emergence
Oxadiazone	Ranstar SD	2-tert-Butyl-4-(2,4-dichloro-5-isopropoxy phenyl 1, 3, 4-oxdiazolin-5-one	1.5 L.	Pre-emergence
Oxadiazone	Ranstar SD		2.0 L.	Pre-emergence
Butralin	Amex 24%	4-(1, 1-dimethylethyl)-N-(1-methylproyl)-2, 6-dinitrobenzen amine	2.5 L.	Pre-emergence
Butralin + Linuron 240 + 60 gm./L.	Lenamex		3.5 L.	Pre-emergence
Hoeing		Twice, before the first and the second irrigations.		
Control		un-weeded check.		

RESULTS AND DISCUSSION

A- Effect of weed control treatment on soybean weeds after 60 days from sowing:

The dominant weed species which were found in the un-weeded check plots during the two growing seasons were: panic grass (Echinochloa colonum, [L.] Link), purslana (Portulaca oleracea L.) wild okra (Hibiscus trionum L.), biskop's weed (Ammi majus L.), burclover (Midicago hispida Gaerten.), nettle weed (Chenopodium album L.) and sping cocklbur (Xanthum spinosum L.).

Data presented in table (2) indicate that broad-leaved weeds were only about one tenth of total weeds in soybean fields (un-weeded plots). The applied herbicides as well as howing treatment significantly reduced the fresh and dry weight of annual grass and total weeds after 60 days from sowing as compared to the un-weeded treatment, also all weed control treatments decreased significantly the fresh and dry weight of broad-leaved weeds except Lasso (1.5 L.), AC (0.315 L.) + surfactant, Scepter (1.05 L.), Stomp (1.7 L.) and Afalon S (1.0 kg/fad.). The highest reduction percentage for grasses, broad-leaved and total weeds was obtained by AC (0.42 L./fad.) treatment which decreased significantly the fresh and dry weight of weeds by about 80% of the un-weed treatment after 60 days from sowing (table 3). Reduction of weed growth by AC (0.42 L./fad.) also was significantly higher than other weed control treatments except AC (0.350 L.) + surfactant, Amex (2.5 L./fad.) and hoeing (table 2). Applying AC at 0.315 L./fad. with and without surfactant varied in efficiency in controling the grasses only and AC at (0.315 L.) with surfactant was more effective in controlling grasses than without surfactant (table 2) and the reduction percentage of total dry weeds increased by about 7% with surfactant than without surfactant (Table 3).

The superiority of the mentioned herbicides in controlling soybean weeds after 60 days from sowing could be attributed to the high efficiency of AC (0.42 L.), Amex (2.5 L.), hoeing, AC (0.315 L.) + surfactant and Scepter (0.7 L.) + Stomp (1.25 L.), Ronstar (2.0 L.), AC (0.315 L.) and Lenamex (3.5 L./fad.), the reduction percentage of total dry weight of weeds was 79%, 72.2%, 72%, 69.5%, 65.7%, 62.4% and 60.1%, respectively compared with un-weeded treatment. These herbicides were more effective in controlling grasses that were dominant in this experiment. On the other hand, herbicides with low efficiency were Afalon S (1.0 kg), Scepter (0.315 L.) and Lasso (2.0 L./fad.), the reduction

Table (2): Effect of some weed control treatments on fresh and dry weight of weeds (gm/m²) after 60 days from sowing (combined analysis of 1985 and 1986 seasons).

Treatments	Grasses		Brood-leaved		Total weeds	
	Fresh	Dry	Fresh	Dry	Fresh	Dry
AC (0.210 L.)	559.12	88.42	22.13	3.07	581.25	91.49
AC (0.315 L.)	466.37	63.95	47.25	5.77	513.62	69.72
AC (0.42 L.)	277.37	34.42	32.00	4.49	309.37	38.91
Ac (0.315 L.) + surfactant	289.12	40.47	147.13	16.08	436.25	56.55
Scepter	802.50	98.96	115.00	12.52	917.50	111.48
Stomp	737.25	97.72	82.37	8.03	819.62	105.75
Scepter + Stomp	437.12	55.49	70.50	7.66	507.62	63.15
Aflon S	1165.00	135.26	80.62	9.68	1245.62	144.94
Lasso	775.75	95.31	157.07	12.99	932.82	108.30
Lasso + Linuron	721.25	85.11	44.25	5.26	765.50	90.31
Ronstar (1.5 L.)	651.12	86.44	35.13	3.87	686.25	90.27
Ronstar (2.0 L.)	467.00	60.85	51.12	6.16	518.12	67.01
Amex	362.00	44.56	59.25	6.89	421.25	51.45
Lenamex	553.12	69.64	35.63	4.22	588.75	73.86
Hoeing	364.37	44.46	74.38	7.30	438.75	51.76
Control	1391.87	169.39	148.75	15.25	1540.62	184.64
L.S.D. at 5%	168.00	23.62	75.08	7.70	197.44	24.32
1%	223.15	31.38	99.73	--	262.26	32.31

Table (3): Per cent reduction of weeds after 60 days from soybean planting (combined analysis of 1985 and 1986 seasons).

Treatments	Grasses		Brood-leaved		Total weeds	
	Fresh	Dry	Fresh	Dry	Fresh	Dry
AC (0.210 L.)	59.8	47.8	85.1	79.9	62.2	50.4
AC (0.315 L.)	66.5	62.2	68.2	62.2	66.7	62.4
AC (0.42 L.)	80.7	79.7	78.5	70.6	79.9	79.0
Ac (0.315 L.) + surfactant	79.3	76.1	1.1	0.0	71.7	69.5
Scepter	42.4	41.6	22.7	17.9	40.4	39.8
Stomp	47.0	42.4	44.6	47.3	46.8	42.9
Scepter + Stomp	68.6	67.2	52.6	49.8	67.1	65.7
Aflon S	16.4	20.1	45.8	36.5	19.1	21.7
Lasso	44.3	43.7	0.0	14.8	39.5	41.5
Lasso + Linuron	48.2	49.8	70.2	65.9	50.3	51.2
Ronstar (1.5 L.)	53.2	49.0	76.4	74.6	55.5	51.2
Ronstar (2.0 L.)	66.4	64.1	65.7	59.6	66.4	63.8
Amex	74.0	73.7	60.1	54.8	72.7	72.2
Lenamex	60.3	58.9	76.1	72.3	61.8	60.1
Hoeing	73.8	73.7	50.0	52.1	71.5	72.0
Control	0.0	0.0	0.0	0.0	0.0	0.0

$$\text{Percent of reduction} = \frac{\text{the treated treatment}}{\text{the un-weeded check}} \times 100 - 100$$

percentage of total dry weight of weeds was 21.7, 39.8 and 41.5%, respectively compared with control treatment (Table 3).

In general, similar results on weed growth reduction by herbicides application were reported by Moursi et al., (1980); Fayed et al., (1983); Rao (1983); El-Deek et al., (1986); Shaban et al., (1987) and Sary et al., (1988a) & Sary et al., (1988b).

B- Effect of weed control treatments on soybean weeds after 90 days from sowing:

Data presented in table (4) indicate clearly that all herbicidal treatments as well as hoeing treatment decreased significantly fresh and dry weight of grasses, broad-leaved and total weeds after 90 days from sowing as compared to the un-weeded treatment. It is worthy to mention that Lasso (1.5 L.), AC (0.315 L.) + surfactant, Scepter (1.05 L.), Stomp (1.7 L.) and Afalon S (1.0 Kg/fad.) were more effective in controlling broad-leaved weeds after 90 days than 60 days from sowing, the reduction in broad-leaved weeds increased from 14.8 to 66.3, 0.0 to 76.1, 17.9 to 69.6, 47.3 to 62.4 and from 36.5 to 75.3, respectively (tables 3 and 5). Moursi et al. (1980), reported that Linuron, Stamp, Maloran, Treflan, Modowan and Amex were not efficient enough for controlling annual broad-leaved. Weeds after 45 days from soybean sowing, also they mentioned that, Stomp, Amex and Treflan were more effective in controlling weeds after 75 days than 45 days from sowing.

In conclusion, weed control treatments in sobyean could be classified with regard to their efficiency into three groups: **(a)** eradication over 70% of weed population achieved by hoeing (twice) AC (0.420 L.), Amex (2.5 L.), AC (0.210 L.), AC (0.315 L.), AC (0.315 L.) + surfactant and Ronstar (2.0 L./Fad.) **(b)** between 55% and 70% eradiation achieved by Scepter (0.7 L.) + Stomp (1.25 L.), Lenamex (3.5 L.), Ronstar (1.5 L.), Lasso (1.5 L.) + Linuron (0.75 kg) and Lasso (0.2 L./fad.) and group **(c)** with less than 55% eradiation achieved by Scepter (1.05 L.), Stomp (1.7 L.) and Aflan S 1.0 kg/fad. (table 5).

These results agree with those reported by Fayed et al., (1983); El-Deek et al., (1986); Shaban et al., (1987) and Sary et al., (1988a). Fayed et al. (1983), found that, hand hoeing and Ancrack (5.5 L./fad.) treatments gave the highest controlling effect on total soybean weeds, El-Deek et al. (1986), found that, Metribuzin + Oxfluorfen (0.20 + 0.18 kg/fad.) was on excellent herbicide with regard

Table (4): Effect of some weed control treatments on fresh and dry weight of weeds (gm/m²) after 90 days from sowing (combined analysis of 1985 and 1986 seasons).

Treatments	Grasses		Brood-leaved		Total weeds	
	Fresh	Dry	Fresh	Dry	Fresh	Dry
AC (0.210 L.)	539.50	66.76	36.25	3.03	575.75	69.79
AC (0.315 L.)	535.00	67.34	33.25	3.88	568.25	71.22
AC (0.42 L.)	382.50	51.61	29.37	2.95	411.87	54.56
Ac (0.315 L.) + surfactant	418.12	63.36	52.88	6.98	471.00	70.34
Scepter	831.87	119.02	85.63	8.89	971.50	127.91
Stomp	1002.50	144.90	95.00	11.00	1097.50	155.90
Scepter + Stomp	546.00	76.11	60.25	8.51	606.25	84.62
Aflon S	1175.00	175.29	61.87	7.21	1236.87	182.50
Lasso	796.00	104.87	88.75	9.85	885.25	114.72
Lasso + Linuron	740.00	104.15	51.87	6.01	791.87	110.16
Ronstar (1.5 L.)	710.00	101.44	53.12	6.50	763.87	107.94
Ronstar (2.0 L.)	545.00	72.80	52.50	5.95	597.50	78.75
Amex	485.00	64.26	35.5	4.55	520.5	68.81
Lenamex	736.25	96.12	46.87	5.75	783.12	101.87
Hoeing	318.12	41.87	36.25	4.38	354.37	46.25
Control	1694.37	240.14	192.50	29.23	1886.87	269.37
L.S.D. at 5%	226.35	35.99	57.02	8.54	190.08	37.99
1%	300.66	47.80	75.74	11.35	252.48	50.46

Table (5): Percent reduction of weeds after 90 days from soybean planting (combined analysis of 1985 and 1986 seasons).

Treatments	Grasses		Brood-leaved		Total weeds	
	Fresh	Dry	Fresh	Dry	Fresh	Dry
AC (0.210 L.)	68.2	72.2	81.2	89.6	69.5	74.1
AC (0.315 L.)	68.4	72.0	82.7	86.7	69.9	73.6
AC (0.42 L.)	77.4	78.5	84.7	89.9	78.2	79.3
Ac (0.315 L.) + surfactant	75.3	73.6	72.5	76.1	75.0	73.9
Scepter	50.9	50.4	55.5	69.6	51.4	52.5
Stomp	40.8	39.6	50.6	62.4	41.8	42.1
Scepter + Stomp	67.8	68.3	68.9	70.9	67.9	68.6
Aflon S	30.7	27.0	67.9	75.3	34.4	32.2
Lasso	53.0	56.3	53.9	66.3	53.1	57.4
Lasso + Linuron	56.3	56.6	73.1	79.4	58.0	59.1
Ronstar (1.5 L.)	58.1	57.8	72.4	77.8	59.6	59.9
Ronstar (2.0 L.)	67.8	69.7	72.7	79.6	68.3	70.8
Amex	71.4	73.2	81.6	84.4	72.4	74.5
Lenamex	56.5	60.0	75.7	80.3	58.5	62.2
Hoeing	81.2	82.6	81.8	85.0	81.2	82.8
Control	0.0	0.0	0.0	0.0	0.0	0.0

to the total annual weeds. Sary et al. (1988a), stated that Linuron mixtures with other herbicides were superier in controlling soybean weeds.

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