EFFECT OF SOYBEAN PLANTING METHODS ON THE EFFICIENCY OF HERBICIDES

II- YIELD, YIELD, COMPONENTS AND CHEMICAL CONTENTS

BY

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ABSTRACT

Two field experiments were carried out during 1979 and 1980 seasons at the Research and Experimental Station of the Faculty of Agriculture, Moshtohor, to study the effect of planting methods and some weed control treatments on soybean plants. The results indicated that heraty method was the best in all characters studied, i.e., no. of pods/plant, weight of pods/plant, seed index, seed yield, biological yield, protein as well as oil yield/fed. weed control treatments increased to different extents the no. of branches/plant no. of pods/plant, weight of pods/plant, seed yield/plant, seed index, seed and biological yield, protein and oil yield and no. of plants/fed. The interaction between planting methods and weed control treatments showed significant effect on no. of branches/plant, seed yield/-plant, weight of 100 seeds, seed yield, biological yield and no. of plants/fed.

INTRODUCTION

Many investigators, showed that using new selective herbicides improved yield and yield components of field crops, since weeds compete the crop plants for nutrients, water and light and concequently reduce the yield per unit area. Saghir and Bhatti (1972), indicated that linuron as pre-emergence treatment increased the number of pods/-plant. Moreover, Salim (1978), found that butralin at 0.75 L./fed. increased seed yield/plant. Whereas, Sistachs et al. (1975), stated that trifluralin at 0.5 kg/ha. increased number of pods and seed weight/plant. On the other hand, Rafael et al., (1976) and Rubin (1976), showed that metribuzin caused injury and damage to soybean crop. Which Harvey (1973), indicated that trifluralin reduced soybean plant growth. Moreover, Davis and Habetz (1975), indicated that bladex at 2-5 lb/ac. caused on acceptable level of injury to soybean. Nevertheless, the seed yield as well as biological yield/fed. significantly increased by application of herbicides (Kvitko, 1967; Ramirez et al., 1970;

Saghir & Bhatti, 1972; Parochetti et al., 1972; Baranova et al., 1975; Frans & Blythe, 1975 and Roshdy, 1979). So, the present investiation was conducted to study the effect of planting methods and some weed control treatments on yield and chemical content of soybean plants.

MATERIALS AND METHODS

Materials and methods are given in detail in the first paper concerning this reasearch (Sary et al., 1988). At harvest a sample of ten plants from each subplot as taken and the following data were recorded:

A- Yield and yield components:

Number of branches/plant, no. of pods/plant, weight of pods/plant, weight of 100 seeds and seed yield/plant. After that the plants in each plot were taken to determine no. of plants/fed., seed yield/fed. and biological yield/fed.

B- Chemical contents:

Total nitrogen percentage was determined by micro Kjeldahl method (A.O.A.C., 1970). Protein content was obtained by multiplying N by 6.25 (Tripathi et al., 1971). Whereas, oil percentage was determined according A.O.A.C. (1955).

RESULTS AND DISCUSSION

A- Effect of planting methods:

1- Seed yield per plant and some of its components:

Data presented in Table (1) show significant differences between heraty and afir method in number of pods/plant, weight of pods/plant and seed index, whereas diferences in number of branches and seed yield/plant were not significant.

2- Seed yield, biological yield and number of plants/fed.:

Data in Table (2) indicate that the heraty method was better than afir concerning all characters studied where the differences in biological yield/fed., number of plants/fed. and seed yield/fed. were statistically significant. The increases in these mentioned characters might be due to the good effects of heraty method on decreasing the weed spectrum and increasing the growth characters of soybean plants.

3- Protein and oil percentage in soybean seeds:

Data in Table (3) show no significant differences between the heraty and afir methods in the percentages of both protein and oil contents of soybean seed.

Table (1): Effect of planting methods on yield and its com ponents per plant.
(Combined analysis of 1979 and 1980 experiments).

Methods of planting	No. of branches /plant	No. of pods/ plant	Weight of pods /plant in gms	Seed index	Seed yield /plant in gms.
Heraty	3.86a	71.75a	50.14a	17.39a	18.51a
Afir	3.70a	63.59b	47.21b	16.61b	17.50a

Table (2): Effect of planting methods on biological yield, number of plants and seed yield per faddan.
(Combined analysis of 1979 and 1980 experiments).

Methods of planting	Biological yield/fad. in kgs.	No. of plant/ fad.	Seed yield/ fad. in kgs
Heraty	4532a	72726a	1353a
Afir	4046b	69512b	1190b

Table (3): Effect planting methods on protein and oil percentages in soybean seeds.
(Combined analysis of 1979 and 1980 experiments).

Methods of planting	Protein %	Oil %	Protein yield/ fad. in kgs.	Oil yield/ fad. in kgs.
Heraty	36.68a	21.72a	496.24	298.32
Afir	36.73a	22.18a	436.90	263.83

Means for each character followed by the same alphabetical letter are not statistically dif ferent at the 5% level.

B- Effect of weed control treatments:

1- Seed yield per plant and some of its components:

Results in Table (4) demonstrate clearly that all weed control treatments increased to different extents the no. of branches, no. of pods, weight of pods and seed yield/plant as well as seed index with the exception of diphenamide effect (1.5 kg/fed.) on no. of branches/plant. Data also indicate that metribuzin treatment (0.5 kg/fed.) and its combination with linuron as well as the mixture of linuron with tridex gave the highest increases in all studied characters, i.e. no. of branches, no. of pods, weight of pods and seed yield/plant. On the other hand, diphenamide (1.5 kg/fed.) treatment gave the lowest number of branches, no. of pods, weight of pods and seed index compared with other treatments under invistigation. Similar results were early reported by many invistigators; Saghir and Bhatti (1972), indicated that linuron as pre-emergence treatment increased the no. of pods/plant. Also, Salim (1978), showed that butralin at 0.75 L./fed. increased seed yield/plant. Moreover Sistachs et al. (1975), stated that trifluralin at 0.5 kg/ha. increased the no. of pods and seeds/plant.

2- Seed yield, number of plants and biological yield/fed.:

Results in Table (5) indicate clearly that all weed control treatments increased significantly biological yield, number of plants and seed yield/fed. except metribuzin (0.5 kg/fed.) and the mixture of linuron with tridex treatments. The available results also indicate that the highest seed yield per feddan was recorded with linuron-metribuzin treatment. This treatment increased the seed yield by 170.5% of the un-weeded treatment. Also, the mixture of linuron with oxadiazon gave an increase in seed yield amounted to 153.8% of the unweeded treatment. Linuron + phenisopham, linuron + butralin and linuron + tridex gave similar effects on seed yield/fed. These results might be attributed to the effect of these weed control treatments on the depression of weeds and consequently the increases in the growth characters of soybean plants, namely no. of branches, no. of pods, weight of pods, seed yield/plant and seed index (Table 4). In this connection Kvitko (1967); Ramirez et al., (1970); Parochetti et al., (1972); Saghir & Bhatti (1972); Baranova et al., (1975); Roshdy (1979) and many other investigators indicated that linuron and its combinations at recommended rates caused on increase in soybean yield. Overton et al., (1978) and Salim (1978), stated that butralin gave significant increase in seed yield of soybeans.

Table (4): Effect of some weed control treatments on number of branches, number of pods, weight of pods and seed yield per plant and seed index.
(Combined analysis of 1979) and 1980 experiments).

Weed control treatments	No. of branches per plant	No. of pods pat plant	Weight of pods/plant in gm	Seed yield per plant in gm.	Weight of 100 seeds in gm.
Linuron at 1.0 kg/fad.	3.8c	69.2e	48.65ef	17.98fg	16.93d
Butralin at 2.0 L/fad.	3.4bc	70.9e	51.23fg	18.68g	17.65e
Oxadiazon at 2.0 L/fad.	3.3b	63.2cd	44.05bcd	14.23b	15.85c
Metribuzin at 0.5 kg/fad.	5.5e	80.9h	61.70i	23.15j	18.93g
Diphenamide at 1.5 kg/fad.	2.3a	59.6b	42.55bc	16.88de	15.35b
Tridex at 1.5 L/fad.	4.2cd	73.9f	51.23fg	18.65g	18.15f
Phenisophem at 1.0 L/fad.	3.2b	64.5d	45.73cde	17.40ef	15.95c
Linuron + Butralin Mix. *	4.6d	75.9fg	53.03g	19.73h	18.63g
Linuron + Oxadiazon	3.6bc	61.5bcd	45.68cde	16.63d	17.23d
Linuron + Metribuzin	5.1d	79.9h	59.15i	21.55i	18.88g
Linuron + Diphenamido	2.8b	63.6cd	42.45b	17.55ef	16.05c
Linuron + Tridex	5.6e	78.0gh	55.98h	22.68j	18.80g
Linuron + Phenisophem	3.4bc	60.8bc	46.78de	15.73c	15.63bc
Hoeing	3.8c	68.5e	48.48ef	17.50ef	17.08d
Control	2.3a	44.9a	33.48a	11.78a	13.98a

* Mixture rates were half of those of the individual herbicide rates.
Means for each character followed by the same alphabetical letters were not statistically different at the 5% level.

Table (5): Effect of some weed control treatments on seed yield, biological yield and number of plants per faddan.
(Combined analysis of 1979 and 1980 experiments).

Weed control treatments	Biological yield kg/ fad.	No. of plants/ fad.	Seed Yield kg/fad.
Linuron at 1.0 kg/fad.	4600ef	79440i	1375.4ef
Butralin at 2.0 L/fad.	4138de	66350d	1297.7d
Oxadiazon at 2.0 L/fad.	4380e	83500j	1385.6f
Metribuzin at 0.5 kg/fad.	3460c	43450a	771.6b
Diphenamide at 1.5 kg/fad.	3412c	70850e	1158.0c
Tridex at 1.5 L/fad.	5100g	74400fg	1330.7d
Phenisopham at 1.0 L/fad.	3908d	78850hi	1341.4de
Linuron + Butralin Mix. *	5476h	76550g	1417.8fg
Linuron + Oxadiazon	4792f	79900i	1487.4h
Linuron + Metribuzin	3120b	72400ef	1585.1i
Linuron + Diphenamide	3870d	71300e	1171.1c
Linuron + Tridex	4534ef	57750b	1395.9fg
Linuron + Phenisopham	4598ef	78700h	1433.9g
Hoeing	4398e	71800ef	1330.4d
Control	2310a	61500c	586.1a

* Mixture rates were half of those of the individual herbicide rates.
Means for each character followed by the same alphabetical letters were not statistically different at 5% level.

With regard to the number of plants/fed., results in Table (5) show that oxadiazon at 2.0 L./fed. was the best treatment and differed significantly as compared with all other treatments. Oxadizon was followed by linuron, phenisopham and linuron + oxadiazon, hoeing, diphenamide, linuron + metribuzin and linuron + oxadiazon, hoeing, diphenamide, linuron + metribuzin and linuron + diphenamide mixtures which did not differ significantly from each other. The increases in number of plants per fed. due to these mentioned treatments were 16.8, 15.2, 17.7 and 15.9 and 15.9% respectively compared to the un-weeded treatment. Similar results were reported previously by Johnson (1971), who stated that linuron had no effect on plant stands, while Clarlaus (1977), indicated that linuron at conc. of 0-40 ppm had no significant effect on soybean germination.

Concerning the biological yield per feddan, which was affected by soybean growth and number of plants, the data in Table (5) indicate that all weed control treatments increased the biological yield significantly as compared to un-weeded treatment. This result may be due to controlling the weeds and reduction of the determinental effect from weed competition. The best treatment which gave highest biological yield was linuron + butralin.

It differed significantly with other treatments and was followed by tridex at 1.5 L./fed. In this connection, Malyshev (1976), reported that linuron at 3.0 kg/ha resulted in 1.64 t fresh fodder/ha. compared with respectively yields of 1.67 t/ha. with 2 hand weeding and 1.13 t/ha without weed control. Roshdy (1979), found that all weed control treatments studied increased the biological yield of soybean per unit area compared with that obtained from un-weeded treatment.

3- Protein and oil percentage in soybean seeds:

Results in Table (6) reveale clearly that some of weed control treatments under investigation increased both protein and oil percentage significantly, but other treatments showed no effect. The highest increases in protein percentage were recorded with linuron-butralin mixture, phenisopham, diphenamide and butralin. Similar increases in protein percentage were achieved with hoeing treatment which reached 10.5% of the control treatment. Data presented in Table (6) reveale that the effect of the studied weed control treatments on oil percentage was similar to that of protein percentage with some exceptions.

Table (6): Effect of some weed control treatments on protein and oil content of soybean seeds.
(Combined analysis of 1979 and 1980 experiments).

Weed control treatments	% protein	% oil	Protein yield /Fad. in kgs.	Oil yield/ Fad in kgs.
Linuron at 1.0 kg/fad.	37.68bc	21.88cde	518.24	300.93
Butralin at 2.0 L/fad.	38.55c	20.63abc	500.24	267.71
Oxadiazon at 2.0 L/fad.	34.13a	22.13de	472.90	306.63
Metribuzin at 0.5 kg/Fad.	36.71b	22.00cde	283.24	169.75
Diphenamide at 1.5 kg/fad.	38.57c	20.63abc	446.64	262.10
Tridex at 1.5 L/fad.	36.68b	22.38de	488.10	297.81
Phenisopham at 1.0 L/fad.	38.85c	21.13bcd	521.15	283.44
Linuron + Butralin Mix. *	38.97c	20.38ab	552.53	288.95
Linuron + Oxadiazin	33.82a	21.75cde	503.02	323.50
Linuron + Metribuzin	34.16a	22.88e	541.46	362.67
Linuron + Diphenamide	34.73a	20.38ab	406.72	238.67
Linuron + Tridex	37.85bc	21.00abc	528.34	293.13
Linuron + Phenisopham	36.53b	20.38ab	523.79	292.22
Hoeing	38.53c	22.63	512.61	301.10
Control	34.85a	19.68a	204.23	115.34

* Mixtures rates were half of those of the individual herbicide rates.
Mean for each character followed by the same alphabetical letters were not statistically different at the 5% level.

Table (7): Effect of the interaction between planting methods and some weed control treatments on some characters of soybean (combined analysis of 1979 and 1980 seasons).

Characters / Planting methods / Weed control treatments		No.of brancher per plant		Seed yield per plant in gms.		Weight of 100 seed in gms.		Biological yield per fed. in Kgs.		No. of plants per fed.		Seed yield per fed. in Kgs.	
		Heraty	Afir	Heraty	Afir	Heraty	Afir	Heraty	Afir	Heraty	Afir	Heraty	Afir
Linuron	1.0 Kg/fed.	3.70	3.95	18.15	17.80	17.25	16.60	4790	4230	84200	74800	1440.40	1310.35
Butralin	2.0 L. "	3.75	3.10	19.25	18.10	18.00	17.30	4236	4040	68900	63800	1435.45	1159.85
Oxadiazon	2.0 L. "	3.40	3.15	14.60	13.85	16.05	15.65	4700	4060	85500	81500	1415.30	1355.85
Metribuzin	0.5 Kg "	5.70	5.30	22.55	23.75	19.50	18.35	3940	2960	46900	40000	865.40	677.75
Diphenamide	1.5 Kg "	1.95	2.55	18.00	15.75	15.50	15.20	3416	3410	69400	72300	1255.30	1060.70
Tridex	1.5 L. "	4.25	4.05	19.35	17.95	18.50	17.80	5216	4984	74000	74800	1484.65	1176.70
Phenisopham	1.0 L. "	3.30	3.15	18.15	16.65	16.35	15.55	4190	3624	79600	79700	1483.95	1198.90
Linuron + Butralin mix ¤		4.60	4.35	19.95	19.50	18.85	18.40	5850	5100	79700	73400	1510.65	1325.00
Linuron + Oxadiazon		3.65	3.45	18.15	15.10	17.70	16.75	4940	4646	78300	81500	1490.60	1476.10
Linuron + Metribuzin		5.25	5.00	21.25	21.85	19.30	18.45	5950	4790	78600	66200	1684.78	1485.40
Linuron + Diphenamide		3.05	2.55	18.15	16.95	16.30	15.80	3990	3784	69500	73100	1211.58	1130.60
Linuron + Tridex		5.55	5.60	22.80	22.55	19.25	18.35	4766	4304	59500	56000	1435.10	1356.65
Linuron + Phenisopham		3.65	3.05	16.65	14.80	16.50	14.75	4630	4568	79200	78200	1541.25	1326.50
Hoeing		3.75	3.85	18.00	17.00	17.50	16.65	4680	4116	74800	68800	1400.45	1260.40
Control (un-weeded)		2.10	2.40	12.65	10.90	14.35	13.60	2530	2090	62600	60400	630.55	544.65
L.S.D. 5 % level		0.37		0.79		0.43		288		2500		96.92	

¤ Mixture rates were half of those of the individual herbicide rate.

Concerning both protein yield and oil yield per feddan, data in Table (6) indicate that all weed control treatments incresed to a great extent the protein and oil yield per feddan. These increases amounted to the double amount of the un-weeded concerning protein yield per feddan. Similar results were early reported by Penner and Meggitt (1970), who indicated that trifluralin at the rates of 0.75-1.0 lb/ac. had no effect on the oil content of soybean, Saghir and Bhatti (1972), found that linuron at 0.5-1.0 Kg/ha increased protein and oil yields of soybeans and improved oil quality. Also Singh and Mani (1975), showed that trifluralin (2.0 L.) + vernam (1.0 L.)/ha, increased the protein yield by 4 h kg/ha compared with un-weeded control.

C- Effect of the interaction between planting methods and some weed control treatments:

1- Yield and its components:

Data in Table (7) show that all the studied characters were signifiantly affected by the interaction between planting methods and weed control treatments. The highest increases in the mentioned characters namely, number of plnts and seed yield/plant, seed index, biological yield, number of plants and seed yield/feddan were obtained by using metribuzin alone or the mixture of linuron-metribuzin under heraty planting. Linuron combinations with phenisopham or butralin or oxadiazon were also effective under heraty planting whereas linuron + metribuzin in addition to tridex or phenisopham resulted in favourable effects under afir planting.

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تأثير طرق الزراعة وكفائة المبيدات العشبية على فول الصويا

٢ - المحصول ومكوناته والتركيب الكيماوى

عبدالحميد السيد الدبابي جابر عبداللطيف ساري أحمد رشدى محمد
علي عبد الهادى سالم

أجريت تجربتان حقليتان بمحطة البحوث والتجارب الزراعية بكلية الزراعة بمشتهر في موسمي ١٩٧٩ ، ١٩٨٠ وذلك بغرض دراسة تأثير طريقتين للزراعة (الحراتي والعفير) وبعض المبيدات العشبية ومخاليطها والعزيق علي المحصول ومكوناته والتركيب الكيماوى لبذور فول الصويا صنف كالاند وكانت أهم النتائج المتحصل عليها مايلي :

(١) تفوقت طريقة الزراعة الحراثي علي العفير في معظم الصفات المدروسة وهي عدد ووزن فروق النبات ،ووزن ١٠٠ بذرة ،محصول الفدان من البذور ،المحصول البيولوجي وكذلك محصول الفدان من البروتين والزيت .

(٢) أعطت المقاومة الكيماوية للحشائش زيادة في معظم الصفات المدروسة بالمقارنة بمعاملة الكنترول (بدون مقاومة) .

(٣) كان للتفاعل بين طرق الزراعة والمقاومة الكيماوية للحشائش أثرا معنويا علي صفات عدد أفرع النبات ومحصول النبات من البذور ووزن ١٠٠ بذرة وعدد النبات بالفدان ومحصول الفدان من البذور وكذا المحصول البيولوجي .