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Investigations on Herbicides in Field Crops in Libya

I. Effect of Application Methods of Herbicides on Growth, Yield, Yield Components, and Weeds in Maize (*Zea mays* L.)

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ABSTRACT

The combined effect of three herbicides (AC92,553, Trifluralin, and Dacthal) and three application methods (preplanting soil-incorporated, preemergence, and postemergence) on growth, yield, yield components, and weeds in maize (*Zea mays* L.) was investigated under conditions of Tripoli, Libya, in the 1974 summer season. The preplanting method generally caused a significant detrimental reduction in the percentage of seedling emergence. The pre-and postemergence applications caused slight reductions in this percentage. The three herbicides were similar in their effect upon such percentage. The preplanting method caused a significant reduction in the seedling fresh weight. The herbicides exerted similar effect on this weight. The least seedling height was obtained with the preplanting treatment and the highest with the control.

Several summer annual and perennial weeds showed different modifications in growth as affected by the treatments. In general, the preplanting and preemergence methods significantly reduced the fresh weight of weeds. The herbicides reduced this weight in comparison with the untreated plots.

Generally, the preemergence and postemergence treatments resulted in superior maize yields over the preplanting method. AC92,553 and Trifluralin gave nonsignificant higher yields of ears and grain than that of Dacthal. For example, the grain yield values corresponding to these herbicides were 1.88, 1.99, and 1.61 kg per plot. The lowest significant mean number of ears per plot (3.24) was that of the preplanting method. The length of husked ears and the 1,000-grain weight were not significantly influenced by either the herbicides or the application methods.

According to these results, the following conclusions may be drawn:

1. The recommended application method for AC92,553 and Trifluralin (preplanting soil-incorporated) proved to be injurious to maize growth, yield, and yield components. It may be invalid for weed control in maize under Tripoli conditions.
2. AC92,553 and Trifluralin might be applied for weed control in maize under Tripoli conditions as preemergence and postemergence treatments.

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3. Dacthal may not be suitable because it showed inferior results under the present conditions.
4. Further studies are required to examine the effect of different concentrations of AC92,553 and Trifluralin beside the recommended rates for a satisfactory weed control in maize fields under the Libyan conditions.

INTRODUCTION

Field crop production in the Libyan Arab Republic (L.A.R.) is faced with many obstacles that cause drastic reductions and losses in the national income. Weeds are among these factors. In fact, weeds represent the most important pest interference in agriculture and cause the highest yield losses. There are several reasons for this, one of which is the lack of information about the different methods of weed control.

Weeds may be controlled physically, biologically, or chemically (3,9). In general, the physical methods are the cheapest and the most commonly used, especially in the developing and underdeveloped countries. However, chemical weed control by herbicides may be successful under certain circumstances, as in large agricultural projects.

A very limited number of herbicides have been imported for weed control in L.A.R. Unfortunately, the utilization of these herbicides has been practically restricted to the regions of state-owned projects. Much information is required to reveal suitable application methods and concentrations of herbicides and their influence upon the field crops under Libyan conditions. Herbicides may be applied by three common methods; namely, preplanting, preemergence, and postemergence (9). The choice of any method depends on crop species and herbicide.

Maize (*Zea mays* L.) is one of the new summer cereal crops that may have good prospects under irrigated farming in the Libyan agriculture, according to El-Sharkawy *et al.* (4, 5, 6), as in Kufra and Sarir Projects. However, several broadleaf and grass summer annual and perennial weeds are associated with maize.

Several investigators worked on the chemical weed control in maize. Anton-Smith (2) found that Trifluralin injured maize when incorporated into the soil just before sowing. Shaalan *et al.* (10, 11) found that maize seedlings were very sensitive to the preemergence and postemergence applications of Trifluralin at different concentrations. The reports by Cyanamid International Technical Information (1) and Thomson (13) mentioned that the preferred application of AC92,553 for maize was the preplanting method. The preemergence and postemergence applications were not tested. Thomson (13) reported that Dacthal could be applied by being placed on top of the soil before weed seed germination (preemergence). Dacthal was recommended for vegetable crops. It was not tested in maize.

The present investigation was conducted to achieve the following objectives:

1. The effect of three herbicides on growth, yield, yield components, and weeds in maize under Tripoli conditions.
2. The effect of three application methods of these herbicides on the same measurements. Such effect was compared with that of manual cultivation.

MATERIALS AND METHODS

An experiment was conducted at the Faculty of Agriculture Experimental Farm in the summer season of 1974 at Sidi El Misri, Tripoli. A split-plot experimental design with four replicates was used. The main plots were assigned to the three herbicides,

AC92,553, Trifluralin, and Dacthal. AC92,553 [N-(1-ethylpropyl)-2,6-dinitro-3,4-xylidine] is a dinitro aniline compound that can be used as a selective preplanting soil-incorporated herbicide. It was recommended (13) to be applied at the rate of 3.0 l/ha. It is formulated in an emulsified concentrate of 33.0% active ingredient. Trifluralin (alpha, alpha, alpha, Trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine) is a dinitro analine compound used as a selective preplanting soil-incorporated or preemergence herbicide. The recommended rate of application is 2.0 l/ha, according to Thomson (13). It is formulated either in an emulsified concentrate or granules of five percent active ingredient. The former formulation was used in this work. Dacthal (dimethyl tetrachloroterephthalate) is a phthalic acid compound used as a selective preemergence herbicide. It may be applied at the rate of 7.2 kg/ha, as was mentioned by Thomson (13). It is formulated as wettable powder of 50 and 75% active ingredient and granules of five percent active ingredient. The wettable powder was used here. These recommended rates of herbicides were used in the present work.

The sub-plots included the three application methods, viz. preplanting soil-incorporated, preemergence, and postemergence, one manual cultivation, and control (no cultivation or herbicidal application). Sub-plot size was 3.0 m × 3.0 m = 9.00 sq. m. The concentrations of the herbicides used in this experiment were 4.8 and 3.2 cc per plot (for AC92,553 and Trifluralin, respectively) and 11.5 g per plot (for Dacthal). Each herbicide was mixed with 1,800 cc water per plot. The herbicides were sprayed separately by a knapsack motor-operated sprayer. The preplanting treatment was applied on 9 April just before planting. The herbicides were incorporated into the soil by a manual hoe to a depth of about 5–7 cm. The preemergence treatment was applied on soil surface soon after planting and before irrigation. This was done on 10 April. The postemergence treatment was applied on 5 May when maize plants were one month old at the 4 to 5 leaf stage, while the weeds were at the 2 to 3 leaf stage. The single manual cultivation was completed on 9 June by using the hoe. The remaining treatment was concerned with the control plots in which neither herbicides nor cultivation were applied.

The experimental field was previously planted with Egyptian clover. The imported open-pollinated maize cultivar, American Early, was used. Seeds were sown on 10 April at the rate of 40 kg/ha. Each plot included six rows spaced at 60 cm apart. Ten hills were planted per row at 30 cm spacings with two maize seeds per hill.

All plants were similarly fertilized with two equal increments of the composite fertilizer (N:12 — P:24 — K:12) each of which was applied at the rate of 500 g per plot. The two applications were done on 26 April and 30 May. On 25 June, 500 g per plot of ammonium sulphate (20.5% N) were added to stimulate plant growth. Plots were irrigated by sprinklers whenever needed. Plots were thinned five weeks after planting so that one vigorous maize plant was left per hill. Sevin was sprayed twice at the rate of 2 kg/ha and once at the rate of 3 kg/ha to control maize insects, especially the stem borers.

The percentage of maize seedling emergence was calculated before thinning on the basis of the number of hills in which the seedlings sprouted and emerged above the soil surface. Such percentage was derived as follows:

$$\text{Percentage of seedling emergence} = \frac{\text{Number of emergent hills per plot}}{60 \text{ (total number of hills per plot)}} \times 100$$

Ten five-week old seedlings were randomly chosen from thinned plants in each plot to determine the average seedling fresh weight in grams per plant. The average seedling

height was determined by measuring the plant height of the same ten seedlings from the base to the top of the stalks. These seedlings were placed in an electric oven for 24 hours at 105°C after which the average seedling dry weight in grams per plant was recorded.

All weed species were cut at the soil surface ten days before maize harvesting by using manual sickles. The total fresh weight of weeds in grams per plot was recorded. Moreover, the weed species were thoroughly identified on a visual observation basis.

The maize yield of ears was harvested by hand on 22 August. The total number of husked ears per plot was counted. Ten husked ears were randomly chosen from each plot to measure the average ear length in centimeters. Few plots produced less than ten ears upon which this average was calculated. The ears were manually dehusked and weighed in kilograms and adjusted on the 15.5% moisture basis. These ears were then shelled by an experimental sheller to determine the average grain yield per plot. The 1,000-grain weight in grams was determined by using random grains from shelled ears.

Data on the total fresh weight of weeds and the number of ears per plot were transformed by getting the values of $\sqrt{X + 1}$ before statistical analysis. Other observations were statistically analyzed by the usual methods of the analysis of variance, as given by Snedecor (12), Le Clerg *et al.* (7), and Li (8).

RESULTS AND DISCUSSION

The results of this experiment were summarized in Tables 1 to 10 in which the average values and general means of the ten estimations are presented.

I. Seedling emergence percentage

The effect of herbicides and methods of application on the average percentage of maize seedling emergence is indicated in Table 1. This average was very significantly influenced by the application methods. The highest significant general mean was that of manual cultivation, control, and postemergence treatments (91.67, 90.56, and 86.25 percent, respectively). This was expected because these three treatments were not applied with herbicides. The preplanting soil-incorporated application gave the lowest significant mean (37.50%). On the other hand, the preemergence method did not significantly reduce seedling emergence as compared with that of the postemergence treatment, although the former percentage was significantly lower than those of

Table 1 Average percentage of maize seedling emergence as treated with different herbicides and methods of application (Tripoli, 1974)

	Methods of application					
Herbicides	Preplanting incorporated	Preemergence	Postemergence	Manual cultivation	Control	Mean
AC92,553	34.17	78.75	94.17	88.34	88.75	76.84
Trifluralin	42.08	75.42	81.25	91.67	91.25	76.34
Dacthal	36.25	86.67	83.34	95.01	91.67	78.59
Mean[a]	37.50	80.28	86.25	91.67	90.56	—

[a] L.S.D. (for methods): (0.05) = 10.12; (0.01) = 13.57%.

manual cultivation and control. Consequently, it was concluded that the preplanting soil-incorporated application generally caused a detrimental effect on maize seedlings which might reduce the final yield. This was true for the three herbicides under study. This may lead to another conclusion that the recommended method of applying AC92,553 and Trifluralin, according to Thomson(13), might be invalid for maize in Tripoli since a high percentage of seedlings was destroyed (57.92 for Trifluralin and 65.83 for AC92,553). However, the preemergence and postemergence applications of both herbicides could be used, if they were effective in weed control.

In the case of Dacthal, results indicated that the recommended method of application (preemergence) caused a slight injury to seedlings. This result agreed with that of Thomson (13).

Data of Table 1 also indicate that the three herbicides were comparable in their effect on the seedling emergence percentage. The general mean values were 76.84, 76.34, and 78.59% for AC92,553, Trifluralin, and Dacthal, respectively. There was no significant interaction between the herbicides and methods of application.

In general, the preplanting method resulted in several morphological abnormalities to maize seedlings. In the case of AC92,553, several symptoms were noticed, such as large burning areas of primary leaves, leaf twisting, severe wrinkling of leaves, and retardation of growth in few to many hills. These observations agreed with those mentioned in the literature (1). The same method in the case of Trifluralin resulted in several injuries, such as severe chlorosis, modifications of primary leaves, leaf twisting, and weak growth. Similar observations were reported by Shaalan and El Khishen (10) and Anton-Smith (2). Dacthal caused similar symptoms when applied by this method as was mentioned by Thomson (13).

II. Seedling fresh and dry weights

Results of the average fresh and dry weights are given in Tables 2 and 3. The general mean of fresh weight was significantly influenced by the application methods. The preemergence and postemergence applications exerted a similar effect on such mean to that of manual cultivation and control. On the other hand, the preplanting method caused a significant reduction in the fresh weight of seedlings, although the difference was not significant between this method and the preemergence treatment. The corresponding mean values of fresh weight for both methods were 17.65 and 27.70 g per plant. Similar results were obtained for the average values within the herbicides.

Table 2 Average fresh weight in grams per plant of maize seedlings as treated with different herbicides and methods of application (Tripoli, 1974)

	Methods of application					
Herbicides	Preplanting incorporated	Preemergence	Postemergence	Manual cultivation	Control	Mean
AC92,553	12.43	25.78	42.63	29.33	30.80	28.19
Trifluralin	30.10	24.20	21.60	33.53	36.30	29.15
Dacthal	10.43	33.13	38.43	34.58	32.18	29.75
Mean[a]	17.65	27.70	34.22	32.48	33.09	—

[a] L.S.D. (for methods): (0.05) = 11.76 g/plant

Table 3 Average dry weight in grams per plant of maize seedlings as treated with different herbicides and methods of application (Tripoli, 1974)

	Methods of application					
Herbicides	Preplanting incorporated	Preemergence	Postemergence	Manual cultivation	Control	Mean
AC92,553	2.70	7.03	10.2	5.80	8.98	6.94
Trifluralin	4.25	5.53	7.18	7.33	7.53	6.36
Dacthal	4.93	5.93	8.38	5.60	9.13	6.79
Mean	3.96	6.16	8.58	6.24	8.54	—

Data of Table 2 further indicate that the three herbicides showed similar effect upon the seedling fresh weight. The mean values were 28.19, 29.15, and 29.75 g per plant for AC92,553, Trifluralin, and Dacthal, respectively. There was no significant interaction between the herbicides and application methods. Such results were similar to those of seedling emergence.

Table 3 shows that neither herbicides nor application methods exerted a significant effect on the seedling dry weight. Such result differed from that of fresh weight, although the preplanting method gave the lowest values of dry weight (2.70, 4.25, and 4.93 g per plant in respect to AC92,553, Trifluralin, and Dacthal). This means that herbicides changed the water content of maize seedlings, hence the significant results were obtained only with the fresh weight. Shaalan and El Khishen (10) reported dissimilar results. They found that the preemergence treatment of Trifluralin significantly reduced the dry weight of 15- and 30-day old maize seedlings.

III. Seedling height

Results on the average maize seedling height are summarized in Table 4. The application methods very significantly affected the seedling height, especially the preplanting method for which the general mean value was 24.13 cm. This might explain why the herbicides significantly reduced the fresh weight besides changing the water content in maize seedlings, in the case of preplanting application. Other results were similar to those of the fresh weight (Table 2). These findings differed from those reported by

Table 4 Average maize seedling height in centimeters as treated with different herbicides and methods of application (Tripoli, 1974)

	Methods of application					
Herbicides	Preplanting incorporated	Preemergence	Postemergence	Manual cultivation	Control	Mean
AC92,553	21.05	29.85	37.75	34.88	35.68	31.84
Trifluralin	31.60	28.48	29.50	38.68	37.15	33.08
Dacthal	19.73	32.10	36.00	36.60	38.65	32.62
Mean[a]	24.13	30.14	34.42	36.72	37.16	—

[a] L.S.D. (for methods): (0.05) = 7.13; (0.01) = 9.56 cm.

Shaalan and El Khishen (10) who found that the effect of Trifluralin was pronounced on maize seedling height when applied as a preemergence treatment.

IV. Fresh weight of weeds

Weed growth was variably distributed among the experimental plots due to the effect of herbicides and application methods. A general survey was made for the weed species grown because it was difficult to identify the individual weed species per plot. The surveyed weed species were either summer annuals or perennials. The summer annuals were sedge (*Cyperus difformis*), beardgrass (*Polypogon monspeliensis*), cocklebur (*Xanthium spinosum*), and purslane (*Portulaca oleracea*). The perennial weeds were bermudagrass (*Cynodon dactylon*) and field bindweed (*Convolvulus arvensis*). Visual observation indicated that the weed plants were abnormally affected by the treatments. This was expected as was mentioned by Muzik (9). Malformations varied from slight detrimental effects to a complete death of weeds.

Table 5 Average fresh weight of weeds in grams per plot grown in maize treated with different herbicides and methods of application at Tripoli, 1974 (Transformed data)

	Methods of application					
Herbicides	Preplanting incorporated	Preemergence	Postemergence	Manual cultivation	Control	Mean[a]
AC92,553	1.33	1.07	1.39	1.56	1.45	1.36
Trifluralin	1.53	1.14	1.53	1.38	1.68	1.45
Dacthal	1.17	1.35	1.32	1.69	1.87	1.48
Mean[b]	1.34	1.19	1.41	1.54	1.66	—

[a] L.S.D. (for herbicides): (0.05) = 0.06; (0.01) = 0.10 g/plot.
[b] L.S.D. (for methods): (0.05) = 0.27 g/plot.

Data in Table 5 reveal that the average fresh weight of weeds was significantly and very significantly affected by the application methods and herbicides in this order. As expected, the significant heaviest fresh weight of weeds was obtained from the control and manual cultivation plots due to dense weed population and the absence of herbicidal action. A high weed population was also obtained with the postemergence treatment, although its mean value (1.41) was not significantly different from that of either the control (1.66) or manual cultivation (1.54). In general, the preplanting and preemergence methods significantly reduced the fresh weight of weeds, although the differences in their mean values were not significant from that of the postemergence application. This indicates that the first two methods proved to be more effective in weed control than the latter one. However, the results of this research (Tables 1, 2, 3) showed that maize seedlings were injured by the preplanting application of Trifluralin and AC92,553. This confirms the previous conclusion that these two herbicides might be applied either preemergence or postemergence to give a satisfactory weed control. These results disagreed with Thomson's report (13). Furthermore, Table 5 shows that, in general, the herbicides reduced the fresh weight of weeds as compared with the untreated plots. This suggests the possibility of using the herbicide, AC92,553, for weed control in maize fields in the Tripoli area as preemergence and postemergence treatments.

V. Maize yield and its components

The results of these determinations are summarized in Tables 6 to 10. Data in Table 6 show that the average yield of ears was significantly affected by the application methods. In general, the postemergence and preemergence treatments resulted in superior yields over the preplanting method, although not significantly. Their respective mean values were 2.60, 2.23, and 1.80 kg per plot. This indicates that the preplanting application, recommended for AC92,553 and Trifluralin (13), caused an inferior yield of maize. Therefore, it was concluded that this method might not be used for weed control in maize, as stated earlier. The herbicides exerted a similar effect upon the average yield of ear, except that AC92,553 and Trifluralin resulted in a nonsignificant higher yield than that of Dacthal. Results of Table 7 are similar to those of Table 6.

It is obvious in Table 8 that the average number of maize ears was very significantly influenced by the application methods. The lowest mean number of ears (3.24) was that of the preplanting method and the highest mean number (5.02) was that of the manual cultivation. The preemergence and postemergence treatments gave a significantly higher mean number of ears (4.06 and 4.35, respectively) than that of the preplanting method. Table 8 further indicates that the herbicides did not significantly affect the average number of ears.

The average length of husked ears and the 1,000-grain weight were not significantly

Table 6 Average yield in kilograms per plot of maize ears (grain and cob) as treated with different herbicides and methods of application (Tripoli, 1974)

	Methods of application					
Herbicides	Preplanting incorporated	Preemergence	Postemergence	Manual cultivation	Control	Mean
AC92,553	1.63	2.52	3.51	2.79	2.24	2.54
Trifluralin	2.37	2.34	2.22	3.48	2.99	2.68
Dacthal	1.40	1.85	2.08	3.07	2.43	2.16
Mean[a]	1.80	2.23	2.60	3.11	2.55	—

[a]L.S.D. (for methods): (0.05) = 0.84 kg/plot.

Table 7 Average grain yield in kilograms per plot of maize as treated with different herbicides and methods of application (Tripoli, 1974)

	Methods of application					
Herbicides	Preplanting incorporated	Preemergence	Postemergence	Manual cultivation	Control	Mean
AC92,553	1.21	1.87	2.61	2.07	1.66	1.88
Trifluralin	1.75	1.73	1.65	2.58	2.23	1.99
Dacthal	1.04	1.37	1.54	2.28	1.80	1.61
Mean[a]	1.33	1.65	1.93	2.31	1.90	—

[a]L.S.D. (for methods): (0.05) = 0.62 kg/plot.

Table 8 Average number of maize ears per plot as treated with different herbicides and methods of application at Tripoli, 1974. (Transformed data)

	Methods of application					
Herbicides	Preplanting incorporated	Preemergence	Postemergence	Manual cultivation	Control	Mean
AC92,553	2.98	4.41	5.08	4.65	4.45	4.31
Trifluralin	3.71	3.75	3.61	5.12	5.44	4.33
Dacthal	3.04	4.03	4.36	5.30	4.76	4.30
Mean[a]	3.24	4.06	4.35	5.02	4.88	—

[a] L.S.D. (for methods): (0.05) = 0.61; (0.01) = 0.82 ears/plot.

Table 9 Average length of husked maize ears in centimeters as treated with different herbicides and methods of application (Tripoli, 1974)

	Methods of application					
Herbicides	Preplanting incorporated	Preemergence	Postemergence	Manual cultivation	Control	Mean
AC92,553	15.90	14.85	17.65	16.28	15.75	16.09
Trifluralin	18.28	16.90	15.70	17.10	15.80	16.76
Dacthal	16.40	14.60	15.68	15.28	16.28	15.69
Mean	16.93	15.45	16.34	16.22	15.94	—

Table 10 1,000-grain weight in grams of maize as treated with different herbicides and methods of application (Tripoli, 1974)

	Methods of application					
Herbicides	Preplanting incorporated	Preemergence	Postemergence	Manual cultivation	Control	Mean
AC92,553	382.5	307.9	404.6	350.1	394.9	368.0
Trifluralin	436.4	343.6	404.6	353.1	377.4	383.0
Dacthal	367.8	342.5	385.4	397.6	414.9	381.6
Mean	395.6	331.3	398.2	366.9	395.7	—

affected by either the application methods or the herbicides, as shown in Tables 9 and 10. The analysis of variance indicated no significant interaction between the herbicides and the application methods for all measurements of maize yield and its components.

The results of this investigation suggest that further studies are needed to examine the effect of different concentrations of AC92,553 and Trifluralin beside the recommended rates for satisfactory weed control in maize fields under Libyan conditions.

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دراسات على مبيدات الحشائش في المحاصيل الحقلية بالجمهورية العربية الليبية

١ – أثر طرق اضافة المبيدات على النمـــو والمحصول ومكونات المحصول والحشائش في الذرة الشامية (السبول) .

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المستخلص

درس التأثير المشترك لثلاثة مبيدات للحشائش (اى . سى ٩٢٥٥٣ ، تريفلان ، داكثال) وثلاث طرق للاضافة (قبل الزراعة مـع الخلط بالتربة ، قبل تكشف البادرات ، بعـــد تكشف البادرات) على النمو والمحصول ومكونات المحصول في الذرة الشـامية (السـبول) وكذا التأثير على الحشائش . وقد تمت الدراسة بمزرعة كلية الزراعة بجامعة طرابلس بسيدي المصري في موسم ١٩٧٤ . وتتلخص نتائج الدراسة في النقاط الآتية :–

١ – انخفضت معنويا النسبة المئوية للتكشف والوزن الأخضر والارتفاع للبادرات عنـــد اضافة المبيدات قبل الزراعة ، وكان الانخفاض طفيفا بالنسبة للمعاملتين « قبـل وبعد التكشف » . وقد تساوي تأثير المبيدات الثلاثة على هذه القياسات .

٢ – ظهرت تحورات مختلفة على بعض الحشائش الحولية الصيفية والمعمرة نتيجة للمعاملات ، وبصفة عامة انخفض معنـويا الوزن الأخضر للحشائش بالمعاملتين « قبل الزراعة وقبل التكشف » . كما أدت اضافة المبيدات الثلاثة إلى انخفاض هذا الوزن

٣ – تفوق عموماً محصول الذرة الشامية (الكيزان والحبوب) نتيجة للمعاملتين « قبل وبعد التكشف » على مثيله في حالة المعاملة « قبل الزراعة » . وقد أنتج المبيدان « اى . سى ٩٢٥٥٣ ، تريفلان » محصولا أعلى منـه في حالة المبيـد « داكثال » . ولم يتأثر كل من طول الكيزان ووزن الألف حبة بالمبيدات أو طرق الاضافة .

وعلى ضوء هذه النتائج أمكن التوصل الى الاستنتاجات الآتية :-

١ - لا يفضل استخدام الطريقة الموصي بها لاضافة المبيدين « اي . سي ٩٢٥٥٣ ، تريفلان » وهي قبل الزراعة مع الخلط لمقاومة الحشائش النامية (السبول) تحت ظروف طرابلس.

٢ - يمكن اضافة المبيدين « اي . سي ٩٢٥٥٣ ، تريفلان » قبل أو بعد التكشف لمقاومة الحشائش في الذرة الشامية (السبول) تحت ظروف طرابلس . ولا ينصح باستخدام المبيد « داكثال » لعدم فاعليته .

٣ - الاستمرار في الدراسات لمعرفة أثر التركيزات المختلفة للمبيدين « اي . سي ٩٢٥٥٣ ، تريفلان » بجانب التركيزات الموصي بها .