# EFFECT OF NITROGEN FERTILIZATION AND WEED CONTROL METHODS ON ANNUAL WEEDS AND YIELD OF SUNFLOWER (*HELIANTHUS ANNUUS* L.)

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***Abstract***

Two field experiments were conducted at Sakha Agricultural Research Station during 2000 and 2001 summer seasons to investigate the effect of nitrogen fertilization and weed control treatments on annual weeds and sunflower growth and yield.

Results indicated that as nitrogen fertilization increased up to 40 kg N / fed., the fresh weight of total annual weeds significantly increased. In the same respect, nitrogen rate had a significant effect on plant height, dry weight of sunflower plant and sunflower seed yield during both seasons. Application of butralin (Amex 48% EC) at 1200 g a.i/fed and oxadiargyl (Topstar 80% WG) at 160 g a.i./fed. surpassed other weed control treatments and reduced fresh weight of total annual weeds by 96.3 and 90.6% and by 88.9 and 73.7%, respectively in both seasons. Weed control treatments did not affect plant height, meanwhile it significantly affected the dry weight of sunflower plant and sunflower seed yield. Hence, butralin and oxadiargyl achieved the highest dry weight and increased seed yield by 595 and 536 and by 338 and 229 kg/fed, respectively in both seasons as compared to the weedy check. The interaction of nitrogen rate and weed control treatments was statistically significant on total annual weeds, dry weight of sunflower plants and sunflower seed yield. Hence, butralin or oxadiargyl achieved the lowest fresh weight of annual weeds, the highest dry weight of sunflower plant and the highest seed yield per fed. as compared to the unweeded check with the high nitrogen level. Therefore, to maximize the benefit from nitrogen fertilization, it is necessary to eliminate weed competition by using butralin, oxadiargyl or hand hoeing.

## INTRODUCTION

Sunflower (*Helianthus annuus* L.) is one of the most important sources of edible oil production in the world. Associated weeds with sunflower are considered as a major problem in sunflower fields, thus sunflower production is seriously affected by weed competition. Upadhyay (1984) pointed that one of the major

constraints to higher production in oilseed crops is the heavy infestation of weeds and their ineffective weed control management. The fields of oilseed crops should be kept free from weeds for at least 40 to 45 days after sowing. This may be done either by cultural practices, herbicides application or by both methods. Robinson *et al.* (1967) pointed that sunflower competed well with weeds but failed to develop vegetative ground cover sufficiently in early growing stages to prevent weeds establishment. Weed competition account for considerable reduction in sunflower seed yield varying from 33 to 81% as reported by Singh and Singh (1978), Nalewaja *et al* (1982), Gil *et al* (1984), Tel *et al.* (1991), Kholosy *et al* (1995) and Ibrahim (2001).

Optimum yield of sunflower was obtained when weed free condition was maintained for the first 45 days after sowing. Warmington (1981) reported that sunflower would produce maximum yields only if it was grown without competition from weeds. Failure to control weeds during the first six weeks of the crop's life frequently results in severe loss of yields.

The harmful influence of weeds must be eliminated from the period of emergence until the end of vegetation. Weed control within the critical period of competition could reduce weed damages. Kosovac (1981) indicated that weeds of medium intensity negatively influence both development and yield of sunflower. If weed control was carried out late, the yield would be reduced about 10%.

Hand hoeing is still a traditional method for weed control in Egypt but the scarcity in the hand – labour is becoming a problem. Concerning the effectiveness of hand hoeing for weed control in sunflower fields, Gautam *et al.* (1975) pointed that hand weeding twice reduced the population of weeds by 62.1% as compared with the unweeded treatment in sunflower fields. Mostafa and Hassanien (1983) found that one hoeing at 21 days from sowing sunflower significantly increased head diameter, 100-seed weight, seed yield per plant and seed yield per fed. by 10.1, 11.5, 31.5 and 42.4% respectively, over the unweeded. Shaban *et al.* (1985) found that hand hoeing twice after 21 and 45 days from sowing sunflower decreased the dry weight of annual grasses by 60.8 and 57.7% after 30 days from sowing and by 76.5 and 83.9% after 45 days from sowing, respectively, in 1981

and 1982 seasons as compared with that of the unweeded check. Ibrahim and Abusteit (1988) found that two cultivations at 30 and 55 days from sowing decreased the fresh weight of annual grasses in sunflower by 80 and 71% in 1985 and 1986 seasons, respectively.

Efficient herbicides in sunflower solve weed problem efficiently and ensuring significant increase of yield and their application allows full mechanization of the production process. Herbicides offer a vital solution in growing sufficient quantities of sunflower especially in the case of labor shortage. Warmington (1981) found that use of pre-emergent herbicides, as pendimethalin in sunflower fields should be considered when it is known, or expected, that the soil contain large numbers of weed seeds. Patel *et al.* (1994) found that oxyfluorfen at 0.3 kg a. i. / ha. as pre-emergence after 4 days from sowing and hand weeding twice (20 and 40 days after sowing) reduced the dry weight of total weeds by 74.3 and 66.7%, respectively, as compared with that of weedy check. Poonguzhalan *et al.* (1996) reported that sunflower yield increased by pendimethalin or hand hoeing operation. Giri *et al.* (1998) found that pendimethalin as pre-emergence at the rate of 1.5 kg /ha. and oxyfluorfen as per-emergence at 0.125 kg / ha. increased sunflower seed yield by 35.7 and 36.2 %, respectively. Abo Ghazala *et al* (2001) found that butralin + one hand hoeing were effective in controlling annual weeds and increasing seed yield of sunflower.

In respect to the effect of nitrogen fertilization on sunflower and associated weeds, Schatz *et al* (1999) indicated that the application of excessive amounts of nitrogen fertilizer might reduce profitability and create groundwater pollution hazards. Determination of the optimum rate of fertilizer is necessary to maximize profit. However, results sometimes show no yield benefit from N fertilization of sunflower. Nitrogen fertilization not only increase yield, but also improve the N-status of soil for the next crop in the rotation. Sunflower yield increased slightly with the increases in N fertilization, but differences were not statistically significant. Tanaka and Anderson (1999) reported that controlling weeds in sunflower is a challenge to producers because of few herbicide options and rapid development of herbicide resistant weeds. Cultural systems are needed that improve sunflower's competitiveness with weeds.

Thus the present investigation was undertaken to evaluate the effect of nitrogen fertilization rates, some weed control treatments and their interaction on annual weeds as well as to investigate their effect on sunflower growth and seed yield.

## MATERIALS AND METHODS

Two field experiments were conducted at Sakha Agricultural Research Station during 2000 and 2001 summer season to investigate the interaction between some nitrogen rates and weed control treatments and their effects on annual weeds, growth and yield of sunflower. A split-plot design with four replications was used. Nitrogen rates (0, 20 and 40 kg N/fed.) were distributed randomly in the main plots, meanwhile weed control treatments were allocated in the sub-plot. The sub-plot area was 12 $m^2$ (five rows, 4 m long, 60 cm between ridges and 20 cm between hills). Weed control treatments were as follow:

1- Amex (butralin 48% EC) at the rate of 1200 g a.i. / fed. applied pre-emergence.
2- Topstar (oxadiargyl 80% WG) at the rate of 160 g a.i. /fed. applied pre-emergence.
3- Hand hoeing twice at 30 and 45 days after sowing.
4- Weedy check.

Sunflower variety was hybrid (Vidoc). Sunflower was sown at June 15$^{th}$ in both seasons. Nitrogen fertilization rates were added in equal two doses before the first and second irrigation. All other agronomic practices were carried out as recommended package. All used herbicides were applied by using knapsack sprayer.

Weeds from 1 $m^2$ were hand pulled from each plot, counted, classified and weighed 60 days after sowing and the following data were recorded:

1-Fresh weight of annual grassy weeds ($g/m^2$).
2- Fresh weight of broad leaf-weeds ($g/m^2$).
3- Fresh weight of total annual weeds ($g/m^2$).

At harvest, the following data on sunflower were taken:

1- Plant height (cm) average of 20 plants per plot.

2- Dry weight of plant leaves (g) average of 20 plants per plot.

3- Dry weight of sunflower plant (g) average of 20 plants per plot.

4- Sunflower seed yield (kg/fed).

All data were subjected to statistical analysis as described by Snedecor and Cochran (1974).

**Results and Discussion**

**I. Effect of nitrogen fertilization:**

**I. 1. On annual weeds:**

Data at Table (1) revealed that as nitrogen rate increased, the fresh weight of total annual weeds significantly increased. In 2000 season, results indicated that increasing nitrogen to 20 and 40 kg N/fed. increased fresh weight of grassy, broad leaf and total annual weeds by (43 and 88%), (25.5 and 72.7%) and by (31.6 and 80.4%), respectively as compared to zero nitrogen level.

Table 1. Effect of nitrogen rates on the fresh weight of grassy, broad leaf and total annual weeds ($g/m^2$) during 2000 and 2001 seasons.

| Nitrogen rates (kg N / fed) | 2000 season | | | 2001 season | | |
|---|---|---|---|---|---|---|
| | Grassy weeds ($g/m^2$) | Broad leaf weeds ($g/m^2$) | Total annual Weeds ($g/m^2$) | Grassy weeds ($g/m^2$) | Broad leaf weeds ($g/m^2$) | Total annual Weeds ($g/m^2$) |
| 0 | 79 | 172 | 250 | 218 | 563 | 781 |
| 20 | 113 | 216 | 329 | 367 | 726 | 1094 |
| 40 | 149 | 297 | 451 | 386 | 934 | 1320 |
| LSD | 13.9 | 15.1 | 27.9 | 121.1 | 249.1 | 242.0 |

Also, in 2001 season results indicated that the fresh weight of annual weeds increased as nitrogen rate increased, where the use of nitrogen at the rate of 20 and 40 kg N/fed. increased fresh weight of grassy, broad leaf and total annual weeds by (68 and 77%), (29 and 65.9%) and by (40 and 69%), respectively as compared to zero nitrogen. Similar results were obtained by Ibrahim (2001).

**I. 2. On sunflower growth and yield components:**

Data of 2000 season revealed that nitrogen rate significantly increased plant height, hence the use of nitrogen at the rate of 20 and 40 kg N/fed. increased the highest plant by 3.8 and 10.5%, respectively as compared to zero nitrogen, meanwhile there was no significant effect as a result of nitrogen rates on plant height in the second season as shown in Table (2).

Data of 2001 season revealed significant effect of nitrogen rates on the dry weight of leaves per plant. Where, nitrogen rate at 20 and 40 kg N/fed. recorded 8.3 and 18.8% increase in the dry weight of plant leaves, respectively as compared to zero nitrogen level (table 2).

Data of the two seasons revealed that nitrogen rates significantly affected the dry weight of sunflower plant. Where, nitrogen rate at 20 and 40 kg N/fed. increased the dry weight per plant by (7.9 and 13.6%) and by (1.5 and 8.9%), respectively in 2000 and 2001 seasons as compared to zero nitrogen level (Table2).

Table 2. Effect of nitrogen rates on sunflower growth and yield components during 2000 and 2001 seasons.

| Nitrogen rates (kg N/fed) | 2000 season | | | | 2001 season | | | |
|---|---|---|---|---|---|---|---|---|
| | Plant height (cm) | Dry wt. of plant leaves (g) | Dry wt. of plant (g) | Seed yield Kg/fed. | Plant height (cm) | Dry wt. of plant leaves (g) | Dry wt. of plant (g) | Seed yield kg/fed. |
| 0 | 103.3 | 24.4 | 55.3 | 747.3 | 90.8 | 18.1 | 48.1 | 635.8 |
| 20 | 107.2 | 26.5 | 59.7 | 887.9 | 92.0 | 19.6 | 48.8 | 698.4 |
| 40 | 114.1 | 28.8 | 62.8 | 939.7 | 99.1 | 21.5 | 52.4 | 775.4 |
| LSD | 4.63 | NS | 2.48 | 20.8 | NS | 0.78 | 2.52 | 28.06 |

Data of the two seasons revealed that nitrogen rates significantly affected seed yield. Hence, seed yield increased as nitrogen rate increased. This was true in both seasons, where the use of nitrogen rate of 20 and 40 kg N/fed. improved sunflower seed yield by (18.8 and 25.7%) and by (9.8 and 21.9%), respectively in

2000 and 2001 seasons as compared to the zero nitrogen level as shown in Table (2). In this concern Schatz et al (1999) indicated that determination of the optimum rate of fertilizer is necessary to maximize profit. Nitrogen fertilization not only increase yield, but also improve the N-status of soil for the next crop in the rotation.

**II. Effect of weed control treatments:**

**II. 1. On annual weeds:**

Data shown in Table (3) revealed that all weeds control treatments significantly reduced fresh weight of grassy, broad leaf and total annual weeds compared to the untreated check during both 2000 and 2001 seasons. Butralin at 1200 g a.i. / fed., oxadiargyl at 160 g a.i. / fed. and hand hoeing twice achieved the highest reduction at both seasons and reduced the fresh weight of annual grassy weeds by 96.3, 92.8 and 80.1%, respectively in 2000 season and 85.4, 78.1 and 45.7%, respectively in 2001 season. Ibrahim and Abusteit (1988) found that two cultivations at 30 and 55 days from sowing decreased the fresh weight of annual grasses in sunflower by 80 and 71% in 1985 and 1986 seasons, respectively.

Butralin at 1200 g a.i. / fed. and oxadiargyl at 160 g a.i. / fed. surpassed the hand hoeing treatment and reduced the fresh weight of broad leaf weeds by (96.3 and 89.5%) and by (90.5 and 71.8%), respectively in the two seasons as compared to the weedy check. Meanwhile hand hoeing reduced fresh weight of broad leaf weeds by 79.5 and 49.3%, respectively in the two seasons as shown at Table (3).

Data revealed that butralin and oxadiargyl recorded the highest reduction of total annual weeds in both seasons, hence, these treatments reduced the fresh weight of total annual weeds by 96.3 and 90.6%, respectively in 2000 season and by 88.9 and 73.7%, respectively in 2001 season, meanwhile hand hoeing recorded 79.8 and 48.3% reduction in the fresh weight of total annual weeds, respectively at both seasons. Gautam *et al.* (1975) pointed that hand weeding twice reduced the population of weeds by 62.1% as compared with the unweeded treatment in sunflower fields. Abo Ghazala *et al* (2001) found that butralin + one hand hoeing were effective in controlling annual weeds and increasing seed yield of sunflower.

Warmington (1981) found that use of pre-emergent herbicides, as pendimethalin in sunflower fields should be considered when it is known, or expected, that the soil contain large numbers of weed seeds.

Table 3. Effect of weed control treatments on fresh weight of grassy, broad leaf and total annual weeds ($g/m^2$) during 2000 and 2001 seasons.

| Weed control treatments | 2000 season | | | 2001 season | | |
|---|---|---|---|---|---|---|
| | Grassy weeds $g/m^2$ | Broad leaf weeds $g/m^2$ | Total annual weeds $g/m^2$ | Grassy weeds $g/m^2$ | Broad leaf weeds $g/m^2$ | Total annual weeds $g/m^2$ |
| Butralin | 13 | 25 | 38 | 99 | 150 | 249 |
| Oxadiargyl | 25 | 71 | 96 | 149 | 444 | 593 |
| Hand hoeing | 69 | 139 | 208 | 369 | 797 | 1166 |
| Weedy check | 347 | 678 | 1025 | 680 | 1573 | 2252 |
| LSD | 14.2 | 14.6 | 21.2 | 145.2 | 188.6 | 196.8 |

**II. 2. On sunflower growth and seed yield:**

Data at Table (4) revealed that weed control treatments did not affect plant height during both 2000 and 2001 seasons.

Data of 2001 season showed a significant effect of weed control treatments on the dry weight of leaves per plant. All studied weed control treatments increased dry weight of plant leaves significantly compared to the weedy check. Butralin, oxadiargyl and hand hoeing (twice) increased the dry weight of plant leaves by 156, 130 and 94%, respectively as compared to the weedy check Table 4.

Results showed significant effect of weed control treatments on the dry weight of sunflower plant. Butralin, oxadiargyl and hand hoeing (twice) increased the dry weight by 117.8, 100.8 and 74.6%, respectively in the first season and by 109.4, 89.2 and 50.2%, respectively in the second season as compared to the weedy check Table 4.

Data of 2000 and 2001 seasons revealed that weed control treatments significantly affected seed yield. All studied weed control treatments increased sunflower seed yield significantly compared to weedy check. Butralin, oxadiargyl and hand hoeing (twice) increased sunflower seed yield by 595, 536 and 426, respectively in the first season and by 338, 229 and 104 kg/fed, respectively in the second season as compared to the weedy check (Table 4). These results are in agreement with those obtained by Nalewaja *et al.,* (1971) where they reported that sunflower, given neither cultivation nor herbicide treatment, yielded 53% less than weed free plots. Mostafa and Hassanien (1983) found that one hoeing at 21 days from sowing sunflower significantly increased seed yield by 42.4% over the unweeded. Poonguzhalan *et al.* (1996) reported that sunflower yield increased by pendimethalin or hand hoeing operation. Abo Ghazala *et al* (2001) found that butralin + one hand hoeing were effective in controlling annual weeds and increasing seed yield of sunflower.

Table 4. Effect of weed control treatments on sunflower growth and seed yield during 2000 and 2001 seasons.

| Weed control teatments | 2000 season | | | | 2001 season | | | |
|---|---|---|---|---|---|---|---|---|
| | Plant height (cm) | Dry wt. of plant leaves (g) | Dry wt. of plant (g) | Seed yield kg / fed. | Plant height (cm) | Dry wt. of plant leaves (g) | Dry wt. of plant (g) | Seed yield kg / fed. |
| Butralin | 110.8 | 34.0 | 74.5 | 1064.3 | 96.8 | 25.9 | 64.3 | 922.8 |
| Oxadiargyl | 108.9 | 56.1 | 68.7 | 1004.8 | 91.4 | 23.2 | 58.1 | 814.4 |
| Hand hoeing | 106.8 | 26.5 | 59.7 | 895.2 | 95.1 | 19.6 | 46.1 | 688.9 |
| Weedy check | 106.4 | 13.7 | 34.2 | 469 | 92.1 | 10.1 | 30.7 | 585 |
| LSD | NS | NS | 1.99 | 37.9 | NS | 0.99 | 1.61 | 39.4 |

**III. Effect of the interaction of nitrogen rate and weed control treatments:**

**III. 1. On annual weeds:**

Data shown at Table (5) revealed that the effect of the interaction of nitrogen rates and weed control treatments on the fresh weight of total annual weeds was statistically significant in both 2000 and 2001 seasons. The highest fresh weight of total annual weeds was obtained from weedy check treatment under the highest nitrogen level (40 kg N/fed). These results were true in both seasons. This mean that the highest nitrogen fertilizer rate stimulate weed growth and consequently increased weed competition, meanwhile, chemical weed control treatments by butralin or oxadiargyl masked the effect of the higher nitrogen rates on weed biomass.

Table 5. The interaction between nitrogen rates and some weed control treatments on the fresh weight of annual weeds, g/m2 during 2000 and 2001.

| Weed control treatments | 2000 season | | | 2001 season | | |
|---|---|---|---|---|---|---|
| | Fresh weight of annual weeds, g/m2 | | | Fresh weight of annual weeds, g/m2 | | |
| | Nitrogen rates (kg/fed) | | | Nitrogen rates (kg/fed) | | |
| | 0 | 20 | 40 | 0 | 20 | 40 |
| Butralin | 25 | 35 | 54 | 169 | 242 | 336 |
| Oxadiargyl | 72 | 99 | 119 | 451 | 593 | 735 |
| Hand hoeing | 170 | 196 | 258 | 819 | 1399 | 1278 |
| Weedy check | 735 | 986 | 1374 | 1686 | 2141 | 2930 |
| LSD | 36.4 | | | 340.9 | | |

**III. 2. On sunflower growth and seed yield:**

The effect of the interaction between nitrogen rates and weed control treatments on the dry weight of sunflower plants was statistically significant in 2000 and 2001 seasons, where butralin, oxadiargyl and hand hoeing increased dry weight of sunflower plant up to 184 and 215 percent increase as compared to the unweeded check under the highest nitrogen level. These results indicated that

increasing nitrogen fertilization without controlling weeds resulted in a severe competition to sunflower growth (Table 6).

Table 6. Effect of the interaction between nitrogen rates and weed control treatments on sunflower growth and seed yield, 2000 and 2001 seasons.

| Weed control treatments | 2000 season | | | | | | 2001 season | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Dry weight of sunflowers plant (g) | | | Seed yield (kg/fed) | | | Dry weight of sunflowers plant (g) | | | Seed yield (kg/fed) | | |
| | Nitrogen rates, kg/fed | | | Nitrogen rates, kg/fed | | | Nitrogen rates, kg/fed | | | Nitrogen rates, kg/fed | | |
| | 0 | 20 | 40 | 0 | 20 | 40 | 0 | 20 | 40 | 0 | 20 | 40 |
| Butralin | 66.1 | 76.1 | 81.4 | 890 | 1100 | 1203 | 56.5 | 64.8 | 71.7 | 749 | 928 | 1092 |
| Oxadiargyl | 61.3 | 69.5 | 75.3 | 822 | 1064 | 1129 | 54.3 | 54.8 | 65.1 | 712 | 786 | 945 |
| Hand hoeing | 53.0 | 60.1 | 66.0 | 716 | 922 | 1048 | 44.3 | 43.8 | 50.3 | 620 | 691 | 756 |
| Weedy check | 41.0 | 33.0 | 28.6 | 561 | 466 | 830 | 37.5 | 32.0 | 22.7 | 463 | 389 | 903 |
| LSD | 3.5 | | | 65.7 | | | 2.78 | | | 68.2 | | |

The effect of the interaction between nitrogen rates and weed control treatments on sunflower seed yield was statistically significant in both 2000 and 2001 seasons and gave similar trends with their effect on dry weight of sunflower plant. Hence, increasing nitrogen rates with chemical or hand hoeing increased sunflower seed yield than the unweeded check, where the highest seed yield per feddan was achieved by butralin or oxadiargyl which increased seed yield by 737 and 663 kg/fed, respectively in 2000 season and by 703 and 556 kg/fed, respectively in 2001 season as compared to the unweeded check with nitrogen rate of 20 kg N/fed. (Table 6).

It could be concluded that in order to increase the benefit from nitrogen fertilization by sunflower, it is necessary to eliminate weed competition by using butralin, oxadiargyl or hand hoeing (twice).

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# تأثير التسميد النتروجينى ومعاملات مكافحة الحشائش على الحشائش الحولية ومحصول عباد الشمس

**مسعد محمود ابراهيم عبد الحميد**

*المعمل المركزى لبحوث الحشائش – مركز البحوث الزراعية – الجيزة – جمهورية مصر العربية*

تـم اقامة تجربتين حقليتين فى محطة البحوث الزراعية بسخا فى الموسم الصيفى ٢٠٠٠ و ٢٠٠١ لدراسة تأثير مستوى التسميد النيتروجينى وبعض معاملات مكافحة الحشائش والتفاعل بينهما على الحشائش الحولية وعلى صفات النمو ومحصول عباد الشمس . صممت التجارب فى نظام القطع المنشقة مرة واحدة حيث وزعت مستويات التسميد النيتروجينى (صفر ، ٢٠ ، ٤٠ كجم نيتروجين / فدان) فى القطع الرئيسية بينما تم توزيع معاملات مكافحة الحشائش عشوائيا فى القطع الشقية وكانت معـاملات مكافحـة الحشائش المختبرة : مبيد البوترالين بمعدل ١٢٠٠ جم مادة فعالة / فدان ومبيد الاوكسـاديارجيل بمعدل ١٦٠ جم مادة فعالة / فدان ومعاملة العزيق مرتين بالإضافة إلى القطع غير المعاملة.

أوضحت النتائج أن الوزن الغض للحشائش الحولية تزايد بزيادة معدل التسميد النيتروجينى حـتى ٤٠ كجم / فدان. كما أوضحت النتائج التأثير المعنوى لمستوى النيتروجين على ارتفاع النبات والـوزن الجاف للأوراق لكل نبات والوزن الجاف لنبات عباد الشمس وكذلك على وزن بذور عباد الشمس.

كمـا أوضـحت النتائج أن كل معاملات مكافحة الحشائش كانت فعالة فى مكافحة الحشائش الحولية بالمقارنـة القطـع غير المعاملة. وتفوقت معاملات البوترالين والاوكساديارجيل ، حيث سجلتا أعلى نسـبة خفـض فى الوزن الغض للحشائش الحولية (٩٦,٣ و ٩٠,٦%) و ( ٨٨,٩ و ٧٣,٧%) على الترتيـب فى كلا الموسمين . و لم يكن لمعاملات مكافحة الحشائش تأثير معنوى على ارتفاع النبات بيـنما كـان تأثـيرها معنوى على الوزن الجاف لنبات عباد الشمس حيث حققت معاملتى البوترالين والاوكسـاديارجيل أعلى وزن جاف لنبات عباد الشمس فى موسمى الدراسة على الترتيب، كما حققتا زيـادة فى محصول بذور عباد الشمس قدرها ٥٩٥ ، ٥٣٦ كجم فى الموسم الأول و ٣٣٨ ، ٢٢٩ كجم فى الموسم الثانى بالمقارنة بالقطع غير المعاملة.

وأوضـــحت النـــتائج التأثـــير المعنوى للتفاعل بين مستوى التسميد النيتروجينى ومعاملات مكافحـــة الحشائش على مكافحة الحشائش الحولية والوزن الجاف لنبات عباد الشمس ومحصول عباد الشـــمس. حيث حققت معاملتى البوترالين والاوكساديارجيل أقل وزن للحشائش الحولية وأعلى وزن جـــاف لنـــبات عباد الشمس وأعلى محصول بذور عباد الشمس بالمقارنة بالقطع غير المعاملة تحت مستوى تسميد نيتروجين ٢٠ كجم / ف

ويستخلص من هذه الدراسة انه للحصول على أعلى استفادة لنبات عباد الشمس من التسميد النتروجيـــنى فمـــن الضـــرورى استبعاد المنافسة الناتجة عن الحشائش باستخدام مبيد البوترالين أو الوكساديارجيل أو معاملة العزيق (مرتين).