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Effect of some weed control treatments on sesame and associated weeds

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ABSTRACT
Two field experiments were conducted during the summer 2019 and 2020 seasons at Giza Research Station, Agricultural Research Center (ARC) Egypt, to study the effectiveness of some herbicides on weeds control and their effect on sesame yield and its components, cultivar Shandaweel3. The experiment was laid out in randomized complete block design with four replications included ten weed control treatments (alone or followed by one hand hoeing, hand hoeing twice and unweeded check). The results obtained from this study pointed that the two field experiments were high infestation by weeds (36.9 and 36.7 ton/fed), in the first and second seasons, respectively which reduced sesame yield about 16.1 and 19.9 % compared to hand hoeing twice and about 29.7 and 33.5 % compared to the application pendimethalin followed by one hand hoeing, which produced the highest sesame seed yield and the highest reduction percent of total weeds. Metribuzin alone and or followed by one hand hoeing produced the best reduction of total weeds without any significantly different in hand hoeing twice, but gave the lowest one of sesame seed yield compared to other weed control treatments under study due to it herbicide caused phytotoxic effect on the sesame crop. Prometryn alone or followed by one hand hoeing was the lowest treatment on reduced fresh weight of total weeds. Clethodim alone was resulted the lowest reduction on fresh weight of total weeds, due to clethodim specific herbicide of grassy weeds. From this study can be using pendimethalin or hand hoeing twice for weeds control in sesame field.
Keywords: Sesame, Weed control, Hand hoeing twice, Broad weeds, Narrow weeds.

INTRODUCTION
Sesame (*Sesamum indicum* L.) is an important oilseed crop in the ancient world because drought resistance of sesame crop and oil extraction from sesame seeds great stability (Bedigian and Harlan, 1986). Sesame is quality food, nutrition, edible oil, bio-medicine and health care, all in one and is often called as the 'queen of oil seeds' (Chaudhuri and Ghosh, 2020). The Egyptian production of sesame in 2020 by 38 thousand tons from 29 thousand hectares FAO, 2020. Weed infestation is one of the major factors limiting the yield of sesame due to the weeds have enormous stress at the initial growth stages and the effects on the economic yield of sowing crops Channappagoudar *et al.* 2008). The high weed infestation in sesame field produced more than 50% yield losses due to slow sesame growth in the seedling period and earlier growth stage and the application of weed control treatments in its period have very little sesame weed competition and improved the growth characters, yield and its components of sesame (Bennett *et al.* 2003; Dungarwal *et al.,* 2003 and Ghataka *et al.,* 2006). Weed control in sesame include more methods each method complement with other for indicated the best reduction of weeds and the best improved in sesame yield . Many researchers reported that the integrated between sowing sesame by the recommended sesame variety, the recommended seeding rate, fertilizer, irrigation and the recommended herbicide complement with one hand hoeing can be improved growth of sesame plant and reduced weed biomass.

Select super complement with one hand hoeing and hand hoeing twice produced the lowest dry weight of weeds and increased significantly seed yield of sesame (Rehab and Fakkar, 2008). S-metloachlor + metribuzin caused 49% reduction of sesame stand and reduced seed yield (Grichar *et al.,* 2009). Pendimethalin at 450 g/ha or 750 g/ha followed by one hand hoeing after one month resulted the best reduction of weed biomass and increased seed yield of sesame (Sagarkam 2014), Prometryn followed by one hand hoeing and hand hoeing twice gave the highest

reduction percentage of weed and increased significantly plant height, number of capsules/plant, 1000 seeds weight (g) and seed yield (ardab/fed) (Ismail et *al*., 2015; Patel *et al.,* 2017 and Sangeetha, 2019). Singh (2018) and Chaudhure and Ghosha (2020). In Egypt, there are no recommended herbicides registered for weed control in sesame. The herbicides are the element of integrated weed control in field crops and the soil applied herbicides always affected by a soil characterized, so for this reason the objective of this research was test of some herbicides for weed control on sesame crop and associated weeds under clay loamy soil at Giza Research Station farm.

MATERIALS AND METHODS

Two experiments were conducted at Giza Research Station, Agriculture Research center (ARC), Egypt, during 2019 and 2020 successive summer seasons to test of some herbicides for weed control on sesame crop and associated weeds under clay loamy soil. The Randomized Complete Block Design (RCBD) and four replications were used.
Ten weed control treatments were used as follow:
1) Metribuzin (Sencor) at the rate 300 g/fed. applied as (pre-sowing).
2) Prometryn (Gesagard) at the rate 500 ml/fed. applied as (pre-sowing).
3) Clethodim (Select super) at the rate 250 ml/fed. applied after one month from sowing as (post-emergence).
4) Pendimethalin (Stomp) at the rate 1.5 L/fed. applied as (pre-sowing).
5) Metribuzine (Sencor) at the rate 300 g/fed. as (pre-sowing) followed by hand hoeing once after 30 days from applied the herbicide.
6) Prometryn (Gesagard) at the rate 500 ml/fed. as (pre-sowing) followed by Hand hoeing once after 30 days from applied the herbicide.
7) Clethodim (Select super) at the rate 250 ml/fed. (post-emergence) followed by hand hoeing once after 30 days from applied the herbicide.
8) Pendimethalin (Stomp) pre-sowing at the rate 1.5 L/fed. followed by hand hoeing once after 30 days from applied the herbicide.
9) Hand hoeing twice after 30 and 45 days from sowing.
10) Check (Control) un-weeded.
The common name, trade name and chemical name of the herbicides used in the experiment is shown in **Table 1:**
Table 1. The common name, trade name and chemical name of the used herbicides.

Common name	Trade name	Chemical name
Metribuzin	Sencor	4-amino-6 tert-butyl-3-methylthio-1,2,4 triazine-5(4H)-one
Prometryn	Gesagard	N^{-2},N^{4}-di-isopropyl-6-methylthio-1,3,5-triazine-2,4-diamine
Clethodim	Select	Chloroallyloxyimino [propyl]-5-[2-(ethylthio) propyl]-3-hydroxycyclohex-2-enone
Pendimethalin	Stomp	[N-(l-ethylpropyl)-2, 6-dinitro-3, 4-xylidine,

The type of field experiment soil was clay loamy, pH. was 8.9 and EC 1.98 (**Table 2**).

Table 2. Mechanical and chemical analyses of the soil at the experimental site in 2019/2020 seasons.

Analysis	Seasons	
	2019	**2020**
PHYSICAL ANALYSIS		
Coarse sand	22.6	21.2
Fine sand	38.1	34.1
Silt and clay	37	34.7
Soil texture classification	Clay loamy	Clay loamy
CHEMICAL ANALYSIS		
pH	8.09	7.32
EC (m mohs/cm) at 25°C	1.98	1.37
Organic matter (O.M)%	1.62	1.32
Calcium carbonate ($CaCO_3$)%	5.2	5.7
AVAILABLESOLUBLE nutrients(PPM)	2.8	3.9
Nitrogen (N)	9	9.5
Phosphorus (P)	3.48	6.4
potassium (K)	0.22	0.20

The chemical analyses of the water at the experimental site is shown in **Table 3.**

Table 3. Chemical analyses of the water at the experimental site in 2019 / 2020 seasons.

Analysis	Seasons	
	2019	2020
CHEMICAL ANALYSIS		
PH	7.9	7.7
EC	0.41	0.43
Soluble cation		
Na^+	1.70	1.69
K^+	0.35	0.37
Ca^{++}	1.25	1.24
Mg^+	0.93	0.92
Soluble anions		
Hco_3^-	1.30	1.29
Cl^-	1.85	1.82
So_4^{--}	0.95	0.92
SAR	1.63	1.61

The plot size was 12 m^2 (3 m × 4 m) in five ridges each 4 m long and 60 cm width and 20 cm between hills with seeding rate 3 kg/fed. The plants were thinned to two plants per hill were left. Sowing was done on the month of May in both seasons. Cultivar Shandaweel -3 was used in these experiments.

Data was recorded:

Weeds:

Weeds were hand pulled from 1 m^2 for each plot after 45 and 75 days from sowing in the herbicide alone plots and at 75 days from sowing in the herbicide with or without one hand hoeing. The weeds were classified to annual grassy and broad-leaved weeds to estimate then fresh weight (g/m^2) of grassy, broad-leaved weeds and their total weeds.

Sesame crop:

- Number of days from planting to 50 % flowering for sesame plant.
- At harvest, ten plants were talking from each plot to record the following traits; plant height (cm), height of the first capsule (cm), fruiting zone length (cm), capsules number of $plant^{-1}$, 1000-seed weight (g) and seed yield g/plant.
- Seed yield (ardab/fed) estimated by the seed yield kg/plot and calculated by ardab/fed. as the formuala:

$$\text{Yield (ardab/fed)} = \frac{y\ (kg/plot) \times area\ of\ one\ fed.}{Plot\ area \times weight\ of\ ardab\ (kg)}$$

One ardab of sesame seed = 120 kg, One feddan = 4200 m^2 and the plot area = 12 m^2.

- Oil seed percentage was estimated by Soxhalet method according to A.O.A.C. (1980).

Statistical analysis:

Data of the experiments were subjected to statistical analysis of a randomized complete block design and the least significant differences (LSD) among treatments means at 5 % level were calculated according to **Snedecor and Cochran (1980).** The obtained data were statistically analyzed using M.STAT Computer program V.4 (1986)

RESULTS

Effect of weed control treatments on weeds:

The infestation rate in the field experiments were 6.89 & 11.75 ton/fed and 36.89 & 36.72 ton/fed. at 45 and 75 days After Sowing (2019 & 2020 seasons, respectively. The percent of broad leaved weeds to grassy weeds from the fresh weight of total weeds were 97 and 96.9% to 3 and 3.1% at 45 DAS, 93.4 and 93.6 % to 6.6 and 6.4% at 75 DAS, in 2019 and 2020 seasons, respectively. The dominant weeds in field experiments' were *Trianthema portulacastrum* (glius) about 97% as broad leaved weed, *Echinochloa colonum* (Jungle rice) and *Brachiaria repens* (signal grass) 3% as grassy weeds in the first season whilst *T.portulacastrum*, 70.8%, *Euphorbia heliascopia*(sun spurge) and *chorchorus olitorius* (nalta jute) were 22.6% as broad leaved weeds and *E.colonum* and *B. repens* as grassy weeds were 6.6% from the fresh weight of total weeds in the second season. **Table 4** pointed that the effect of all herbicides alone and /or complement with hand hoeing once reduced significantly the fresh weigh of broad leaved, grassy and total weeds in both seasons. The reduction percentage in fresh weight of grassy, broad leaved and total weeds at 45 DAS was

74.6, 76.9 and 76.8% by pendimethalin (Stomp), 70.8, 56.6 and 55.7% by metribuzin (Sencor), 36.2, 46.5 and 46.5% by prometryn (Gesagard) and 57.4, 27.7 and 28.6% by clethodim in the first season. In the second season the reduction percentage was 76.5, 76.2 and 76.2% by pendimethalin, 27.9, 54.7 and 46.1% by metribuzin, 38.5 , 51.6 and 51.2% by prometryn and 59.4, 25.5 and 26.6 % by clethodim on fresh weight of grassy , broad leaved and total weeds , respectively, compared to unweeded check.

Table 4. Effect of weed control treatment on the reduction of grassy, broad-leaved weeds and their total weeds fresh weight in 2019 and 2020 seasons at 45 days from sowing.

Treatment	Broad leaves weeds kg/m²		Narrow leaves weeds kg/m²		Total weeds kg/m²	
	2019	2020	2019	2020	2019	2020
Metribuzin (Sencor)	2.49	2.50	0.12	0.12	2.61	2.63
Prometryn (Gesagard)	3.07	2.67	0.11	0.10	3.18	2.78
Clethodim (Select Super)	4.14	4.11	0.07	0.07	4.22	4.18
Pendimethalin (Stomp)	1.32	1.31	0.04	0.08	1.37	1.35
Control unweeded	5.73	2.52	0.01	0.17	5.91	5.70
L.S.D 0.05	1.63	1.50	0.06	0.07	1.64	2.79

Data in **Table 5** inducted that all weed control treatments i.e. the four herbicides alone and/or complement with hand hoeing once were significantly reduced fresh weight of annual broad-leaved weeds, grassy and their total weeds in both seasons. All herbicides under study complement with one hand hoeing was significantly reduced of annual grassy, broad leaved and total weeds than its herbicide alone in both seasons. The ascending of the herbicides complement with one hand hoeing was pendimethalin, Metribuzin, clethodim and prometryn, which were equal or more than the effect of hand hoeing twice in reduction fresh weight of broad leaved and total weeds in both seasons. The reduction percentage on the total weeds for the above ascending of herbicide with one hand hoeing and hand hoeing twice was 91.1 , 71.8 , 64.6 , 45.8 and 58.7% in 2019 season and in 2020 season the reduction percentages were 91.6 , 73.4 , 64.3 , 47.7 and 58.6%, respectively compared to unweeded check. The reduction percentages of application the herbicide alone on fresh weight of total weed were 53.9, 77, 26.9 and 29.2% in 2019 season and 54, 57.4, 27.7 and 32% in 2020 season, produced from pendimethalin, metribuzin, clethodim and prometryn, respectively, compared to unweeded check. The grassy weed was about 6.8 and 6.4% from the total weed (8783 and 8743 g/m2) in 2019 and 2020 season, respectively. The greatest reduction in fresh weight of grassy weeds were 99.6 and 95 % resulted from pendimethalin and clethodim complement with one hand hoeing in both seasons followed by pendimethalin and clethodim alone 92.1 and 91.2 & 91.9 and 91.5 in 2019 & 2020 season , respectively . In general, the treatment of pendimethalin+hand hoeing was the most effective of weed control in both seasons under the conditions of this study.

Table 5. Effect of weed control treatment on the reduction of grassy, broad-leaved weeds and their total weeds fresh weight in 2019 and 2020 seasons at 75 days from sowing.

Treatment	Broad leaves weeds		Narrow leaves weeds		Total weeds	
	2019	2020	2019	2020	2019	2020
Metribuzin (Sencor)	3.74	3.65	0.07	0.06	3.81	3.72
Prometryn (Gesagard)	6.01	5.75	0.20	0.18	6.22	5.94
Clethodim (Select Super)	6.37	6.27	0.05	0.04	6.42	6.31
Pendimethalin (Stomp)	4.00	3.97	0.04	0.04	4.05	4.02
Metribuzin + hoeing once	2.40	2.26	0.07	0.06	2.47	2.32
Prometryn + hoeing once	4.33	4.19	0.42	0.38	4.75	4.57
Clethodim + hoeing once	3.07	3.09	0.02	0.02	3.10	3.12
Pendimethalin + hoeing once	0.77	0.73	0.02	0.02	0.77	0.73
Hand hoeing twice	3.55	3.55	0.06	0.06	3.62	3.62
Control unweeded	8.20	8.18	0.58	0.55	8.78	8.74
L.S.D 0.05	1.11	1.12	0.15	0.15	1.13	1.12

1- Effect of weed control treatments on growth, yield and its components:

Data in **Tables** (**6, 7, and 8**) indicated that weed control treatments were used gave significantly increased on yield and its components in both growing seasons.

Table 6. Effect of weed control treatment on number of days to 50% flowering, plant height and fruiting zone in 2019 and 2020 season.

Treatment	Days to 50 % flowering		Plant height (cm)		Fruiting zone (cm)	
	2019	2020	2019	2020	2019	2020
Metribuzin (Sencor)	42.8	41.5	124.5	128.3	77	79
Prometryn (Gesagard)	42	41.5	148.8	154.1	107	113.9
Clethodim (select Super)	43.5	42.8	131.8	135.3	79.8	85.3
Pendimethalin (Stomp)	43.8	42.3	132.5	140.3	84.3	95.3
Metribuzin + hoeing once	42.23	42.3	146.8	145.7	96.8	106
Prometryn + hoeing once	42.3	42.5	154.5	162.3	118.8	122.3
Clethodim + hoeing once	43.3	41.8	151.8	158.2	115.3	119.7
Pendimethalin + hoeing once	42.3	42.5	160.3	164.3	121.3	125.3
Hand hoeing twice	43.8	43.5	147.3	150	103.3	107
Control unweeded	43	43	109.5	119.9	70	74.1
L.S.D 0.05	1.25	1.53	9.86	5.95	12.02	4.37

Table (6) reported that the days to 50% flowering, plant height (cm) and fruiting zone (cm) were significantly affected by all weed control treatments. The shortest period for 50% flowering was resulted from application prometryn herbicide alone, but, hand hoeing twice give the longest period. Pendimethalin complement with one hand hoeing produced the greatest value of plant height and fruiting zone followed by the integrated between prometryn or clethodim each with one hand hoeing, prometryn alone, hand hoeing twice, metribuzin with one hand hoeing, pendimethalin alone and clethodim, alone, but, the lowest values was resulted from metribuzin alone.

Table (7) showed that weed control treatments were significantly increased on height of the first capsule (cm), number of capsules/plant and 1000 seeds weight (g) compared to unweeded control in both seasons. The lowest height of the first capsule (35.8 cm) resulted from prometryn complement with one hand hoeing in the first season and clethodim with one hand hoeing (38.5 cm) in the second season, but the greatest value of height the first capsule (52 and 50 cm) was obtained with clethodim alone in 2019 and 2020 season, respectively. These results were agreement with Ismail et al (2015).

Table 7. Effect of weed control treatment on height first capsules, number capsules/plant and 1000 seed weight in 2019 and 2020 season.

Treatment	Height of first capsules (cm)		No. of capsules /plant		1000 seed weight (g)	
	2019	2020	2019	2020	2019	2020
Metribuzin (Sencor)	47.5	49.3	85.5	89	3.82	4.02
Prometryn (Gesagard)	41.8	40.3	122.3	124.5	4.28	4.57
Clethodim (Select Super)	52	50	88	96.5	4.16	4.3
Pendimethalin (Stomp)	48.3	45	95.8	107.8	4.18	4.28
Metribuzin + hoeing once	50	39.8	109	113.3	4.30	4.43
Prometryn + hoeing once	35.8	40	131.5	136	4.85	5.4
Clethodim + hoeing once	36.5	38.5	130	133	4.5	4.88
Pendimethalin + hoeing once	39	39	132.3	143.3	4.92	5.36
Hand hoeing twice	44	43	118	119.5	4.25	4.4
Control unweeded	39.5	45.8	79.3	80.8	3.24	3.52
L.S.D 0.05	9.82	5.51	12.99	6.72	0.19	0.15

Data presented in **Table 8** revealed that weed control treatments caused increased significantly the seed yield/plant (g), seed yield (ard/fed.) and seed oil percentage in both seasons, compared to unweeded check. The highest seed yield (g/plant) and seed yield (ard/fed.) was obtained from pendimethalin + one hand hoeing by the increased percentage of seed yield (g/plant) and seed yield (ardab/fed) was 58.8 and 42.2% & 82.6 and 50.4% in 2019 & 2020

seasons, respectively, compared to unweeded check. Pendimrthalin + one hand hoeing resulted significantly increased in seed yield (ardab/fed.), followed by prometryn + one hand hoeing, clethodim + hand hoeing, prometryn alone and hand hoeing twice. The highest value of oil percentage was recorded by pendimethalin + hand hoeing (9.9% and 10%), prometryn + one hand hoeing (9.6% and 7.8%) and clethodim + hand hoeing (9.4% and 6.9%), in 2019 and 2020, respectively, compared to unweeded check.

Table 8. Effect of weed control treatment on Seed yield/plant, Seed yield (Ard./fed) and Oil percentage (%) in 2019 and 2020 season.

Treatment	Seed yield/plant (g)		Seed yield (Ard./fed)		Oil %	
	2019	2020	2019	2020	2019	2020
Metribuzin (Sencor)	20.5	21.33	3.79	3.96	41.10	41.30
Prometryn (Gesagard)	27.4	31.88	4.56	4.88	44.75	43.98
Clethodim (Select Super)	21.2	23.88	3.84	4.04	41.68	41.68
Pendimethalin (Stomp)	23.25	27.28	4.0	4.14	41.85	42.05
Metribuzin + hoeing once	25.78	28.1	4.08	4.28	43.25	43.05
Prometryn + hoeing once	30.13	36.2	4.94	5.4	45.03	44.53
Clethodim + hoeing once	28.7	33.48	4.79	5.1	44.98	44.13
Pendimethalin + hoeing once	32.55	38.95	5.19	5.58	45.18	45.43
Hand hoeing twice	26.5	30.98	4.35	4.63	43.40	43.15
Control unweeded	19.2	19.33	3.65	3.71	41.08	41.23
L.S.D 0.05	2.39	2.38	0.23	0.20	1.04	1.35

In conclusion, pendimethalin herbicide complement with one hand hoeing gave due to the highest reduction of weeds and had the highest sesame yield and its components, due to reduced the fresh weight of total weeds by the herbicides complement with one hand hoeing during the critical period of weed sesame competition in early stage of sesame crop. These results were agreement with the results obtained by Ismail *et al* (2015) and Chaudhuri and Ghosh, 2020).

DISCUSSION

a-The effect of weed control on weeds:

All the herbicides under studyas as well as hand hoeing twice was significantly reduced significantly the fresh weight of weed, when applied alone and/or complement with one hand hoeing. These results due to the herbicides killed the weed species by specific herbicides effect on grassy and broad leaved weeds, but clothedium herbicide specific effect on grassy weeds. These results were agreement with Singh (2018).

All the herbicides complement with one hand hoeing reduced significantly of fresh weight of weeds compared to its herbicide alone.T hese results due to the increased the effect of the herbicides by application one hand hoeing due to both hand. These results due to both hand hoeing and the herbicide treatment killed or reduced the growth of the growing weed species. These results were harmony with the foundation by Rehab and Fakkar (2008), Grichar et al. (2009), Ismail *et al.* (2015) and Chaudhuri and Ghosh, 2020).

b-The effect of weed control treatments on yield and its components:

The weed control treatments caused improved the growth characters which reflected on increased the productivity of sesame crop. These results due to the reduced weed/sesame competition due to the reduced fresh weight of weeds by weed control treatments, which killed and the effect on growth rate of weeds. These resulted were agreement with the results which recorded by Ismail *et al* (2015).

Pendimethalin + one hand hoeing preduced the highest sesame seeds and oil % followed by prometryn + one hand hoeing. Due to the increase of fruiting zone, number of capsule/plant, weight of 1000 seeds and seed yield(g/plant) due to reduced weed/sesame competition during early stage of sesame crop by weed control treatments. These results are in agreement with Dungarwal *et al.* (2003), Ghataka *et al.* (2006), Rehab and Fakkar (2008), Sagarka *et al.* (2014), Patel *et al* (2017), Singh *et al.* (2018), Sangeetha *et al.* (2019), and Chaudhuri and Ghosh, 2020).

CONCLUSION

From these results can be using pendimethalin complement with one hand hoeing, pendimethalin alone and hand hoeing twice for weed control in sesame experimental farm at Giza Research station, but metribuzin alone or complement with one hand hoeing resulted the best weed control and the lowest seed yield due to it herbicide caused damage of sesame crop in both seasons.

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تأثير بعض معاملات مكافحة الحشائش على السمسم والحشائش المصاحبة له

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أقيمت تجربتان حقليتان خلال الموسمين الصيفيين 2019 و 2020 بمحطة بحوث الجيزة، مركز البحوث الزراعيه لدراسة تأثير بعض مبيدات الحشائش في مكافحة الحشائش وتأثيرها على محصول السمسم ومكوناته صنف شندويل-3. تم توزيع معاملات مكافحة الحشائش وهي: ميتريبيوزين بمعدل 300جم/فدان، بروميترين بمعدل 500 مل/فدان، كليوثيديم بمعدل 250مل/فدان، بنديميثالين بمعدل 1.5 لتر / فدان منفردة أو مكملة بعزقة واحدة بعد شهر من المعاملة ، العزق مرتين ومعاملة الكنترول في تصميم قطاعات كاملة العشوائية فى أربعة مكررات. أشارت نتائج التجربة أن حقل التجارب موبؤ بشدة بالحشائش حيث كان متوسط وزن الحشائش حوال 36.9 طن/فدان في كلى الموسمين، والذى سبب نقص في محصول بذور السمسم حوالي 16.1 و19.9% مقارنة بمعاملة العزيق مرتين وحوالي 29.7 و 33.5% مقارنة بمعاملة مبيد بنديميثالين متبوعا بعزقة واحدة في موسمي 2019 و2020علي الترتيب. كانت الحشيشة السائدة بأرض التجارب هي رجلة افرنجي (26.1 طن/فدان) في كلا الموسمين. أعطى مبيد ميتريبيوزين منفرداً أو متبوعاً بعزقة واحدة أعلي نسبة نقص في الوزن الغض للحشائش الكلية بنسب تقارب أو تفوق العزيق مرتين ولكن أعطي أقل محصول مقارنة بمعاملات مكافحة الحشائش الآخري نتيجة الاثر السمي علي نباتات السمسم. أعطى مبيد بروميترين منفرداً أو متبوعاً بعزقة واحدة أقل وزن غض للحشائش الكلية. أعطى مبيد كليوثيديم منفرداً أقل نقص في الوزن الغض للحشائش الكلية ويرجع ذلك الي ان مجموعة كولثيديم متخصصة للحشائش النجيلية فقط. من هذه الدراسة يمكن استخدام البنديميثيلين او العزيق مرتين في مكافخة الحشائش في حقول السمسم.

الكلمات المفتاحية: السمسم ، مكافحه الحشائش ، العزيق مرتين ، الحشائش عريضه الاوراق ، الحشائش ضيقه الاوراق.