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Effect of Planting Spaces and Weed Control Treatments on Onion Seed Yield and Associated Weeds



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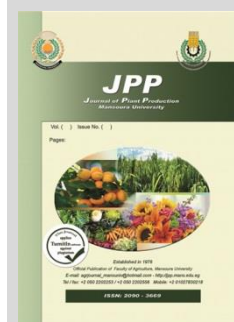
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ABSTRACT

A field experiment was conducted at the Gemmeiza Agricultural Research Station, Agricultural Research Center in Egypt, during the winter seasons of 2022/2023 and 2023/2024. The objective was to determine the optimal planting spaces and the most efficient combination of different herbicides for weed control in onion seed yield. Three replicates were used in the split plot experiment in randomized complete block design (RCBD). Three planting spaces- 20 cm (3.990 ton bulbs/fed), 25 cm (3.192 ton bulbs/fed) and 30 cm (2.659 ton bulbs/fed) were utilized in the main plots. Six different weed control treatments were distributed at random across the experiments sub plots as follows: T₁: Stomp-extra +Hand hoeing once, T₂: Omega +Hand hoeing once, T₃: Goal 4F + Giako, T₄: Flora + Fuzeiled forty, T₅: Hand hoeing (twice) and T₆: Weedy check. Results indicated that lowest both fresh and dry weight of total weeds resulted from low onion planting spaces 20 cm or 25 cm under weed control treatment control T₁: Stomp-extra + hand hoeing once, T₂: Omega +Hand hoeing once, and T₅: Hand hoeing (twice) over two seasons. Also, these treatments produced higher the umbel diameter, number of scapes/plant, 1000 seed weight and seed yield (g/plant). Interaction between planting spaces and weed control treatments (25 cm with T₁: Stomp-extra + Hand hoeing once treatment) gave the highest seed yield kg/fed, % germination, net income/fed and benefit cost ratio compared with the other planting spaces and other weed control treatments.

Keywords: Onion seed, planting spaces; Herbicides



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INTRODUCTION

Ancient Egypt regarded onion (*Allium cepa* L.) as a significant vegetable crop. For onions to be successfully produced for both fresh consumption and dehydration, viable pure seeds must be available. The total area under cultivated for onions in 2023 was 38040 Faddan with an average production of 284 kg seeds fed⁻¹ (Yearly Book of Economics and Statistics, 2024). Successful onion seed production relies on selecting cultivars that are suitable for the different conditions imposed by different environments. Since weed competition in onions can lead to total crop failure, the crop needs to be kept weed-free for a considerable amount of time following emergence or transplanting in order to prevent a large loss in production. (Glaze 1987).

The main factor limiting the generation of onion seed yield is weed infestation, which reduces bulb and seed yield by 70–80% (Channapagoudar and Biradar, 2007). Onions that are grown for their seeds have shallow roots, grow slowly, and have non-branching, narrow, erect leaves. Due to this type of growing habit, it cannot compete well with weeds. Moreover, due to the rising expense of human labor and its limited supply, weeding during crucial growth phases is extremely challenging. The over-reliance on labor in onion weed management may be addressed by the application of pre-plant and post emergence herbicides, however, for optimal outcomes at a reasonable cost, the right mixture, dosages, and application timing are more crucial. Therefore, the current study was conducted to determine the most effective pre-planting and post-emergence herbicide combination for producing onion seed and effective control

of weeds (Kalhapure *et al.*, 2013). According to Amalfitano *et al.* (2019), planting 3.3 cold-stored bulbs/m² was the combination that yielded the most seeds per hectare. As bulb density increased, number of flower stalks/plant, as well as their height, diameter, inflorescence diameter, and seed germ inability, dropped. Onion seed output, flower per umbel, number of scapes per plant, and umbel diameter are among the yield components that are impacted by climate and management factors such as spacing, watering, fertilizer, and plant protection (Patil *et al.*, 1993). According to Brewster (1994), high-quality seeds and ideal plant spacing are crucial for *Allium* species' optimal plant growth, high output, and quality. Wider bulb spacing for onion seed production resulted in increased germination and emergence percentages, according to Ayoub and Hala (2013), number of leaves/plant, umbel diameter, yield umbel, seed yield/plant, total number of scapes/plant, scape height, scape diameter, and seed scape height, seed yield/ ha and other workers found similar outcomes, with 1000 seeds weight being less than the closest spacing (Asaduzzaman, *et al.* 2012; Kumar, 2015; Helen *et al.*, 2015; Ginoya, 2018; Thalkari, *et al.* 2019). Different investigators have reported the poor onion plants competition (Wicks *et al.*, 2005; Menges and Tamez 2010). Kalhapure *et al.*, (2014) It was found that using 0.750 kg/ha of pendimethalin before plants appeared, followed by quizalofop-ethyl 0.050 kg/ha mixed with oxyfluorfen 0.250 kg/ha after emergence, effectively controlling a variety of broad-leaf weeds and grassy. Additionally, decreased weed biomass, density, index, and efficacy of weed control were recorded. The number of

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umbels per plant, plant dry matter, number of seeds per umbel, seed weight per umbel, 1000 seeds weight, umbel breadth, and flowering stalk were all raised by this treatment. Additionally, it increased the B.C. ratio, gross return, net return, and seed yield kg/ha. According to Bhasker *et al.* (2024), controlling weeds is the main obstacle to onion success. Although chemical weed management has been widely employed to increase crop productivity, even selective herbicides may disrupt the physiological and biochemical alterations in onions. In seed onions, oxyfluorfen 23.5% EC at 1.0-liter ha⁻¹ showed the most broad-leaved weed control efficacy (82.95%), whereas pendimethalin 38.7% CS at 1.75-liter ha⁻¹ showed the most grass weed control efficiency (90.19%) (Shinde *et al.*, 2013).

The objective of this study is to use planting spaces with new herbicides pre & post emergence for decrease the weed harmful competition on onion seed yield and yield components, under Middle Nile Delta.

MATERIALS AND METHODS

This investigation was carried out at the Gemmeiza Agricultural Research Station Farm, Gharbia Governorate, Egypt, (Middle Nile Delta, Lat. 30.47 Long. 31.00) during 2022-2023 and 2023-2024, winter seasons, to evaluate the effect of planting spaces and herbicides combination on weeds control and seed yield of onion cv. Giza Red. Planting date was

Table 2. Chemical and physical analyses between 0 - 30 cm of the experimental soil, in 2022/2023 and 2023/2024 seasons.

Seasons	Particle size distribution			Soil texture	Chemical analyses					
	Sand (%)	Silt (%)	Clay (%)		EC(ds m ⁻¹) (1:5)	pH (1:1)	Organic matter (%)	Available (mg kg ⁻¹)		
								Total	N (%)	P (ppm)
2022/23	18.48	31.05	50.47	Clay	2.19	7.89	1.56	32	2.38	260.3
2023/24	17.65	30.60	51.75	Clay	2.74	8.02	1.42	29	2.18	286.2

The summer preceding crops were maize during in two seasons. The plot area consisted of five ridges spaced 60 cm apart, measuring 3 meters long and 3.5 meters wide (3.5 × 3 m = 10.5 m²), and was designed as split plot arrangement in randomized complete block design (RCBD) with three replicates. The size of bulb diameter was 4.5 – 5.8 cm and the weight from 90 to 100 g. Main plots were used for the three planting spaces i.e., 20 cm (3.990 ton bulbs fed⁻¹), 25 cm (3.192 ton bulbs fed⁻¹) and 30 cm (2.659 ton bulbs fed⁻¹) under six different weed control treatment was randomly distributed in the sub plot of experiment as follow:-

T₁- Stomp-Extra 45.5 % CS (pendimethalin) at 1.5 L/ fed applied after planting and before irrigation + Hand hoeing once at 30 days after planting (DAP).

Table 3. Trade, common and chemical names of the used herbicides in this investigation.

Trade name	Common name	Chemical name	PHI (day)
Stomp-Extra 45.5 % CS	Pendimethalin	N-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine	30
Omega 33 % EC			
Goal 4F 48 % SC	Oxyfluorfen	2-chloro-1-(3-ethoxy-4-nitrophenoxy)-4-(trifluoromethyl)benzene	45
Flora 24 % FC			
Giako 10.8 % EC	Haloxyp-p- Methyl	Methyl(R)-2-[4-(3-chloro-5-trifluoromethyl-2-pyridyloxy)phenoxy]propionate	35
Fusilade forty 15 % EC	Fluazifop-p-butyl	butyl(R)-2-[4-[[5-(trifluoromethyl)-2-pyridinyl]oxy]phenoxy] propanoate	35

Plants were fertilized with 500 kg superphosphate (15.5% P₂O₅), 100 kg potassium (52% K₂O)/Fed. and 100 kg nitrogen, (33.5% N), the application of nitrogen fertilizer as three equal parts i.e., 3, 6 and 9 weeks after planting. However, phosphorus Fertilizers were added once on ridges planted with mother bulbs at the time of planting. Furrow irrigation was practiced every 15-20 days as intervals. Insect and disease control was carried as commonly followed with onion grown for seed production according to a technical recommendations Ministry of Agriculture for the onion crop. Harvesting started when 10 - 20% of the capsules were opened and/or the umbels began to be of grey color. The harvesting dates were June 6th

done on 15th December in both seasons. The meteorological data for the two seasons include the monthly average values of minimum, and maximum air temperature °C, humidity relative (%) and rainfall (mm) are presented listed in Table 1 Chemical and physical properties of the soil analysis, according to Jackson (1973). The experiments were listed in Table 2.

Table 1. Monthly average for precipitation (mm/day), relative humidity percentage, and minimum and maximum air temperatures (°C). in 2022/2023 and 2023/2024 seasons at Gemmeiza Agricultural Research Station.

Seasons	Months	Temperature air °C		Humidity relative (%)	Precipitation (mm/day)
		Max.	Min.		
2022-2023	Dec.	21	13	60%	3.0
	Jan.	18	12	59%	5.5
	Feb.	28	13	54%	6.2
	Mar.	20	12	53%	5.5
	Apr.	24	16	47%	1.4
	May.	33	22	46%	0.7
2023-2024	Jun.	35	23	49%	0.1
	Dec.	19	9	62%	2.8
	Jan.	16	10	60%	5.1
	Feb.	30	15	59%	6.0
	Mar.	32	18	55%	5.2
	Apr.	28	18	48%	1.2
	May.	34	21	47%	0.5
	Jun.	35	26	55%	0.1

T₂- Omega 33 % EC (pendimethalin) at 2 L/fed applied after planting and before irrigation + Hand hoeing once at 30 DAP.

T₃- Goal 4F 48 % SC (Oxyfluorfen) at 0.75 L/fed applied after planting and before irrigation + Giako 10.8 % EC (Haloxyp-p- Methyl) at 0.65 L/fed applied at 30 DAP.

T₄- Flora 24 % FC (Oxyfluorfen) at 0.75 L/fed applied after planting and before irrigation + Fusilade forty 15 % EC (fluazifop-p-butyl) at the rate of 1.4 L/fed at 30 DAP.

T₅- Hand hoeing twice at 30 and 45 DAP.

T₆- Unwedded (Weedy check).

The herbicides have been applied by a CP3 knapsack sprayer with a 200 L/fed water volume. The trade, common, chemical names, and pre-harvest interval day (PHI) of the herbicides used are displayed in Table 3.

and 3rd in the first and second growing seasons. Umbels were collected and put in sacks and were left for air drying and seeds were threshed from umbels after their complete dryness and then seeds were scomed by sieving.

Data collected:

Onion measurements: -

Onion growth characters

At harvest, ten plants were hand pulled at random for each subplot to determine the following characters:

1. Number of scapes per plant: Number of scapes plant⁻¹ was counted as an average allformed on the ten labeled plants in each experimental plot.

2. Diameter of the main umbel (cm): The diameter of the main scapes was measured using a Vanier caliber for the ten labeled plants at each plot for calculating the average umbel diameter.

Onion seed yield and its components:

- 1- Seed yield/umbel (g) as an average of seed yield / plant from No. of umbels per plant.
- 2- Seed yield/plant (g): as an average of the ten plants/ labeled at each plot.
- 3- Seed yield/Fadden (kg): It is calculated from

$$\frac{\text{seed yield/plot} \times 42000}{\text{plot area (10.5 m}^2\text{)}}$$

Onion seed quality:

- 1- 1000 – seed weight (g) (Seed index)
- 2- Percentage of germination (%): seed were germinated between two filter papers at 20°C. It was calculated by equation:

$$\text{Germination \%} = \frac{\text{Number of normal seeding after 12 days}}{\text{Initial number of seed}} \times 100$$

- 3- Rate of germination: It was calculated after (Bartlett, 1937), according to the following equation:

$$\text{Germination rate} = \frac{A_1T_1 + A_2T_2 + A_3T_3 + \dots + A_nT_n}{A_1 + A_2 + A_3 + \dots + A_n}$$

Table 4. Types weed, their scientific and English name for weeds accompanied onion crop in the experimental site and the percentage of fresh weight total annual weed (g/m) at 60 days of planting during 2022/23 and 2023/24 seasons

Weed types	English name	Scientific name	2022/23 season		2023/24 season	
			*F.W. of weeds (gm ⁻²)	% Infection	* F.W. of weeds (gm ⁻²)	% Infection
Grassy weeds	Hood canary-grass	<i>Phalaris sp.</i> , L.	560.3	21.0	583	19.8
	Wild-oat	<i>Avena sp.</i> , L.	320.0	12.0	370.6	12.6
	Wild beet, sea beet	<i>Beta vulgaris</i> , L.	670.0	25.1	690	23.4
Broad-leaved weeds	Curly dock	<i>Rumex acetosella</i> , L.	120.0	4.5	167	5.7
	Lambsquarters	<i>Chenopodium sp.</i> , L.	175.0	6.6	185	6.3
	Preinpernel	<i>Anagallis arvensis</i> L.	130.0	4.9	150	5.1
	Lesser swine-cress	<i>Coronopus didymus</i> , L.	480.2	18.0	500	17.0
	Toothed medik, Bur clover	<i>Medicago polymorpha</i> , L.	210.0	7.9	300	10.2
Total weeds (g/m)			2665.5	100.0	2945.6	100.0

*F.W. = Fresh weight of total annual weeds (g m⁻²) in Weedy check at 60 days after planting

Economic assessment:

Economic assessment: for the results was done to investigate the differences between the different studied factors to get the highest profitability by using some economic criteria as total costs, total income, net income, and benefit cost ratio.

Economic criteria were used according to the method described by (Cimmyt, 1988). Economic criteria were estimated from the following formulas:

Total costs = costs, fertilization, irrigation, insect, pathogen and weeds control, harvesting and rental value / fed of land preparation, planting, post sowing activities.

Total income (TI) = (yield (kg fed⁻¹) x price of kg (L.E.))

Net income (NI) = total income - total cost (L.E.).

Benefit Cost ratio (BC) = (total income/total cost).

Statistical analysis:

Using software called MSTAT, statistical analysis was performed in accordance with Gomez and Gomez (1984). The LSD test was used to compare the mean results at the 5% level of significance.

RESULTS AND DISCUSSION

1- Effect of planting spaces and weed control treatments:

Onion yield:

Onion growth characters:-

The data presented in Table 5 indicate that planting spacing significantly influenced the number of scapes per

Where:

A₁ - number of seedlings at the first count.

A_n - number of seedlings at the last count.

T₁ - number of days to first count.

T_n - number of days to the last count.

Weed measurements: -

On annual weeds.

Weeds were randomly selected by hand from 1m² in each plot at 60 and 80 days after onion planting. The annual weeds have been classified and identified into species. to grass, broadleaved, and total annual weeds. Afresh and dry weight of each species was determined as (g/m²). Weeds were dried for 48 hours at 70 °C in a forced draft oven before their dry weight was determined.

Table 4 indicated that After 60 days of sowing, weeds were manually removed at random from each plot's square meter in a weedy check, then divided into species and classified into the following groups and the percentage of fresh weight total annual weeds and the selected experimental site was infested with annual grassy *Phalaris sp* was dominant by 21 and 19.8 % and annual Broad-leaved weeds *Beta vulgaris*, and *Coronopus didymus* was dominant by (25.1 and 18.0 %) and (23.4 and 17 %) during 2022/23 and 2023/24 seasons, respectively.

plant and the diameter of umbels during both seasons. Onion plants were noticed to grow under the highest planting space (30 cm) achieved the highest scopes/plant values and diameter of umbel, whereas the lowest planting space (20 cm) attained the lowest values, during both seasons. These results was in agreement with that found by Amalfitano *et al.* (2019), who obtained taller plant from closer spacing.

Table 5. Effect of planting spaces and weed control treatments on Onion growth characters during 2022/2023 and 2023/2024 seasons.

Treatments	NO. of scapes plant ⁻¹		Diameter of umbel (cm)	
	2022/2023	2023/2024	2022/2023	2023/2024
Planting spaces (A)				
20 cm	4.89	4.00	5.75	5.16
25 cm	5.87	5.20	6.38	5.75
30 cm	6.90	6.61	6.88	6.21
LSD _{0.05}	0.70	0.97	0.58	0.45
Weed control treatments (B)				
T1- Stomp+H.H.	6.80	5.90	7.40	6.70
T2- Omega+H.H	5.60	5.00	6.50	5.80
T3- Goal+Giako	5.41	5.10	5.51	4.90
T4-Flora+Fusilade	6.40	5.30	6.60	5.91
T5- Hand hoeing	6.70	6.10	7.20	6.50
T6- Weedy check	4.41	4.30	4.90	4.51
LSD _{0.05}	0.55	0.53	0.32	0.31
Interaction(A x B)	*	*	NS	NS

H.H. = Hand hoeing

NS = Non-significant at P: 0.05

Results in Table 5 showed that number of scapes plant⁻¹ and diameter of umbel significantly were affected by weed control treatments in both seasons. The application of T₂- Omega + Hand hoeing once, and T₃- Goal + Giako gave the lowest values in the first and second seasons, respectively.

While the highest values that number of scapes plant⁻¹ and diameter of umbel were obtained by application of T₁- Stomp extra + once, hand hoeing, T₅- Hand hoeing (twice) and T₄- Flora + Fuzeiled forty proved more dominant in respect of these growth and yield-attributing traits during the first and second seasons, respectively as compared to the untreated control treatment. These results were in line with that revealed by Shinde *et al.* (2013) and Kalhapure *et al.* (2014) according to their findings, the use of oxyfluorfen post-emergence and pendimethalin pre-emergence led to a weed-free environment, which improved the growth and development of the onion crop.

Onion seed yield and its components-

According to Data in Table 6 showed that weight of seed yield (g/umbel, g/ plant and kg/ fed) were significantly affected by planting spaces during the course of the two seasons. The highest values of seed yield (g/umbel), seed yield (g/plant), and seed yield (kg/fed) were seen in onion plants planted in the medium planting space (25 cm), followed by planting spaces (20 cm) as opposed to planting spaces (30 cm) during the first and second seasons. These

outcomes concurred with those discovered by Kalhapure *et al.*, (2014) and Amalfitano *et al.* (2019) who obtained taller plant from closer spacing. Under the planting spacing impact, seed weight (g/umbel, g/plant, and kg/fed) showed an adverse tendency, with the medium spaces showing the highest value and the highest planting spaces showing the lowest. Because there was less competition between plants for light, water, and nutrients, so the seed weight values under medium planting areas were likely higher. These results are in agreement with the results Ayob and Hala (2013) and Ginoya (2018). Weed treatments had a significant increasing effect on onion seed productivity and its components, such as seed yield weight (g/umbel), seed yield (g/ plant) and seed yield (kg/ fed), compared to the weedy check during both seasons. Additionally, Table 6 data showed that the weed management methods, T₁ Stomp-Extra + once, hand hoeing and T₅ hand hoeing (twice) gave higher values seed yield weight (g/ umbel) by (57.7 and 60.2 %) and (51.9, and 58.4%), seed yield weight (g/ plant) by (63.6 and 59.3 %) and (55.7 and 58.1%) and seed yield (kg/ fed) by (59.3 and 58.1 %) and by (57.5 and 57.3 %), respectively, followed by T₂ Omega + Hand hoeing once, and T₃ Goal + Giako in seasons one and two, respectively, compared to treatment weedy check. These results was in agreement with that found by Kalhapure *et al.*, (2014) and Bhasker *et al.*, (2024).

Table 6. Effect of planting spaces and weed control treatments on onion seed yield and its components during 2022/2023 and 2023/2024 seasons.

Treatments	Seed yield(g /umbel)		Seed yield(g /plant)		Seed yield(kg /fed)	
	2022/2023	2023/2024	2022/2023	2023/2024	2022/2023	2023/2024
Planting spaces (A)						
20 cm	0.75	0.72	5.96	5.81	234.1	224.4
25 cm	0.91	0.86	6.57	6.22	241.5	233.2
30 cm	0.69	0.65	5.44	4.84	206.5	199.2
LSD _{0.05}	0.04	0.06	0.48	0.26	8.74	4.61
Weed control treatments (B)						
T ₁ - Stomp+H.H.	0.97	0.93	7.48	6.91	284.5	269.1
T ₂ - Omega+H.H	0.92	0.86	6.69	6.43	263.4	250.6
T ₃ - Goal+Giako	0.66	0.62	5.00	4.80	186.4	180.7
T ₄ -Flora+ Fusilade	0.85	0.80	6.44	6.08	241.3	236.0
T ₅ - Hand hoeing	0.91	0.89	6.95	6.70	272.7	264.4
T ₆ - Weedy check	0.41	0.37	3.08	2.81	115.8	112.8
LSD _{0.05}	0.03	0.05	0.24	0.27	8.70	7.84
Interaction(A x B)	**	NS	**	**	*	*

H.H. = Hand hoeing

NS = Non-significant at P: 0.05

Quality of onion seeds:-

Data in Table 7 showed that 1000 seed weight (g) was significantly impacted by planting spaces in both seasons. Onion plants planted in the medium planting space (25 cm) were found to have the greatest values of 1000 seeds weight (g) in both seasons. These were followed by planting space (20 cm) and planting space (30 cm). These results agreed with that found by Kalhapure *et al.*, (2014), they revealed that taller plant from closer spacing. The percentage of germination onion seeds showed adverse trend under planting spaces effect, as medium spaces showed the highest values by 84.5 and 81.5% in the two seasons respectively, while the highest planting spaces appeared the lowest ones. The germination rate/day was not significant in both seasons. Weed control treatments had a significant

increasing effect on onion seed productivity and its components, such as 1000 seed weight, as well as germination percentage and daily germination rate, compared to the weedy check in two seasons. Additionally, Table 7 data indicated that application of T₁- Stomp Extra + once, hand hoeing and T₅- hand hoeing (twice) resulted in the highest higher values from 1000 seed weight by (40.6 and 37.3 %) and (33.94, and 33.53%) in both seasons, respectively. The same treatments showed that the highest percentage of onion seed germination were (86.7 and 83.7 %) and (86.0 and 83.6%) in 2022/23 and 2023/24 seasons, respectively, while were significant for reducing the number of days to germination ratio/day during two seasons. These findings concurred with those discovered by Shinde *et al.* (2013), Kalhapure *et al.*, (2014) and Bhasker *et al.*, (2024).

Table 7. Effect of planting spaces and weed control treatments on 1000 seeds weight, germination percentage and germination rate/day in 2022/2023 and 2023/2024 seasons

Treatments	1000seeds weight (g)		(%)Germination		Germination(rate/day)	
	2022/2023	2023/2024	2022/2023	2023/2024	2022/2023	2023/2024
Planting spaces (A)						
20 cm	3.15	2.91	81.8	79.2	4.3	4.5
25 cm	3.45	3.14	84.5	81.5	4.0	4.3
30 cm	2.90	2.75	77.8	76.9	4.2	4.5
LSD _{0.05}	0.26	0.14			NS	NS
Weed control treatments (B)						
T ₁ - Stomp+H.H.	3.82	3.30	86.7	83.7	3.3	3.6
T ₂ - Omega+H.H.	3.10	3.00	81.2	79.8	3.5	3.8
T ₃ - Goal+Giako	2.98	2.71	78.8	77.6	4.6	4.9
T ₄ -Flora+ Fusilade	3.23	3.11	79.2	77.3	4.6	4.8
T ₅ - Hand hoeing	3.62	3.28	86.0	83.6	3.6	3.9
T ₆ - Weedy check	2.27	2.18	76.3	73.4	5.3	5.5
LSD _{0.05}	0.11	0.15			0.13	0.16
Interaction (A x B)	**	*	-	-	NS	NS

H.H. = Hand hoeing

NS = Non-significant at P: _{0.05}**Effect of annual weeds:****On-fresh weight of annual weed:-**

According to data in Table 8, expanding the onion planting spaces across two seasons significantly increased the fresh weight of grass, broad-leaved, and total annual weeds g.m⁻² at 60 and 80 days after planting (DAP). Low onion planting spacing (20 cm) was found to reduce fresh weight of grass (g/m²) by (20.52 and 23.65 %) and (18.84

and 20.06 %), and decreased broad leaved (g.m⁻²) by (15.34 and 15.75 %) and (15.56 and 16.10 %); while fresh weight (g.m⁻²) of total weeds decreased by (16.79 & 17.97 %) and (16.49 and 16.52 %), as compared to wider onion planting space (30 cm) at (60 and 80 DAP) in 2022/23 and 2023/24 seasons, respectively, (Kumar 2015) and Thalkari 2019).

Table 8. Effect of planting spaces and weed-control treatments on fresh weight annual weeds (g/m²) at 60 and 80 days after planting in 2022/2023 and 2023/2024 seasons.

Treatments	Fresh weight annual weeds at 60 DAP						Fresh weight annual weeds at 80 DAP					
	Grassy weeds (g.m ⁻²)		Broad-leave weeds (g.m ⁻²)		Total weed (g.m ⁻²)		Grassy weeds (g.m ⁻²)		Broad-leave weeds (g.m ⁻²)		Total weed (g.m ⁻²)	
	2022/23	2023/24	2022/23	2023/24	2022/23	2023/24	2022/23	2023/24	2022/23	2023/24	2022/23	2023/24
Planting spaces (A)												
20 cm	190.6	214.1	520.9	575.2	711.5	789.3	374.5	402.0	1056.2	1128.1	1430.7	1530.1
25 cm	217.1	243.0	595.6	655.4	812.7	898.4	446.9	462.9	1212.7	1291.6	1659.5	1754.6
30 cm	239.8	263.8	615.3	681.3	855.1	945.1	490.5	502.9	1253.6	1329.9	1744.1	1832.8
LSD _{0.05}	28.99	26.82	21.38	27.13	37.14	28.74	49.87	45.07	35.04	38.42	54.25	51.68
Weed-control treatments (B)												
T ₁ - Stomp+H.H.	96.7	110.1	170.6	202.2	267.3	312.3	215.4	233.7	368.7	434.6	584.1	668.3
T ₂ - Omega+H.H.	75.3	91.3	255.3	284.4	330.6	375.7	169.0	202.4	556.7	626.1	725.7	828.5
T ₃ - Goal+Giako	63.4	78.2	581.7	616.7	645.1	694.9	153.5	180.3	1326.0	1408.6	1479.5	1588.9
T ₄ -Flora+ Fusilade	57.1	69.3	392.3	419.5	449.4	488.8	132.9	158.7	880.1	956.1	1013.0	1114.8
T ₅ - Hand hoeing	122.1	139.3	278.6	309.1	400.7	448.4	306.3	316.6	649.4	718.9	955.7	1035.5
T ₆ - Weedy check	880.3	953.6	1785.2	1992.0	2665.5	2945.6	1646.7	1643.8	3264.3	2355.1	4911.0	4998.9
LSD _{0.05}	37.06	39.58	64.55	75.48	77.33	78.21	132.96	85.47	113.09	122.95	235.61	196.09
interaction(A x B)	NS*	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

H.H. = Hand hoeing

NS* = Non significant at P: _{0.05}

Furthermore, Table 8 data showed that the fresh weight of grass, broad-leaved, and total weeds g/m² was significantly reduced by weed-control treatments. In comparison to weedy check treatment, the combination of herbicidal treatments (pre-planting with post- or hand hoeing) and the application of (T₁, T₂, T₃, T₄ and T₅) decreased the fresh weight of grassy weeds g.m⁻² by (89.0, 91.5, 92.8, 93.5 and 86.1%) and (88.5, 90.4, 91.8, 92.7 and 85.4 %), the fresh weight of broadleaved weeds g.m⁻² by (90.5, 85.7, 67.4, 78.0 and 84.4%) and (89.8, 85.7, 69.0, 78.9 and 84.5%) and total weeds' fresh weight g/m² by (90.0, 87.6, 75.8, 83.1 and 85.0%) and (89.4, 87.3, 76.4, 83.4 and 84.8 %), at 60 (DAP) in 2022/23 and 2023/24 seasons, respectively. The outcomes at 80 (DAP) for both seasons follow the same pattern as all weed management methods. These findings suggested that employing the aforementioned control methods was a good way to keep out of the seed onion crop during its early growing period, while weeds were effectively controlled by these treatments, broad-leaved weeds were less successfully controlled by treatment T₃. The interaction between planting

spaces and weed control techniques did not significantly alter the fresh weight of grassy, broadleaved, and total weeds g/m² in either season. These findings are consistent with those of Bhasker *et al.*, (2024).

On dry weight annual weeds:

Table 9 showed that expanding the onion planting spaces in both seasons significantly increased the dry weight of grass, broad-leaved, and total weeds/m² at 60 and 80 days after planting (DAP). It was showed that low planting spaces (20 cm) reduced dry weight of grassy weeds (g/m²) by (20.04 and 23.42 %) and (18.99 and 20.18 %), broad leaved (g/m²) by (15.24 and 15.71 %) and (15.53 and 15.13 %); when compared to a wider onion planting space (30 cm) at (60 and 80 DAP) in 2022/23 and 2023/24 seasons, respectively, the dry weight of total weeds (g/m²) reduced by 16.59 and 17.82 % and 16.47 and 16.53 %. These findings align with those of Thalkari (2019) found that moderate onion density reduced dry weight of grassy leaves by 12.82 and 17.12%, by 8.16 and 9.24; for weight of broad-leaves and by 10.14 and 12.80%; for

dry weight of total weeds as compared to low onion density in both seasons, respectively. Also, data in Table 9 showed that significant differences in dry weight of grassy, broad-leaves and total weeds/m² to weed control treatments. Herbicidal treatments pre planting application (T₁- Stomp-extra 45.5 % CS at 1.5 L/ fed + Hand hoeing once at 30 days after planting (DAP), T₂- Omega 33 % EC at 2 L/ fed + Hand hoeing once at 30 (DAP), T₃- Goal 4F 48 % SC at 2 L fed⁻¹ + Giako 10.8 % EC at 0.65 L fed⁻¹ applied at 30 (DAP), T₄- Flora 48 % SC

at 2 L fed⁻¹ + Fuzeiled forty 15 % EC at 1.5 L/fed applied at 30 (DAP) and T₅- Hand-hoeing (twice), decreased dry weight of grassy weeds by (89.1, 90.9, 92.3, 92.9 and 86.1 %) and (88.1, 89.2, 90.9, 91.8 and 84.8 %), broad-leaved weeds by (90.9, 86.1, 67.8, 78.4 and 84.7) and (90.0, 85.8, 69.1, 79.0 and 84.5 %) and total weeds by (90.3, 87.7, 75.8, 83.1 and 85.2 %) and (89.4, 86.8, 75.8, 82.9 and 84.6 %), at 60 (DAP) in the first and second seasons, as compared to weedy check treatment.

Table 9. Effect of planting spaces and weed control treatments on dry weight of annual weeds (g.m⁻²) at 60 and 80 days after planting in 2022/2023 and 2023/2024 seasons.

Treatments	Dry weight of annual weeds at 60 DAP						Dry weight of annual weeds at 80 DAP					
	Grassy weeds(g.m ⁻²)		BroadLeavesweeds(g.m ⁻²)		Total weed (g.m ⁻²)		Grassy weeds(g.m ⁻²)		BroadLeavesweeds(g.m ⁻²)		Total weed (g.m ⁻²)	
	2022/23	2023/24	2022/23	2023/24	2022/23	2023/24	2022/23	2023/24	2022/23	2023/24	2022/23	2023/24
Planting spaces (A)												
20 cm	36.7	40.1	100.1	111.5	136.8	151.6	70.3	79.5	205.5	219.4	275.8	298.9
25 cm	41.6	45.3	114.3	126.7	155.9	172.0	83.1	91.2	235.2	250.4	318.3	341.6
30 cm	45.9	49.5	118.1	132.0	164.0	181.5	91.8	99.6	243.8	258.5	335.6	358.1
LSD _{0.05}	3.82	4.50	3.62	4.30	5.19	5.17	7.13	8.36	5.92	6.71	9.35	10.97
Weed control treatments (B)												
T ₁ - Stomp+H.H.	18.2	20.7	31.5	38.5	49.7	59.2	40.6	46.2	70.1	82.6	110.7	128.8
T ₂ - Omega+H.H.	15.5	18.8	48.2	55.0	63.7	73.8	34.6	42.0	108.0	121.3	142.6	163.3
T ₃ - Goal+Giako	12.9	15.8	111.5	119.5	124.4	135.3	31.0	36.4	257.1	273.1	288.1	309.5
T ₄ -Flora+ Fusilade	11.8	14.3	74.8	81.2	86.6	95.5	27.4	32.5	170.4	184.9	197.8	217.4
T ₅ - Hand hoeing	23.2	26.4	52.8	59.8	76.0	86.2	58.2	62.9	125.7	139.0	183.9	201.9
T ₆ - Weedy check	166.9	173.8	346.2	386.2	513.1	560.0	298.6	320.6	637.7	655.6	936.3	976.2
LSD _{0.05}	4.78	4.39	5.74	7.49	5.70	6.69	17.37	18.71	34.19	36.32	48.38	52.75
Interaction(A x B)	*	*	**	NS	*	**	NS	NS	NS	NS	*	**

1st = 2022/23 2nd = 2023/24 seasons. H.H. = Hand hoeing

NS* = Non-significant at P: 0.05

The results at 80 (DAP) in the first and second season, take the same trend with all weed control treatments. These results indicate that the use of the above control treatments were good measures for controlling weeds during early growth period of seed onion crop. Dry weight of grass, broadleaved and total weeds/m² were significantly affected by interaction between planting spaces and treatments in both seasons at 60 (DAP). On the other hand, the results at 80 (DAP) Dry weight of grassy, and broad-leaved g/m² were not significantly affected by interaction between planting spaces and weed control treatments in the first and second seasons. In both seasons, the interaction between planting spaces and weed control methods had a substantial impact on the dry weight of total weeds g.m⁻². These results are in

harmony with those obtained by several researchers, such as Shinde *et al.* (2013) and Kalhapure *et al.* (2014),

2- Impact of interaction between planting spaces and weed control treatments:

On onion growth characters:

Maximum number of scapes/plant was recorded with the interaction between planting spaces 25 cm and weed control treatments, T₁- Stomp + H.H. and T₅- Hand hoeing (Table 10). Accounting the chemical treatments, mixed pre-plant applications (Stomp with hand hoeing once or hand hoeing twice) were dominant more proved in respect of growth and yield attributing characters.

Table 10. Effect of interaction between planting spaces and weed control treatments on Onion growth characters during 2022/23 and 2023/24 seasons.

Planting spaces	Weed control treatments	No. of scapes plant ⁻¹		Diameter of umbel (cm)	
		2022/23	2023/24	2022/23	2023/24
20 cm	T ₁ - Stomp+H.H.	5.5	4.5	7.0	6.3
	T ₂ - Omega+H.H.	4.8	3.7	5.9	5.3
	T ₃ - Goal+Giako	4.4	3.5	4.6	4.2
	T ₄ -Flora+ Fusilade	5.3	4.2	6.1	5.5
	T ₅ - Hand hoeing	5.2	4.8	6.6	6.0
	T ₆ - Weedy check	4.2	3.4	4.1	3.7
25 cm	T ₁ - Stomp+H.H.	6.9	5.7	7.5	6.7
	T ₂ - Omega+H.H.	5.1	4.8	6.5	5.8
	T ₃ - Goal+Giako	5.4	5.1	5.6	5.1
	T ₄ -Flora+ Fusilade	6.7	5.4	6.6	5.9
	T ₅ - Hand hoeing	6.6	6.0	7.3	6.6
	T ₆ - Weedy check	4.5	4.2	4.7	4.3
30 cm	T ₁ - Stomp+H.H.	8.1	7.4	7.8	7.0
	T ₂ - Omega+H.H.	6.9	6.4	7.0	6.3
	T ₃ - Goal+Giako	6.3	6.8	6.1	5.5
	T ₄ -Flora+ Fusilade	7.2	6.1	7.0	6.3
	T ₅ - Hand hoeing	8.4	7.4	7.7	7.0
	T ₆ - Weedy check	4.1	3.8	5.7	5.2
LSD _{0.05}		1.63	1.58	NS	NS

H. H = Hand hoeing

NS* = Non significant at P: 0.05

However, diameter of umbel was not significantly impacted by the way weed management methods and planting spaces interact in the first and second seasons. It was at pre to

the post-emergence mixed application of (Flora and Fusilade), in respect of number of scopes. Due to its efficient control through the use of various pre- and post-emergence herbicides,

weeds may no longer compete with crops for space, water, air, nutrients, and sunlight. It offers a better environment and enough other supplies for crops to grow and develop properly. According to Kalhapure *et al.* (2013) and Kalhapure *et al.* (2014), use of oxyfluorfen as post-emergence or pendimethalin as pre-emergence treatment was responsible for the improved growth and development of the onion crop because of the weed-free environment.

On yield of onion seeds and its components

Table 11 showed that the yield of onion seeds (g/umbel, g/plant and kg/fed) were higher significant. The

combination of planting spaces 25 cm and weed control treatments T₁-Stomp+H.H. and T₅-Hand hoeing produced the highest onion seed production (kg/fed) in both seasons, with 304.3 and 285.0 kg fed⁻¹ and 283.7 and 276.9 kg fed⁻¹, respectively. According to Kalhapure *et al.* (2013) and Kalhapure *et al.* (2014), using Pendimethalin as a pre-plant and Oxyfluorfen as a post-emergence treatment on onions improved yield and economic characteristics.

Table 11. Effect of interaction between planting spaces and weed control treatments on onion seed yield and its components in 2022/2023 and 2023/2024 seasons.

Planting spaces	Weed control treatments	Seed yield(g umbel ⁻¹)		Seed yield(g plant ⁻¹)		Seed yield(kg fed ⁻¹)	
		2022/23	2023/24	2022/23	2023/24	2022/23	2023/24
20 cm	T ₁ - Stomp+H.H.	0.93	0.9	7.36	7.27	294.6	277.6
	T ₂ - Omega+H.H.	0.86	0.81	6.82	6.64	271.4	254.7
	T ₃ - Goal+Giako	0.62	0.58	4.91	4.87	191.1	184.1
	T ₄ -Flora+ Fusilade	0.83	0.81	6.58	6.48	248.8	242.9
	T ₅ - Hand hoeing	0.89	0.87	7.06	7.03	279.2	271
	T ₆ - Weedy check	0.39	0.36	3.02	2.56	119.4	115.8
25 cm	T ₁ - Stomp+H.H.	1.12	1.08	8.41	7.69	304.3	283.7
	T ₂ - Omega+H.H.	1.11	1.00	7.89	7.21	286.5	273.0
	T ₃ - Goal+Giako	0.78	0.73	5.53	5.23	192.2	189.3
	T ₄ -Flora+ Fusilade	0.99	0.94	7.03	6.72	257.7	255.8
	T ₅ - Hand hoeing	1.00	0.99	7.07	7.06	285.0	276.9
	T ₆ - Weedy check	0.48	0.44	3.5	3.39	123.2	120.6
30 cm	T ₁ - Stomp+H.H.	0.85	0.81	6.68	5.78	254.6	246.0
	T ₂ - Omega+H.H.	0.79	0.77	6.25	5.43	232.2	224.0
	T ₃ - Goal+Giako	0.58	0.54	4.56	4.29	176.0	168.7
	T ₄ -Flora+ Fusilade	0.72	0.66	5.71	5.03	217.3	209.3
	T ₅ - Hand hoeing	0.85	0.81	6.72	6.01	254.0	245.3
	T ₆ - Weedy check	0.35	0.3	2.72	2.47	104.7	102.0
LSD 0.05		0.09	NS	0.71	0.81	26.11	23.53

H.H = Hand hoeing

NS* = Non-significant at P 0.05

Onion seed quality:

According to data in Table 12, a significant 1000 seeds weight was seen during first and second seasons, respectively, when planting spaces 25 cm interacted with weed control treatments T₁-Stomp+H.H. and T₅-Hand hoeing by 4.23 and 3.92 g and 3.60 and 3.48 g. Additionally, the highest

germination rate per day and the highest germination % were observed in interaction between planting spacing and weed control treatments T₁ and T₅. According to Kalhapure, *et al.* (2013) and Kalhapure *et al.* (2014), using pendimethalin as pre-plant and oxyfluorfen as post-emergence in onions improved yield and economic factors.

Table 12. Effect of interaction between planting spaces and weed control treatments on 1000 seed weight(g), seed yield (kg /fed) and its components in 2022/2023 and 2023/2024 seasons.

Planting spaces	Weed control treatments	1000 Seed weight (g)		%Germination		Germination rate /day	
		2022/2023	2023/2024	2022/2023	2023/2024	2022/2023	2023/2024
20 cm	T ₁ - Stomp+H.H.	3.90	3.22	87.7	83.0	3.4	3.6
	T ₂ - Omega+H.H.	3.11	3.04	81.0	79.7	3.7	4.0
	T ₃ - Goal+Giako	3.02	2.78	79.0	76.7	4.5	4.9
	T ₄ -Flora+ Fusilade	3.11	3.01	77.7	77.7	5.2	5.4
	T ₅ - Hand hoeing	3.57	3.20	86.7	84.3	3.3	3.7
	T ₆ - Weedy check	2.20	2.20	78.7	73.7	5.4	5.6
25 cm	T ₁ - Stomp+H.H.	4.23	3.60	91.3	88.0	3.1	3.5
	T ₂ - Omega+H.H.	3.25	3.10	83.3	81.0	3.3	3.6
	T ₃ - Goal+Giako	3.10	2.82	81.0	79.0	4.0	4.5
	T ₄ -Flora+ Fusilade	3.62	3.46	86.7	82.0	5.2	5.3
	T ₅ - Hand hoeing	3.92	3.48	88.3	85.3	3.3	3.5
	T ₆ - Weedy check	2.58	2.35	76.3	74.0	5.0	5.4
30 cm	T ₁ - Stomp+H.H.	3.32	3.08	81.0	80.0	3.4	3.8
	T ₂ - Omega+H.H.	2.95	2.86	79.3	78.7	3.5	3.7
	T ₃ - Goal+Giako	2.81	2.54	76.3	77.0	5.3	5.4
	T ₄ -Flora+ Fusilade	2.96	2.87	73.3	72.3	3.4	3.7
	T ₅ - Hand hoeing	3.36	3.18	83.0	81.0	4.2	4.7
	T ₆ - Weedy check	2.03	1.98	74.0	72.7	5.5	5.6
LSD 0.05		0.34	0.41			NS	NS

H. H = Hand hoeing

NS* = Non-significant at P 0.05

On dry weight of annual weeds:

Interaction between planting spaces and weed control treatments in both seasons had a substantial impact

on grassy dry weight, broad-leaved and total weeds/m², according to data in Table 13. Onion planting at high spacing (30 cm) under T₆-Weedy check treatment produced

the highest values grassy dry weight of weeds g/m² (181.2 and 186.8 g), broad-leaved dry weight g/m² (360.0 and 402.3 g), and total dry weight of weeds g/m² (541.2 and 589.1 g) in the first and second seasons, respectively. However, when utilizing T₁-Stomp Extra + manual hoeing as a treatment, the lowest dry weight of broad-leaved

plants/m² (24.0 and 29.6 g) and dry weight of total weeds/m² (39.8 and 47.6 g) were obtained by planting onions at low spacing (25 cm) in both seasons. However, while employing T₄-Flora + Fusilade treatment, onions were planted at low spacing (25 cm) and the dry weight of grassy-leaved g.m² (9.0 and 10.3 g) was obtained 60 DAP in both seasons.

Table 13. Effect of interaction between planting spaces and weed control treatments on dry weight of annual weeds (g m⁻²) at 60 and 80 days after planting in 2022/2023 and 2023/2024 seasons.

Planting spaces	Weed control treatments	Dry weight of annual weeds at 60 DAP						Dry weight of annual weeds at 80 DAP					
		Grassy weeds (gm ⁻²)		Broad-leave weeds (gm ⁻²)		Total weed (gm ⁻²)		Grassy weeds (gm ⁻²)		Broad-leave weeds (gm ⁻²)		Total weed (gm ⁻²)	
		1 st	2 nd	1 st	2 nd	1 st	2 nd	1 st	2 nd	1 st	2 nd	1 st	2 nd
20 cm	T ₁ - Stomp+H.H.	18.8	20.9	36.0	41.6	54.8	62.5	41.9	46.6	80.2	92.7	122.1	139.3
	T ₂ - Omega+H.H	15.2	19.2	49.8	56.4	65.0	75.5	34.0	43.1	111.6	126.2	145.6	169.3
	T ₃ - Goal+Giako	13.2	17.2	113.5	121.3	126.7	138.5	30.4	39.6	261.8	279.8	292.2	319.4
	T ₄ -Flora+ Fusilade	11.3	14.8	78.0	84.9	89.3	99.7	25.6	33.6	177.6	193.4	203.2	227.0
	T ₅ - Hand hoeing	24.7	27.2	52.8	60.0	77.5	87.2	58.7	64.7	125.7	139.1	184.4	203.7
	T ₆ - Weedy check	166.4	172.5	355.5	395.7	521.9	568.2	308.1	319.9	654.5	671.2	962.6	991.1
25 cm	T ₁ - Stomp+H.H.	15.8	18.0	24.0	29.6	39.8	47.6	35.1	40.2	53.5	65.9	88.584	106.1
	T ₂ - Omega+H.H	14.3	16.8	40.8	46.6	55.2	63.4	32.1	37.7	91.5	104.2	123.5	141.9
	T ₃ - Goal+Giako	9.7	11.2	102.3	108.3	111.9	119.5	26.6	25.7	235.8	249.7	262.4	275.5
	T ₄ -Flora+ Fusilade	9.0	10.3	63.3	69.3	72.3	79.7	22.3	23.5	144.0	157.9	166.3	181.4
	T ₅ - Hand hoeing	18.2	22.1	47.2	54.3	65.4	76.4	52.2	52.5	112.4	125.7	164.6	178.2
	T ₆ - Weedy check	153.0	162.1	323.1	360.7	476.1	522.8	253.4	297.1	595.8	612.6	849.3	909.7
30 cm	T ₁ - Stomp+H.H.	20.1	23.2	34.4	44.3	54.5	67.5	44.8	51.7	76.6	89.1	121.4	140.8
	T ₂ - Omega+H.H	16.8	20.3	53.9	62.2	70.7	82.4	37.7	45.3	120.8	133.6	158.5	178.9
	T ₃ - Goal+Giako	15.7	19.1	118.7	128.9	134.4	148.0	36.1	44.0	273.8	289.7	309.9	333.7
	T ₄ -Flora+ Fusilade	15.0	17.8	83.2	89.3	98.2	107.0	34.2	40.4	189.5	203.3	223.6	243.7
	T ₅ - Hand hoeing	26.8	30.0	58.4	64.9	85.2	94.9	63.7	71.4	139.1	152.4	202.8	223.8
	T ₆ - Weedy check	181.2	186.8	360.0	402.3	541.2	589.1	334.2	344.7	663.0	682.9	997.2	1027.7
LSD 0.05		14.33	13.18	17.22	NS	17.10	20.07	NS	NS	NS	NS	45.14	58.26

1st = 2022/23 2nd = 2023/24 seasons DAP = day after planting H. H = Hand hoeing

NS* = Non-significant at P: 0.05

3-Economic assessment:

Results presented Table 14 showed that average mean total costs, total income, net return and benefit cost ratio of three planting spaces seed yield as affected by weed treatments as the means of the growing seasons. The results indicated that the values of total costs, total income, net income and benefit cost ratio were differed owing to the differences between treatments. Planting space 25 cm with Stomp + hand hoeing gave the highest gross income

235.200 LE, Net return 178.330 LE and Benefit/ cost ratio 4.13. On the other hand, all planting spaces with (Flora + Fusilade) treatment received the highest total costs as compared to all other it. While, weed check with any planting space had the lowest total costs and gave the lowest total income, net income and benefit cost ratio compared to all other treatments. These findings are consistent with those of multiple studies, including Kalhapure *et al.* (2014) and Bhasker *et al.* (2024).

Table 14. Economic evaluation for onion seed yield as affected by planting spaces and weed control treatments as the mean for 2022/2023 and 2023/2024 seasons.

Planting spaces	Treatments	Total Costs(L.E.fed ⁻¹)	Total income (L.E.fed ⁻¹)	Net income(L.E.fed ⁻¹)	Benefit cost ratio
20 cm	T ₁ - Stomp+H.H.	60885	228880	167995	3.75
	T ₂ - Omega+H.H	60645	210440	149795	3.47
	T ₃ - Goal+Giako	60569	150080	89511	2.47
	T ₄ -Flora+ Fusilade	61195.5	196680	135484.5	3.21
	T ₅ - Hand hoeing	60135	220080	159955	3.65
	T ₆ - Weedy check	58930	94080	35150	1.59
25 cm	T ₁ - Stomp+H.H.	56870	235200	178330	4.13
	T ₂ - Omega+H.H	56630	223800	167170	3.95
	T ₃ - Goal+Giako	56554	152600	96046	2.69
	T ₄ -Flora+ Fusilade	57180.5	205400	14821.5	3.59
	T ₅ - Hand hoeing	56120	224760	168640	4.00
	T ₆ - Weedy check	54920	97520	42600	1.77
30 cm	T ₁ - Stomp+H.H.	54200	200240	146040	3.69
	T ₂ - Omega+H.H	53960	182480	128520	3.38
	T ₃ - Goal+Giako	53884	137880	83996	2.55
	T ₄ -Flora+ Fusilade	54510.5	170640	116129.5	3.13
	T ₅ - Hand hoeing	54450	199720	145270	3.66
	T ₆ - Weedy check	52250	82680	30430	1.58

H.H = Hand hoeing

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تأثير مسافات الزراعة ومعاملات مكافحة الحشائش على محصول بذور البصل والحشائش المصاحبة

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الملخص

تم إجراء تجربة حقلية بمحطة البحوث الزراعية بالجميزة مركز البحوث الزراعية خلال موسمي الزراعة ٢٠٢٣/٢٠٢٢ و ٢٠٢٤/٢٠٢٣ لدراسة تأثير مسافات الزراعة وبعض معاملات مكافحة الحشائش المصاحبة لمحصول البصل لإنتاج البذور. استخدمت تجربة القطع المنشقة مرة واحدة في تصميم قطاعات كاملة العشوائية، حيث كانت مسافات الزراعة الثلاثة في القطع الرئيسية ٢٠ سم (٣٩٩٠ كجم أبصال/فدان) و ٢٥ سم (٣١٩٢ كجم أبصال/فدان) و ٣٠ سم (٢٦٥٨,٥ كجم أبصال/فدان) مع ست معاملات لمكافحة الحشائش تم توزيعها عشوائياً في القطع الفرعية كما يلي T1: ستومباكسترا + عزيق بيوي مرة واحدة و T2: أوميجا + عزيق بيوي مرة واحدة و T3: جول ٤ اف + جياكو و T4: فلورا + فيوزيليد فورتى و T5: عزيق بيوي (مرتين) و T6: بدون معاملة في ثلاث مكررات. أظهرت النتائج انخفاض الوزن الطازج والجاف للحشائش الكلية المختلفة من خلال تقليل مسافات الزراعة (٢٠ سم أو ٢٥ سم) وزيادة معنوية نتيجة استخدام معاملات مكافحة الحشائش T1 و T2 و T5 في كلا الموسمين. بالإضافة إلى أكبر عدد من الحوامل الزهرية لكل نبات وقطر النورة ومحصول البذور (جم/نبات) ووزن ١٠٠٠ بذرة. أوضح التفاعل بين مسافات الزراعة (٢٥ سم بين الجور) ومعاملة مكافحة الحشائش T1: ستومباكسترا + عزيق بيوي مرة واحدة ارتفاع في إنتاجية محصول بذور البصل (كجم/فدان)، والنسبة المئوية للإنبات وصافي الدخل/فدان مقارنة بمسافات الزراعة ومعاملات مكافحة الحشائش الأخرى.

الكلمات الدالة: بذور البصل، مسافات الزراعة، ميديات حشائش