

Statement on the Positive Effects of Mulching with Straw and Black Nylon on the Growth and Yield of Green Onions

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Annotation: The study was conducted in one of the private sector fields in the Sheikh Mohammed area in Mosul. Planting took place on 11/5/2022 for the fall semester. The experiment included evaluating three types of covers: straw cover, half cover with black nylon, and full cover with black nylon. In addition to planting in open soil for the purpose of producing green onions without irrigation. The CRD design was used in this experiment, where the first treatment was without soil covering, the second treatment was straw covering, the third treatment was covering half the soil with black nylon, and the fourth treatment was Mulching completely with black nylon, with three replicates for each factor. Two lines of onions were planted, the distance between each line and the next was 25 cm, and the distance between each plant was 10 cm. The (Bashiqi) variety was planted. The results showed that when planting and producing green onions using full soil coverage without irrigation, it gave the best significant results compared to planting in open soil for all the studied characteristics,

as the weight of the plant in the case of full soil coverage was (206.19) g, while the weight of the plant in the case of open soil was (57.78) g.

Keywords: Mulching, soil, black nylon, without irrigation, coverage, green onion.

Introduction

Onions belong to the narcissus family Alliaceae and their scientific name is (*Allium cepa*, L.). They are biennial plants, where the bulbs are produced in the first year of planting, and the flower spikes and seeds are produced in the second year after a period of dormancy and exposure to cold to achieve sprouting. The original homeland of onions is Iran, extending to Pakistan. It was cultivated in ancient civilizations in Iraq. Onions are consumed in large quantities as green onions and are second in importance among vegetable crops after tomatoes (Abdel, 1995). It is used in cooking and consumed as a green onion and as an appetizing flavoring when eating. It is sold in markets in the form of powders after being ground and dried. Onion and garlic extracts have high antibacterial and antifungal properties. Onions are a source of nutritional value. Many sources have indicated that the presence of the sharp substance in onions is due to the presence of organic sulfur compounds that give onions their properties, taste and smell. These compounds contain methyl, allyl and propyl derivatives of sulfur-containing amino acids, which are called alliin. When they decompose, they give stronger substances in taste and smell, known as alliin derivatives, which appear when the onions are injured. The amount of these compounds present in the onion tissue is what determines the pungent taste and is called allylpropyl disulfite.

Materials and working methods

The study was conducted in one of the private sector fields in the Sheikh Mohammed area near the city of Mosul during the autumn growing season (2022-2023). To study the feasibility of producing green onions under different types of plastic mulch without irrigation. Also, to maintain a suitable environment for onion growth, including temperature and humidity, through the use of plastic mulch and organic materials

Use a CRD design with three replicates for each treatment. . Statistical analysis was carried out using the SAS program (2001) and Duncan's multiple range test was performed at a probability level of 0.05 (Al The land was plowed and then cut according to the proposed design for the experiment. The land was arranged in the form of panels with an area of (1m x 1m) and irrigated with an appropriate amount of water to reach the field capacity. The first treatment was without covering, the second treatment was covering it with straw with a thickness of 10 cm, the third treatment was covering half of the panels with black nylon, and the fourth treatment was covering the panels completely with black nylon. Two lines of onions were planted, the distance between one line and the other was 25 cm, and the distance between one plant and another was 10 cm. The (Bashiqi) variety was planted.-Rawi and Khalaf Allah, 2000).

Traits studied:

- 1 - Plant weight (g)
- 2 - Number of plant leaves
- 3 - Plant height (cm)

4 - Stem diameter (cm)

5 - Dry weight of shoots (g)

Table (1) shows the rainfall rates for the city of Mosul (2022-2023)

Month	2023	2022
January	62.4	56.6
February	51.9	10.1
March	52.2	18.3
April	45.4	30.5
May	17.7	24.1
June	1.2	0.0
July	0.2	0.0
August	0.0	0.0
September	0.6	0.0
October	12.6	10.5
November	40.6	47.7
December	59.2	3.2
Annual total	344.0	201.0

Three plants were taken and the average was taken from each replicate and measurements were made on them. The plants were weighed with a sensitive electronic balance and the number of leaves for each plant was calculated. The length of the plant was measured with a measuring tape and the diameter of the stem with a foot. The dry weight was calculated after drying the plants in the oven at a temperature of 72 degrees Celsius until the weight was stable.

Results and Discussion

Table (2) shows the effect of soil cover on the characteristics of onion plants.

Treatment	Wet Weight	Dry Weight	Stem Diameter	Number of Leaves	Plant Height
Control	57.78 ^C	5.45 ^C	9.1 ^C	7.88 ^A	62.99 ^A
Straw Cover	66.5 ^C	7.5 ^C	10.3 ^C	6.55 ^A	63.11 ^A
Half Cover with Black Nylon	140.41 ^B	14.18 ^B	14.1 ^A	9 ^A	64.1 ^A
Full Cover with Black Nylon	206.19 ^A	20.74 ^A	17.9 ^A	8.89 ^A	84.3 ^A

The coefficients with the same letters for each factor separately are not significantly different according to Duncan's multiple range test at the 5% probability level.

The results of the table indicate that the treatment of full coverage of black plastic was significantly superior with the highest values in some desirable traits of the results, as it reached (206.19) g/plant in the weight of the daughters and (20.74) g/plant in the dry weight, and the lowest value was in the control treatment (without coverage), as it reached (57.78-5.45) g/plant, respectively. As for the stem diameter trait, the treatment of full coverage with black nylon was superior and obtained the highest value of (20.74) mm, while there was no significant difference between it and the treatment of half coverage with black plastic. The lowest value of stem diameter was in the control treatment, reaching (9.1) mm. As for the trait of number of leaves and

plant length, no significant differences appeared between the treatments, and the highest values appeared in the treatment of full coverage with black plastic, reaching (8.89) leaves/plant and (84.3) cm, respectively. One of the main problems in onion cultivation is weeds due to the weak ability of the onion plant to grow and the competition of weeds for light, nutrients and moisture. Gorojan (2001) found that weeds are the biggest competition for the onion crop for light, nutrients and moisture, which affects the onion yield and quality and which is a host for diseases and their transmission to the onion crop. It may also be due to the fact that Mulching helps change the root environment in which the plant grows, securing its need for water and nutrients, and reducing the loss of elements through washing, thus increasing the process of photosynthesis, which results in increasing the plant's carbohydrate content (Ali, 2001). These results are consistent with what Al-Jabouri (2005) found in his study on onion plants. He found that soil coverage increased vegetative growth characteristics, which may be attributed to the fact that soil coverage reduced water evaporation and maintained adequate soil moisture, which improved the availability of nutrients, especially nitrogen. This is consistent with (1997, Parmer and Sharma) who found that plastic covering of the soil, especially polyethylene, led to improving its moisture and providing a good environment for root growth in wheat plants. They indicated the readiness of phosphorus absorption in the presence of moisture, especially in the vegetative growth stage of the plant. Coverage prevents this element from evaporating into the atmosphere in the form of ammonia gas and nitrogen dioxide. We agree with what Goundet and Olsen (2001) found, that covering with transparent polyethylene and black polyethylene increased soil temperature to a depth of 30 cm, and the variation between day and night temperatures decreased significantly in covered soil compared to exposed soil, especially when covered with black plastic.

Recommendations

1. Study the possibility of growing onions permanently when Mulching with black nylon.
2. Explore other soil covering materials for onion cultivation and production that have a similar effect to black nylon.

References

1. Al-Jubouri Amer Abdullah Hussein (2005) The effect of mulching and irrigation on the productivity of three onion varieties. Master's thesis, Department of Horticulture, College of Agriculture and Forestry, University of Mosul, Ministry of Higher Education and Scientific Research, Republic of Iraq.
2. Abdel, C. G. (1995). "Effects of supplementary irrigation and indole "- Bekundo, M. L., Lekasi, J., Woomer, P., & Tenywa, J. (2001). "National Agricultural Research Centre, KAR-Muguga. P.O. Box 30148, Nairobi, Kenya
3. "Ali, Issam Hussein (2001). The effect of planting date, potassium fertilization, and soil cover on the growth, flowering behavior, and yield of tomatoes grown in greenhouses in the Basra region. PhD thesis, College of Agriculture, University of Basra, Republic of Iraq.
4. Gorgan, J., Wall, M., Gramer, C., Sammis, T., Lewis, B., & Schroeder, J. (2001). "Bulb onion culture and management. College of Agriculture and Home Economics: New Mexico State University, pp. 19".
5. Home, G. (2002). "Onion, leek, shallot and garlic. Home vegetable gardening Ec 570. 2002, pp. 6".
6. Kelley, W. T., & Granberry, D. M. (2000). "Commercial "
7. Kirnak, H., Kaya, C., Higgs, D., & Gercek, S. (2001). "A long-term experiment to study the role of mulches in the physiology and macro nutrition of strawberry grown under water stress. Aust Agric. Res. 52: 937-943".

8. Lamont, W. J. (1993). "Plastic mulch for production of vegetable crops. Hort technology 3, 35-39".
9. Miller, A. A., Gardener, W. R., & Goltz, S. M. (1971). "Internal water status and water transport in seed onion plants. Agronomy Journal 36, 779-784".
10. Sharma, P. K. and Parmer, D. K. (1997). Effect of phosphorus and mulching on the uptake of secondary Nutrients and productivity of wheat at different