P-ISSN 2322 - 0678 & E-ISSN 3048 - 9946
Gujarat Journal of Extension Education Vol. 38 : Issue 2 : December 24 https://doi.org/10.56572/gjoee.2024.38.2.0008

# COMPARISON OF GREENHOUSE CUCUMBER YIELD USING DRIP IRRIGATION AND SURFACE IRRIGATION IN INJIL DISTRICT OF HERAT PROVINCE

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***ABSTRACT***

*This research was carried out in 2022 in Injil District, Herat province in order to investigate the performance of greenhouse cucumbers using drip irrigation and surface irrigation. The data was collected from a sample of 60 people using pre-prepared questionnaires. 23.33% of the people under research have small families (1-3). 45% of the people under study were illiterate, 31.66% of the people under research study had (1-5) years of farming experience. 50% of the people under research were average farmers who had between (300-500) meters of land. 5% of the people under the research have a low annual income less than 159,312 Afghanis. 86.66% of the people under the study believe that the use of drip irrigation saves water. They believe that one of the disadvantages of the drip irrigation system is its high costs. 85% of the people under the study believe that the use of surface irrigation reduces the cost. 46.66% of the people under the research believe that the yield of cucumbers using surface irrigation is at an average level, but 63.66% of the people under the research believe that the yield of greenhouse cucumbers is using drip irrigation is at a high level. The majority of cucumber greenhouse owners (65%) believe that the crop level in one harvest period using drip irrigation is more than (25) tons. The majority of cucumber greenhouse owners (65%) believe that the level of the crop in two harvest periods using drip irrigation is more than (50) tons. However, regarding surface irrigation, the majority of cucumber greenhouse owners (63.33%) believe that the crop level in one harvest period using surface irrigation is on average between (20-25) tons. The majority of cucumber greenhouse owners (66.66%) believe that the level of the crop in two harvesting periods using surface irrigation is between 40-50 tons.*

***Keywords****: yield, greenhouse cucumbers, surface irrigation, drip irrigation, injil district*

## INTRODUCTION

Afghanistan is a country whose economy is based on agriculture, but it has a weak economy due to the neglect of agriculture and the significant reduction in the production of agricultural, livestock and horticultural products and having poor agriculture. Agriculture in Afghanistan is traditionally done at a low level for the livelihood of the peasants, so it is felt necessary to carry out fundamental and infrastructure activities in relation to the current conditions after the recent developments. We pursued this goal so that we could take a small step towards mechanization and raising the economic and social level of people's lives. And with progress in the field of agriculture, one can approach self-sufficiency and true independence. And as a result, led the country's economy to the desired level and towards progress in all fields. Drip irrigation is known as the best method of irrigation systems in the world, which has been extremely important for all the world, especially agricultural experts, by which vast agricultural lands are irrigated, unfortunately, it is very little popular in Afghanistan. But it is being developed and promoted, which has been promoted by the government and public and private institutions among the people. Also, Herat province is one of the provinces where the majority of people are farmers. People have been using greenhouses for about 12 years, and there are more than 1000 greenhouses in this province, production includes cucumbers, eggplants, eggplants, and okra.

Cucumber (Cucumis sativus *L*.) is an important vegetable crop from Cucurbitaceace family and having a chromosome number 2n = 14. Cucumber is native of south Asia, specifically warm and humid climate of the Himalaya in North West India and probably northern Africa (Pal, Arunabha, et al. 2020).

Irrigation conditions based on traditional methods

and partial root drying methods were simulated. The amount of irrigation water calculated through measurements taken from A-class evaporation pot was delivered to the root parts through drip irrigation technique. All agricultural activities were performed equally in all of the parcels in the study. The only difference was about the irrigation treatments and implementations. In other words, the differences in the data obtained from the study have been affected by the employed irrigation treatments. It was found out in this study that traditional irrigation techniques and Partial Root Drying technique were found to be effective on cucumber cultivation (Kaman, H., 2017).

The large production of this plant is done not only in the open space, but also in the greenhouse, so in order to achieve the highest yield and successful production, especially in greenhouse cultivation, in addition to creating a favorable substrate for plant growth and using agricultural techniques in accordance with It also developed into a management solution to face potential tensions and problems during the period of growth.

Drip irrigation is known as the best method of irrigation systems in the world, which is of great importance to all the world, especially agricultural experts, by which vast agricultural lands are irrigated. Therefore, drip irrigation is one of the better methods of irrigation compared to surface irrigation inside the greenhouse, which in this way can play a significant role in reducing diseases and weeds.

**OBJECTIVE**

To know the comparison of greenhouse cucumber yield using drip irrigation and surface irrigation

**METHODOLOGY**

This research was conducted in Injil District, Herat province, which is one of the provinces of Afghanistan, located in the west of the country. It borders; Turkaministan in the north, Frah province in the south, Islamic Republic of Iran in the west, and Badghis and Gor provinces in the east. Also, the majority of the people of Herat province are engaged in agriculture, and the Injil District is one of the influential Districts of Herat province. And there are fertile lands in this District for the agricultural activities.

The statistical population of this research is under the title of Comparison of greenhouse cucumber yield using drip irrigation and surface irrigation, therefore 60 greenhouse owners who are engaged in greenhouse work in Injil District have been randomly selected.

Ex-post facto research design method used in this research and it is a research that is done using the results of basic research in order to improve and complete the behavior of methods, tools, products, structures and patterns of human societies. This method is used in cases where the phenomena have already happened. The data collected from the respondents were scored, tabulated and analyzed using SPSS and Excel to determine frequency and percentage, mean, Standard Deviation as statistical tools and techniques.

**RESULTS AND DISSCUSSION**

**The yield rate of greenhouse cucumber using surface irrigation**

The information provided in table 1 shows the performance of greenhouse cucumbers using surface irrigation that the majority of cucumber greenhouse owners (46.66%) believe that the yield of greenhouse cucumbers using surface irrigation is at an average level. And the lowest (8.3%) of the participants of the study believe that the yield of greenhouse cucumbers using surface irrigation is at a high level. The majority of cucumber greenhouse owners (53.33%) of the participants of the study believe that their net income is at an average level with the use of surface irrigation, and the lowest (13.3%) of the participants of the study believe that their net income using surface irrigation at a high level. The majority of cucumber greenhouse owners (43.33 %) of the participants of the study believe that their annual income is at an average level with the use of surface irrigation, and the lowest (20%) percent of the participants of the study believe that their annual income is at a high level, the majority of cucumber greenhouse owners (73.33%) believe that the prevalence of pests using surface irrigation is at a high level, and the lowest (8.3%) percent of participants of the study believe that the prevalence of pests using surface irrigation is at a low level, the majority of greenhouse owners (63.3%) believe that the rate of soil erosion using surface irrigation is at a high level, and the lowest (6.6%) participants of the study believe that the level of soil erosion using surface irrigation is at a low level, and the majority of cucumber greenhouse owners (63.3%) of the people under the research believe that the effectiveness of fertilization using surface irrigation is at a low level. and the lowest (1.6%) of the greenhouse owners believe that the effectiveness of fertilization using surface irrigation is at a high level.

**Table 1 : Yield rate of cucumber using surface irrigation** (n=60)

| Sr. No. | Particular | Category | No. of Participants | Percentage |
|---|---|---|---|---|
| 1 | What was the yield rate using surface irrigation? | Low | 27 | 45.00 |
| 2 | | Average | 28 | 46.66 |
| 3 | | High | 05 | 08.30 |
| 4 | What was the net income using surface irrigation? | Low | 20 | 33.30 |
| 5 | | Average | 32 | 53.33 |
| 6 | | High | 08 | 13.30 |
| 7 | What was your annual income using surface irrigation? | low | 22 | 36.60 |
| 8 | | Average | 26 | 43.33 |
| 9 | | High | 12 | 20.00 |
| 10 | What was the rate of pests using surface irrigation? | Low | 05 | 08.30 |
| 11 | | Average | 11 | 18.30 |
| 12 | | High | 44 | 73.33 |
| 13 | What was the rate of soil erosion using Surface irrigation? | Low | 04 | 06.60 |
| 14 | | Average | 18 | 30.00 |
| 15 | | High | 38 | 63.30 |
| 16 | How was the effectiveness of fertilization Using surface irrigation? | Low | 38 | 63.30 |
| 17 | | Average | 21 | 35.00 |
| 18 | | High | 01 | 01.60 |

**The yield of greenhouse cucumbers using drip irrigation**

The information presented in table 2 shows the performance of greenhouse cucumbers using drip irrigation. The majority of cucumber greenhouse owners (63.33%) believe that the yield of greenhouse cucumbers using drip irrigation are at a high level and the lowest (36.6%) of greenhouse owners believe that the yield of greenhouse cucumbers is at an average level, the majority of cucumber greenhouse owners (76.66%) believe that their net income is by using drip irrigation are at a high level and the lowest (23.3%) of the greenhouse owners believe that their net income is at an average level. the majority of cucumber greenhouse owners (78.33%) believe that their annual income is by using drip irrigation are at a high level, (21.66%) believe that their annual income using drip irrigation is at an average level. The majority of cucumber greenhouse owners (56.66%) believe this that the prevalence rate of pests using drip irrigation is at a low level and (43.66%) believe that the rate of pests using drip irrigation is at an average level, the majority of greenhouse owners (76.66%) believe this that the amount of soil erosion using drip irrigation is low, and (23.3%) believe that the soil erosion rate is at a average level, and the majority of cucumber greenhouse owners (86.66%) believe that the effectiveness of fertilization using drip irrigation is at a high level. And (10%) percent of the greenhouse owners believe that the effectiveness of fertilization using drip irrigation is at an average level.

**Table 2 : The yield of greenhouse cucumbers using drip irrigation** (n=60)

| Sr. No. | Particular | Category | No. of participants | Percentage |
|---|---|---|---|---|
| 1 | What is the yield rate with drip irrigation? | Low | 0 | 0 |
| | | Average | 22 | 36.60 |
| | | High | 38 | 63.30 |
| 2 | What is the net income using drip irrigation? | Low | 0 | 0 |
| | | Average | 14 | 23.30 |
| | | High | 46 | 76.66 |
| 3 | What is the annual income using drip irrigation? | Low | 0 | 0 |
| | | Average | 13 | 21.66 |
| | | High | 47 | 78.33 |
| 4 | What is the rate of pests using drip Irrigation? | Low | 34 | 56.66 |
| | | Average | 26 | 43.33 |
| | | High | 0 | 0 |
| 5 | Soil erosion rate using drip irrigation | Low | 46 | 76.66 |
| | | Average | 14 | 23.33 |
| | | High | 0 | 0 |
| 6 | What is the effectiveness of fertilization using drip irrigation? | Low | 02 | 03.30 |
| | | Average | 06 | 10.00 |
| | | High | 51 | 85.00 |

**Greenhouse crop level using surface and drip irrigation**

The data presented in table (3) shows the crop level using drip irrigation in two harvest periods. The majority of cucumber greenhouse owners (65%) believe that the crop level in one harvesting period using drip irrigation is more than (25) tons, and the lowest (5%) percent believe that the crop level in one period harvesting using drip irrigation is at the low limit between 15-20 tons, the majority of cucumber greenhouse owners (65%) believe that the crop level in two harvest periods using drip irrigation is more than (50) tons. have and the lowest (5%) believe that the level of the product in two harvest periods with use from drip irrigation is at the lower limit between 30-40 tons.

**Table 3 : The yield of greenhouse cucumbers using drip irrigation** (n=60)

| Greenhouse Product | | Category | Number | Percentage |
|---|---|---|---|---|
| Surface Irrigation | Crop level in one harvest period | Less than (15-20) Ton | 16 | 26.66 |
| | | Average (15-20) Ton | 38 | 63.33 |
| | | More than (15-20) Ton | 06 | 10.00 |
| | Crop level in two harvest periods | Less than (15-20) Ton | 15 | 25.00 |
| | | Average (15-20) Ton | 40 | 66.66 |
| | | More than (15-20) Ton | 05 | 08.33 |
| Drip Irrigation | Crop level in one harvest period | Less than (15-20) Ton | 03 | 05.00 |
| | | Average (15-20) Ton | 18 | 30.00 |
| | | More than (15-20) Ton | 39 | 65.00 |
| | Crop level in two harvest periods | Less than (15-20) Ton | 03 | 05.00 |
| | | Average (15-20) Ton | 18 | 30.00 |
| | | More than (15-20) Ton | 39 | 65.00 |

## CONCLUSION

Due to the increasing world population, the demand for agricultural products has also increased, and in order to meet the human demand, the inputs must be consumed more than before in order to see more yield. Drip irrigation is known as the best method of irrigation systems in the world, which is extremely important for all the world, especially agricultural experts, by which vast agricultural lands are irrigated.

Therefore, drip irrigation is one of the best methods of irrigation compared to surface irrigation inside the greenhouse, which in this way can play a significant role in reducing diseases and weeds. The use of drip irrigation in the greenhouse is very important because the management factor is one of the four factors, land, water, capital and management are production factors, and the irrigation management factor is directly related to the yield of greenhouse products. Because the farmers who used drip irrigation systems in the greenhouse, their crops performed much better than the farmers who used surface irrigation in the cucumber greenhouse. It is used correctly so that not only the current generation but also the future generations can use it. Greenhouse cucumber is one of the products that has attracted the attention of farmers in Herat province in recent years.

## CONFLICT OF INTEREST

All authors express no conflict of interest in any part of the research.

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*Received : October 2024 : Accepted : December 2024*