



Performance Evaluation of Mini Fertigation with Rainfall: Effect on Black Mustard Seed Brassica Juncea for Home Agriculture

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Abstract

Water and land have been scarce nowadays and the needs for much efficient use of this resources is much important than before especially with the growing population and climate change. The condition is worsened with the global issue which is Covid-19 that has decapitated many of economic activities. Due to this, government has been enforcing strict regulations. The planting of crops especially short-term crop at home is much more relevant than before as there are nothing much that can be done. Combine that with the unutilized source of rainwater, thus come the concept home farming. Brassica Juncea are chosen due to the short life cycle thus would make it easier to cultivate. It is irrigated with water from rain via homemade reservoir thus ensuring no cost at the water side. The needs for much more efficient irrigation method such as utilization of rainwater to create energy can be feasible as there are downward movement of water from the topside of house downwards.

Keywords: Faba bean; Demonstration; Varieties

Introduction

The black mustard seed Brassica Juncea is famous for its use in food crops. It is often used in the form of vegetables, oilseeds, feed, green manure, and condiments. It originates in India much before the Christian era and it is used for many purposes such as oil for cooking and frying, spice for seasoning foods, vegetables and for religious ceremonies (Mehra [1]). Since then, the Brassica crop has been a part of human agriculture system and occupies a predominant place in the world's agrarian economy. Originated from Asia, India, China and Japan is the first of the countries that is known to start cultivating this type of crop. Prakash[2]; Weiss, [3] has documented the crop in India, and Yan, 1990 has found the recorded Chinese word of rapeseed. The earliest use of this crop is as oil for burning lamps, and poor people use it as an edible oil. At a later centuries, this crop has become an important use for cooking and lighting oil. The benefits can be seen in medicines as the Greek, Roman and Chinese have described its values in their writings at 500-200 BC (Robbelen et al., [4]). The uses of this mustard crop are wide and not only limited to vegetables. The harvested mustard crop is dried and can be made into a commercial mustard seed. From there it can be further processed into fixed oil, bran, prepared mustard paste and ground mustard. Mostly is with the process of milling, grinding, and deheating (Cui & Eskin, [5]).

More and more natural habitat is being converted to agricultural land and this leads to the extensive use of chemicals. This then leads to the dramatic declination of animals (Carson, [6]). Many studies have been conducted to prove that agricultural pesticides can be directly toxic to wildlife species and reduce their food supply. As the link between the population declines and the utilization of land for agriculture, it is well-documented by (Rauschenberger et al., [7]) Water is a renewable resources, but its availability is variable and limited. Their availability depends on rainfall, temperature, evaporation, and runoff. With increasing population, current climate issue, and efficient use of water, it has led to an extensive problem with the water supply. As of agriculture alone, it accounts for 87% of the freshwater consumption. That is why, new methods for efficient use of water especially for agriculture, needs to be done so that it can be better utilize in other sector, thus would help in water shortage problems [8].

That leads to the idea of crop cultivation without lands and using rain as water supply for the crop. That is a much better utilization of water without using the supplied water to our home. There are many projects that has been done based on this principle such as vertical farming, however it still utilizes pipe water. This study attempts to utilize rain as water supply without the needs of using

pipe water, integrated with vertical farming. The best thing about this system is that there is no electrical system that is utilized, but rather is purely by using naturally acting forces in our surroundings such as gravity and atmospheric pressure. The objective of this study is to design and evaluate the performance of the irrigation system in term of the plants physical growth and the environment.

Materials and Methods

Planting Material



Figure 1: Container and Soil.



Figure 2: Brassica Juncea Seed.



Figure 3: Irrigation System.

Preparation

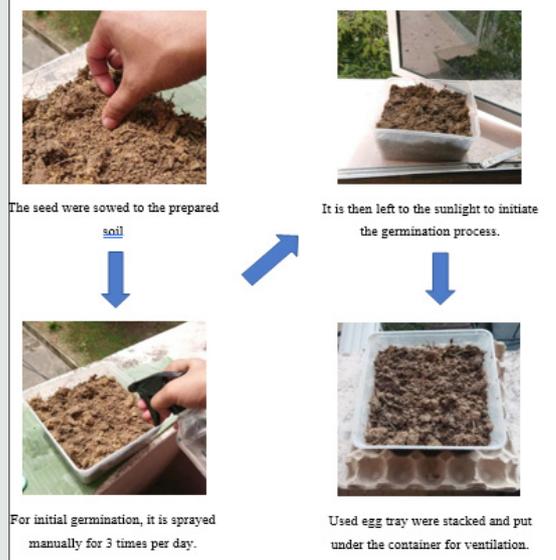


Figure 4: Crop.

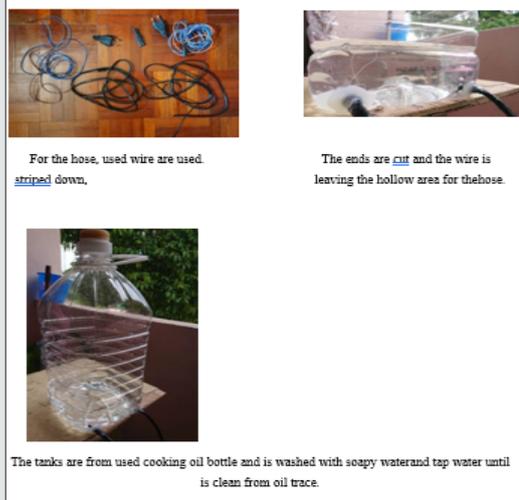


Figure 5: Irrigation System.

Working Mechanism



Figure 6:It utilizes gravity for water flow to the crop.



Figure 7: When the cap is closed, no atmospheric pressure is present, stopping the flow of water.



Figure 8: When the cap is opened, atmospheric pressure will present, making water flow.

Results and Discussions

Physical Analysis

Criteria that is evaluated in the physical analysis includes height of the plant and number of leaves.

Table 1: Height of the plant.

Days	3	6	9	12
Average Leaf Number	2	4	4	4

Table 2: Number of Leaves

Days	3	6	9	12
Average Plant Height (cm)	0.63	2.49	3.03	3.44

Based on Table 1, it can be clearly seen that there is an increment of leaves number from the first measurement is taken to the second measurement. The numbers are constant from day 6 until

day 12 as there are an enlargement of the leaf size rather than addition of new leaves. For Table 2, there are a gradual increase in the average plant height of the crop. It increases steadily from day 3 until day 12. The most increment of height can be seen from day 3 to day 6 whereby there are a difference of 1.86 cm. This is due to the rapid growth of the stem of the crop.

Environment Analysis

The environment plays a vital role in the growth of a crop. Without ideal environment, crop will struggle to live and perform to its full potential. That is why the environment needs to be analyzed to know how the plant will react to a set of environmental condition. Apps that is downloaded from Play Store is used to measure the environment factor in this experiment.

Conclusion

To conclude, it can be said that the implementation of this project is a successful one as there are no cost that is incurred due to the materials that is used are all around the house. Surely there are a certain aspects that needs to be improved, but for a start, this is quite good. The flaws can be overcome with some effort it can be much better with a small gradual modifications. Overall, there are no need to go out and buy the materials as it is readily at home, thus conforming to the government recommendation to Stay at Home.

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