

Production of Different Lettuce and Cucumber Varieties in Hydroponic Culture at Jamalpur Region

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Abstract:

The experiment was conducted at the Hydroponic net house at Horticulture Research Centre nursery, Regional Agricultural Research Station, Jamalpur during the winter season of 2021-2022 with a view to evaluate the performance of different cucumber and lettuce varieties with hydroponic solution. "Low-cost Hydroponic solution-A, B and C" were used to culture the plants and the circulating system was maintained. Three commercial cucumber varieties were selected for the experiment called "Moinamoti", "Alavi green" and "Green bird" and three commercial lettuce varieties were used for the experiment named "BARI Lettuce-1", "Green Leaf" and "Green wave". The highest Number of fruits plant⁻¹ was found in Alavi green variety (18.00) and found lowest in Green bird (14.20) variety. The maximum average individual fruit weight was found in Alavi green (206.45 g) and the minimum in Green bird (180.39 g). The maximum yield was obtained from Alavi green (3.63 kg) and followed by Moinamoti (2.96 kg) and the minimum was in Green bird (2.51 kg) variety. For the lettuce experiment some rectangular boxes were used which were made by wood and thick polythene flim and box were covered by cork sheet. Each cork sheet contained 28 lettuce plant. The highest Plant height was recorded from BARI Lettuce-1 (42.0 cm) while the lowest plant height was recorded from Green Leaf (36.0 cm). The highest entire single plant weight recorded from Green wave (390 g) followed by BARI Lettuce-1 (351 g) while but the lowest was observed in Green Leaf (323 g). The maximum edible leaf weight recorded from Green wave (330 g) followed by BARI Lettuce-1 (310 g) while but the minimum was observed in Green Leaf (285 g).

Keywords: Hydroponic system, Vegetables, Lettuce, Cucumber, Hydroponic culture.

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INTRODUCTION

Day by day our farming land is decreasing and our labor crises increasing. So, automation or mechanization in agricultural sector is becoming a burning issue. Hydroponics grow plants without soil (Gericke, 1940; Gericke, 1945; Hoagland and Arnon, 1950) using nutrient solution in either an inert non-soil substrate, sometimes called soilless culture, or with no substrate at all – pure hydroponics (Jensen, 1997; Jones, 2005). By Hydroponics system one grower can easily grow many crops with less industry and time. One kg cucumber can be sold by 60 taka in normal market. Hydroponics products are also very safe product also. So, this produces can demand high value from the customers as well. Low-cost hydroponic solution can be formulated easily with the market available chemicals.

MATERIALS AND METHODS

The experiment was laid out at CRD design with four replications. The total 4 numbers (10 feet length) of 6-inch PVC pipe were used to set up experiment of cucumber. Each variety had 14 plants and those plants were planted with prewashed coconut coir substrates in net pot. Total circulating system contained 216 liters of working solutions. Every 6-hour interval the total solution was circulating for 15 minutes with the help of simple automatic programmable water pump. One 500 Liter tank was used to stock the working solution's mixture and maintained different Electrical conductivity (EC) for different growing stage. At early seedling stage, seedling stage, vegetative stage, flowering stage, and fruiting stage the Electrical conductivity (EC) was maintained 1.2, 1.5, 1.8, 2.2 and 2.5 respectively (Mollick, *et al.*, 2016). For the lettuce experiment some rectangular boxes were used which were made by 8-inch width wood sheet and thick polythene flim and box were covered by corck sheet (6 ft x 3 ft) where plants were planted. Each cork sheet contained 28 lettuce plant. The EC was measured by the EC meter named "HANNA Dist-4" made in UK. The pH of the working solution was also maintained from 5.5-6.5 which was also measured by the pH meter named HANNA made in UK. The average temperature of October, November, December, January, February, March and April of our net house was recorded 27, 25, 20, 19, 23, 27 and 32 degrees centigrade, respectively. The average relative humidity of October, November, December, January, February, March, and April of our net house was found 68, 87, 80, 75, 73, 65 and 82 percentage (%), respectively. The temperature and humidity were measured by "INKBIRD IBS-TH1 Plus" Meter, made in Japan which can store the measured value in every 30 min Interval within a day as a data logger. During the experimental time average sunshine hour varied from 10-12 hour per day and average light intensity was recorded for October–December 67000 lux and January-April 54000 lux. The light intensity was measured by "MESTEK LM610 Illumino meter" made in Japan. Data were taken for different parameters and analyzed by 'Statistix-10' computer program.

RESULTS AND DISCUSSION

Cucumber

The performance of yield and yield contributing of cucumber at different planting time are presented in the table 1. Significant variation was found in most of the parameters due to using different varieties. The highest plant height obtained from Alavi green (232.45 cm) and lowest from Moinamoti (206.39 cm). Minimum days required to 1st female flowering in Alavi green (33.33 days), maximum in treatment Green bird (41.80 days). Days to 1st harvest was minimum in Alavi green (44.44 days) and maximum in Moinamoti (74.84 days). Number of fruit plant⁻¹ was higher in Moinamoti treatment (18.06) and lower in treatment Green bird (15.03). Fruit length and girth was highest in Moinamoti (18.06 cm×5.21 cm) and lowest in at Green bird treatment (15.03 cm × 4.81 cm). The average individual fruit weight is maximum in Alavi green (206.45 g) minimum in Green bird (180.39 g). The maximum yield plant⁻¹ was obtained from Alavi green (3.63 kg) treatment and flowed by Moinamoti (2.96 kg) and minimum in Green bird (2.51 kg) treatment (Table 1).

Table 1: Yield and yield contributing characters of cucumber grown on hydroponics culture in the year-round production

Treatment	Plant height (cm)	Days to female flowering	Days to first harvest	No. of fruits plant ⁻¹	Fruit length (cm)	Fruit girth (cm)	Individual fruit wt. (g)	Yield plant ⁻¹ (kg)
Moinamoti	206.39 c	36.40 b	47.84 b	15.13 b	18.06 a	5.21 a	193.81 b	2.96 b
Alavi green	232.45 a	33.33 c	44.44 c	18.00 a	16.96 b	5.73 b	206.45 a	3.63 a
Green bird	215.39 b	41.80 a	52.64 a	14.20 c	15.03 c	4.81 ab	180.39 c	2.51 c
LSD (0.05)	8.44	2.21	5.66	0.84	0.93	0.55	20.41	0.11
LS	*	*	**	**	*	**	**	**
CV (%)	2.05	4.11	3.26	4.99	7.94	4.65	4.83	3.32

NS = Non-Significant, * indicates significant at 5% level and ** Significant indicates at 1% level of probability.

Lettuce

Significant variation was found in most of the parameters due to using different lettuce varieties. The highest Plant height was recorded from BARI Lettuce-1 (42.0 cm) while the lowest plant height was recorded from Green Leaf (36.0 cm). The maximum day to harvest was observed in Green Leaf (48.0 days) which is not desirable, but the minimum was found in “BARI Lettuce-1” (44.0 days). The highest number of edible leaves was found from BARI Lettuce-1 (19.0) which is statistically identical to “Green wave” (19.0) variety while the lowest number of edible leaves was recorded from Green Leaf (15.0). The maximum leaf length was observed in “Green Leaf” (32.6 cm) which is desirable, but the minimum was found in BARI Lettuce-1 (29.3 cm). There was no significant variation found in leaf breadth and dry matter content parameters. The maximum root length was observed in Green wave (82.3 cm) while but the minimum was found in BARI Lettuce-1 (66.3 cm). The highest entire single plant weight recorded from Green wave (390 g) followed by BARI Lettuce-1 (351 g) while but the lowest was observed in Green Leaf (323 g). The maximum edible leaf weight recorded from Green wave (330 g) followed by BARI Lettuce-1 (310 g) while but the minimum was observed in Green Leaf (285 g).

Table 2. Yield and yield contributing character of three lettuce varieties grown on hydroponics culture

Treatment	Plant Height (cm)	Days to first harvest	No. of edible leaves	Leaf Length (cm)	Leaf width (cm)	Root length (cm)	Dry matter content (%)	Single plant weight (g)	Edible leaf weight (g)
BARI Lettuce-1	42.0 a	44.0 b	19.0 a	34.6 a	23.6	66.6 c	2.60	351.0 a	310.0 b
Green Leaf	36.0 c	48.0 a	15.0 b	31.6 b	25.3	78.2 b	2.80	323.0 b	285.0 c
Green Wave	39.0 b	41.0 c	19.0 a	33.3 a	24.6	82.3 a	2.30	390.0 a	330.0 a
LS	*	*	**	*	NS	*	NS	*	**
CV (%)	9.9	5.9	5.6	6.3	8.4	7.6	4.8	9.9	8.3

NS = Non-Significant. * indicates significant at 5% level and ** Significant indicates at 1% level of probability.

CONCLUSION

From the experiment it might be concluded that automatic hydroponic system is good for cucumber production. The variety “Alavi green” gave the maximum results. In automation hydroponic system It needs a few labour for intercultural operations which is cost effective. Further study should be needed for other crops. From the above study the maximum yield for edible lettuce was (330 g) from each plant of Green wave variety which is very nearer to BARI Lettuce-1 (310 g). From one culture tray (28 plants) about 7.8-9.2 kg edible lettuce was harvested.

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