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Effect of Drip Irrigation on Yield Parameter of Selected Brinjal Variety in Sylhet District

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Abstract:
In drip irrigation method water directly applied to the root zone of plant, that's why it was a water saving technique. In year of 2020-2021, a field experiment was conducted at Zakigonj, Sylhet, Bangladesh, to investigate yield of brinjal with different level of drip irrigation. Each brinjal was planted in a 75 cm × 60 cm split plot pattern. There were six treatments in that study, those were T_1 = 50% of water requirement, T_2 = 60% of water requirement, T_3 = 70% of water requirement, T_4 = 80% of water requirement, T_5 = 90% of water requirement, T_6 = 100% of water requirement and yield performance was undertaken. The average yield was maximum at 90% of total water requirement, which was higher than 100% of total water requirement. The average yield at treatment T_1, T_2, T_3, T_4, T_5 and T_6 were 2.47, 2.232, 2.3075, 2.607, 3.431 and 3.0096 kg per plant (on an average) respectively.

Keywords **—Brinjal, Drip Irrigation, Sylhet District.**

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I. INTRODUCTION
Brinjal, one of the Solanaceae families vegetable crop grown in worldwide, which contain essential compounds aspartic acid, tropanre, flavonoids, lanosterol, gramisterol, steroid alkaloids, glycoalkaloids, oxalic acid, ascorbic acid, solasodine, tryptophan, histidine with a rich value [01]. Brinjal also contain water, protein, carbohydrates, fats, minerals, fiber at a rate of 92.7%, 1.4%, 4.0%, 0.3%, 1.3% respectively[02]. In Bangladesh, winter (October to March) is main season of brinjal though it can produce throughout the year. Winter in Bangladesh almost rainless that's why crop production at that season directly depends on irrigated water. In recent year water crises increase day by day and one in ten people having no access to pure water [03]. So development of water saving techniques is needed in crop irrigated land to overcome severe shortage of water resource [04]. Drip irrigation techniques use worldwide for loss reduction purpose in crop field, which emphasis to develop a relationship between irrigation scheduled with crop yield by considering different method of irrigation [05]. Again to protect the environment, to conserve water resources modern irrigation system should be adopted [06]. Drip irrigation is a one type of micro irrigation in which water is directly applied to root zone of crops. Drip irrigation can save water 50-90% comparing to other irrigation system, which means decreased in water requirement with producing a

balancing crop production [07]. In 1984 Pruit et al. proved by conducting an experiment in tomato crop field, drip irrigation increase crop production by 19% and water use efficiency by 20% comparing to conventional irrigation [08]. Drip irrigation is superior over other conventional method of irrigation as it provides water directly to the root zone of crop [09]. For brinjal production, drip irrigation provides highest water use efficiency at 65% of water requirement was found in farmer's field at IFTM University, Moradabad, India [10]. In different agro climatic condition production of crop at different irrigation level, found different by Shrivastava et al. [11]. Bangladesh has 30 different agro-ecological zones which means potential water requirement, actual crop water requirement, production parameter of brinjal will different for every ecological zone. The specific objective of the study is:

- To evaluate yield parameter response of brinjal at different rate of drip irrigation.

II. MATERIALS AND METHODS

A. Experimental site: In 15th October 2020 to 13th March 2021, this experiment was conducted at farmer's field of Zakigonj, Sylhet, Bangladesh. More importantly, different published reports, research articles, newspapers and websites were also checked as sources of secondary data and information. At the end of data collection, the collected data were coded, compiled, tabulated and analyzed.

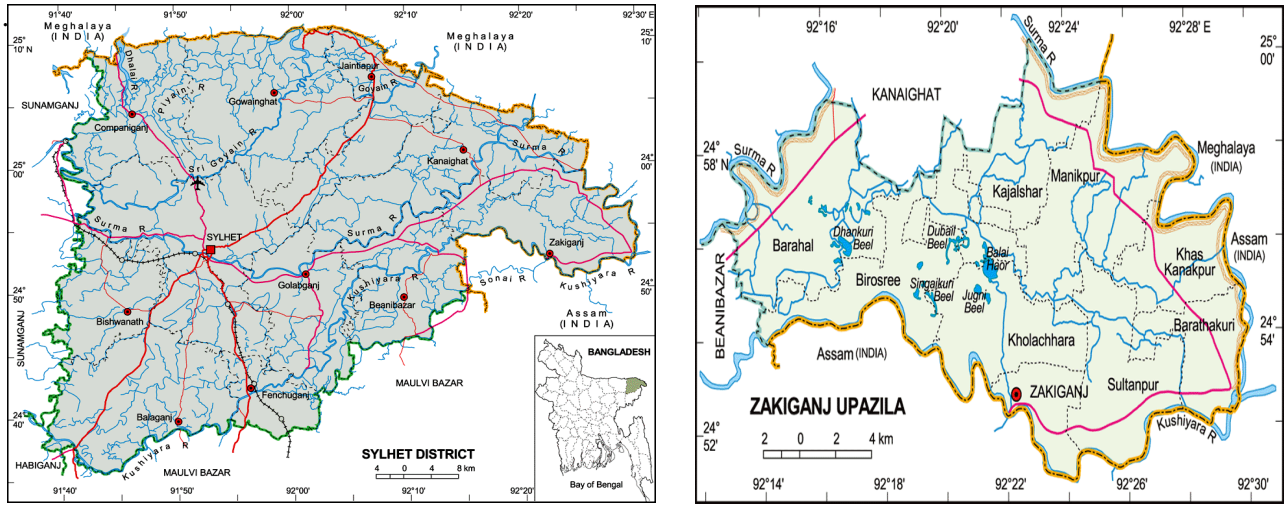

Fig. 1 Map of the study areas (Banglapedia 2003)

To input the raw data, Microsoft Office Excel 2007® and IBM SPSS Statistics V25.0® were used to analyze the raw data.

Table-1: Details of Experiment

Sl. No.	Topics	Details	Unites of measurement
1	Name of variety	Brinjal	Singnath
2	Irrigation methods	Drip irrigation	-
3	Water source	Tub well	-
4	Irrigation interval	2	Days
5	Plant to plant distance	75	cm
6	Row to row distance	60	cm

7	Area per plant	0.45	m^2
8	Plantation time	October	-
9	Crop duration	15th October to 13th March	-

B. Potential evapotranspiration calculation: As crop duration was 15th October to 13th March, that duration's potential evapotranspiration ET_0 was calculated out by using ET_0 software developed by The Land Water Division of FAO [12]. Inputted data for ET_0 calculation was 30 years (1984 -2014) metrological data (daily maximum and minimum temperature, wind speed, relative humidity, sunshine hours etc.) of Sylhet then average daily ET_0 was calculated out. The maximum and minimum ET_0 were 5.23mm and 2.46mm respectively.

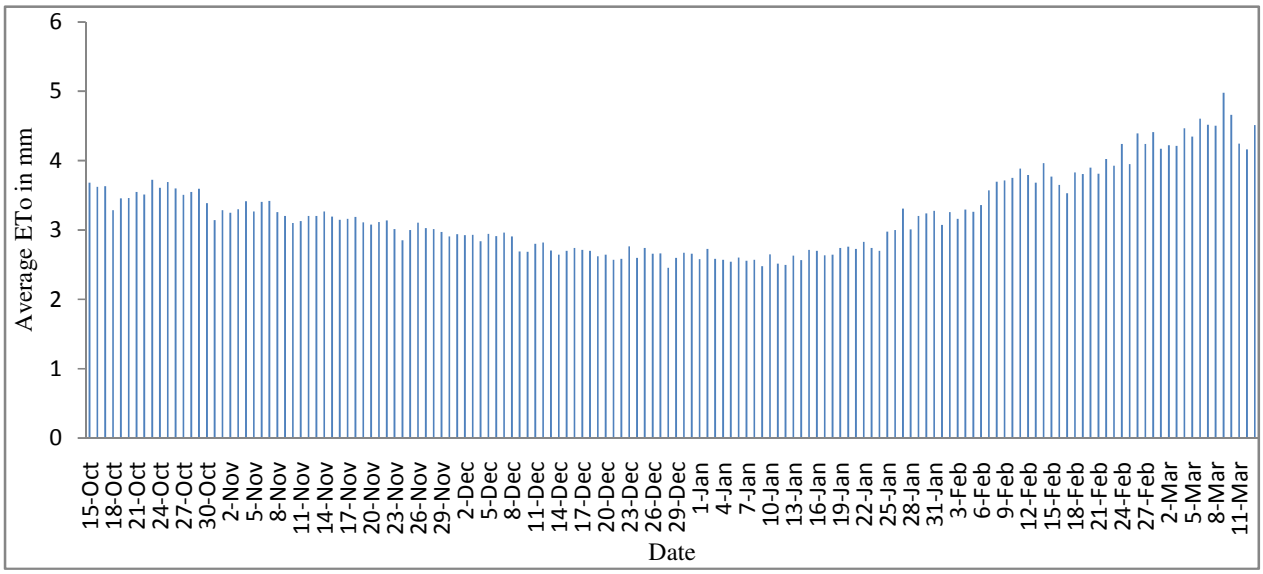

Fig. 1 Effect of drip irrigation levels on yield

C. Actual crop water requirement:
Crop water requirement (CWR) was estimated by multiplying potential evapotranspiration with crop coefficient (K_C) value of different stage.

Mathematical equation: $CWR = K_C \times ET_0$

Crop coefficient value at initial, mid, and end season were collected from FAO irrigation and drainage paper no. 24 [12].
Then volumetric requirement of water was calculated by using following equation [09]

Volumetric Water Requirement per plant: CWR × Projected area per plant

Initial ET_0, mid season ET_0, and end season ET_0 were average of the 40 days, 70 days and 40 days potential evapotranspiration respectively.

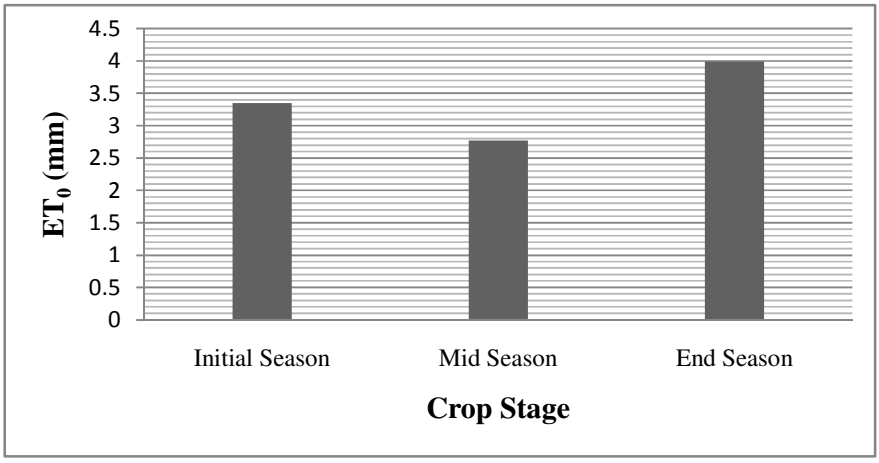

Fig. 2 Effect of drip irrigation levels on yield

Crop Stage	Duration in days	Crop coefficient value (K_C)	Water requirement calculation			Area per plant m^2	Volumetric water requirement		Dripper discharge (L/H)	Operation time over two days (min)
			ET_0 mm	CWR mm	CWR m		m^3	L		
Initial season	40	0.6	3.35	2.01	.00201	0.45	.00091	0.91	3.5	31
Mid season	70	1.05	2.77	2.91	.00291	0.45	.00131	1.31	3.5	45
End season	40	0.9	3.99	3.59	.00359	0.45	.00162	1.62	3.5	56

Source: Author's estimation based on field survey, 2020-2021

D. Experimental Design: Six treatments level of drip irrigation were considered. Those were
T_1 = 50% of water requirement
T_2 = 60% of water requirement
T_3 = 70% of water requirement
T_4 = 80% of water requirement
T_5 = 90% of water requirement
T_6 = 100% of water requirement
Singnath brinjal variety was used for the experiment. Seedlings were transplanted to plot with (75cm × 60cm) spacing. Crop water requirement as estimated above was directly applied near the root zone of every plant by emitters. Lateral pipe used for water supplied purpose to emitters from sub main pipe. Sub main used for supplying water from main pipe to lateral, main pipe used for supplying water from source to sub main pipe.

III. RESULTS AND DISCUSSION

Treatment	No. of fruit per plant	Fruit diameter (cm)	Fruit length (cm)	Fruit weight (gm)	Production per plant (kg)
T_1	32.5	3.6	24.5	76	2.47
T_2	31	3.4	24.2	72	2.232
T_3	32.5	3.8	24	71	2.3075
T_4	33	3.7	24.8	79	2.607
T_5	36.5	3.9	27	94	3.431
T_6	34.2	3.2	25.5	88	3.0096
CV	5.65	7.25	4.45	11.48	17.23

Source: Author's estimation based on field survey, 2020-2021

At different drip irrigation level response of parameter (fruit no., fruit length, fruit diameter, fruit weight, and production per plant) were different. Those parameters response were increased proportionally with irrigation level increased until 90% of water requirement. Maximum production was obtained from treatment T_5 which was 3.431 kg per plant. Minimum production was obtained at T_2 (2.232 kg per plant). Productions at treatment T_1, T_3, T_4, and T_6 were 2.47, 2.3075, 2.607 and 3.0096 kg per plant respectively.

IV. CONCLUSIONS

It can be concluded from the experiment that for raising brinjal crop, 90% drip irrigation was more effective; at that level production was more than full irrigation**.**

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REFERENCES

[1] Muhammad Yasir Naeem., Senay Ugur. Turkish Journal of Agriculture - Food Science and Technology Available online, ISSN: 2148-127X
[2] Aykroyd, W. R., *Composition of brinjal fruit. ICMR Special Rept*. pp. 42 (1963).
[3] Boulton, R. (Ed.). (2016, March 16). On world water day, 650 million people can't get a safe drink. Retrieved December 13, 2016, from http://www.reuters.com/article/us-health-water-idUSKCN0WI182.
[4] Akhmedov, A.D. and I.A. Davidov, Eggplant cultivation in Volgograd area conditions. Proceedings of Nizhnevolzskiy Agro University Complex: Science and Higher Vocational Education, 2: 10-15, 2006.
[5] Kuldeep B. Patel., Biharilal R. Patel and Madhusudan M. Parikh irrigation scheduling through water production function for rabi brinjal with surface and drip irrigation methods. Thirteenth International Water Technology Conference, IWTC 13, 2009.
[6] Malek-Mohammadi. Irrigation Planning: Integrated Approach. J. Water Res. Plan. and Manage.vol.124, 1994.
[7] Laptaev, V.N., Water saving in irrigation is the most important way to improve efficiency of vegetable farming. Vegetable Farming and Green housing, 8: 3-5, 2006.

[8] Pruitt W.O., Fereres E., Martin P.E., Singh H., Henderson D.W., Hagan R.M., Tarantino E., Chandio B. Microclimate, Evapotranspiration, and Water-use Efficiency for Drip and Furrow-Irrigated Tomatoes. International Commission on Irrigation and Drainage (ICID), 12th Congress, Fort Collins, 367–393, 1984.
[9] S.K. Biswas., A.R. Akanda., M.S. Rahman., M.A. Hossain Effect of drip irrigation and mulching on yield, water-use efficiency and economics of tomato. Plant Soil Environ. Vol. 61, 2015, No. 3: 97–102 doi: 10.17221/804/2014-PSE
[10] Ram Kumar., Himanshu Trivedi., Rahul Yadav., Bhagwan Das., Ankur Singh Bist B. Department of Agricultural Sciences and Engineering, SET, IFTM University, Moradabad-244102 (U.P.)
[11] Shrivastava P.K., Parikh M.M., Sawani N.G., Raman S. Effect of drip irrigation and mulching on tomato yield. Agricultural Water Management, 25: 179–184, 1994.
[12] FAO – Food and Agriculture Organization of the United Nations, 1–13.

