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Performance of Cucumber in Early Summer Season on walk-in Structure

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ABSTRACT

The field experiment was conducted to know profitability of different cucumber variety at agriculture farm of Girija Prasad koirala college of Agriculture and Research centre (GPCAR) of Purbanchal University, Gothgaun from March to July 2020. The experiment was conducted in Randomized complete block design with Walk–in structure with three treatments (GS_{16}, Bhaktapur Local and Cucumber green long) and five replications. Each treatment consists of two plants in a replication. Sex ratio was seen on first thirty flowers after sowing of seed. All fruit harvested was considered for research purpose. The research revealed that fruit yield was poor in Bhaktapur local, satisfactory in GS_{16} and Cucumber green long. The fruit yield was higher in Cucumber green long followed by GS_{16}. There was no satisfactory fruit yield in Bhaktapur local. Hence, it is concluded that thermo sensitive variety of cucumber Bhaktapur Local is not profitable to grow in summer season in plain area of eastern Nepal. Growing of cucumber green long for pickling quality is beneficial although slicing quality is better seen in GS_{16}. The research hints that cucumber green long is a profitable agriculture commodity for the research area.

Keywords- Cucumber, profitable, summer, walk-in

I. INTRODUCTION

Cucumber is considered as an important cucurbitaceous crops in Nepal with respect to production potentialities and the availability in market. Cucurbitaceous family consists of 118 genera and 825 species (Khan et al., 2015). Cucumber is mainly grown in tropical and subtropical regions of the world (Wang et al., 2007). Khanal *et al.* (2020) states that cultivation of cucumber in Nepal can be done from terai to high hills altitude ranging from 100 masl to 1800 masl. Mainly three forms of cucumber slicing, pickling, and burp less are extensively cultivated across the globe (Reddy 2015).

GS_{16} , Bhaktapur localand Cucumber green long cultivars are highly prefer by consumer in plain area of eastern Nepal as reported by local agrovet. Shakya *et al.* (2006) reported that the heat tolerant cultivars produced commercial yield while the susceptible cultivars did not set fruit. Sharma and Bhattarai (2006) also observed that the summer-grown vines of Bhaktapur Local in low hills became absolutely androecious producing only male flowers. Cucumber is considered as cooling food in summer (Maurya et al., 2015). In general, a fresh Cucumber provides vitamin C, niacin, iron, calcium, thiamine, fibers and phosphorus (Khan et al., 2015). The minimum per capita per day requirement of vegetables is 300 g as standard set forth by dieticians and nutritionist. (Gautam & Bhattarai, 2006) report that vegetable intake by Nepalese people is low as compared to standard, with a deficiency of 60 percent in relation to vegetable production.

Most of the Nepalese cucumber cultivars are open pollinated monoecious in nature, predominantly maleness type which is greatly influenced by temperature and other management factors. Normally, monoecious cucumber will produce male flowers at the first five or six nodes and then will start producing a certain ratio of female to male flowers depending on environmental conditions (Gledhill, 2007). The best possible solution to increase the yield of cucumber is by selecting high yielding genotypes according to the agro climacteric condition of different area and their characterization (Al-Rawahi et al., 2011). Analyzing the consumer preference for cucumber, the present study forwarded an approach to supply sufficient cucumber during summer season in eastern plain areaof Nepal.

II. MATERIAL AND METHODS

The Field experiment was conducted at Girija Prasad Koirala College of agriculture and research centre farm in Gothagaun, Morang from March-July, 2020. The experiment was laid out in randomized block design with six replication. The treatments consist of three different cucumber varieties GS_{16}, Bhaktapur Local and Cucumber green long. Planting of all cucumber variety was done at spacing of 1.5 m × 1.5 m. Pit digging was done at least one week before seed sowing. Farm Yard Manure (FMY) was applied @30t ha^{-1} in a respective pit of size 0.5m×0.5m ×0.5m. Seeding was made 2 seeds per pit and after emergence of true leaves, weak and lanky seedling was rouged out and only one seedling per hill was allowed to grow. Gap filling was also done 20 days after seeding (DAS) where necessary. For this, seed was sown in plastic tray half of total number of pit dug.

For the proper growth of seedling, Multiplex® 2.5ml was mixed in one litre of water and spray twice in each treatment. First spray was made on 30 DAS and second was applied 15 days after first spray. Prophylactic spray of Blitox-50®@ 2 g liter^{-1} of water was made 30 and 45 DAS to avoid fungal diseases. For control of Fruit fly, Single cue lure called Aakarshan commonly available in local agrovet was placed immediately after initiation of flowering. The fruit fly collected in trap was disposed in every 10 days till last harvest. Similarly to control Red Pumpkin beetle, spray of Super-D (Mixture of Chloropyriphos and Cypermethrin) was sprayed twice in field at 20 and 35 days after sowing of seeds. All the recommended cultural practices were carried throughout the growing season according to Manandar, 2011. To meet the requirement of recommended doses of plant nutrients, urea (46:0:0), Diammonium phosphate (18:46:0) and Muriate of potash (0:0:50) were taken as source of nitrogen, phosphorus and potassium respectively. The soil lab report reveals that silty loam is present in research field. Data were analyzed using the Genstat Eighteenth Edition Genstat Procedure Library Release PL26.2. Pole system staking was prepared for summer crop inside walk-in structure.

III. DATA RECORDING

Plant flower sex expression and yield attributes related parameter were particularly taken into account for observations. All the observable plants of each treatment were considered for a mentioned characteristic.

A. Sex ratio: It is fact that counting of all male/female flowers in cucumber crop is difficult as it is a vine crop and intolerance to disturbances. So, in general flower was counted on first thirty flower of plant and woolen ribbon was used for marking female flower. Sex ratio is calculated based on the observations available from first thirty flowers observed.

B. Yield and economic analysis: Yield and yield attributing parameters were recorded in every three succeeding days interval from May 22 (1st harvest) to June17, (9th harvest). Harvested fruits of more than 250 g in weight were counted and weight separately of each treatment. Finally, the productivity (t ha^{-1}) was computed considering the per plant yield (g per plant) as an output of 1.5 m^2 area.

The price of cucumber variety GS_{16}, Bhaktapur Local and Cucumber green long was Rs.50, Rs.80 and Rs. 40 respectively per Kg at the time of seeding in field. On an average farm gate price of three varieties (GS_{16}, Bhaktapur Local and Cucumber green long) was Rs. 20, Rs.60 and Rs.15 from first picking to its last picking. Gross income was calculated by multiplying yield with farm gate price at research period. Finally, Benefit-cost ratio (B:C ratio) was calculated using the formula given by (Subedi *et al*., 2019).

B:C = Gross income / Total costs

Where, Gross income = Total cucumber production (kg/ha) ×Price per Kg cucumber,
Total costs = sum total of all variable costs
Net return= Gross income - Total cost

IV. RESULTS

Phenological characteristics

The number of first thirty days male and flowers varies significantly among treatment (Table 1). The highest number of first thirty male flower was observed in GS_{16} variety (24.90) followed by CGL variety (19.98) while lowest was observed in BL variety (11.70). The highest number of first thirty female flower was observed in GS_{16} variety (7.13) while lowest was found in BL variety (2.43) followed by CGL variety (3.61). However, sex ratio was higher in CGL variety (6.30) followed by BL variety (6.05) while GS_{16} had lower sex ratio (4.16).

Table 1: Mean number of first thirty flowers on different varieties of cucumber in Gothgaun, Morang

Varieties	Male flower	Female flower	Sex ratio
CGL	4.47^{ab} (19.98)	1.90^{a} (3.61)	2.51 (6.30)
BL	3.42^{a} (11.70)	1.56^{a} (2.43)	2.46 (6.05)
GS_{16}	4.99^{b} (24.90)	2.67^{b} (7.13)	2.04 (4.16)
Grand mean	4.29 (18.40)	2.04 (4.16)	2.34 (5.48)
SE±d	0.49	0.22	0.42
LSD (0.05)	1.13	0.51	0.98
P (0.05)	0.034	0.003	0.509
CV (%)	18.1	17.1	28.7

Values in parenthesis are original data.

Yield from the first thirty flower differ significantly among different varieties of cucumber (Table 2). Highest total yield from first thirty flower was recorded in CGL variety (8.24 t ha^{-1}) followed by GS_{16} variety (5.57 t ha^{-1}) whereas lowest was recorded from BL variety (3.88 t ha^{-1}).

Table 2: Mean performance of first thirty flowers on different varieties of cucumber in Gothgaun, Morang.

Varieties	Marketable yield	Unmarketable yield	Total yield (t ha^{-1})
CGL	2.47^{b} (6.10)	1.31^{b} (1.72)	2.87^{b} (8.24)
BL	1.55^{a} (2.40)	0.94^{a} (0.88)	1.97^{a} (3.88)

GS_{16}	1.88[a] (3.53)	0.96[a] (0.92)	2.44[a] (5.95)
Grand mean	1.97 (3.88)	1.07 (1.14)	2.36 (5.57)
SE±d	0.22	0.11	0.20
LSD (0.05)	0.50	0.26	0.46
P (0.05)	0.008	0.016	0.006
CV (%)	17.5	16.4	13.4

Values in parenthesis are original data.

Yield

There was highly significant difference ($p<.001$) among different varieties in total yield (mt ha^{-1}). Highest yield was recorded in CGL variety (27.23 mt ha^{-1}) followed by GS_{16} variety (18.37 mt ha^{-1}). Lowest yield was recorded in BL variety (3.53 mt ha^{-1}).

Table 3: Total yield (t ha^{-1}) of different varieties of cucumber in Gothgaun, Morang.

Varieties	Total yield (t ha^{-1})
CGL	5.20[c] (27.23)
BL	1.823[a] (3.53)
GS_{16}	4.26[b] (18.37)
Grand mean	3.76 (16.4)
SE±d	0.370
LSD (0.05)	0.854
P (0.05)	<.001
CV (%)	15.6

Values in parenthesis are original data.

Economic analysis of cucumber production

The total cost of production was similar in all the treatment (NRs.179000) per hectare .The major cost contributors were labor, land, fertilizers and bamboo. The net return was highest in Cucumber green long followed by GS_{16}.. The gross return in cucumber is highly influenced by yield and price of crop (Subedi *et al*., 1993)

Table 4: B/C ratio of cucumber of different variety in Gothgaun, Morang.

Variety	Fruit yield (kg ha^{-1})	Price (Rs kg^{-1})	Gross income (NRs.)	Total cost (NRs.)	Net return (NRs.)	B/C ratio
GS_{16}	18353	20	367,060	179000	188060	2.05
Bhaktapur Local	3510	60	210,600	179000	31600	1.17
Cucumber green long	27241	15	408,615	179000	229615	2.28

Weather and cucumber performance

The average rainfall does not affect fruit set condition until last month of May. However, at the beginning of June fruit set in field was poor. Similarly incidence of cucurbit fruit fly was more from last weeks of April as temperature start to rises above 25°c.

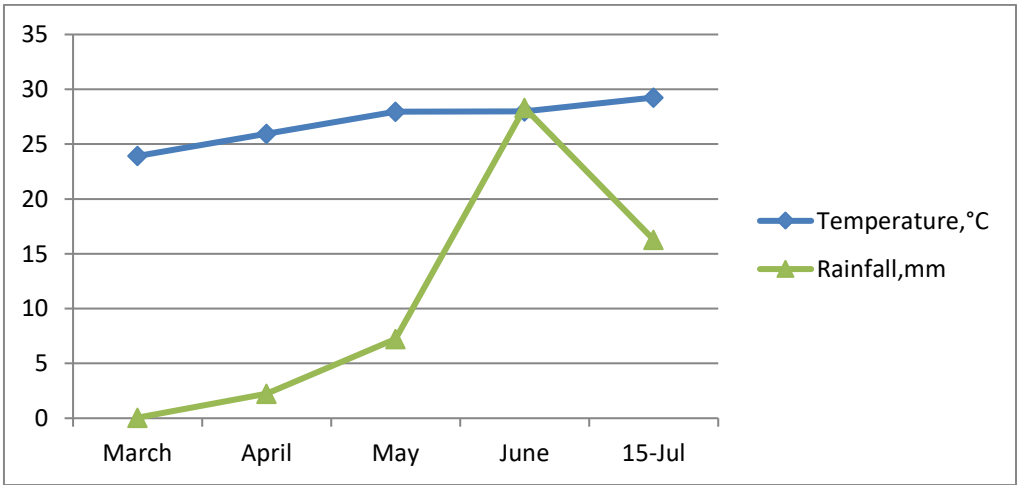

Figure 1: Bi-monthly average temperature and Rainfall in Gothgaun, Morang

V. RESULT AND CONCLUSION

In Nepal, Cucumber yield greatly varies with season of growing and the variety. Summer season is consider as normal cultivation technology of cucumber in terai region of Nepal. The average yield of individual variety was recorded as 18.35 t ha^{-1}, 3.5 t ha^{-1} and 27.24 t ha^{-1} from all plots. The average cucumber production in Jhapa, Sunsari and Morang district as of 2016/2017 (MOAD, 2018) is 18.66 t ha^{-1}. However, Production of

GS_{16} is lower and Cucumber green long is higher than the yield of commercial cucurbit cultivation (25-30 t ha^{-1}). The performance of GS_{16} and Cucumber green long was satisfactory. Similarly, B/C ratio suggests production of Bhaktapur local in terai region of eastern Nepal in early summer season is unprofitable.

The findings of the research shows that Cucumber green long and GS_{16} can be promoted as cucumber business in early summer season in terai region of Nepal. The seasonal price indices of cucumber were highest in the month of March and the lowest in the succeeding month. This suggests that cucumber plantation should not exceed from beginning month of May. The situation of cucumber production in research area can increase the income and employment opportunities of the cucumber farmers. Similarly contact with extension work in local government agriculture centre, improvement in harvesting and post-harvest technology for commercial farmers help to increase net income in this business. Commercial production of cucumber can attract unemployment youth people of Nepal. This will directly improve socioeconomic status and help in alleviating rural poverty in terai region of Nepal.

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