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ASSESSMENT OF GROWTH CHARACTERISTICS AND YIELD OF DIFFERENT CUCUMBER CULTIVARS

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ABSTRACT

A field experiment was carried out to determine the performance of different cucumber varieties. The research was carried out in Randomized Complete Block Design (RCBD) with 4 treatments and 6 replications. The varieties used are Bhaktapur local, Kamini, Ragini, and Ranjha. Data were collected on the following parameters such as stem length, plant height, number of leaves, number of branches, number of male flowers, number of female flowers, days to first flowering, male to female flower ratio, days to first male flowering, days to first female flowering, fruit weight, fruit length, number of fruits per plant and yield. It is found that among the performance of different varieties, Kamini was the best high yielding variety for this locality with a yield of 58.93 ton ha^{-1} followed by Ranjha. Kamini exhibited a greater count of female flowers and fruits. In comparison, Bhaktapur local outperformed other varieties in various aspects such as plant height (193.37 cm), number of leaves (42.39), number of branches (7.13), and male to female ratio (2.63).

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1. Introduction

Cucumber (*Cucumis sativus* L.) is an edible fruit that comes under the family Cucurbitaceae. It comprises 117 genera and 825 species and is cultivated in warmer parts of the world (Nagamani et al., 2019). There are more than 30 species in the genus *Cucumis*, including the economically significant and widely cultivated cucumber (Huang et al., 2009). Cucumber is very popular among the Cucurbits and is now grown throughout the world (Shetty and Wehner, 2002). Cucumber is the fourth most important cultivated vegetable after cabbage, onion, and tomatoes in the world (Fareed et al., 2017). The fruits are edible and are used during summer as a cooling food (Akbar et al., 2015). Cucumber plants usually grow with very dense branches and leaves which lead to producing vegetative growth only, so the formed flowers and fruits tend to decrease (Mardhiana et al., 2017). It was reported that originated in India about 3,000 years ago domestication of cucumber occurred later throughout Europe (Bisognin, 2002; Shetty and Wehner, 2002). It was widely grown in China, Cameroon, Iran, the Russian Federation, and Türkiye (Amin et al., 2018). Dhading has been designated as a "pocket area": agriculture-based special economic zones that are directed towards promoting Nepalese agriculture, livestock products, and commodities that have a comparative advantage (Sedhain et al., 2018). In Dhading, Nepal cucumber is cultivated with a cultivation area of 440 ha with 6600 Mt production and productivity of 15.50 mt ha^{-1} (MOALD, 2020). The mostly cultivated variety of cucumber in Dhading is Bhaktapur Local.

Table 1. Status of Cucumber production in Dhading, Nepal (Source: MOALD 2012-2020)

S.N.	Year	Area (ha)	Production (Mt.)	Yield (Mt. ha^{-1})
1	2011/12	423	6134	15
2	2012/13	428	6206	15
3	2013/14	428	6206	15
4	2014/15	429	6221	15
5	2015/16	429	8220	19.2
6	2016/17	436	6344	15
7	2017/18	460	7598	14.5
8	2018/19	460	7586	16.49
9	2019/20	440	6600	15

Cucumbers are prostrate, branched, stiffly hairy vines possessing sharply five-cornered leaves and unbranched tendrils. Although most newer cultivars of cucumbers are gynoecious and several older cultivars are andromonoecious, cucumbers are monoecious. The flowers are formed in the leaf axils on extremely short axillary shoots with bright yellow color approximately 4 cm in diameter. In one axillary position, multiple staminate flowers often occur, whereas pistillate flowers usually appear singly (Tatlioglu, 1993).The calyx and corolla of all type of flower are provided with 5 lobed while staminate flower have three stamen and pistillate flower with five stigmas. The pistillate flower are provided with a long cylindrical shaped ovary that corresponding to the mature fruit (Tatlioglu, 1993). The intensity and type (e.g., gynoecious or monoecious) of sex expression are important in commercial cucumber production because differences in sex type and flowering can affect harvest date and relative yield (Staub et al., 2008). The cultivated species of cucumbers are predominantly monoecious but it consists of quantitative sex variations, ranging from almost male to completely female individuals (Shifriss, 1961). The first flowers to appear near the base of a cucumber plant are male. In about a weak after male flower initiation the female flowers appear with the small cucumber fruit at the base. Normally, fruits at the base of the plant are smaller than those borne on laterals or on the upper portion of the plant. It was revealed from the research done in Mid Hills of Nepal that the longest fruits (34 cm) were produced by the genotype Bhaktapur local at Hemja. At Lumle, the mohico green long produced the longest (28.37 cm) fruits followed by the Bhaktapur local (27.52 cm) and Kusule (26.83 cm) (Upadhyay et al., 2004). Experiment performed at Banepa-4, Kavre, Nepal in 2019 shows higher number of fruits, yield per plant and yield per hectare was observed on the variety Kamini (Shrestha et al., 2020). The research site was facing the problem of low productivity of cucumber due to the use of indigenous varieties and traditional cultivation practices. So, the research was conducted to know the best variety of cucumber.

2. Materials and methods

2.1. Site selection

The site of the study was selected at Dhading which was commanding area of PMAMP, Project Implementation Unit, Dhading. Nepal. The area is situated within the 27˚54'26.91''N latitude and 84˚53'11.74'' E longitude with an elevation of 487m above sea level. It is located in the sub-tropical climate of Nepal having average temperature of less than 10˚C in winter and more than 30˚C in summer season. Average annual rainfall of 3500 mm.

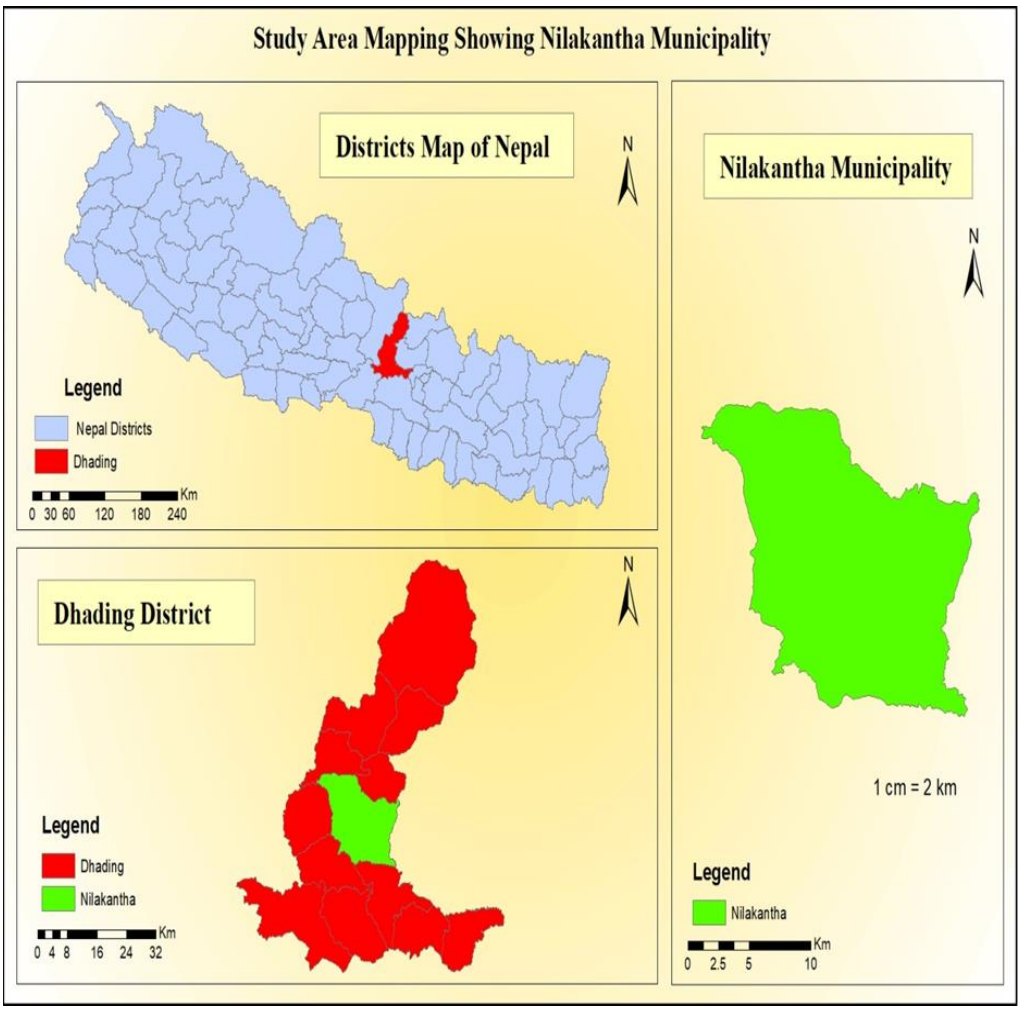

Figure 1. Research site, Nilakantha-7, Dhading

2.2. Climate of study area

The research site lies in the sub-tropical zone of Nepal. It is characterized by three distinct seasons namely, rainy monsoon (June – October), cool winter (November – February), and hot summer (March – May). Dhading has sub-tropical climate where average temperature becomes <10°C in winter and >30°C in summer. The minimum monthly average relative humidity was during month of April (51.09 %) and maximum during month of June (80.93 %) with average relative humidity of 61.27 during the crop period. The monthly average maximum temperature ranged from 18.49°C (February) to 27.98°C (May) and the monthly average minimum temperature ranged from 7.94°C (February) to 20.48°C (June).

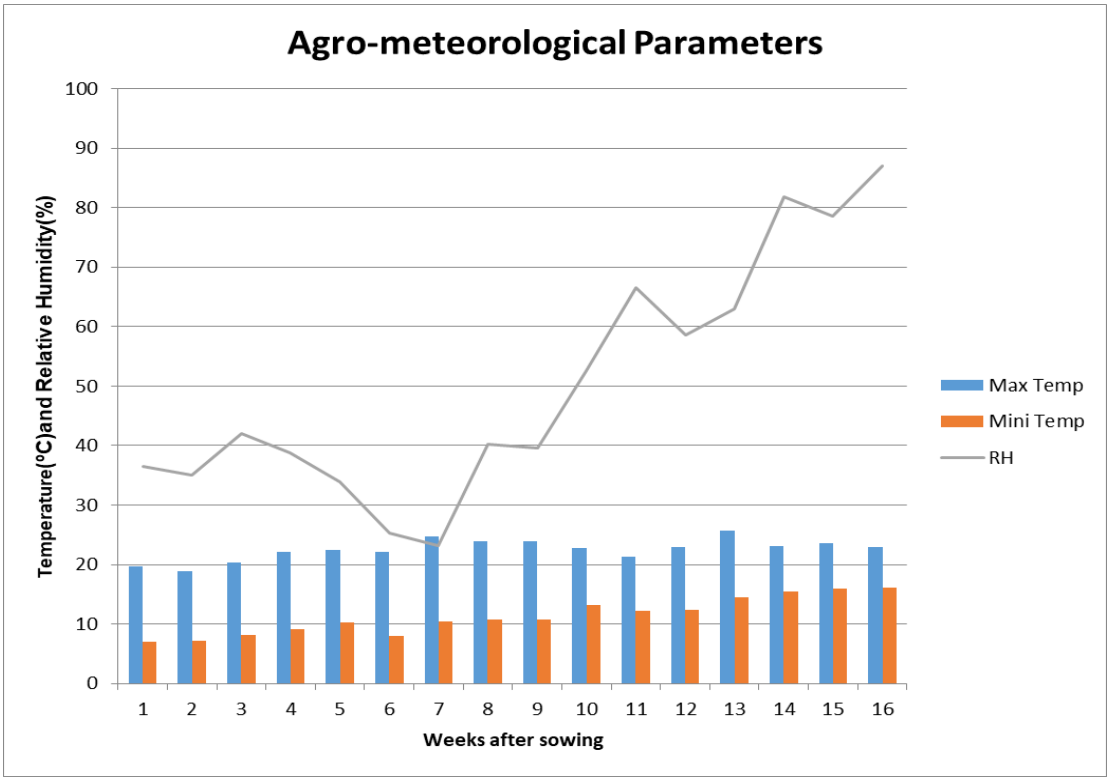

Figure 2. Graph of weekly average maximum and minimum temperature and relative humidity during the crop period in Dhading, Nepal (Source: Nepal Hydrological and Meteorological Department, 2021)

2.3. Physical and chemical

Before application of Farm Yard Manure (FYM) and chemical fertilizers, soil samples were taken from each replication by using shovel from 0 to 15 cm. The physical and chemical properties of soil sample taken from experimental field were tested. The texture of soil in experimental field was found to be sandy loam.

The pH of soil of experimental field was found to be 6.6. The nitrogen level was found to be medium, whereas the level of phosphorus and potassium was found to be low by Olsen method and Flame photometer respectively.

2.4. Experimental design

The experiment will be conducted on Randomized Complete Block Design with 4 treatments and 6 replications. The spacing between replication is 0.65 m×0.65 m and between plant is 0.75 m×0.75 m.

2.5. Details of treatment

For the research, the following 4 varieties (treatments) were selected.

Table 2. Details of treatments used in the study area

Symbols	Varieties
T1	Bhaktapur Local
T2	Kamini
T3	Ragini
T4	Ranjha

2.6. Field layout

Each variety (treatment) was replicated 6 times and each plot contained 25 plants, out of which 5 plants were taken as sample.

2.7. Field preparation

In order to get friable, well aerated and moist, and weed free soil, the field was firstly ploughed by power tiller on March 13, 2021. Individual pits of depth 30 cm were dug out to transplant the cucumber on March 15, 2021.

2.8. Plants under treatment

2.8.1. Seedling preparation

Soil, Farm Yard Manure (from the backyard farm) and sand in the ratio of 2:1:1 respectively was mixed, and poly-bags were filled with this mixture on February 22, 2021. Poly-bags were prepared, and one seed of each variety was sown in each polybags. They were regularly watered during seed raising period. Intensive care was taken for raising the seedling.

2.8.2. Transplanting

When seedlings were 22 days old and attain three leaves and hard enough, they were transplanted in the main field. 3 to 4 leaf stage healthy seedlings were transplanted after removing the polybag without disturbing the roots with spacing of 0.75 m * 0.75 m row-row and plant-plant distance on March 15, 2021.

2.8.3. Fertilizer

Recommended dose of NPK is 150:75:75 kg per hectare was applied in the form of Urea, Diammonium phosphate (DAP) and Muriate of Potash (MoP) respectively. Half amount of Nitrogen and full dose of Phosphorus and Potassium applied as basal dressing and remaining half dose of Nitrogen was split into two equal halves and top dressed after 4 weeks and 7 weeks of transplanting, respectively.

2.8.4. Intercultural operation

After transplanting of seedlings, various intercultural operations were done like weeding, irrigation and staking as per as the requirement. Two hand weeding were done at 20 Days after Transplanting and 45 Days after Transplanting. Stakings was done after 20 Days after Transplanting (DAT). Irrigation was done as per the requirements.

2.8.5. Harvesting

Manual harvesting was done when the cucumber gains desirable size of around 200-250 gram (Sharma and Bhattarai, 2006).

2.9. Data Collection

Each plot contained 25 plants which was the sampling frame. Out of these, 5 plants in each plot were selected by simple random sampling technique in each plot for data collection. Two types of parameters (growth and yield) were chosen for evaluation of five sample plants.

2.9.1. Growth Parameters

a) Plant height (cm)
The height of the five tagged plants was recorded in cm after 15 days, 30 days, 45 days and 60 days of transplanting with the help of meter scale.

b) Number of leaves
From five tagged plant, number of leaves per plants were counted and recorded after 30 days, 45 days and 60 days of transplanting.

c) Number of branches

The number of braches from each five tagged plants were counted and recorded after 30, 45 and 60 days of transplanting

2.9.2. Yield attributing characters

a) Number of male and female flower

The number of male and female flowers were recorded after first flowering from each tagged plants.

b) Days to appearance of first male flower

The number of days for the appearance of first male flower was recorded. If the variety takes lesser number of days to the appearance of first male flower, it was considered more ideal.

c) Days to appearance of first female flower

The number of days for the appearance of first female flower was recorded from each tagged plant. If the variety takes lesser number of days to the appearance of first female flower, it was considered ideal for cultivation.

d) Number of fruits

The total number of fruit from each plant and plot was counted and recorded while harvesting.

e) Fruit length (cm)

The length of the fruit was taken with the help of scale after each harvest.

f) Fruit yield (kg plant^{-1})

The fruit yield was calculated by weighing the fruits harvested at various pickings. The total weight of all picked fruits per plant during the season determined the fruit yield per plant.

g) Fruit yield per hectare

The fruit yield was determined by weighing the fruits harvested at various pickings. The total weight of all picked fruits during the season per plot was recorded, yielding the fruit yield per plot. The fruit yield per plot was then converted to yield per hectare.

2.10. Data analysis

The recorded data were then entered and organized in a Microsoft Excel 2013 (Microsoft Corporation, Redmond, Washington, United States). The obtained data was subjected to analysis of variance (ANOVA) using appropriate statistical software (R Studio, V-4.2.2, Boston Massachusetts, USA) (RCT, 2023). The mean was evaluated by Duncan's Multiple Range Test (DMRT) for interpretation level of Probability.

3. Results and discussion

3.1. Growth parameters

3.1.1. Plant height

Among four different varieties of cucumber, Bhaktapur local is the local variety and remaining are hybrid varieties. Plant height was measured with the help of meter scale. Table 3 shows that there was a non-significant difference among different varieties of cucumber in plant height during early stage of growth i.e., up to 15 DAT. However, there was significant difference in plant height among the different varieties of cucumber at 30, 45 and 60 DAT. Bhaktapur local recorded tallest plant height (77.73 cm) which was statistically at par with the variety Kamini (71.7 cm). Variety Ragini recorded shortest plant height (48.5 cm) which was statistically at par with the variety Ranjha (58.03 cm). Bhaktapur local recorded tallest plant height at 45 DAT (156.27 cm) and at 60 DAT (193.37 cm). At 45 DAT, variety Ranjha recorded shortest plant height (88.5 cm). At 60 DAT, variety Ranjha recorded shortest plant height (116.33 cm) and statistically at par with the variety Ragini (121.97 cm). At 60 DAT, the plant height of different varieties was in range of 116.33 cm to 193.37 cm. Bhaktapur local recorded highest plant height and number of branches among different varieties in " Varietal screening of Cucumber in Sundarharaicha Municipality, Morang, Nepal" (Sah et al., 2021).

Plant height was found to be highest in variety Chadani followed by Bhaktapur local and then Kamini in "Evaluation of Cucumber varieties for quality traits and yield" (Shrestha et al., 2020). It has been reported that the highest plant height was observed in Kathmandu local (203 cm) and the lowest plant height in Kasinda (148.70) with average plant height of 177.45 cm (Maharjan et al., 2015).

Table 3. Average plant height (cm) of different cucumber varieties at different growth stages

Varieties	Plant height (cm)			
	15 DAT	30 DAT	45 DAT	60 DAT
Bhaktapur local	20.70	77.73^{a}	156.27^{a}	193.37^{a}
Kamini	20.55	71.7^{a}	118.5^{b}	152.47^{b}
Ragini	20.43	48.5^{b}	102.47^{bc}	121.97^{c}
Ranjha	20.27	58.03^{b}	88.5^{c}	116.33^{c}
SEM (±)	0.15	3.08	5.79	6.53
F probability	Ns	***	***	***
$LSD_{0.05}$	0.72	11.33	16.45	11.43
CV %	2.85	14.38	11.48	6.36
Grand mean	20.49	63.99	116.43	146.03

Note: DAT: Days after Transplanting, Ns: Non significant, ***, Significant at 0.001 P value. Same letter(s) within column represent non-significant difference at 0.05 level of significance based on Duncan Multiple Range Test.

3.1.2. Number of leaves

Green leaves were counted from each tagged plant in each plot. Table 4 shows among four different varieties, number of leaves per plant was found to be statistically non-significant at 30 DAT. Varieties differed significantly for number of leaves at 45 DAT and 60 DAT. Highest number of leaves were obtained from variety Kamini (21.12) and was statistically at par with Bhaktapur Local (21.01) and Ranjha (19.87). Poor result was obtained from variety Ragini (16.07). Highest number of leaves per plant was observed in Bhaktapur local (42.39) followed by Kamini (39.47) and then Ranjha (34.87). Likewise, the lowest number of leaves per plant was recorded in Ragini (29.70) during entire cropping duration.

Table 4. Average Number of leaves of different cucumber varieties at different growth stages

Varieties	Number of leaves		
	30 DAT	45 DAT	60 DAT
Bhaktapur local	13.97	21.01^{a}	42.39^{a}
Kamini	12.80	21.12^{a}	39.47^{ab}
Ragini	10.80	16.70^{b}	29.70^{c}
Ranjha	13.13	19.87^{a}	34.87^{b}
SEM (±)	0.84	0.75	1.23
F probability	Ns	*	***
$LSD_{0.05}$	2.78	2.89	4.70
CV %	17.84	11.93	10.43
Grand mean	12.68	19.67	36.61

Note: DAT: Days after Transplanting, Ns: Non significant, *, significant at 0.05 P value, ***, Significant at 0.001 P value. Same letter(s) within column represent non-significant difference at 0.05 level of significance based on Duncan Multiple Range Test.

3.1.3. Number of branches

The number of branches per plant indicates the growth performance of the vine (Sharma et al., 2005). The result of statistical analysis showed that among different varieties, number of branches at 30 DAT, 45 DAT and 60 DAT was found significant. Significantly higher number of branches were recorded in Bhaktapur local followed by Kamini at 30 DAT, 45 DAT and 60 DAT. Likewise, poor results were obtained from Ragini during entire crop duration. At 45 DAT and 60 DAT, variety Kamini and Ranjha were found statistically at par as shown in Table 5.

Similarly, among different varieties of cucumber, the greater number of branches was found in Bhaktapur local (5.26 branch) and the smaller number of branches was found in Encounter-962 (1.20 branch) by (Sah et al., 2021). Likewise, number of primary branches was recorded highest on the variety Chadani which was statistically at par with the variety Shahini-2, Bhaktapur local and Kamini by (Shrestha et al., 2020). Also (Subedi and Sharma, 2005) reported Bhaktapur Local had significantly longer vine and the vine had significantly very high number of branches.

Table 5. Average plant height (cm) of different cucumber varieties at different growth stages

Varieties	Number of branches		
	30 DAT	45 DAT	60 DAT
Bhaktapur local	3.27[a]	5.37[a]	7.13[a]
Kamini	2.70[b]	3.87[b]	5.03[b]
Ragini	1.97[d]	3.37[c]	4.30[c]
Ranjha	2.35[c]	3.80[b]	5.23[b]
Sem (±)	0.11	0.16	0.22
F probability	***	***	***
$LSD_{0.05}$	0.27	0.38	0.39
CV %	8.52	7.56	5.88
Grand mean	2.57	4.10	5.43

Note: DAT: Days after Transplanting, ***, Significant at 0.001 P value. Same letter(s) within column represent non-significant difference at 0.05 level of significance based on Duncan Multiple Range Test

3.2. Yield attributing characters

3.2.1. Number of flower per plant and days to first flower

The result of the statistical analysis shows the number of flowers among different varieties during total growth period were found significantly different at 0.1 % level of significance as shown in Table 6.

Male flowers: Significantly highest number of male flower was found in Bhaktapur local followed by Kamini. Likewise, among different variety lowest number of male flower per plant was found in Ranjha.

Female flowers: There was a significant difference among different varieties on number of female flowers per plant. Highest number of female per plant was recorded from Kamini which was statistically at par with Ranjha. Likewise, lowest number of female flower per plant was recorded in Bhaktapur local.

Days to first male flower: The statistical analysis for days to first male flowering showed significant result. Male flowers were significantly first observed in Ranjha which was statistically at par with Kamini and Ragini. Similarly, the numbers of days to first male flowers were significantly greater at Bhaktapur local (24.21 days).

Days to first female flower: Duration to first flower initiation is an important character for identifying early genotype (Upadhyay et al., 2004). Variety Ranjha produced the first female flower significantly in short duration (22.76 days) and was statistically at par with Kamini (22.86 days). Similarly, Bhaktapur Local produced female flowers significantly later at 31.83 days after transplanting.

Male to female ratio: Sex ratio was statistically found higher in Bhaktapur local (2.63). The significantly lower sex ratio was statistically found in variety Ranjha which was statistically at par with Kamini.

Similar results were found in following findings:

- In Bhaktapur local significantly higher number of male flowers (32 m^{-2}) was reported in "Single stem cultivation and performance of cucumber cultivars during winter-spring seasons" by (Subedi and Sharma, 2005).

- Bhaktapur local recorded maximum number of male flowers per plant in control (107 per plant) by (Dhakal et al., 2019).

• The lowest number of female flower (69.33 flowers plant^{-1}) was reported in Bhaktapur local in "Varietal screening of Cucumber in Sundarharaicha Municipality, Morang, Nepal" by (Sah et al., 2021).

• According to "Monitoring and varietal screening cucurbit of fruit fly, Bactrocera cucurbitae Coquillett (Diptera: tephritidae) on cucumber in Bhaktapur and Kathmandu, Nepal" by (Maharjan et al., 2015), Kamini had the highest number of female flowers (27.33 flowers plant^{-1}), while Kusle had the fewest (7.83 flowers plant^{-1}).

• (Shrestha et al., 2020) reported variety Bhaktapur local took longer days (21.3±0.1 days) to initiate male flower which was significantly different (P≤0.001) from all other varieties.

Table 6. Floral characters of different cucumber varieties

Treatments	Male Flowers	Female Flowers	Days to first male flower	Days to first female flower	Sex Ratio
Bhaktapur local	42.83^{a}	16.37^{b}	24.21^{a}	31.83^{a}	2.63^{a}
Kamini	37.78^{b}	24.70^{a}	20.57^{b}	22.86^{c}	1.54^{c}
Ragini	35.71^{c}	18.17^{b}	20.96^{b}	24.00^{b}	1.97^{b}
Ranjha	33.80^{d}	24.45^{a}	20.25^{b}	22.76^{c}	1.38^{c}
Sem (±)	0.75	0.82	0.37	0.78	0.10
F probability	***	***	***	***	***
$LSD_{0.05}$	1.89	2.08	1.26	1.01	0.19
CV %	4.05	8.07	4.75	3.23	8.36
Grand mean	37.55	20.92	21.49	25.37	1.88

Note: ***, Significant at 0.001 P value. Same letter(s) within column represent non-significant difference at 0.05 level of significance based on Duncan Multiple Range Test

3.2.2. Number of fruits per plant and fruit length

Number of fruits per plant: Fruits from each randomly selected plants were counted at each harvest and total number of fruits per plant was recorded and average numbers of fruits were calculated. Table 7 shows there was a highly significant difference among the varieties on total number of fruits per plant. Significantly higher number of fruits per plant were harvested from variety Kamini (15.17) and was statistically at par with Ranjha (14.50). Similarly, lowest number of fruits per plant were harvest from Bhaktapur local (8.17). (Shrestha et al., 2020) reported highest numbers of fruits were harvested from variety Kamini (19.7±2.0) and the lowest numbers of fruits were harvested from the variety Bhaktapur local (12.8±1.4).

Fruit length (cm): The result of statistical analysis shows non-significant difference in the fruit length among the different varieties. Table 7 shows that the average fruit length was 20.45 cm. However (Shrestha et al., 2020) reported that longest fruit length on the variety Karma (26.8±1.2 cm) which was at par (P≤0.05) with the varieties Shalini (26.7±1.4 cm), Bhaktapur local (26.7±0.6 cm), Shahini-2 (26.3±0.1 cm) and Chadani (25.5±0.2 cm) followed by the variety Kamini (24.4±0.4 cm) and Manisha (20.3±0.3 cm).

Table 7. Number of fruits per plant and fruit length of different varieties of cucumber

Varieties	Number of fruits per plant	Fruit length (cm)
Bhaktapur Local	8.17^{c}	20.75
Kamini	15.17^{a}	20.19
Ragini	11.33^{b}	20.63
Ranjha	14.50^{a}	20.23
Sem (±)	0.65	0.14
F probability	***	Ns
$LSD_{0.05}$	2.13	0.85
CV %	14.06	3.36
Grand Mean	12.29	20.45

Note: Ns: Non significant, ***, Significant at 0.001 P value. Same letter(s) within column represent non-significant difference at 0.05 level of significance based on Duncan Multiple Range Test

3.2.3. Average fruit weight and yield

Average fruit weight: Varieties differed significantly for average fruit weight. The highest result was obtained from Bhaktapur local (0.312 kg) and lowest result was obtained from Ragini (0.200 kg) as in Table 8. It has been shown that the Bhaktapur Local was found superior as compared to the other varieties in terms of average fruit weight (Sah et al., 2021). It has been also reported that weight of different varieties of cucumber depends on heredity and genetic variability (Kumar et al., 2013).

Yield: Varieties differed significantly for yield per plant. The highest result was obtained from Kamini (3.315 kg) and significantly higher yield (58.93 mt ha^{-1}). Poor yield per plant was obtained from Bhaktapur local (2.543 kg) and significantly lower yield (45.21 mt ha^{-1}) which was statistically at par with variety Ragini (2.847 kg). In this research, we found Kamini as the best yielding variety. However, NS-404 variety was found superior as compared to the other varieties in terms of yield by (Sah et al., 2021). Likewise, Bhaktapur local recorded minimum yield of 17.48 t ha^{-1} in control (Dhakal et al., 2019). Also, lowest yield was recorded in Bhaktapur local variety (3.53 mt ha^{-1}) by (Dahal and Adhikari, 2021).

Table 8. Average weight (kg), yield per plant (kg) and yield (mt ha^{-1}) of Cucumber

Variety	Average weight (kg)	Yield per plant (kg)	Yield (mt ha^{-1})
Bhaktapur local	0.312^{a}	2.543^{b}	45.21^{b}
Kamini	0.252^{b}	3.315^{a}	58.93^{a}
Ragini	0.200^{d}	2.847^{b}	50.60^{b}
Ranjha	0.219^{c}	2.897^{ab}	51.50^{ab}
Sem (±)	0.01	0.09	1.522415
F probability	***	*	*
$LSD_{0.05}$	0.02	0.44	7.74
CV %	5.39	12.20	12.20
Grand mean	0.245	2.90	51.56

Note: *, significant at 0.05 P value, ***, Significant at 0.001 P value. Same letter(s) within column represent non-significant difference at 0.05 level of significance based on Duncan Multiple Range Test

4. Conclusion

Bhaktapur local was found to be superior in morphological characters such as stem length, number of leaves and number of branches whereas Kamini was found to have highest number of female flowers and fruits per plant. Kamini was most appropriate variety followed by Ranjha to obtain higher yield in short duration whereas Ragini and Bhaktapur local was least appropriate in terms of yield.

Compliance with Ethical Standards

Conflict of Interest

The authors declare no conflict of interest regarding the publication of this manuscript.

Authors' Contributions

All authors contributed equally to all stages of the preparation of this manuscript. Similarly, the final version of the manuscript was approved by all authors.

Ethical approval

Not applicable.

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Consent for publication

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References

Akbar, A., Ahmad, Z., Begum, F., & Raees, N. (2015). Varietal reaction of cucumber against cucumber mosaic virus. *American Journal of Plant Sciences, 6*(07), 833. https://doi.org/10.4236/ajps.2015.67090

Amin, E., Raza, M. M., & Iqbal, M. (2018). Kheera Local: A new high yielding, well adaptable and heat tolerant cucumber (*Cucumis sativus* L.). *Journal of Agricultural Research, 56*(1), 13–16.

Bisognin, D.A. (2002). Origin and evolution of cultivated cucurbits. *Ciência Rural*, *32*(4), 715–723. https://doi.org/10.1590/s0103-84782002000400028

Dahal, K., & Adhikari, R. (2021). Performance of cucumber in early summer season on walk-in structure. International *Journal for Research in Applied Sciences and Biotechnology*, *8*(3), 3–6. https://doi.org/10.31033/ijrasb.8.3.4

Dhakal, S., Karki, M., Subedi, P., & GC, A. (2019). Effect of ethephon doses on vegetative characters, sex expression and yield of cucumber (*Cucumis sativus* cv. Bhaktapur Local) In Resunga municipality, Gulmi, Nepal. *International Journal of Applied Sciences and Biotechnology*, *7*(3), 370–377. https://doi.org/10.3126/ijasbt.v7i3.25284

Fareed, G., Atiq, M., Abbas, M., Usman, M., Abbas, G., Haidar, Z., & Hussain Qamar, S. (2017). Varietal reaction of cucumber (*Cucumis sativus* L.) germplasm for management of fusarium wilt of cucumber (FWC). *Advances in Zoology and Botany*, *5*(1), 1–3. https://doi.org/10.13189/azb.2017.050101

Huang, S., Li, R., Zhang, Z., Li, L., Gu, X., Fan, W., Lucas, W. J., Wang, X., Xie, B., Ni, P., Ren, Y., Zhu, H., Li, J., Lin, K., Jin, W., Fei, Z., Li, G., Staub, J., Kilian, A., Li, S. (2009). The genome of the cucumber, *Cucumis sativus* L. *Nature Genetics*, *41*(12), 1275–1281. https://doi.org/10.1038/ng.475

Kumar, S., Kumar, D., Kumar, R., Thakur, K., & Singh Dogra, B. (2013). Estimation of genetic variability and divergence for fruit yield and quality traits in Cucumber (*Cucumis sativus* L.) in North-Western Himalays. *Universal Journal of Plant Science*, *1*(2), 27–36. https://doi.org/10.13189/ujps.2013.010201

Maharjan, R., Regmi, R., & Poudel, K. (2015). Monitoring and varietal screening cucurbit fruit fly, bactrocera cucurbitae coquillett (Diptera: Tephritidae) on cucumber in Bhaktapur and Kathmandu, Nepal. *International Journal of Applied Sciences and Biotechnology*, *3*(4), 714–720. https://doi.org/10.3126/ijasbt.v3i4.13988

Mardhiana, M., Pradana, A. P., Adiwena, M., Kartina, K., Santoso, D., Wijaya, R., & Maliki, A. (2017). Effects of pruning on growth and yield of cucumber (*Cucumis sativus*) Mercy variety in the acid soil of North Kalimantan, Indonesia. *Cell Biology and Development*, *1*(1), 13–17. https://doi.org/10.13057/cellbioldev/v010103

MOALD. (2020). Statistical Information in Nepalese Agriculture. Ministry of Agriculture and Livestock, 290. https://nepalindata.com/resource/statistical-information-nepalese-agriculture-207374-201617/

Nagamani, G. V., Kumar, J. S. A., Reddy, T. B. M., Rajesh, A. M., Amarananjundeswara, H., Reddy, R. L. R., & Doddabasappa, B. (2019). Performance of different parthenocarpic cucumber (*Cucumis sativus* L.) hybrids for yield and yield attributing traits under shade net house. *International Journal of Current Microbiology and Applied Sciences*, *8*(03), 978–982. https://doi.org/10.20546/ijcmas.2019.803.117

RCT (2023). R Core Team: R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing Vienna, Austria. Available from: https://www.R-project.org/

Sah, A., Swar, P., Yadav, S. K., Chaudhary, S., & Maharjan, D. (2021). Varietal screening of Cucumber in Sundarharaicha Municipality, Morang, Nepal. *International Journal of Environment, Agriculture and Biotechnology*, *6*(4), 071–078. https://doi.org/10.22161/ijeab.64.9

Sedhain, K., Mathema, A. B., Sherpa, N., & Adhikari, B. B. (2018). Knowledge, Power and Policy: The case of agricultural development in Dhading District, Nepal (Issue September). https://doi.org/10.13140/RG.2.2.21965.28643

Sharma, M. D., & Bhattarai, S. P. (2006). Performance of cucumber cultivars at low hill during summer-rainy seasons. *Journal of the Institute of Agriculture and Animal Science*, *27*, 169-171. http://dx.doi.org/10.3126/jiaas.v27i0.713

Sharma, M., GC, Y., Tripathi, K., & Bhattarai, S. (2005). Performance of Mahyco Green Long and Bhaktapur Local cucumber cultivars at different sowing dates in mid-hill of Nepal. *Journal of the Institute of Agriculture and Animal Science*, *26*, 163–166. https://doi.org/10.3126/jiaas.v26i0.671

Shetty, N. V., & Wehner, T. C. (2002). Screening the cucumber germplasm collection for fruit yield and quality. *Crop Science*, *42*(6), 2174–2183. https://doi.org/10.2135/cropsci2002.2174

Shifriss, O. (1961). Sex control in cucumbers. *Journal of Heredity*, *52*(1), 5–12. https://doi.org/10.1093/oxfordjournals.jhered.a107021

Shrestha, S. P., Group, K., Dahal, J., & Pandey, U. (2020). Evaluation of cucumber (*Cucumis sativus* L .) varieties for quality. October.

Staub, J. E., Robbins, M. D., & Wehner, T. C. (2008). Cucumber. In Vegetables I: Asteraceae, Brassicaceae, Chenopodicaceae, and Cucurbitaceae (pp. 241–282). New York, NY: Springer New York.

Subedi, P., & Sharma, M. (2005). Single stem cultivation and performance of cucumber cultivars during winter-spring seasons. *Journal of the Institute of Agriculture and Animal Science*, *26*, 149–151. https://doi.org/10.3126/jiaas.v26i0.668

Tatlioglu, T., (1993). *Cucumber. Genetic Improvement of Vegetable Crops*, 197–234. https://doi.org/10.1016/b978-0-08-040826-2.50017-5

Upadhyay, I.P., Gautam, K.B., Paudel, J.N.C. & B.K. (2004). Poor Hill Farmers through Off-Season Cucumber and Rainy Season Tomato Production in the Hills of Nepal Application of Plastic Film Technology for Increased Income of Disadvantaged Poor Hill Farmers through Off-Season Cucumber and Rainy Season Tomato Produ. January.