



Performance evaluation of brinjal genotypes in the mid-hill region of Gandaki Province, Nepal

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ABSTRACT

Six genotypes of brinjal were evaluated at the Horticulture Research Station, Malepatan to identify the potential genotype for mid-hills of Gandaki province in the month of May 2020 and 2021. Experiments were conducted in a Randomized Complete Block Design (RCBD) with four replications. The genotypes were Jumli Local, Parwanipur Selection 1, Pusa Purple Long, Tanahun Collection, Takunchaur Collection, and Pokhara Lurkee. There were significant ($p < 0.05$) differences in the observed parameters such as fruit per plant, fruit length, fruit weight, and total yield. The highest number of fruits per plant (21.56) was found in the Tanahun Collection followed by Pokhara Lurkee (13.44). The longest fruit (16.07 cm) was found in Pokhara Lurkee, which was at par with Pusa Purple Long (15.51 cm). The highest yield (33.24 mt ha⁻¹) was found in Tanahun Collection followed by Pokhara Lurkee (23.55 mt ha⁻¹). Though Tanahun Collection performed better in yield, Pokhara Lurkee was preferred by the farmers and consumers of the growing area due to long cylindrical shape and its purple color. From this research, it can be concluded that there is a possibility of increasing the productivity of brinjal by the selection of high yielding and consumer preferred genotypes for mid-hill condition of Gandaki province. The genotype showing higher yield and better adaptability needs further evaluation in farmer's field conditions to check the consistency in their performance, and hence, register as a variety.

Keywords: Brinjal, fruit length, genotypes, Pokhara Lurkee

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INTRODUCTION

Brinjal (*Solanum melongena* L.) also known as eggplant or aubergine is one of the important Solanaceous vegetables (Ram 2006). Southern India is the center of origin of brinjal, while it is grown worldwide including Nepal (Achhami et al 2013). It is one of the important vegetables cultivated for its edible fruits and ranked fifth in position in terms of the world's production after tomato, onion, cucumber/gherkins and cabbage. The world's highest producer of brinjal is China followed by India, Egypt, Turkey and Iran (FAOSTAT 2022). Botanically, the fruit of brinjal is a berry, which can be purple, green, white or striped with wide variations in shape and size (Chadha 2019). It is rich in nutrients, minerals, antioxidants,

vitamins, dietary fiber, body-building factors and proteins (Matsubara et al 2005; Obho et al 2005).

Brinjal loves long and warm growing period with a mean temperature of 21-27°C, but it can be cultivated in a wide range of temperature (Chadha 2019). It can adapt to different agro-climatic regions ranging from Terai to mid hills of Nepal. In Terai region, brinjal is winter crop, while in the mid-hills to high hills; it is a summer crop (Joshi 2003; Thapa et al 2009; Gotame et al 2020). The productivity of brinjal in India, Asia and the world has been reported to be 17.4, 30 and 30.2 mt ha⁻¹ respectively (FAOSTAT 2022). Production of brinjal is carried out in almost all provinces with the highest area coverage in Lumbini Province (3658 ha) followed by Madhesh Province (3443 ha). In contrary, the productivity was highest in Gandaki Province (17.08 mt ha⁻¹) followed by Province 1 (16.79 mt ha⁻¹). Brinjal is a major summer vegetable of Gandaki Province for daily consumption as the vegetable. The brinjal production area of Kaski district is 125 ha with the productivity of 17.08 mt ha⁻¹, while the production area of Gandaki Province is 414 ha with a productivity of 13.66 mt ha⁻¹. The total area of brinjal production in Nepal is 11292 ha with the productivity of 13.2 mt ha⁻¹ (MoALD 2021).

Although higher yield is the major objective of every crop improvement program, however, consumer preference might be different towards those varieties known for highest yielder. Often the consumer choices have been found to depending on the shape, size, color and resistance to insect-pests and diseases (Chadha 2019). In India, the choice of color in brinjal is also the important factor such as purple and dark purple are more preferred in North-West India, green and variegated in South India and white color brinjal in East India (Chadha 2019). The use of fruit according to fruit size are different as round and big fruits are used for making bhārtha, small-round for stuffing and long to prepare mixed vegetables (Chadha 2019).

The productivity of brinjal in Nepal is low as compared to neighboring countries. The lacks of high yielding cultivars with high tolerance to many insect pests are the major reason for low productivity (Joshi 2003; Thapa et al 2009). Earlier released brinjal variety Nurki in Nepal has lost its originality and is found susceptible to various biotic and abiotic stresses (Rawal et al 2014). Recently registered variety of brinjal is Parwanipur Selection 1 is cultivated mainly in the central Terai region of Nepal (Chaudhary et al 2004, Gotame et al 2020). Pokhara Lurkee is the first choice among the brinjal producer and consumers, especially due to high yield and peculiar taste and good cooking quality respectively. This variety is widely adapted in the farmer's field but has not been registered/released yet. There are more potential germplasm of brinjal available in Nepal; however, a systematic study of those varieties has yet to be carried out for suitable characteristics. Thus in present study we evaluated brinjal genotypes aiming to find high yielding, disease and pest resistant varieties suitable for cultivation in the mid-hill region of Gandaki Province and similar agro-ecological regions of Nepal.

MATERIALS AND METHODS

Experimental sites

The trial was conducted at Horticulture Research Station (HRS), Malepatan, Pokhara, Kaski district during the two consecutive seasons, 2020 and 2021 under irrigated condition. The station is located at about 28°13'6.8" N latitude and 83°58'27.72" E longitude with an

elevation of 848 masl. The station has sub-tropical humid type of climate. The soils are deep, well drained and sandy loam in texture.

Table 1. Meteorological data of HRS, Malepatan in 2020 and 2021 during crop period

Year/Month	Temperature (°C)		Rainfall (mm)	Relative humidity (%)
	Maximum	Minimum		
2020				
May	28.5	17.2	488.2	73.3
June	29.7	21.3	936.8	83.3
July	28.87	22.49	1499.3	81.62
August	32.24	23.268	845.9	86.88
September	30.72	21.19	1473.8	79
2021				
May	29.96	21.02	283.4	73
June	29.15	22.56	965.21	87.76
July	32.05	22.63	1347	77.43
August	29.93	22.55	1244.9	82.9
September	29.98	21.16	749.4	79.88

Source: Annual Report of HRS, Malepatan and Department of Hydrology and Meteorology, Western Regional Climate Office, Pokhara, 2020 and 2021

Plant materials

Six genotypes of brinjal viz: Pusa Purple Long, Pokhara Lurkee, Jumli Local, Tanahun Collection, Parwanipur Selection 1 and Takunchaur Collection were evaluated for the yield potential at HRS, Malepatan in May, 2020 and 2021.

Table 2. Genotypes of brinjal used in the experiment

Genotypes	Source of collection
Jumli Local	Horticulture Research Station, Jumla
Pusa Purple Long	Agrovet (From seed market of Pokhara, Kaski)
Parwanipur Selection 1	Directorate of Agriculture Research, Parwanipur, Bara
Pokhara Lurkee	Horticulture Research Station, Malepatan, Kaski
Tanahun Collection	Bhanu-9, Tanahun
Takunchaur Collection	Takunchaur, Galyang Municipality, Syangja

Experimental design and treatment details

The experiment was conducted in randomized complete block design (RCBD) design layout with four replications each of six genotypes as treatments. The plot size was maintained at 2.4m × 2.25 m (5.4 m²) and spacing was 60 cm × 45 cm adjusted 20 plants per plot.

Cultural practices

One month's old seedlings were transplanted on the second week of May in both years. Fertilizer was applied at the rate of 20 mt ha⁻¹ of compost and 120:80:60 kg of NPK ha⁻¹. The urea was applied 3 times in split doses during the growth period i.e. half during the planting and remaining first one third was applied at one month of transplanting and second top dress was done 60 days after transplanting. Weeding and irrigation were done same for each treatment as when required. Crop harvesting was continued up to the month of September.

Data observation

The parameters like plant height, number of days to 50% flowering, and days to first harvest were recorded from the five sample plants from each plot. The fruits were evaluated based on the fruit weight, fruit length, diameter, and the number of fruits per plant. From the total yield of the sample plants, the estimated yield was calculated. The disease was scored during flowering and peak harvesting time. The number of wilted plants (plants showing symptoms)

against the total number of plants per plot was recorded. Scoring was done using a 1-5 scale as described by [Dinssa et al \(2015\)](#) and [Gotame et al \(2019\)](#) as follows.

Plant status score (1-5)

1. Healthy plants = 1
2. About 25% of the plants wilted = 2
3. About 50% of the plants wilted= 3
4. About 75% of the plants wilted = 4
5. The entire plant wilting = 5

Shoot and fruit borer infestation score

The number of infested plants with the shoot and fruit borer (plants showing symptoms) against the total number of plants per plot were recorded according to the method described by [Thapa et al \(2009\)](#) and [Awal et al \(2017\)](#).

$$\text{Percentinfestation} = \frac{\text{Numberoffruitsinfested}}{\text{Totalnumberoffruits}} \times 100$$

Fruit status Score (1-5)

1. Healthy fruits (0% infestation) = 1
2. 1-25% of the fruit infested = 2
3. 26-50% of the fruit infested = 3
4. 51-75% of the fruit infested = 4
5. 76-100% of the fruit infested = 5

Statistical analysis

The observed parameters were recorded and maintained on spread sheet. Analysis of variance was performed using R (version 3.6.3) and RStudio1.3.1093. Means were compared by Duncan's Multiple Range Test (DMRT).

RESULTS

Phenotypic characteristics

The phenotypic characters such as fruit shape, fruit apex and fruit color were evaluated. The genotypes Pusa Purple Long, Pokhara Lurkee and Tanahun Collection were cylindrical in shape, while Jumli Local and Takunchaur Collection were obovate in shape and Parwanipur Selection 1 was found ellipsoid in shape ([Table 3](#)). The fruit colors of genotypes were also found different. Pusa Purple Long was dark purple fruit and Pokhara Lurkee had purple with slightly greenish color fruit. The characteristics of brinjal fruit shape and apex were noted as per the guidelines given by [Gotame et al \(2019\)](#).

Table 3. Fruit characteristics of brinjal genotypes at HRS, Malepatan, 2020

Genotypes	Fruit shape	Fruit apex	Fruit color
Pusa Purple Long	7 (Cylindrical)	4 (Pointed)	Dark Purple
Pokhara Lurkee	7 (Cylindrical)	4 (Pointed)	Purple with slightly greenish
Jumli Local	3 (Obovate)	3 (Rounded)	Greenish stripe
Tanahun Collection	7 (Cylindrical)	4 (Pointed)	Purple
Parwanipur Selection 1	6 (Ellipsoid)	2 (Flattened)	Stripe Purple
Takunchaur Collection	3 (Obovate)	1 (Indented)	Purple

Plant height, days to 50% flowering and days to first harvest

There was significant ($P=0.031$) difference in plant height at 40 DAT among the tested genotypes (Table 4). The tallest plant (56.25 cm) was found in genotype Pokhara Lurkee, which was at par with Tanahun Collection and Parwanipur Selection 1 followed by Pusa Purple Long. The shortest plant height occurred in Takunchaur Collection (44.97 cm), which was at par with Jumli Local (45.25 cm). There was also a significant ($P<0.01$) difference in the plant height at 120 DAT (Table 4). The tallest plant height (129.9 cm) was recorded in Pokhara Lurkee followed by Parwanipur Selection 1 (107.59 cm) which was at par with the genotype Tanahun Collection. The shortest plant height (65.56 cm) recorded in Jumli Local.

Table 4. Plant height, days to 50% flowering, days to first harvest of brinjal genotypes at HRS, Malepatan in 2020 and 2021

Genotypes	Plant height at 40 DAT(cm)			Plant height at 120 DAT (cm)		
	2020	2021	Mean	2020	2021	Mean
Jumli Local	48.50	42.00 ^c	45.25 ^c	68.62 ^d	62.50 ^e	65.56 ^d
Parwanipur Selection 1	51.37 ^a	48.00 ^{bc}	49.68 ^{abc}	108.93 ^b	106.25 ^b	107.59 ^b
Pokhara Lurkee	55.51	57.00 ^a	56.25 ^a	133.06 ^a	126.75 ^a	129.90 ^a
Pusa Purple Long	48.75	45.75 ^{bc}	47.25 ^{bc}	84.79 ^c	82.50 ^d	83.64 ^c
Takunchaur Collection	45.43	44.50 ^c	44.97 ^c	91.25 ^c	89.50 ^{cd}	90.37 ^c
Tanahun Collection	54.62	53.00 ^{ab}	53.81 ^{ab}	108.37 ^b	103.75 ^{bc}	106.06 ^b
Grand Mean	50.7	48.37	49.53	99.17	95.20	97.19
SEM±	29.32	24.50	25.77	113.90	103.71	103.64
LSD _{0.05}	ns	7.46**	7.65*	16.08***	15.34***	15.34***
CV%	10.68	10.23	10.24	10.76	10.69	10.47

ns; non-significant, * $P<0.05$, ** $P<0.01$ and *** $P<0.001$, CV: Coefficient of variation, LSD: Least significant difference, SEM±: Standard error of mean. Means within the column followed by the same letter are not significantly different at a 5% level of significance by DMRT.

Table 5. Performance of brinjal genotypes on days to fifty percent flowering, days to first harvest at HRS, Malepatan in 2020 and 2021

Genotypes	Days to 50% flowering (DAT)			Days to first harvesting (DAT)		
	2020	2021	Mean	2020	2021	Mean
Jumli Local	39.50 ^d	31.25 ^c	35.37 ^c	46.00 ^d	67 ^c	56.50 ^d
Parwanipur Selection 1	50.75 ^a	45.75 ^a	48.25 ^a	95.00 ^a	85 ^a	90.00 ^a
Pokhara Lurkee	51.75 ^a	44.50 ^a	48.12 ^a	67.00 ^b	57 ^d	62.00 ^c
Pusa Purple Long	43.00 ^c	42.00 ^b	42.50 ^b	59.50 ^c	73 ^b	66.25 ^b
Takunchaur Collection	47.50 ^b	25.75 ^d	36.62 ^c	67.00 ^b	47 ^e	57.00 ^d
Tanahun Collection	43.75 ^c	22.75 ^e	33.25 ^d	59.25 ^c	45 ^f	52.12 ^e
Grand Mean	46.04	35.33	40.68	65.6	62.33	63.97
SEM±	4.05	0.95	1.58	21.37	5.87e-28	5.34
LSD _{0.05}	3.03***	1.47***	1.89***	6.96***	3.65e-14***	3.48***
CV%	4.37	2.76	3.09	7.045	3.88e-14	3.61

*** $P<0.001$, CV: Coefficient of variation, LSD: Least significant difference, SEM±: Standard error of mean. Means within the column followed by the same letter are not significantly different at a 5% level of significance by DMRT.

The days to 50% flowering after transplanting were significant ($P<0.001$) among the tested genotypes (Table 5). The fastest fifty percent flowering recorded in the Tanahun Collection (33.25 DAT) and then in Jumli Local (35.37 DAT) and Takunchaur Collection (36.62 DAT). The longest days required for 50% flowering was occurred in Parwanipur Selection 1 (48.25 DAT) which was at par with Pokhara Lurkee (48.12 DAT) genotype. The days to first harvesting of brinjal were significant ($P<0.001$) among the tested genotypes after the transplanting date (Table 5). The fastest harvesting (52.12 DAT) was occurred in the

Tanahun Collection followed by Jumli Local (56.5 DAT) and Takunchaur Collection (57 DAT). The longest time for harvesting occurred in Parwanipur Selection 1 (90 DAT).

Number of fruits per plant and weight and length of fruit

There was significant ($P < 0.001$) difference in the number of fruit per plant among the tested genotypes (Table 6). The highest (21.56) number of fruits per plant was found in the Tanahun Collection followed by Pokhara Lurkee (13.44) and Takunchaur Collection (12.62). Lowest number of fruits per plant was found in the Parwanipur Selection1 (7.31) and Jumli Local (7.31).

There was significant ($P < 0.001$) difference in the individual fruit weight of brinjal among the tested genotypes (Table 6). Heavy individual fruit (81.98 g) was found in Parwanipur Selection 1 followed by Pusa Purple Long (57.73 g), which was at par with Pokhara Lurkee (51.51g), Takunchaur Collection (46.35 g), and the lowest fruit weight (44.94 g) was found in the Tanahun Collection, which was at par with Jumli Local (45.18 g).

There was significant ($P < 0.001$) difference for the length of fruit (Table 6). The longest fruit (16.07 cm) was found in the Pokhara Lurkee and Pusa Purple Long (15.51cm), Parwanipur Selection 1 (15.32 cm) and Tanahun Collection (14.19 cm) and the shortest fruit length (7.13 cm) was found for the Jumli Local which was at par with Takunchaur Collection (8.84 cm).

Table 6. Performance of brinjal genotypes on number of fruits per plant, individual fruit weight and length of fruit at HRS, Malepatan in 2020 and 2021

Genotypes	No. of fruit per plant			fruit weight (g)			Length of fruit (cm)		
	2020	2021	Mean	2020	2021	Mean	2020	2021	Mean
Jumli Local	7.12 ^c	7.50 ^c	7.31 ^c	47.85 ^b	42.50 ^c	45.18 ^c	7.38 ^b	6.87 ^c	7.13 ^b
Parwanipur Selection 1	6.50 ^c	6.75 ^c	6.62 ^c	83.95 ^a	80.00 ^a	81.98 ^a	15.65 ^a	15.00 ^{ab}	15.32 ^a
Pokhara Lurkee	13.62 ^b	13.25 ^b	13.44 ^b	49.78 ^b	53.25 ^{bc}	51.51 ^{bc}	15.38 ^a	16.75 ^a	16.07 ^a
Pusa Purple Long	7.375 ^c	7.25 ^c	7.31 ^c	57.47 ^b	58.00 ^b	57.73 ^b	15.78 ^a	15.25 ^{ab}	15.51 ^a
Takunchaur Collection	12.50 ^b	12.75 ^b	12.62 ^b	45.69 ^b	47.00 ^c	46.35 ^{bc}	8.93 ^b	8.75 ^c	8.84 ^b
Tanahun Collection	26.62 ^a	16.50 ^a	21.56 ^a	44.37 ^b	45.50 ^c	44.94 ^c	14.38 ^a	14.00 ^b	14.19 ^a
Grand Mean	12.29	10.66	11.48	54.85	54.37	54.61	12.92	12.77	12.84
SEM±	2.29	2.31	1.21	73.85	47.75	55.87	2.66	1.58	1.97
LSD _{0.05}	2.28***	2.29***	1.66***	12.95***	10.41***	11.26***	2.45***	1.89***	2.11***
CV%	12.31	14.25	9.60	15.66	12.70	13.68	12.62	9.86	10.92

*** $P < 0.001$, CV: Coefficient of variation, LSD: Least significant difference, SEM±: standard error of mean, Mean within the column followed by the same letter are not significantly different at a 5% level of significance by DMRT.

Diameter of fruit, yield per plant and yield per hectare

There was significant ($P < 0.001$) difference in the fruit diameter among the tested genotypes (Table 7). The highest fruit diameter (40.55 mm) was found in the Jumli Local, Takunchaur Collection (40.14 mm) and Parwanipur Selection1 (34.47 mm). The smallest fruit diameter (28.25 mm) was found for the Tanahun Collection which was at par with Pokhara Lurkee (28.57 mm) and Pusa Purple Long (30.49 mm).

There was significant ($P<0.001$) difference in the yield per plant among the tested genotypes (Table 7). The highest yield per plant (933.97 g) was found for the Tanahun Collection followed by Pokhara Lurkee (663.81 g), which was at par with the Takunchaur Collection (589.93 g). The lowest yield per plant (330.28 g) was found for Jumli Local, which was at par with Pusa Purple Long (394.56 g) and Parwanipur Selection 1 (455.25 g). There was significant ($P<0.001$) difference in the yield among the tested genotypes (Table 7). The highest yield (33.24 mt ha⁻¹) was found for the Tanahun Collection followed by Pokhara Lurkee (23.55 mt ha⁻¹), Takunchaur Collection (20.58 mt ha⁻¹) and Parwanipur Selection 1 (15.78 mt ha⁻¹). The lowest yield (11.48 mt ha⁻¹) was found for Jumli Local which was at par with Pusa Purple Long (13.93 mt ha⁻¹).

Table 7. Evaluation of brinjal genotypes on fruit diameter, yield per plant, and yield at HRS, Malepatan in 2020 and 2021

Genotypes	Fruit diameter (mm)			Yield per plant (g)			Yield (mt ha ⁻¹)		
	2020	2021	Mean	2020	2021	Mean	2020	2021	Mean
Jumli Local	40.84 ^a	40.25 ^a	40.55 ^a	342.06 ^c	318.50 ^c	330.28 ^d	12.67 ^c	10.29 ^d	11.48 ^c
Parwanipur Selection 1	36.70 ^{ab}	38.25 ^a	37.47 ^a	380.50 ^c	530.00 ^c	455.25 ^c	14.12 ^c	17.48 ^b	15.80 ^d
Pokhara Lurkee	28.91 ^c	28.23 ^b	28.57 ^b	616.37 ^b	711.25 ^{ab}	663.81 ^b	22.83 ^b	24.27 ^a	23.55 ^b
Pusa Purple Long	29.98 ^{bc}	31.00 ^b	30.49 ^b	367.12 ^c	422.00 ^d	394.56 ^{cd}	13.60 ^c	14.26 ^c	13.93 ^{de}
Takunchaur Collection	39.7 ^a	40.51 ^a	40.14 ^a	555.37 ^b	624.50 ^b	589.93 ^b	20.57 ^b	19.59 ^b	20.08 ^c
Tanahun Collection	28.31 ^c	28.19 ^b	28.25 ^b	1109.43 ^a	758.50 ^a	933.97 ^a	41.09 ^a	25.38 ^a	33.24 ^a
Grand Mean	34.08	34.40	34.24	561.81	560.79	561.30	20.81	18.71	19.68
SEM±	23.14	18.86	15.06	7156.10	3598.61	2845.168	10.54	3.95	3.30
LSD _{0.05}	7.25**	6.54**	5.85***	127.49***	90.41***	80.39***	4.89***	2.99***	2.74***
CV%	14.11	12.62	11.33	15.05	10.69	9.50	15.60	10.72	9.23

** $P<0.01$ and *** $P<0.001$, CV: Coefficient of variation, LSD: Least significant difference, SEM±: standard error of mean. Means within the column followed by the same letter are not significantly different at a 5% level of significance by DMRT.

Disease and insect severity

There was significant ($P<0.01$) difference in the disease severity among the tested genotypes (Table 8).

Table 8. Performance of brinjal genotypes on yield, disease severity and insect severity at HRS, Malepatan in 2020 and 2021

Genotypes	Disease severity (1-5 scale)			Insect severity (1-5 scale)		
	2020	2021	Mean	2020	2021	Mean
Jumli Local	2 ^{bc}	3.5	2.75 ^{bc}	0.75	1.75 ^b	1.25 ^b
Parwanipur Selection	3 ^{abc}	3.5	3.25 ^{ab}	2.25	2.25 ^{ab}	2.25 ^{ab}
Pokhara Lurkee	2 ^{bc}	2.75	2.3 ^c	2	3 ^a	2.50 ^a
Pusa Purple Long	4 ^a	3.5	3.75 ^a	1	1.25 ^b	1.12 ^b
Takunchaur Collection	3.5 ^{ab}	3	3.25 ^{ab}	1.25	1.25 ^b	1.25 ^b
Tanahun Collection	2.5 ^{bc}	3.25	2.87 ^{bc}	1.25	2.25 ^{ab}	1.75 ^{ab}
Grand Mean	2.83	3.25	3.04	1.41	1.95	1.68
SEM±	0.48	0.46	0.18	1.07	0.55	0.47
LSD _{0.05}	1.05**	ns	0.65**	ns	1.12*	ns
CV%	24.67	21.01	14.28	73.28	37.96	40.93

ns; non-significant, * $P<0.05$, ** $P<0.01$, CV: Coefficient of variation, LSD: Least significant difference, SEM±: standard error of mean. Means within the column followed by the same letter are not significantly different at a 5% level of significance by DMRT

The highest disease severity (3.75) was found for Pusa Purple Long, which was at par with Parwanipur Selection1 (3.25) and Takunchaur Collection (3.25) and the lowest disease severity (2.3), was found for the Pokhara Lurkee. There was non-significant difference ($P=0.055$) in the insect severity among the tested genotypes (Table 8). But, the highest insect severity (2.5) was found for Pokhara Lurkee and the lowest insect severity was found for the Pusa Purple Long (1.12).

DISCUSSION

Among the tested genotypes the Pokhara Lurkee was the tallest plant having 129.9 cm of height (Table 4). Rawal et al (2014) reported that Pokhara Lurkee was 80.9 cm tall in Khajura, Banke, Nepal. From the evaluation of five genotypes, the highest mean yield of brinjal was 33.24 mt ha⁻¹ for Tanahun Collection followed by Pokhara Lurkee 23.55 mt ha⁻¹ (Table 7). Likewise, the highest yield of 43.15 mt ha⁻¹ was recorded in Pokhara Lurkee in Khajura, Banke (Rawal et al 2014). The variation in plant height and other growth parameters are controlled by gene and climatic factors (Gogoi et al 2017). The variation on plant height among the brinjal cultivars is supported by the result of Singh et al (2014) and Mohantry et al (2001). Quantitative traits like plant height are governed by several genes. The genotypic and environmental factors had a great influence on plant height (Gotame et al 2020). The highest plant height in Pokhara Lurkee could be due to the genetic variation present in the genotypes. The growth parameters and phenotypic characters are differing among the genotypes due to climatic and genetic factors (Tripathy et al 2017). The variation of plant height occurs in genotypes at different growing stages. The variation in plant height is supported by Rai et al (1998), who reported difference in plant height among the different varieties. Rai et al (1998) reported that growth and yield parameters were different according to cultivar.

From the result of two year experiment, the fastest harvesting (52.12 DAT) was in the Tanahun Collection while the longest time taking for the harvesting was in Parwanipur Selection 1 (90 DAT) in Pokhara condition (Table 5) but Gotame et al (2020) reported that days to first picking was 70 DAT for Pokhara Lurkee and 56 DAT for Parwanipur Selection 1 at central Terai conditions in winter season. Similarly, the yield of Parwanipur Selection 1 was 25.8 mt ha⁻¹, Pusa Purple Long was 20.1 mtha⁻¹ and Pokhara Lurkee was 18.2 mt ha⁻¹. The weight of individual fruit among the tested genotypes is different (Table 4). This result is close to the variation that occurred in genotypes reported by Mahaveer et al (2004), Thapa et al (2005) and Mishra et al (2008). The yield differences were recorded in the experiment among the tested genotypes. The genotypic constituents affect the yield potential of the genotypes. The results are close similarity to results found by Gotame et al (2020), Prabhu et al (2008) and Dharwad et al (2009). They found variation in fruit yield among the brinjal varieties in their researches. The results of Sulaiman et al (2020) also support that brinjal genotypes have large genetic variation for vegetative characteristics, yield, and yield attributing characters. The result of Wang et al (2015) also mentioned that variation in color, size, fruit weight, fruit length, and yield, etc. are due to variation in genetic makeup of the genotypes in Solanaceae family.

Koundinya et al (2019) reported that the infestation of brinjal fruit and shoot borer was increased with the rising of temperature in the field. Thapa et al (2009) revealed that shoot and fruit borer (*Leucinodes orbonalis*) is one of the highly harmful pests of brinjal in Nepal. The disease severity was found significant ($P<0.01$) among the tested genotypes (Table 8). The highest disease severity was found for Pusa Purple Long (3.75). The *Fusarium* wilt is major soil-borne fungal diseases of brinjal (Ganopoulos et al 2016). The insect and disease

severity also varies according to the genetic makeup of brinjal genotypes (Gotame et al 2020). The disease severity for the Pokhara Lurkee was lower than the other genotypes which results in close conformity of Gotame et al (2020). The insect severity was found non-significant ($P=0.0547$) among the genotypes in Pokhara (Table 8).

However, Gotame et al (2020) found the least borer infestation in Parwanipur Selection 1, whereas Rawal et al (2014) showed highest insect infestation on Parwanipur Selection 1 genotype. Variable in such insect infestation may be due to the biophysical mechanism, where pedicel and calyx length may have role in less infestation of eggplant fruit and shoot borer (Pawar et al 2021). Parveen and Rao (2020) further discussed about the biophysical basis of resistance against *L. orbonalis* such as thickness of pubescence on the leaves, toughness of skin and pulp of the fruit, thick cuticle and solidness of stem. These types of biophysical characters may have attributed towards the variable infestation of brinjal.

CONCLUSION

The two year's study revealed Tanahun Collection and Pokhara Lurkee performed better in Pokhara condition. Pokhara Lurkee has the characteristics of consumer preferences for shape, size, color and taste. The yield and yield attributing characters are also satisfactory. Due to well adapted cultivar having good tastes, the Pokhara Lurkee could be the best genotypes for the release or registration as a variety in Nepal. The Pokhara Lurkee can withstand more rain than other genotypes, so it can give more yields in this location. It is promising genotype for the mid hills of Gandaki Province and can be recommended in the similar other eco-locations of Nepal.

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Authors' contributions

S Lohani was directly involved in the research design and in the conduction of field experiment, data recording, analysis of data and draft preparation of manuscript while LN Aryal and S Adhikari were involved as helping hands for research concept, design and field experiment as well as data recording and analysis. YR Bhusal and S Aryal had contribution on guideline for proper research design and correction of manuscript.

Conflicts of interest

The authors have no relevant financial or non-financial interests to disclose.

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