



## Effects of Varieties and Fertilization on Growth and Yield of Squash (*Cucurbita pepo* L.)

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### ABSTRACT

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A field experiment was conducted at the Horticulture Farm of the Bangladesh Agricultural University, Mymensingh during the period from October, 2023 to January, 2024 to study the effect of varieties and fertilization on the growth and yield of squash (*Cucurbita pepo* L.). The experiment was carried out in a Randomized Complete Block Design (RCBD) with three replications, with two factors. Factor A: four squash variety namely, Alpona ( $V_1$ ), Kolpona ( $V_2$ ), Pahuja ( $V_3$ ), and Alaska ( $V_4$ ) and Factor B: four fertilizer treatments viz, control ( $T_0$ ), cowdung @ 5 t ha<sup>-1</sup> with NPK @ 80:80:90 kg ha<sup>-1</sup> ( $T_1$ ), cowdung @ 10 t ha<sup>-1</sup> with NPK @ 90:90:100 kg ha<sup>-1</sup> ( $T_2$ ), and cowdung @ 15 t ha<sup>-1</sup> with NPK @ 100:100:110 kg ha<sup>-1</sup> ( $T_3$ ). Data were collected on plant growth, flowering behavior, fruit characteristics, and yield components. Results revealed that both variety and fertilizer had significant effects on all measured parameters. Among the varieties, Pahuja ( $V_3$ ) performed best, producing the tallest plants, highest leaf count, highest number of fruits per plant, and the highest yield (32.49 t/ha). Alaska ( $V_4$ ) flowered earliest and had the widest fruits, while Kolpona ( $V_2$ ) and Alpona ( $V_1$ ) recorded the lowest yields. For fertilizer treatments,  $T_2$  (10 t ha<sup>-1</sup> cowdung + NPK @ 90:90:100 kg ha<sup>-1</sup>) produced the best outcomes, including the tallest plants, maximum number of leaves and fruits per plant, highest yield (32.06 t ha<sup>-1</sup>). Excessive fertilization in  $T_3$  (cowdung @ 15 t ha<sup>-1</sup> with NPK @ 100:100:110 kg ha<sup>-1</sup>) slightly reduced fruit weight and overall yield. The best interaction effect was observed in  $V_3T_2$  (Pahuja + cowdung @ 10 t ha<sup>-1</sup> with NPK @ 90:90:100 kg ha<sup>-1</sup>), which yielded the highest production (45.37 t ha<sup>-1</sup>), demonstrating optimal synergy between variety and nutrient management. Therefore, the variety  $V_3$  (Pahuja) in combination with the fertilizer dose  $T_2$  (10 t ha<sup>-1</sup> cowdung + NPK @ 90:90:100 kg ha<sup>-1</sup>) showed better performance compared to other treatment combinations.

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### 1. Introduction

Squash (*Cucurbita pepo* L.) is a plant cultivated worldwide across various climatic regions and belongs to the Cucurbitaceae family. It offers numerous health benefits to human, as well as potential medicinal properties (Sarhan et al. 2011). Among its many bioactive compounds, squash contains phenolics, flavonoids, vitamins (such as beta-carotene, vitamin A, vitamin B2, alpha-tocopherol, vitamin C, and vitamin E), amino acids, carbohydrates, and minerals, particularly potassium. Additionally, squash is rich in dietary fiber and has a low energy content, providing approximately 17 kcal per 100g of fresh fruit (Tamer et al. 2010).

Squash is native to the New World, where it was cultivated by indigenous people long before European settlement. Its origins are traced to central Mexico, Peru, and the United States (Kathiravan et al. 2006). Squash, along with gourds, shares its American origins and includes varieties such as zucchini and pumpkins (Kumar and Sharma 2018).

Squash is a fast-growing, small-fruited, non-trailing or bush variety of *Cucurbita pepo*. It yields a wide variety of fruit shapes, including rectangular, flattened, crooked, and elongated, with colors ranging from cream to yellow, green, and variegated (Attallah et al. 2016). The average production per plant is around 5.2 kg, with each fruit

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weighing approximately 1.05 kg (Hasan et al. 2016). These squashes are quick to cook, requiring only 5 minutes of cooking time.

The variety of colored squash plays a crucial role in production by influencing yield, growth duration, pest resistance, market demand, and adaptability to climatic conditions (Rashad et al. 2019). Here are some key effects of different squash varieties on production: High-yielding varieties (e.g., Saffron Prolific Straightneck and BARI Squash 1) produce more fruit per plant, thereby enhancing overall production (KPH 2020). Certain varieties, like BARI Squash 1, are specifically bred for resistance to fungal diseases and common pests, reducing losses and improving production efficiency (KPH 2020). On the other hand, susceptible varieties may necessitate increased pesticide use, thus raising production costs. Additionally, some varieties perform better under specific climate conditions. BARI Squash 1 has been developed to thrive in the tropical climate of Bangladesh, ensuring higher yields in such conditions, while Table Queen is better suited for cooler climates, making it ideal for temperate regions. Bright-colored varieties (e.g., Saffron Prolific Straightneck) tend to attract more buyers due to their visual appeal. Furthermore, certain varieties, such as Table Queen, command higher market value due to their extended shelf life and unique flavor. According to FAO (2022), global production of pumpkins, squash, and gourds was approximately 23.3 million tonnes in 2021-2022, while Bangladesh produced only 719,000 tons (BBS 2022) which is quite low. This might be due to poor soil health due to lack of judicious application balanced fertilization (Islam and Rashid 2022).

The application of balanced fertilizers, including both organic manure (such as cowdung) and inorganic fertilizers, has a significant impact on squash production in terms of yield, fruit quality, soil health, and overall plant growth. A combination of cow dung and NPK fertilizers provides a steady release of nutrients, enhancing plant vigor, leaf development, and flowering (Shareef et al. 2022). Studies have demonstrated that balanced fertilization can increase squash yield by 20-40% compared to using only organic or inorganic sources. Cowdung improves soil structure, enhances microbial activity, and increases water retention. NPK fertilizers provide immediate nutrients; however, excessive use of inorganic fertilizers can degrade soil fertility over time (Jamal et al. 2004).

A balanced approach, incorporating both organic and inorganic sources, helps maintain long-term soil productivity. Proper nitrogen application fosters vigorous vine growth and promotes larger fruit size. Phosphorus is crucial for root development and flowering, leading to better fruit set, while potassium enhances fruit color, texture, and taste, improving marketable quality. Cow dung also contributes to enhanced nutrient uptake, resulting in better-flavored and firmer squash. Additionally, it increases microbial diversity in the soil, which helps suppress soil-borne diseases (Al-Halfi and Al-Azzawi 2022). The balanced application of NPK prevents nutrient deficiencies, thereby reducing the susceptibility of plants to fungal and bacterial infections. The integrated use of cow dung and NPK fertilizers optimizes squash production by enhancing soil fertility, improving plant health, boosting yield, and ensuring high-quality fruit (Islam et al. 2022).

This sustainable fertilization strategy benefits both farmers and the environment. The nutrient demands of squash are generally high due to the substantial biomass produced by the plant (Oloyede et al. 2013). Therefore, the present study aimed to investigate the effects of varieties and fertilization on the growth and yield of squash.

## 2. Materials and Methods

### 2.1. Experimental site

The experiment was conducted at the Horticultural Farm of Bangladesh Agricultural University, Mymensingh, during the period from October 2023 to January 2024. The experiment was carried out on a medium high land belonging to the soil series of Old Brahmaputra Flood Plain Alluvial Tract (UNDP 1988) of AEZ - 9. The texture of the soil was silty loam with pH 6.5. The climate of the experimental area was subtropical in nature, which was characterized by high temperature, heavy rainfall, high humidity and relatively long day during the months of April to September and low rainfall associated with moderately low temperature, low humidity and short day during the rest of the year.

### 2.2. Experimental treatments

The experiment consisted of two factors viz., four varieties of squash (Factor A) named V<sub>1</sub> (Alpona), V<sub>2</sub> (Kolpona), V<sub>3</sub> (Pahuja), V<sub>4</sub> (Alaska) and four doses of fertilizer (Factor B) viz., T<sub>0</sub> (Control), T<sub>1</sub> (cowdung @ 5 t ha<sup>-1</sup> + N:P: K @ 80:80:90 kg ha<sup>-1</sup>), T<sub>2</sub> (cowdung @ 10 t ha<sup>-1</sup> + N:P: K @ 90:90:100 kg ha<sup>-1</sup>), T<sub>3</sub> (cowdung @ 15 t ha<sup>-1</sup> + N:P: K @ 100:100:110 kg ha<sup>-1</sup>). The seeds of the variety were collected from local market, Mymensingh.

### 2.3. Experimental design and layout

The two-factor experiment consisting of 16 treatment combinations was laid out in the Randomized Complete Block Design (RCBD) with three replications. The total experimental area was divided into three equal blocks. Three blocks representing the replications. The total number of plots was 48. The size of a unit plot was 1 m<sup>2</sup> (1 m × 1 m). Entire block and entire plot distance was 1 m and 0.5 m, respectively.

### 2.4. Methods of cultivation

The land of the experimental area was first opened on 25th October, 2023 with a tractor and it was opened to the sun for few days prior to next ploughing and laddering. All uprooted weeds and stubbles were removed from the field. The big clods were broken into small soil particles and the surface was leveled until the desired tilth obtained. The entire dose of cowdung, TSP, ½ dose of MoP and 1/3 dose of urea were applied during final land preparation. The rest of the dose of urea and MoP were applied at 30 and 45 DAP followed sowing. Seeds were sown on 8th November, 2023 maintaining plant to plant distance 30 cm and row to row 50 cm. Irrigation, weeding and other intercultural operations were done as and when necessary. As colored squash is susceptible to pest and diseases, so field sanitation was maintained to minimize the occurrence of pests and diseases. Cash 75 WS used

as fungicide. Mancozeb 50% + Carbendazim 25% both used as fungicide. As insecticide for squash, Celcron 50EC was used. Pheromone trap was also used to control insect attack.

## 2.5. Parameters measured

Data on various parameters such as plant height (cm), number of leaves per plant, days to 1<sup>st</sup> flowering, number of male and female flowers per plant, number of fruits per plant, fruit weight (g), fruit length (cm), fruit diameter (cm), yield per plot (kg) and yield per ha (t ha<sup>-1</sup>) were measured (Plate 1).



Plate 1. Different growth stages and measuring various parameters of squash

## 2.6. Statistical analysis

The data on various parameters were statistically analysed using MSTAT computer program. The mean values for all the parameters were calculated and the analysis of variance for the characters was accomplished by F variance test. The significance of difference between pair of means was tested by the Least Significant Difference (LSD) test at 5 and 1% levels of probability (Gomez and Gomez 1984).

## 3. Results and Discussion

### 3.1. Plant height

Plant height is an important character of squash plant. The plant height was recorded at different stages of growth i.e.

at 25, 35, 45 and 55 days after sowing (DAP). Different varieties significantly influenced the plant height of squash. The plant height was increased gradually during different growth stages. The highest plant height attained from Alaska (V<sub>4</sub>) were 32.93 cm, 46.26 cm at 25 and 35 DAP. But at 45 and 55 DAP, the tallest plant was found from Pahuja variety (V<sub>3</sub>) which were 50.08 cm and 51.42 cm respectively. The minimum plant height was recorded from variety Kolpona (V<sub>2</sub>) which was 25.79 cm, 38.78 cm, 43.78 cm and 45.73 cm at 25, 35, 45 and 55 DAP respectively (Figure 1). The superior vegetative growth observed in V<sub>3</sub> (Pahuja) might be attributed to its genetic composition. Abdelkader and Abdein (2023) also observed that different varieties of squash played role in determining plant height.

A significant variation in squash plant height was observed across different fertilizer doses at 25, 35, 45, and 55 days after sowing (DAP). The highest plant heights at 25, 35, 45, and 55 DAP (34.06 cm, 50.05 cm, 54.77 cm, and 56.45 cm, respectively) were recorded under the fertilizer treatment comprising cowdung at 10 t/ha combined with N:P:K at 90:90:100 kg ha<sup>-1</sup> (T<sub>2</sub>). Conversely, the lowest plant heights at the same intervals (26.64 cm, 38.30 cm, 41.07 cm, and 42.31 cm) were observed in the control treatment (T<sub>0</sub>) (Figure 2). This might be due to the combined use of cowdung and inorganic fertilizers which enhances nutrient absorption, particularly nitrogen, which promotes cell division and elongation, leading to increased plant height. Studies by Al-Halfi et al. (2022) also demonstrated that increased nitrogen fertilizer application significantly enhances vegetative growth characteristics.

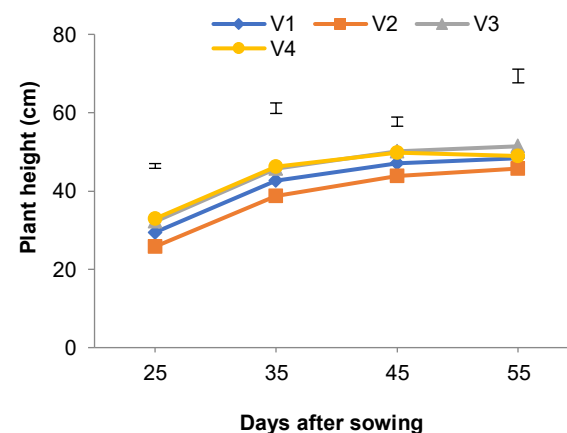
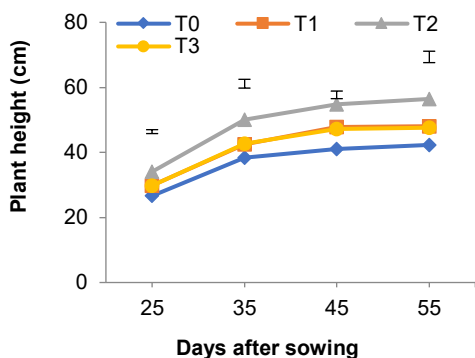


Figure 1. Main effect of variety on plant height at different days after sowing of squash. Vertical bars represent LSD at 1% level of significance; V<sub>1</sub> =Alpona, V<sub>2</sub> = Kolpona, V<sub>3</sub> = Pahuja, V<sub>4</sub> = Alaska.

This variation in plant height at 25, 35, 45, and 55 DA was resulted from the combined effects of different squash varieties and fertilizer applications. The tallest plants (37.57 cm, 54.06 cm, 58.00 cm, and 60.56 cm) were recorded in the Pahuja variety treated with cowdung at 10 t/ha combined with N: P: K at 90:90:100 kg/ha (V3T2). In contrast, the shortest plants (27.15 cm, 32.19 cm, 39.28 cm, and 41.12 cm) were observed in the Alaska variety under the control treatment (V4T0) (Table 1). The superior

performance of the Pahuja variety under the T2 treatment can be attributed to the adequate supply of immediately available nutrients.



**Figure 2.** Main effect of fertilizer doses on plant height at different days after sowing of squash. Vertical bars represent LSD at 1% level of

significance; T<sub>0</sub>= Control, T<sub>1</sub>=(Cow dung @ 5 t ha<sup>-1</sup> + N:P: K @ 80:80:90 kg/ha), T<sub>2</sub> = (Cowdung @ 10 t ha<sup>-1</sup> + N:P: K @ 90:90:100 kg ha<sup>-1</sup>), T<sub>3</sub>=(cowdung @ 15 t ha<sup>-1</sup>+ N:P: K @ 100:100:110 kg ha<sup>-1</sup>).

The integrated use of organic and inorganic fertilizers enhances nutrient absorption, thereby promoting vegetative growth.

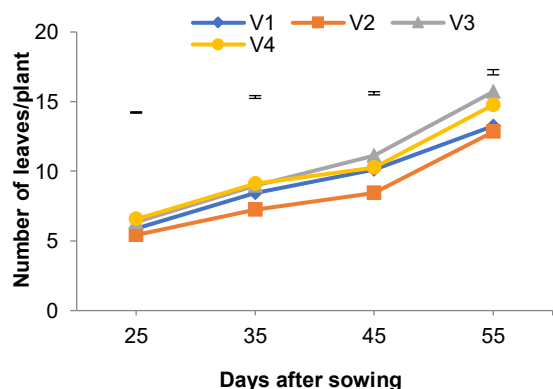
### 3.2. Number of leaves per plant

Number of leaves per plant varied significantly with different varieties of squash. The highest number of leaves was measured in Alaska (V<sub>4</sub>) at 25 and 35 DAP which were 6.56 and 9.13 respectively. But after 45 and 55 DAP the highest number of leaves were observed in Pahuja (V<sub>3</sub>) which were 11.14 and 15.71. On the contrary, the lowest number of leaves was found from Kolpona (V<sub>2</sub>) which was 5.43, 7.25, 8.45 and 12.83 at 25, 35, 45 and 55 DAP, respectively (Figure 3).

**Table 1.** Combined effects of variety and fertilizer doses on plant height at different days after sowing of squash (*Cucurbita pepo*)

Treatment combination	Plant height (cm) at different days after sowing			
	25	35	45	55
V <sub>1</sub> T <sub>0</sub>	27.57	40.00	41.91	41.67
V <sub>1</sub> T <sub>1</sub>	29.29	42.61	49.83	47.17
V <sub>1</sub> T <sub>2</sub>	34.38	50.77	53.80	56.33
V <sub>1</sub> T <sub>3</sub>	26.50	37.33	43.00	48.30
V <sub>2</sub> T <sub>0</sub>	21.69	38.53	39.78	43.18
V <sub>2</sub> T <sub>1</sub>	25.42	37.50	43.17	44.83
V <sub>2</sub> T <sub>2</sub>	30.10	45.87	49.89	52.22
V <sub>2</sub> T <sub>3</sub>	25.95	39.56	42.78	42.68
V <sub>3</sub> T <sub>0</sub>	30.16	42.49	43.31	43.28
V <sub>3</sub> T <sub>1</sub>	32.24	45.95	49.56	52.72
V <sub>3</sub> T <sub>2</sub>	37.57	54.06	58.00	60.56
V <sub>3</sub> T <sub>3</sub>	32.13	44.87	50.06	49.11
V <sub>4</sub> T <sub>0</sub>	27.15	32.19	39.28	41.12
V <sub>4</sub> T <sub>1</sub>	32.40	43.66	48.39	47.56
V <sub>4</sub> T <sub>2</sub>	34.19	49.50	57.40	56.67
V <sub>4</sub> T <sub>3</sub>	34.60	48.78	53.00	50.33
LSD <sub>0.05</sub>	1.58	3.50	3.05	4.55
LSD <sub>0.01</sub>	2.13	4.71	4.10	6.13
Level of significance	**	**	**	**

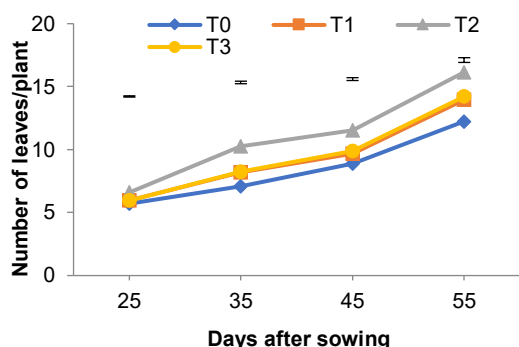
\*\* = Significant at 1% level of probability. V<sub>1</sub> = Alpona, V<sub>2</sub> = Kolpona, V<sub>3</sub> = Pahuja, V<sub>4</sub> = Alaska and T<sub>0</sub> = Control, T<sub>1</sub> = (T<sub>0</sub> = Control, T<sub>1</sub>=(Cow dung @ 5 t ha<sup>-1</sup> + N:P: K @ 80:80:90 kg/ha), T<sub>2</sub> = (Cowdung @ 10 t ha<sup>-1</sup> + N:P: K @ 90:90:100 kg ha<sup>-1</sup>), T<sub>3</sub>=(cowdung @ 15 t ha<sup>-1</sup> + N:P: K @ 100:100:110 kg ha<sup>-1</sup>).



**Figure 3:** Main effect of variety on number of leaves per plant at different days after sowing of squash. Vertical bars represent LSD at 1% level of significance; V<sub>1</sub>=Alpona, V<sub>2</sub> = Kolpona, V<sub>3</sub> = Pahuja, V<sub>4</sub> = Alaska.

The number of squash leaves per plant also showed highly significant response to different level of fertilization. The maximum number of leaves per plant was noted from T<sub>2</sub> (cowdung 10 t ha<sup>-1</sup> + N:P: K @ 90:90:100 kg ha<sup>-1</sup>) treatment which was 6.60, 10.25, 11.53 and 16.1 at 25, 35, 45 and 55 DAP, respectively. And the minimum number of leaves per plant were 5.71, 7.07, 8.87, and 12.24 at 25, 35, 45, and 55 DAP respectively which was found from control (T<sub>0</sub>) treatment (Figure 4). Kaur et al. (2021) also reported that that increased nitrogen fertilizer application significantly influence number of leaves per plant.

The number of leaves per plant was significantly influenced by the interaction effect of squash variety and different doses of fertilizers.



**Figure 4.** Main effect of fertilizer doses on number of leaves per plant at different days after sowing of squash. Vertical bars represent LSD at 1% level of significance; T<sub>0</sub> = Control, T<sub>1</sub> = (Cow dung @ 5 t ha<sup>-1</sup> + N:P: K @

80:80:90 kg/ha), T<sub>2</sub> = (Cowdung @ 10 t ha<sup>-1</sup> + N:P: K @ 90:90:100 kg ha<sup>-1</sup>), T<sub>3</sub>=(cowdung @ 15 t ha<sup>-1</sup> + N:P: K @ 100:100:110 kg ha<sup>-1</sup>

The maximum number of leaves per plant at 25, 35, 45 and 55 DAP (6.90, 11.00, 13.67 and 18.06) was found from Pahuja (V<sub>3</sub>) when treated with fertilizer dose containing cow dung 10 t/ha + N:P:K @ 90:90:100 kg ha<sup>-1</sup> (V<sub>3</sub>T<sub>2</sub>). The lowest number of leaves per plant at 25 and 35 DAP (5.14 and 5.33, respectively) was recorded in the Kolpona variety under the fertilizer treatment of cowdung at 5 t/ha combined with N:P: K at 80:80:90 kg ha<sup>-1</sup> (V<sub>2</sub>T<sub>1</sub>). Meanwhile, the minimum leaf count at 45 and 55 DAP (7.83 and 12.00, respectively) was observed in the Kolpona variety under the control treatment (V<sub>2</sub>T<sub>0</sub>) (Table 2).

**Table 2.** Combined effects of variety and fertilizer doses on number of leaves/plants at different days after sowing (DAP) of squash (*Cucurbita pepo*)

Treatment combination	Number of leaves/plants at different days after sowing			
	25	35	45	55
V <sub>1</sub> T <sub>0</sub>	5.37	7.57	9.78	12.00
V <sub>1</sub> T <sub>1</sub>	5.67	8.33	9.44	13.50
V <sub>1</sub> T <sub>2</sub>	6.77	10.22	10.72	14.67
V <sub>1</sub> T <sub>3</sub>	5.77	7.67	10.56	12.82
V <sub>2</sub> T <sub>0</sub>	5.98	7.56	8.17	12.00
V <sub>2</sub> T <sub>1</sub>	5.14	5.33	7.83	11.78
V <sub>2</sub> T <sub>2</sub>	5.28	8.78	9.72	14.33
V <sub>2</sub> T <sub>3</sub>	5.32	7.33	8.06	13.22
V <sub>3</sub> T <sub>0</sub>	5.70	7.83	9.33	12.83
V <sub>3</sub> T <sub>1</sub>	6.70	8.56	10.99	15.67
V <sub>3</sub> T <sub>2</sub>	6.90	11.00	13.67	18.06
V <sub>3</sub> T <sub>3</sub>	6.13	8.56	10.56	16.28
V <sub>4</sub> T <sub>0</sub>	5.80	7.56	8.55	12.11
V <sub>4</sub> T <sub>1</sub>	6.37	8.45	10.17	14.89
V <sub>4</sub> T <sub>2</sub>	7.47	11.00	12.00	17.56
V <sub>4</sub> T <sub>3</sub>	6.60	9.50	10.33	14.50
LSD <sub>0.05</sub>	0.29	0.67	0.75	1.26
LSD <sub>0.01</sub>	0.39	0.90	1.02	1.70
Level of significance	**	**	**	**

\*\* = Significant at 1% level of probability. V<sub>1</sub> = Alpona, V<sub>2</sub> = Kolpona, V<sub>3</sub> = Pahuja, V<sub>4</sub> = Alaska and T<sub>0</sub> = Control, T<sub>1</sub> = (Cow dung @ 5 t ha<sup>-1</sup> + N:P: K @ 80:80:90 kg/ha), T<sub>2</sub> = (Cowdung @ 10 t ha<sup>-1</sup> + N:P: K @ 90:90:100 kg ha<sup>-1</sup>), T<sub>3</sub>=(cowdung @ 15 t ha<sup>-1</sup> + N:P: K @ 100:100:110 kg ha<sup>-1</sup>

### 3.3. Days to 1st flowering

Squash varieties exhibited significant differences in the time required for the first flowers to appear. Among the four varieties, Alaska (V<sub>4</sub>) flowered the earliest, taking only 37.67 days after sowing. Pahuja (V<sub>3</sub>) followed with a flowering time of 41.83 days, while Kolpona (V<sub>2</sub>) and Alpona (V<sub>1</sub>) required the longest durations, blooming at 46.00 days and 45.67 days, respectively (Table 3). This observation aligns with findings by Abdelkader and Abdein (2023), who noted that varying squash cultivars significantly affect flowering times.

Although fertilizer treatments did not drastically affect the time to first flowering, they still exhibited a statistically significant influence. The treatment comprising cowdung at 15 t/ha combined with N:P: K at 100:100:110 kg ha<sup>-1</sup> (T<sub>3</sub>) resulted in the shortest time to flowering (42.33 days), suggesting that this fertilization level accelerates reproductive development.

**Table 3.** Main effect of variety on days to 1st flowering, number of male flowers per plant, number of female flowers per plant of squash (*Cucurbita pepo*)

Variety	Days to 1st flowerin g after sowing	No. of male flower /plant	No. of female flower/ plant
V <sub>1</sub>	45.67	5.59	4.06
V <sub>2</sub>	46.00	6.02	3.95
V <sub>3</sub>	41.83	6.25	4.40
V <sub>4</sub>	37.67	6.30	4.05
LSD <sub>0.05</sub>	0.64	0.16	0.15
LSD <sub>0.01</sub>	0.86	0.21	0.20
Level of significance	**	**	**

\*\* = Significant at 1% level of probability. V<sub>1</sub> = Alpona, V<sub>2</sub> = Kolpona, V<sub>3</sub> = Pahuja, V<sub>4</sub> = Alaska.

Conversely, the treatment with cowdung at 10 t ha<sup>-1</sup> and N:P: K at 90:90:100 kg ha<sup>-1</sup> (T<sub>2</sub>) led to the longest flowering time (43.17 days) (Table 4). This earliness in flowering may be due to enhanced nutrient translocation to the aerial parts of the plants and stimulation of the reproductive phase from the combined effects of organic

and inorganic fertilizers. [Kaur et al. \(2021\)](#) found that specific NPK doses significantly influenced earlier flower sprouting in summer squash.

**Table 4.** Main effect of fertilizer doses on days to 1st flowering, number of male flowers per plant, number of female flowers per plant of squash (*Cucurbita pepo*)

Fertilizer doses	Days to 1st flowering after sowing	No. of male flower/plant	No. of female flower/plant
T <sub>0</sub>	42.58	5.24	3.09
T <sub>1</sub>	43.08	5.83	3.92
T <sub>2</sub>	43.17	7.20	5.36
T <sub>3</sub>	42.33	5.87	4.08
LSD <sub>0.05</sub>	0.64	0.16	0.15
LSD <sub>0.01</sub>	0.86	0.21	0.20
Level of significance	**	**	**

\*\* = Significant at 1% level of probability. T<sub>0</sub> = Control, T<sub>1</sub> = (Cow dung @ 5 t ha<sup>-1</sup> + N:P:K @ 80:80:90 kg/ha), T<sub>2</sub> = (Cowdung @ 10 t ha<sup>-1</sup> + N:P:K @ 90:90:100 kg ha<sup>-1</sup>), T<sub>3</sub>=(cowdung @ 15 t ha<sup>-1</sup> + N:P:K @ 100:100:110 kg ha<sup>-1</sup>)

The interaction between squash varieties and fertilizer treatments further influenced the time to initial flowering. The earliest flowering (36.33 days) was observed in the Alaska variety under the cowdung 15 t ha<sup>-1</sup> + N:P:K @ 100:100:110 kg ha<sup>-1</sup> treatment (V<sub>4</sub>T<sub>3</sub>), followed closely by Alaska under the cowdung 5 t ha<sup>-1</sup> + N:P:K @ 80:80:90 kg ha<sup>-1</sup> treatment (V<sub>4</sub>T<sub>1</sub>). In contrast, delayed flowering (46.67 days) was recorded in the Kolpona variety under the cowdung 15 t ha<sup>-1</sup> + N:P:K @ 100:100:110 kg ha<sup>-1</sup> treatment (V<sub>2</sub>T<sub>3</sub>), followed by Kolpona under the cowdung 5 t ha<sup>-1</sup> + N:P:K @ 80:80:90 kg ha<sup>-1</sup> treatment (V<sub>2</sub>T<sub>1</sub>) (Table 5). This variation in flowering time can be attributed to the genetic makeup of each variety and the influence of fertilization in inducing the reproductive phase.

### 3.4. Number of male flowers per plant

The number of male flowers produced per plant varied across squash varieties. Alaska (V<sub>4</sub>) produced the most male flowers (6.30), slightly higher than Pahuja (V<sub>3</sub>) was 6.25 and Kolpona (V<sub>2</sub>) was 6.02. Alpona (V<sub>1</sub>) had the fewest male flowers (5.59) (Table 3). This is consistent with research by [Rashad et al. \(2019\)](#), which demonstrated that different squash cultivars significantly influence the number of male flowers produced.

Fertilizer application had a notable impact on the number of male flowers produced by squash plants. The treatment cowdung 15 t ha<sup>-1</sup> + N:P:K @ 100:100:110 kg ha<sup>-1</sup> (T<sub>2</sub>) led to the highest number of male flowers per plant (7.20), suggesting that this nutrient level encourages male flower development, whereas the control group (T<sub>0</sub>) produced the fewest (5.24) (Table 4). This increase in flower production may be due to improved nutritional status facilitated by the treatments. An increase in leaf production likely contributed to greater photosynthate accumulation and induced flowering stimuli, promoting more flower bud initiation. The combined effect of variety and fertilizer application affected the production of male flowers. The highest count of male flowers (7.67) was recorded in the Pahuja variety with cowdung @ 15 t ha<sup>-1</sup> + N:P:K @ 100:100:110 kg ha<sup>-1</sup> treatment (V<sub>3</sub>T<sub>2</sub>).

**Table 5.** Combined effects of variety and fertilizer doses on days to 1<sup>st</sup> flowering, number of male flowers per plant, number of female flowers per plant of squash (*Cucurbita pepo*)

Treatment combination	Days to 1st flowering after sowing	No. of male flower/plant	No. of female flower/plant
V <sub>1</sub> T <sub>0</sub>	44.33	4.71	3.05
V <sub>1</sub> T <sub>1</sub>	46.00	5.86	4.11
V <sub>1</sub> T <sub>2</sub>	46.33	6.83	5.22
V <sub>1</sub> T <sub>3</sub>	46.00	4.94	3.83
V <sub>2</sub> T <sub>0</sub>	45.00	5.77	3.10
V <sub>2</sub> T <sub>1</sub>	46.67	5.50	3.77
V <sub>2</sub> T <sub>2</sub>	45.67	6.71	4.95
V <sub>2</sub> T <sub>3</sub>	46.67	6.11	4.00
V <sub>3</sub> T <sub>0</sub>	40.00	5.11	3.39
V <sub>3</sub> T <sub>1</sub>	43.33	5.42	3.89
V <sub>3</sub> T <sub>2</sub>	43.67	7.67	5.82
V <sub>3</sub> T <sub>3</sub>	40.33	6.78	4.49
V <sub>4</sub> T <sub>0</sub>	41.00	5.38	2.83
V <sub>4</sub> T <sub>1</sub>	36.33	6.55	3.92
V <sub>4</sub> T <sub>2</sub>	37.00	7.59	5.44
V <sub>4</sub> T <sub>3</sub>	36.33	5.66	4.01
LSD <sub>0.05</sub>	1.27	0.32	0.29
LSD <sub>0.01</sub>	1.71	0.43	0.39
Level of significance	**	**	**

\*\* = Significant at 1% level of probability. V<sub>1</sub> = Alpona, V<sub>2</sub> = Kolpona, V<sub>3</sub> = Pahuja, V<sub>4</sub> = Alaska and T<sub>0</sub> = Control, T<sub>1</sub> = (Cow dung @ 5 t ha<sup>-1</sup> + N:P:K @ 80:80:90 kg/ha), T<sub>2</sub> = (Cowdung @ 10 t ha<sup>-1</sup> + N:P:K @ 90:90:100 kg ha<sup>-1</sup>), T<sub>3</sub>=(cowdung @ 15 t ha<sup>-1</sup> + N:P:K @ 100:100:110 kg ha<sup>-1</sup>)

The lowest number of male flowers (4.71) was observed in Alpona variety with control (V<sub>1</sub>T<sub>0</sub>) and 2nd lowest number of male flowers (4.94) was observed in Alpona variety with cowdung @ 15 t ha<sup>-1</sup> + N:P:K @ 100:100:110 kg ha<sup>-1</sup> treatment (V<sub>1</sub>T<sub>3</sub>) (Table 5).

### 3.5. Number of female flowers per plant

The number of female flowers, which directly contribute to fruit development, also varied significantly. Female flowers were highest in Pahuja (V<sub>3</sub>) (4.40), while Alaska (V<sub>4</sub>) and Alpona (V<sub>1</sub>) had moderate numbers 4.05 and 4.06 respectively. Kolpona (V<sub>2</sub>) showed the lowest female flower count (3.95) (Table 3). Similar trends were observed by [Benyamin Esho et al. \(2017\)](#), who reported significant variations in female flower production among different squash varieties. These findings highlight the significant impact of genetic factors inherent to each squash variety on flower production, which are critical for optimizing yield in squash cultivation.

The number of female flowers, crucial for fruit set and yield, was also affected by fertilizer treatments. The treatment cowdung 15 t ha<sup>-1</sup> + N:P:K @ 100:100:110 kg ha<sup>-1</sup> (T<sub>2</sub>) resulted in the highest number of female flowers per plant (5.36), indicating that this fertilization level is most conducive to female flower production, while the control group (T<sub>0</sub>) had the lowest number (3.92) (Table 4). [Ibraheem et al. \(2019\)](#) reported that the optimal number of female flowers per plant was achieved using the highest fertilizer concentrations.

The interaction between variety and fertilizer treatment also played a role in female flower production. The combination of Pahuja variety with cowdung 15 t ha<sup>-1</sup> + N:P:K @ 100:100:110 kg ha<sup>-1</sup> treatment (V<sub>3</sub>T<sub>2</sub>) resulted in the highest number of female flowers (5.82) suggesting that this combination optimizes conditions for female

flower formation. The lowest number of female flowers (2.83) was observed in Alaska variety with control ( $V_4T_0$ ) (Table 5). The increased production of female flowers in the Pahuja variety under optimal fertilization conditions is likely due to the balanced supply of nitrogen, phosphorus, and potassium from both organic and inorganic sources, which enhances nutrient availability and promotes reproductive development. In contrast, the absence of fertilization resulted in a minimal number of female flowers.

### 3.6. Number of fruits per plant

The number of fruits produced per plant, a key determinant of yield, was significantly influenced by variety. The Pahuja variety ( $V_3$ ) exhibited the highest fruit production per plant (3.36), highlighting its superior yield potential. It was followed by the Alpona variety ( $V_1$ ), which recorded the second-highest fruit count per plant (2.53), while the Kolpona variety ( $V_2$ ) produced the fewest fruits per plant (2.25) (Table 6, Plate 2). Abdelkader and Abdein (2023) observed that different squash cultivars significantly affect yield components, including fruit number.

**Table 6.** Main effect of variety on yield and yield contributing characters of squash (*Cucurbita pepo*)

Variety	No. of fruit/plant	Individual fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Yield/plot (kg)
$V_1$	2.53	119.28	19.61	3.66	1.39
$V_2$	2.25	110.54	14.95	3.38	1.36
$V_3$	3.36	343.73	22.73	4.53	3.25
$V_4$	2.38	335.49	20.63	5.03	2.91
LSD <sub>0.05</sub>	0.22	13.80	0.65	0.12	0.07
LSD <sub>0.01</sub>	0.30	18.58	0.87	0.16	0.09
Level of sig.	**	**	**	**	**

\*\* = Significant at 1% level of probability.  $V_1$  = Alpona,  $V_2$  = Kolpona,  $V_3$  = Pahuja,  $V_4$  = Alaska.

Fertilizer treatments also had a significant impact on fruit production per plant. The application of cowdung @ 10 t/ha combined with N:P: K at 90:90:100 kg ha<sup>-1</sup> ( $T_2$ ) resulted in the highest number of fruits per plant (3.46), demonstrating a strong positive correlation between this fertilization level and fruit set. Conversely, the control group ( $T_0$ ) recorded the lowest fruit count (1.78) (Table 7). Most similar findings have also obtained from Shareef et al. (2022) and Kaur et al. (2021) that both organic and inorganic fertilizers significantly increased fruit numbers.

**Table 7.** Main effect of fertilizer doses on yield and yield contributing characters of squash (*Cucurbita pepo*)

Fertilizer doses	No. of fruit/plant	Individual fruit weight (gm)	Fruit length (cm)	Fruit diameter (cm)	Yield/plot (kg)
$T_0$	1.78	195.71	17.02	3.80	1.33
$T_1$	2.47	229.46	19.70	4.17	2.07
$T_2$	3.46	289.86	22.82	4.63	3.21
$T_3$	2.81	194.00	18.38	4.00	2.30
LSD <sub>0.05</sub>	0.22	13.80	0.65	0.12	0.07
LSD <sub>0.01</sub>	0.30	18.58	0.87	0.16	0.09
Level of sig.	**	**	**	**	**

\*\* = Significant at 1% level of probability.  $T_0$  = Control,  $T_1$  = (Cow dung @ 5 t ha<sup>-1</sup> + N:P: K @ 80:80:90 kg/ha),  $T_2$  = (Cowdung @ 10 t ha<sup>-1</sup> + N:P: K @

90:90:100 kg ha<sup>-1</sup>),  $T_3$  = (cowdung @ 15 t ha<sup>-1</sup> + N:P: K @ 100:100:110 kg ha<sup>-1</sup>)

The interaction between variety and fertilizer treatments further influenced fruit production per plant. The highest fruit count (4.33) was achieved in the Pahuja variety when treated with cowdung @ 10 t ha<sup>-1</sup> + N:P:K @ 90:90:100 kg ha<sup>-1</sup> treatment ( $V_3T_2$ ), indicating that this combination optimizes fruit set. The second-highest fruit count (3.50) was recorded in the Alaska variety ( $V_4$ ) under the same fertilization treatment ( $V_4T_2$ ). In contrast, the lowest fruit count (1.33) was observed in the Alaska variety under the control treatment ( $V_4T_0$ ) (Table 8).



**Plate 2.** Squash fruits of four different varieties at harvest

### 3.7. Individual fruit weight

There was significant variation in individual fruit weight among the squash varieties. The Pahuja variety ( $V_3$ ) produced the heaviest fruits (343.73 g), while the Kolpona variety ( $V_2$ ) yielded the lightest fruits (110.54 g). The Alpona variety ( $V_1$ ) recorded the second-lowest individual fruit weight which is 110.54 g (Table 6). Rashad et al. (2019) and Saeid et al. (2015) also reported significant variations of fruit weight in different squash cultivars.

Fertilizer application had a pronounced effect on individual fruit weight. The treatment comprising cowdung @ 10 t/ha combined with N:P:K @ 90:90:100 kg/ha ( $T_2$ ) resulted in the heaviest fruits (289.86 g), suggesting that this nutrient combination enhances fruit development and size. In contrast, the application of cowdung @ 15 t/ha along with N:P: K @ 100:100:110 kg/ha ( $T_3$ ) produced the lightest fruits (194.00 g) (Table 7). Ibraheem et al. (2019) reported similar findings regarding fruit weight when using NPK fertilizers.

**Table 8.** Combined effects of variety and fertilizer doses on yield and yield contributing characters of squash (*Cucurbita pepo*)

Treatment combination	No. of fruit/plant	Individual fruit weight (gm)	Fruit length (cm)	Fruit diameter (cm)	Yield/plot (kg)
V <sub>1</sub> T <sub>0</sub>	1.67	137.90	16.43	3.43	0.99
V <sub>1</sub> T <sub>1</sub>	2.33	128.07	20.80	3.97	1.18
V <sub>1</sub> T <sub>2</sub>	3.11	123.20	24.03	4.03	2.07
V <sub>1</sub> T <sub>3</sub>	3.00	87.93	17.17	3.20	1.31
V <sub>2</sub> T <sub>0</sub>	1.78	93.90	13.63	3.07	1.01
V <sub>2</sub> T <sub>1</sub>	2.22	100.50	15.63	3.40	1.12
V <sub>2</sub> T <sub>2</sub>	2.89	142.20	17.10	3.80	2.18
V <sub>2</sub> T <sub>3</sub>	2.11	105.57	13.43	3.27	1.14
V <sub>3</sub> T <sub>0</sub>	2.33	250.50	19.50	4.07	1.78
V <sub>3</sub> T <sub>1</sub>	3.43	357.13	21.30	4.33	3.03
V <sub>3</sub> T <sub>2</sub>	4.33	471.95	26.60	5.10	4.54
V <sub>3</sub> T <sub>3</sub>	3.33	295.33	23.50	4.60	3.65
V <sub>4</sub> T <sub>0</sub>	1.33	300.53	18.50	4.63	1.55
V <sub>4</sub> T <sub>1</sub>	1.89	332.15	21.07	4.97	2.93
V <sub>4</sub> T <sub>2</sub>	3.50	422.10	23.53	5.60	4.04
V <sub>4</sub> T <sub>3</sub>	2.78	287.17	19.43	4.93	3.12
LSD <sub>0.05</sub>	0.45	27.60	1.29	0.24	0.14
LSD <sub>0.01</sub>	0.60	37.17	1.74	0.32	0.19
Level of sig.	**	**	**	**	**

\*\* = Significant at 1% level of probability V<sub>1</sub> = Alpona, V<sub>2</sub> = Kolpona, V<sub>3</sub> = Pahuja, V<sub>4</sub> = Alaska and T<sub>0</sub> = Control, T<sub>1</sub> = (Cow dung @ 5 t ha<sup>-1</sup> + N:P:K @ 80:80:90 kg ha<sup>-1</sup>), T<sub>2</sub> = (Cowdung @ 10 t ha<sup>-1</sup> + N:P:K @ 90:90:100 kg ha<sup>-1</sup>), T<sub>3</sub> = (cowdung @ 15 t ha<sup>-1</sup> + N:P:K @ 100:100:110 kg ha<sup>-1</sup>)

The interaction between variety and fertilizer treatments significantly influenced individual fruit weight. The heaviest fruits (471.95 g) were recorded in the Pahuja variety under the cowdung @ 10 t ha<sup>-1</sup> + N:P:K @ 90:90:100 kg/ha treatment (V<sub>3</sub>T<sub>2</sub>). Conversely, the lightest fruits (87.93 g) were observed in the Alpona variety treated with cowdung @ 15 t/ha combined with N:P:K at 100:100:110 kg ha<sup>-1</sup> (V<sub>1</sub>T<sub>3</sub>) (Table 8).

### 3.8. Fruit length

Fruit length, a crucial marketable trait, varied significantly across varieties and fertilizer treatments. The Pahuja variety (V<sub>3</sub>) produced the longest fruits (22.73 cm), whereas the Kolpona variety (V<sub>2</sub>) yielded the shortest (14.95 cm). The Alaska variety (V<sub>4</sub>) recorded a fruit length of 20.63 cm, while the Alpona variety (V<sub>1</sub>) produced fruits measuring 19.61 cm (Table 6).

Fertilizer application had a notable impact on fruit length. The treatment comprising cowdung @ 10 t ha<sup>-1</sup> combined with N:P:K @ 90:90:100 kg ha<sup>-1</sup> (T<sub>2</sub>) resulted in the longest fruits (22.82 cm), indicating that this nutrient combination enhances fruit elongation. In contrast, the control group (T<sub>0</sub>) produced the shortest fruits (17.02 cm) (Table 7).

The interaction between variety and fertilizer treatments significantly influenced fruit length. The longest fruits (26.60 cm) were observed in the Pahuja variety under the cowdung 10 t ha<sup>-1</sup> + N:P:K @ 90:90:100 kg ha<sup>-1</sup> treatment (V<sub>3</sub>T<sub>2</sub>), highlighting the effectiveness of this combination in promoting fruit elongation. Conversely, the shortest fruits (13.43 cm) were recorded in the Kolpona variety when treated with cowdung @ 15 t ha<sup>-1</sup> + N:P:K @ 100:100:110 kg/ha treatment (V<sub>2</sub>T<sub>3</sub>) (Table 8).

### 3.9. Fruit diameter

Fruit diameter, another critical size parameter, exhibited significant variation among the varieties. The Alaska variety (V<sub>4</sub>) produced the largest fruit diameter, averaging 5.03 cm, while the Kolpona variety (V<sub>2</sub>) had the smallest, measuring 3.38 cm. The Pahuja variety yielded fruits with an average diameter of 4.53 cm, whereas Alpona fruits measured 3.66 cm in diameter (Table 6). This observation aligns with findings by Benyamin Esho et al. (2017), who noted that variety selection influences fruit diameter.

Fertilizer application had a pronounced effect on squash fruit diameter. The treatment comprising cowdung at 10 t/ha combined with N:P:K @ 90:90:100 kg ha<sup>-1</sup> (T<sub>2</sub>) resulted in the largest average fruit diameter (4.63 cm), suggesting that this nutrient regime significantly enhances fruit girth. In contrast, the control group (T<sub>0</sub>) produced the smallest fruits, with an average diameter of 3.80 cm (Table 7).

The interaction between variety and fertilizer treatment also significantly influenced fruit diameter. The greatest fruit diameter (5.60 cm) was recorded in the Alaska variety treated with cowdung @ 10 t ha<sup>-1</sup> + N:P:K @ 90:90:100 kg ha<sup>-1</sup> (V<sub>4</sub>T<sub>2</sub>). Conversely, the smallest diameter (3.07 cm) was observed in the Kolpona variety under the control treatment (V<sub>2</sub>T<sub>0</sub>) (Table 8).

### 3.10. Yield per plot

The yield of squash per plot, a direct measure of productivity, was significantly influenced by the squash variety. The Pahuja variety (V<sub>3</sub>) produced the highest yield per plot (3.25 kg), followed by the Alaska variety, which had the second-highest yield (2.91 kg). In contrast, the Kolpona variety (V<sub>2</sub>) recorded the lowest yield (1.36 kg), while Alpona yielded a slightly higher 1.39 kg per plot (Table 6).

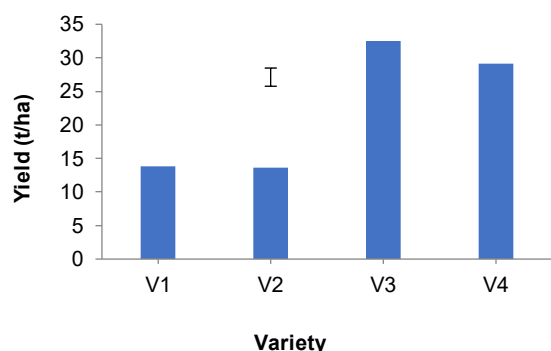
Fertilizer application had a profound impact on total squash yield per plot. The treatment comprising cowdung @ 10 t ha<sup>-1</sup> combined with N:P:K @ 90:90:100 kg ha<sup>-1</sup> (T<sub>2</sub>) resulted in the highest yield (3.21 kg per plot), demonstrating that this nutrient combination optimally enhances productivity within a given area. Conversely, the control group (T<sub>0</sub>) exhibited the lowest yield, producing only 1.33 kg per plot (Table 7). The enhanced yield observed with the integrated use of organic manures and chemical fertilizers may be attributed to the increased availability of essential nutrients like nitrogen, phosphorus, and potassium. This combination likely accelerates the synthesis of chlorophyll and amino acids, leading to more efficient translocation of photosynthates from leaves to fruits, thereby increasing yield per plot. This outcome aligns with the findings of Islam and Rashid (2022), indicating that NPK fertilizers significantly influence yield.

The interaction between variety and fertilizer treatment significantly influenced squash yield per plot. The highest yield (4.54 kg per plot) was achieved with the Pahuja variety under the cowdung @ 10 t ha<sup>-1</sup> + N:P:K @ 90:90:100 kg ha<sup>-1</sup> treatment (V<sub>3</sub>T<sub>2</sub>), indicating that this combination maximizes productivity. In contrast, the

lowest yield (0.99 kg per plot) was observed in the Alpona variety under the control treatment ( $V_1T_0$ ) (Table 8).

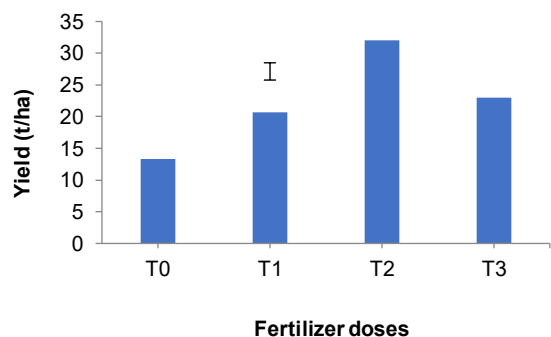
### 3.11. Yield per hectare

Yield expressed in tons per hectare, a standard measure for agricultural productivity, also varied significantly. The Pahuja variety ( $V_3$ ) recorded the highest yield ( $32.49 \text{ t ha}^{-1}$ ), followed by the Alaska variety, which produced the second-highest yield ( $29.11 \text{ t ha}^{-1}$ ). In contrast, the Kolpona variety ( $V_2$ ) had the lowest yield ( $13.62 \text{ t ha}^{-1}$ ), while the Alpona variety yielded slightly more at  $13.86 \text{ t ha}^{-1}$  (Figure 5). These results underscore the significant impact of genetic factors inherent to each squash variety on yield and fruit characteristics. Selecting high-performing varieties like Pahuja ( $V_3$ ) can substantially enhance productivity in squash cultivation.



**Figure 5.** Main effect of variety on yield per hectare of squash. Vertical bar represents LSD at 1% level of significance;  $V_1$  = Alpona,  $V_2$  = Kolpona,  $V_3$  = Pahuja,  $V_4$  = Alaska

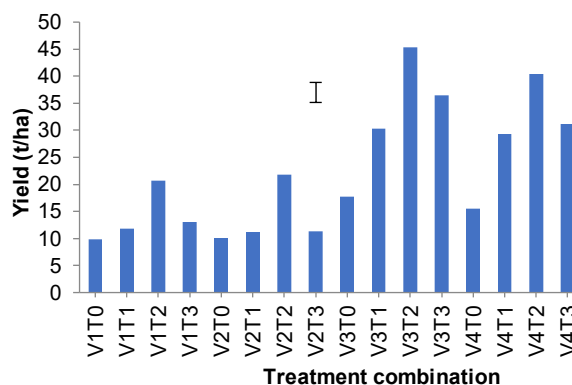
Fertilizer application had a substantial impact on overall squash yield, measured in tons per hectare. The treatment comprising cowdung at  $10 \text{ t ha}^{-1}$  combined with N:P:K @  $90:90:100 \text{ kg ha}^{-1}$  ( $T_2$ ) resulted in the highest yield ( $32.06 \text{ t/ha}$ ), demonstrating its effectiveness in optimizing land use efficiency and maximizing productivity. Conversely, the control group ( $T_0$ ) exhibited the lowest yield, producing only  $13.31 \text{ t ha}^{-1}$  (Figure 6).



**Figure 6.** Main effect of fertilizer doses on yield per hectare of squash. Vertical bar represents LSD at 1% level of significance;  $V_1$  = Alpona,  $V_2$  = Kolpona,  $V_3$  = Pahuja,  $V_4$  = Alaska and  $T_0$  = Control,  $T_1$  = (Cow dung @  $5 \text{ t ha}^{-1}$  + N:P:K @  $80:80:90 \text{ kg/ha}$ ),  $T_2$  = (Cowdung @  $10 \text{ t ha}^{-1}$  + N:P:K @  $90:90:100 \text{ kg ha}^{-1}$ ),  $T_3$  = (cowdung @  $15 \text{ t ha}^{-1}$  + N:P:K @  $100:100:110 \text{ kg ha}^{-1}$ )

The interaction between variety and fertilizer treatment significantly influenced squash yield per hectare. The

highest yield ( $45.37 \text{ t ha}^{-1}$ ) was achieved with the Pahuja variety under the cowdung @  $10 \text{ t ha}^{-1}$  + N:P:K @  $90:90:100 \text{ kg ha}^{-1}$  treatment ( $V_3T_2$ ), while the second-highest yield ( $40.40 \text{ t ha}^{-1}$ ) was obtained from the Alaska variety under the same fertilization regimen ( $V_4T_2$ ). In contrast, the lowest yield ( $9.87 \text{ t ha}^{-1}$ ) was recorded in the Alpona variety under the control treatment ( $V_1T_0$ ) (Figure 7). These findings highlight the significant impact of integrating organic fertilizers like cow dung with inorganic fertilizers on squash growth and yield, as organic amendments enhance soil structure and fertility, while inorganic fertilizers provide readily available nutrients, collectively promoting better plant development and productivity. These results align with the findings of Islam and Rashid (2022), who reported similar outcomes using NPK fertilizers in their experiments.



**Figure 7.** Combined effects of variety and fertilizer doses on yield per hectare of squash. Vertical bar represents LSD at 1% level of significance;  $V_1$  = Alpona,  $V_2$  = Kolpona,  $V_3$  = Pahuja,  $V_4$  = Alaska and  $T_0$  = Control,  $T_1$  = (Cow dung @  $5 \text{ t ha}^{-1}$  + N:P:K @  $80:80:90 \text{ kg ha}^{-1}$ ),  $T_2$  = (Cowdung @  $10 \text{ t ha}^{-1}$  + N:P:K @  $90:90:100 \text{ kg ha}^{-1}$ ),  $T_3$  = (cowdung @  $15 \text{ t ha}^{-1}$  + N:P:K @  $100:100:110 \text{ kg ha}^{-1}$ )

## 4. Conclusion

Therefore, it can be concluded that Pahuja variety ( $V_3$ ) when combined with the treatment combination cowdung @  $10 \text{ t ha}^{-1}$  + N:P:K @  $90:90:100 \text{ kg ha}^{-1}$  ( $T_2$ ) produces better growth and yield compared to other treatments.

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