

## **COMPARATIVE STUDY OF THREE VARIETIES AND APPLICATION METHODS OF MURIATE OF POTASH FERTILIZER ON GROWTH AND YIELD OF ONION**

### **ABSTRACT**

A comparative study on the growth and yield of onions was conducted at Sher-e-Bangla Agricultural University's Horticulture farm from October 2021 to March 2022 during the Rabi season. The experiment employed a Randomized Complete Block Design (RCBD) with two factors: onion varieties ( $V_1$ =BARI Piaz-1,  $V_2$ =BARIPiaz-4,  $V_3$ =BARI Piaz-6) and muriate of potash fertilizer application methods ( $M_1$ =Basal application (Full dose),  $M_2$  =  $\frac{1}{2}$  basal application +  $\frac{1}{2}$  25 DAT (Days aftertransplanting),  $M_3$  =  $\frac{1}{3}$  basal application +  $\frac{1}{3}$  25 DAT +  $\frac{1}{3}$  50 DAT). The results showed significant impacts of both onion varieties and potash fertilizer application methods on growth and yield. Among the onion varieties, BARI Piaz-4 ( $V_2$ ) exhibited the highest bulb weight per plant (66.52g), yield per plot (1.60 kg), and yield per hectare (17.74 t). Regarding potash fertilizer application, the  $\frac{1}{3}$  basal +  $\frac{1}{3}$  25 DAT +  $\frac{1}{3}$  50 DAT method ( $M_3$ ) resulted in the highest bulb weight per plant (59.97 g), bulb yield per plot (1.44 kg), and onion yield per hectare (15.99 t). The combination treatment of BARI Piaz-4 and the  $\frac{1}{3}$  basal +  $\frac{1}{3}$  25 DAT +  $\frac{1}{3}$  50 DAT potash fertilizer application ( $V_2M_3$ ) produced the best results, with the highest bulb weight per plant (73.50 g), yield per plot (1.76 kg), and bulb yield per hectare (19.59 t). In conclusion, cultivating BARI Piaz-4 with a three-times split application of muriate of potash fertilizer ( $V_2M_3$ ) can significantly enhance onion growth and yield, facilitating improved quality production.

**Keywords:** Onion, varieties, muriate of potash, bulb yield.

### **I. INTRODUCTION**

One significant bulbous crop is the onion (*Allium cepa* L.). It belongs to the Alliaceae family. It is a member of the Allium genus. The Mediterranean region serves as the secondary origin region for large type onions, whereas Central Asia serves as the major origin region for spices. One of Bangladesh's most significant and well-liked spice crops is the **Onion**. It is also regarded as a significant vegetable crop. It is ranked first in Bangladesh among all other things. Major spices such as chili, onion, garlic, turmeric and ginger are regularly used in daily diet at large amount [1]. Onion is a basic ingredient in South Asian food and is used as a spice in almost all countries. It is a photo and thermo sensitive crop [2]. Onion stands first among the spice crops in Bangladesh both in area (1.94 lakh ha) and production (25.17 lakh metric ton) [3]. The major onion producing districts of Bangladesh in 2020-21 were Pabna, Faridpur, Rajbari, Rajshahi, Kushtia, Jhainaidaha, Manikganj, Magura, Meherpur and Khulna. Onion output in Bangladesh has gradually expanded over the past few years, but so has the country's reliance on imports. In contrast, rising demand has led to an almost two-and-a-half-fold increase in import volume during the past five years. Bangladesh imported 1.35 lakh MT of onions in 2008-09; this number grew to 6.64 lakh MT in 2021-22, a 4.92-fold increase. Only by boosting output and utilizing a variety of techniques and approaches would it be possible to satisfy the huge demand for onions. In different parts of this country, numerous varieties of onions, including Taherpuri, Faridpuri, BARI piaz-1, BARI piaz-2, BARI piaz-3, BARI piaz-4, BARI piaz-5, Pabna local, Shuk Sagar, Bahadur, Lalima, and Ranga, are produced either as a crop for spices or for food. Some of these varieties (e.g., Taherpuri and Faridpuri) have very good flavour, pungency, taste and storage quality besides their excellent size and shape [4]. Due to the spread of new technology over the past two decades, such as HYV seeds, fertilizer, irrigation, pesticides, power tillers, etc., onion production has increased by many times [5]. There is a significant response of onion to both inorganic and organic fertilizer [6]. One of the crucial management elements that could have a significant impact on the output of onions is fertilizer control. **Nutrient management stands as a paramount factor among the various agronomic practices, playing a pivotal role in achieving enhanced crop yields. [24]. In contemporary agricultural contexts, the primary constraint on optimal plant growth and yield resides in the nutrient composition of the soil. The nutritional needs of various plant species exhibit variability among different crops. [25].** Onion bulb formation, elongation, skin color development, and pungent flavor are all influenced by the nutrients nitrogen, potassium, and sulfur [7]. Best quality onion can be produced through application of well-balanced fertilizers. Potassium is essential for several processes in plant metabolism, including photosynthesis, the movement of photosynthates, the control of plant

pores, the activation of plant catalysts, and pest and disease resistance. In addition to enhancing the onion's keeping quality, it also enhances the quality characteristics of various crops, including the onion, such as color, glossiness, and dry matter buildup[8]. The temporal application of potassium during the growth phase of onion plants plays a crucial role in influencing the process of bulb formation.[9] reported that the division of potassium application into multiple doses resulted in a greater onion bulb weight in comparison to a single application of the same dosage. Thus, to maintain development and quality, potassium must be applied to onions during crucial growth phases in the proper quantity. This study will assist farmers in growing high-quality onions, which will boost output and ensure the farmers' financial well-being. The purpose of this study is to identify suitable variety on growth and yield of onion. To observe actual application method of muriate of potash fertilizer on growth and yield of onion. It also helps to determine the combined effect of variety and fertilizer application method of muriate of potash fertilizer on growth and yield of onion.

## **II. MATERIAL AND METHODS**

### **1. Description of the site**

The study took place from October 2021 to March 2022 at the Horticulture Farm of the Sher-e-Bangla Agricultural University in Sher-e-Bangla Nagar, Dhaka. There was an elevation of 8.6 meters above sea level at the location, which was located at 23° 77' N Latitude and 90° 35' E Longitude. In this location, the three distinct seasons of winter (November to February), pre-monsoon or hot season (March to April), and monsoon season (May to October) were all encountered. Averaging 490 mm of precipitation annually, mostly during the monsoon season, the region experienced frigid winters and hot summers. 28°C and 19°C, respectively, were the mean annual maximum and lowest temperatures.

### **2. Soil sampling and analysis**

Before the experiment, soil samples were collected from the experimental plot. The soil, classified as silty loam, belonged to AEZ No. 28 within the Modhupur Tract region. Soil samples were taken from a depth of 0-15 cm and had a pH of 7.1. These samples were analyzed for their physical and chemical properties at the Soil Resources Development Institute (SRDI), Soil Testing Laboratory in Kamarhati, Dhaka. The soil was air-dried, crushed, and subjected to comprehensive testing.

### **3. Statistical Analysis**

Statistical analysis of recorded data across various parameters was conducted utilizing Statistic 10 software. To assess the significance of variances among treatment means, the Least Significant Difference test (LSD) was applied at a 5% level of significance.

### **4. Field preparation and Treatment allocation**

The experimental area was prepared in mid-October 2021 by initially employing a power tiller to break the ground, followed by a 10-day exposure to sunlight. In order to attain an optimal soil structure, the land underwent a series of preparatory steps, including harrowing, plowing, cross-plowing, and laddering. The experiment was subsequently arranged in accordance with a Randomized Complete Block Design (RCBD) featuring a factorial design with two independent variables, and each treatment combination was replicated three times. The experiment comprised as two factors. Factor A: Varieties of onions-3 kinds e.i. V1=BARI Piaz-1, V2=BARIPiaz-4, V3=BARI Piaz-6 and Factor B: Application method of potash fertilizer- 3 types.e.i. M1=Basal application (Full dose), M2 = ½ basal application + ½ 25 DAT (Days after transplanting), M3 = ⅓ basal application + ⅓ 25 DAT + ⅓ 50 DAT. Each block was divided into 09 plots where 09 treatments combination were distributed randomly and 27-unit plots altogether in the experiment. The size of each plot was 1 m × 0.9 m. The distance maintained between two blocks were 0.75 m and two plots were 0.50 m.

### **5. Planting Materials**

The seeds of onion were collected from Bangladesh Agricultural Research Institute (BARI), Gazipur.

### **6. Manuring and Fertilization**

The entire recommended quantities of Triple Super Phosphate (TSP) and Gypsum were administered as an initial application during the final stage of land preparation. The remaining portion of urea was divided into two equal doses, with the first dose applied 20 days after transplanting, and the second dose applied 45 days after transplanting. Muriate of potash was applied based on the specific treatment requirements.

Table 1. The following doses manure and fertilizers were applied in the experimental plots

Fertilizer	Dose /ha
Cowdung	10 ton
Urea	240 Kg
Muriate of Potash (MP)	150 Kg
Triple super phosphate	220 Kg
Gypsum	150 kg

### III. RESULT AND DISCUSSIONS

#### 1. Effect of variety

Significant differences were observed in the different parameters of plant due to different variety. The maximum plant height (55.29 cm) was measured at 60 DAT from V<sub>2</sub> (BARI Piaz-4) treatment (Fig.1). The highest number of leaves (6.02) per plant at 60 DAT was recorded from V<sub>2</sub> treatment (Fig.3). The treatment V<sub>2</sub> recorded the maximum neck diameter (1.16 cm), bulb length (5.13 cm), bulb diameter of onion (5.43cm), dry matter content of bulb (13.72%), fresh weight of leaves (25.34 g), polar diameter (1.49 cm), bulb weight per plant (66.52 g)(Table 2).The height brix percentage was measured from V<sub>2</sub>( 9.44%). The data revealed that highest yield per plot (1.60 kg), yield (17.74t) per hectare was obtained from V<sub>2</sub> treatment (Table 2).

The observed variance in plant height is likely attributed to the genetic composition of the different cultivars.[10]that in various onion cultivars, plant height is governed by genetic traits, and within a consistent environmental context, different cultivars will manifest their respective heights in accordance with their genetic composition.[11] found a significant difference in the number of leaves per plant among onion varieties. [12] reported that neck diameter of onion varied among different onion varieties and the highest neck thickness of the bulb (0.47 cm), was found in variety Agrifound Dark Red onion variety. The bulb length outcome observed in the current investigation aligns with prior research findings[13] .The results on bulb diameter corroborate the findings [14] .Differences in onion varieties significantly affect bulb development and individual bulb weight, highlighting the substantial influence of genetic factors on growth and bulb development [15].

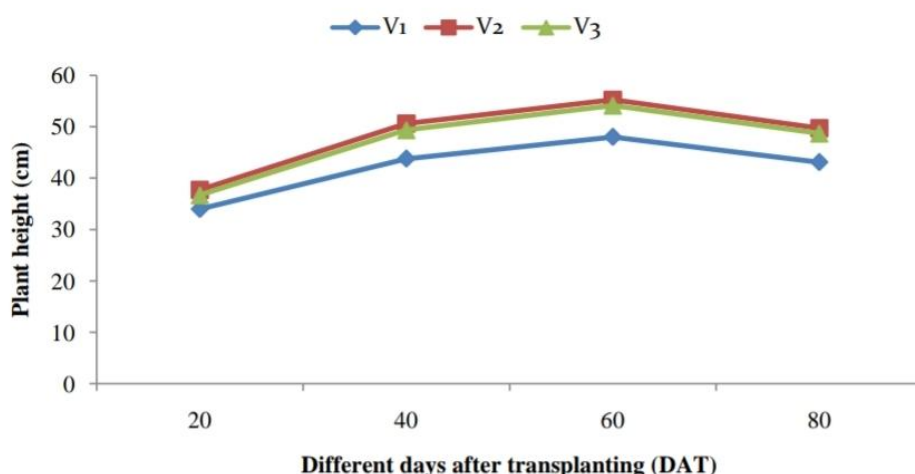
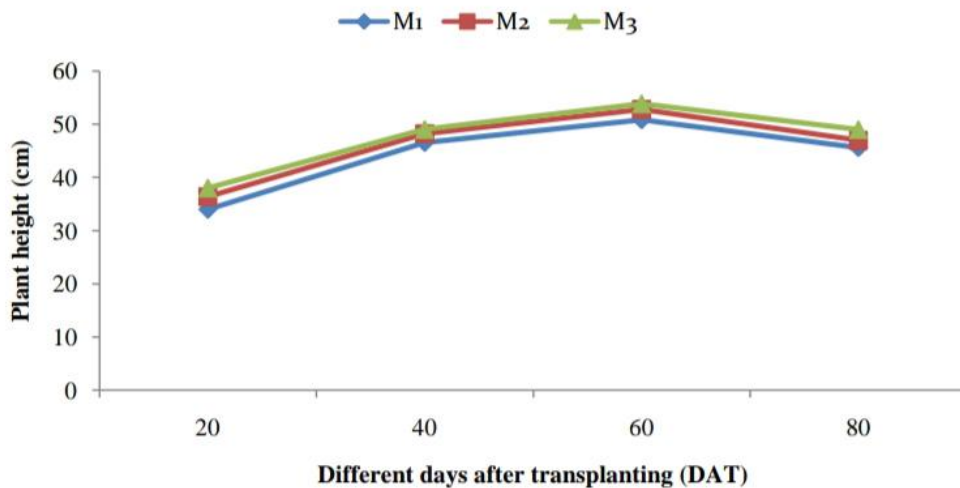


Figure 1. Effect of variety on plant height at different days after transplanting of onion. Note: Here, V<sub>1</sub>=BARI Piaz-1, V<sub>2</sub>=BARI Piaz-4 and V<sub>3</sub>=BARI Piaz-6



**Figure2. Effect of application methods of potash fertilizer on plant height at different days after transplanting of onion.** Note: Here,  $M_1$ =Basal application (Full dose),  $M_2$ = $\frac{1}{2}$  basal application +  $\frac{1}{2}$  25 DAT (Days after transplanting),  $M_3$  =  $\frac{1}{3}$  basal application +  $\frac{1}{3}$  25 DAT +  $\frac{1}{3}$  50 DAT.

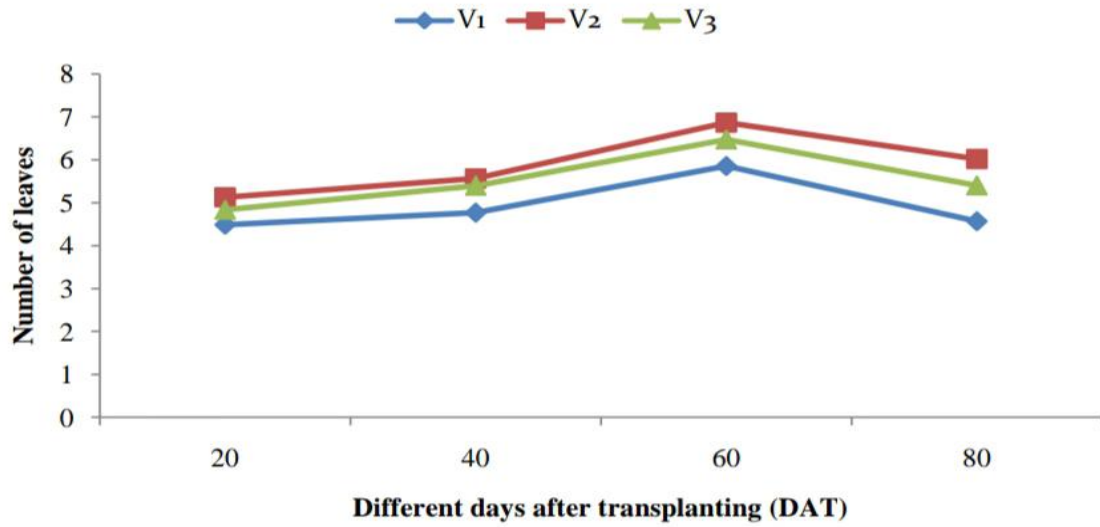
## 2. Effect of potash fertilizer application method

The data revealed that the different application method of potash fertilizer affected the growth and yield of onion. The maximum plant height (53.86 cm) at 60 DAT (Fig. 2) and number of leaves (7.40) at 60 DAT (Fig.4) was measured from  $M_3$  treatment. The treatment  $M_3$  recorded the maximum neck diameter (1.16 cm)(Table 3).The treatment  $M_3$  recorded the bulb length (4.81 cm), bulb diameter (5.31 cm), dry matter content of leaves (12.98 %) (Table 3). The maximum polar diameter (1.53 cm), fresh weight of leaves(22.50 g) was obtained from  $M_3$  treatment (Table 3).The height brix percentage (7.78) from  $M_2$  treatment(Table 3).The data revealed that highest bulb weight (59.97 gm) per plant, yield (1.44 kg) per plot, yield (15.99 t) per hectare was obtained from  $M_3$  Treatment (Table 3).

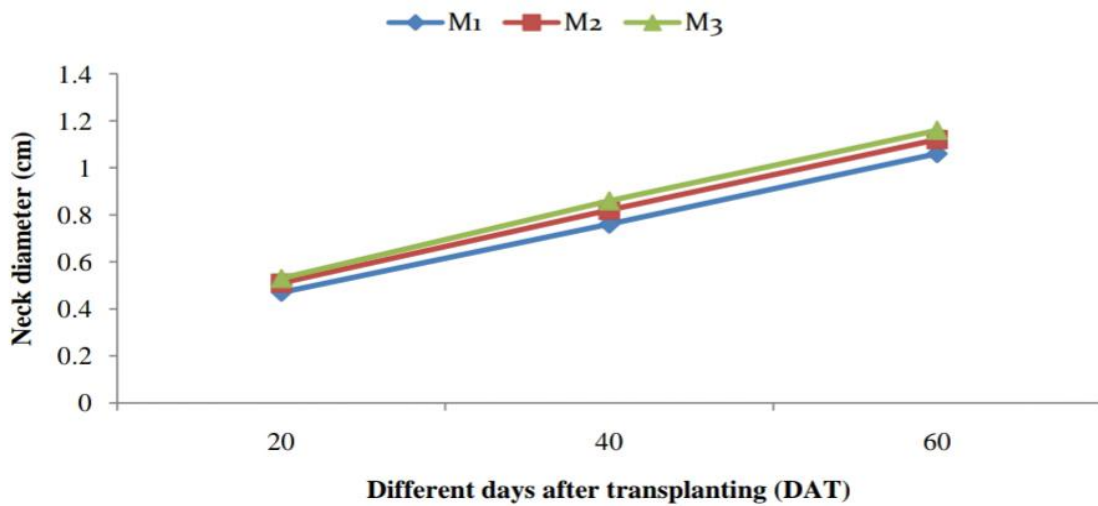
Optimal and regular supply of potassium fertilizer at different growth stages of crop through splitting application resulted in better utilization of potash by the plants which enhanced the growth and yield characteristics of Onion. The findings were similar to [16] Who discovered that split application of potash in crop significantly influenced plant growth characteristics. [17] reported that application of potash fertilizer influenced leaf number of onion plant. The result obtained from the present study was similar with the findings of [18] recorded bulb length of onion after harvesting indicated that, the bulb length of onion was positively influenced by split application of potassium. The result was similar with the findings of [19] discovered a notable disparity in the polar and equatorial dimensions of the bulb. These findings agree with the results of [20].  $M_2$  treatment gave the height brix percentage of onion. The result was similar with the findings of [21]. [22] reported that three split of potash fertilizer significantly influenced onion yield per plot comparable to control treatment. The findings were similar to those of [23] who studied the response of summer onion to potash and its application methods and reported that the highest bulb yield.

## 3. Combined effect of variety and application method of potash fertilizer

Combined effect of variety and application method of potash fertilizer was found to be statistically significant. The maximum plant height (57.13 cm) at 60 DAT was obtained from  $V_2M_3$  treatment combination and number of leaves per plant (7.73) at 60 DAT from  $V_2M_3$  treatment combination (Table 4). The treatment  $V_2M_3$  recorded the maximum neck diameter (1.23 cm), (Table 5). The maximum bulb length (5.44 cm), bulb diameter (5.73 cm), bulb weight per plant (73.50 g), polar diameter (1.60 cm), dry matter content of bulb (14.83%), fresh weight of leaves (26.50 g) was obtained from  $V_2M_3$  treatment (Table 5). The data revealed that highest yield per plot (1.76 kg), yield (19.59 t) per hectare was obtained from  $V_2M_3$  treatment and maximum brix percentage (10.17) was found from  $V_2M_2$  treatment (Table 5)



**Figure3. Effect of variety on number of leaves at different days after transplanting of onion.** Note: Here, V<sub>1</sub>=BARI Piaz-1, V<sub>2</sub>=BARI Piaz-4 and V<sub>3</sub>=BARI Piaz-6



**Figure 4. Effect of application methods of potash fertilizer on number of leaves onion at different days after transplantation of onion.** Note: Here, M<sub>1</sub>=Basal application (Full dose), M<sub>2</sub>=1/2 basal application + 1/2 25 DAT (Days after transplanting), M<sub>3</sub> = 1/3 basal application + 1/3 25 DAT + 1/3 50 DAT.

**Table 2. Effect of variety on Bulb length (cm), Bulb diameter (cm), Neck diameter (cm), Bulb weight per plant (g), Polar diameter (cm), Dry matter content of bulb (%), Fresh weight of leaves, Brix percentage, Yield per plot (kg), Yield per hectare (ton) of onion**

Treatment	Neck diameter (cm)	Bulb length (cm)	Bulb diameter (cm)	Bulb weight per plant (g)	Polar diameter (cm)	Dry matter content of bulb (%)	Fresh weight of leaves	Brix percentage	Yield per plot (kg)	Yield per hectare (ton)
V <sub>1</sub>	1.06 c	3.80 c	4.66 c	38.87 c	1.38	10.20 c	16.59 c	6.83 b	0.93 c	10.36 c
V <sub>2</sub>	1.16 a	5.13 a	5.43 a	66.52 a	1.49	13.72 a	25.34 a	9.44 a	1.6 a	17.74 a
V <sub>3</sub>	1.12 b	4.70 b	5.12 b	57.76 b	1.45	12.30 b	21.50 b	4.94 c	1.39 b	15.4 b
LSD (0.05)	0.0343	0.3168	0.1434	1.6751	0.3202 <sup>ns</sup>	0.2571	0.5622	0.5557	0.0141	0.4467
CV%	5.87	4.21	4.89	6.23	7.25	5.48	6.85	4.95	5.11	5.24

In a column means having similar letter(s) are statistically similar and those having dissimilar letter(s) differ significantly at 0.05 level of probability. Here, V<sub>1</sub>=BARI Piaz-1, V<sub>2</sub>=BARI Piaz-4 and V<sub>3</sub>=BARI Piaz-6

**Table 3. Effect of application methods of potash fertilizer on Neck diameter (cm), Bulb length (cm), Bulb diameter (cm), Bulb weight per plant (g), Polar diameter (cm), Dry matter content of bulb (%), Fresh weight of leaves, Brix percentage, Yield per plot (kg), Yield per hectare (ton) of onion**

Treatment	Neck diameter (cm)	Bulb length (cm)	Bulb diameter (cm)	Bulb weight per plant (g)	Polar diameter (cm)	Dry matter content of bulb (%)	Fresh weight of leaves (g)	Brix percentage	Yield per plot (kg)	Yield per (ton)
M <sub>1</sub>	1.06 c	4.31 b	4.84 c	48.81 c	1.36	11.20 c	20.07 c	7.06 b	1.17 c	13.02 c
M <sub>2</sub>	1.12 b	4.51 ab	5.08 b	54.36 b	1.43	12.06 b	20.87 b	7.78 a	1.3 b	14.49 b
M <sub>3</sub>	1.16 a	4.81 a	5.31 a	59.97 a	1.53	12.98 a	22.50 a	6.38 c	1.44 a	15.99 a
LSD (0.05)	0.0343	0.3168	0.1434	1.6751	0.3202 <sup>ns</sup>	0.2571	0.5622	0.5557	0.0141	0.4467
CV%	5.87	4.21	4.89	6.23	7.25	5.48	6.85	4.95	5.11	5.24

In a column means having similar letter(s) are statistically similar and those having dissimilar letter(s) differ significantly at 0.05 level of probability. Here, M<sub>1</sub>=Basal application (Full dose), M<sub>2</sub>= $\frac{1}{2}$  basal application +  $\frac{1}{2}$  25 DAT (Days after transplanting), M<sub>3</sub> =  $\frac{1}{3}$  basal application +  $\frac{1}{3}$  25 DAT +  $\frac{1}{3}$  50 DAT.

**Table 4. Combined effect of variety and application methods of potash fertilizer on plant height and number of leaves at different days after transplanting of onion**

Treatment	Plant height (cm) at				Number of leaves at			
	20 DAT	40 DAT	60 DAT	80 DAT	20 DAT	40 DAT	60 DAT	80 DAT
V <sub>1</sub> M <sub>1</sub>	32.69 f	42.87 e	47.13 g	41.07 h	3.69 e	4.37 g	5.02 g	4.09 g
V <sub>1</sub> M <sub>2</sub>	33.73 e	44.13 d	48.33 f	42.67 g	4.60 cd	4.89 ef	5.53 fg	4.55 fg
V <sub>1</sub> M <sub>3</sub>	35.60 d	44.43 d	48.67 f	45.65 f	4.93 bc	5.05 de	7.03 bc	5.07 def
V <sub>2</sub> M <sub>1</sub>	35.27 d	48.47 c	54.17 d	48.47 d	4.67 cd	5.07 de	6.33 de	5.41 cd
V <sub>2</sub> M <sub>2</sub>	38.43 b	50.64 b	54.59 cd	49.54 bc	4.87 bc	5.38 cd	6.53 cd	5.81 bc
V <sub>2</sub> M <sub>3</sub>	39.53 a	52.87 a	57.13 a	51.27 a	5.85 a	6.25 a	7.73 a	6.84 a
V <sub>3</sub> M <sub>1</sub>	34.07 e	48.42 c	51.24 e	47.32 e	4.21 de	4.50 fg	5.78 ef	4.76 ef
V <sub>3</sub> M <sub>2</sub>	37.07 c	49.84 b	55.47 bc	48.73 cd	4.87 bc	5.78 bc	6.23 de	5.22 cde
V <sub>3</sub> M <sub>3</sub>	39.00 ab	49.87 b	55.77 b	50.14 b	5.43 ab	5.93 ab	7.43 ab	6.27 ab
LSD (0.05)	0.8972	0.8894	1.1824	0.9968	0.6009	0.4173	0.6356	0.6133
CV%	4.25	5.68	7.23	4.02	5.58	6.32	4.85	6.25

In a column means having similar letter(s) are statistically similar and those having dissimilar letter(s) differ significantly at 5% level of significance. Here, V<sub>1</sub>=BARI Piaz-1, V<sub>2</sub>=BARI Piaz-4, V<sub>3</sub>=BARI Piaz-6, M<sub>1</sub>=Basal application (Full dose), M<sub>2</sub>= $\frac{1}{2}$  basal application +  $\frac{1}{2}$  25 DAT (Days after transplanting), M<sub>3</sub> =  $\frac{1}{3}$  basal application +  $\frac{1}{3}$  25 DAT +  $\frac{1}{3}$  50 DAT.

**Table 5. Combined effect of variety and application methods of potash fertilizer on Neck diameter (cm) Bulb length (cm), Bulb diameter (cm), Bulb weight per plant (g), Polar diameter (cm), Dry matter content of bulb (%), Fresh weight of leaves, Brix percentage, Yield per plot (kg), Yield per hectare (ton) of onion.**

Treatment	Neck diameter (cm)	Bulb length (cm)	Bulb diameter (cm)	Bulb weight per plant (g)	Polar diameter (cm)	Dry matter content of bulb (%)	Fresh weight of leaves	Brix percentage	Yield per plot (kg)	Yield per hectare (ton)
V <sub>1</sub> M <sub>1</sub>	1.01 f	3.47 e	4.39 g	33.30 h	1.31	9.30 h	15.33 f	6.83 cd	0.80 g	8.88 h
V <sub>1</sub> M <sub>2</sub>	1.08 de	3.78 de	4.74 f	39.67 g	1.36	10.27 g	16.10 f	7.50 c	0.95 f	10.58 g
V <sub>1</sub> M <sub>3</sub>	1.09 cde	4.15 cd	4.87 ef	43.63 f	1.49	11.05 f	18.33 e	6.16 de	1.05 f	11.63 f
V <sub>2</sub> M <sub>1</sub>	1.12 cd	4.87 b	5.16 bcd	60.46 cd	1.43	12.80 cd	24.37 b	9.50 ab	1.45 cd	16.12 cd
V <sub>2</sub> M <sub>2</sub>	1.15 bc	5.08 ab	5.40 b	65.60 b	1.45	13.53 b	25.17 b	10.17 a	1.57 b	17.49 b
V <sub>2</sub> M <sub>3</sub>	1.23 a	5.44 a	5.73 a	73.50 a	1.60	14.83 a	26.50 a	8.67 b	1.76 a	19.59 a
V <sub>3</sub> M <sub>1</sub>	1.05 ef	4.59 bc	4.95 def	52.67 e	1.35	11.50 e	20.50 d	4.833 fg	1.26 e	14.04 e

V <sub>3</sub> M <sub>2</sub>	1.14 bc	4.67 bc	5.10 cde	57.83 d	1.48	12.37 d	21.33 d	5.67 ef	1.39 d	15.42 d
V <sub>3</sub> M <sub>3</sub>	1.18 ab	4.84 b	5.33 bc	62.80 bc	1.51	13.05 c	22.67 c	4.33 g	1.51 bc	16.75 bc
LSD (0.05)	0.0594	0.5486	0.2483	2.9014	0.4506 <sup>ns</sup>	0.4452	0.9737	0.9625	0.11	0.7736
CV%	5.87	4.21	4.56	8.25	7.25	5.48	6.85	4.95	5.11	5.24

In a column means having similar letter(s) are statistically similar and those having dissimilar letter(s) differ significantly at 5% level of significance. Here, V<sub>1</sub>=BARI Piaz-1, V<sub>2</sub>=BARI Piaz-4, V<sub>3</sub>=BARI Piaz-6, M<sub>1</sub>=Basal application (Full dose), M<sub>2</sub>= $\frac{1}{2}$  basal application +  $\frac{1}{2}$  25 DAT (Days after transplanting), M<sub>3</sub> =  $\frac{1}{3}$  basal application +  $\frac{1}{3}$  25 DAT +  $\frac{1}{3}$  50 DAT.

#### IV. CONCLUSION

On the basis of present study, it is concluded that the V<sub>2</sub> variety gave highest plant height at 60 DAT of onion. V<sub>2</sub> (BARI Piaz-4) gave highest number of leaves, plant neck diameter, bulb length, bulb diameter, polar diameter, brix percentage, yield per plot, yield per hectare of onion. Among different application method of potash fertilizer height bulb length, bulb diameter, bulb weight per plant, fresh weight of leaves, dry matter content of onion, yield per plot, yield per hectare were found in the M<sub>3</sub> treatment ( $\frac{1}{3}$  basal application +  $\frac{1}{3}$  25 DAT +  $\frac{1}{3}$  50 DAT). Combination of V<sub>2</sub>M<sub>3</sub> treatment gave the height growth and yield per hectare (19.59 t) comparable to the other treatment combination. However, from the present study it may be concluded that, the most suitable combination for a higher yield of onion was V<sub>2</sub> (BARI Piaz -4) with M<sub>3</sub> ( $\frac{1}{3}$  basal application +  $\frac{1}{3}$  25 DAT +  $\frac{1}{3}$  50 DAT).

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