

## Effect of potassium and planting depth on yield and quality of tuberose

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### Abstract

The experiment was conducted at Nagpur, with 4 tiers of potassium: Manipulate (0 kg), 150 kg, 200 kg, and 250 kg ha<sup>-1</sup>, and 3 ranges of planting depth: 5, 7.5, and 10 cm with twelve treatment combinations. The levels of planting depth and potassium were randomized in a factorial randomized block layout. The objectives of the experiment of the test had been to evaluate the consequences of each potassium and planting depth as well as to decide the top of the line mixture of each variables for better tuberose yield and quality. Significantly maximum number of spikes plant<sup>-1</sup> (2.16 & 1.86), spikes plot<sup>-1</sup> (68.98 & 61.91), spikes ha<sup>-1</sup> (2.39 & 2.23 lakhs), florets spike<sup>-1</sup> (26.22 & 25.66), bulbs plant<sup>-1</sup> (6.08 & 5.48), bulbs plot<sup>-1</sup> (194.67 & 175.36), bulbs ha<sup>-1</sup> (1.99 & 1.80 lakhs), bulblets plant<sup>-1</sup> (31.67 & 24.91), bulblets plot<sup>-1</sup> (1013.33 & 797.33), bulblets ha<sup>-1</sup> (35.18 & 27.68 lakhs) and also highest length of spike (77.28 & 74.09 cm), diameter of spike (0.99 & 0.98 cm), length of floret (4.89 & 5.35 cm), diameter of floret (3.91 & 3.84 cm), length of rachis (20.36 & 20.33 cm), diameter of bulb (4.85 & 4.38 cm) and vase life of flower (9.07 & 9.05 days) recorded via applying of potassium 200 kg ha<sup>-1</sup> and planting the bulbs at a depth of 7.5 cm respectively. It was discovered that there has been no significant interaction between planting depth and potassium's effects on yield and quality.

**Keywords:** Tuberose (*Polianthes tuberosa*), potassium levels, planting depth, yield and quality

### Introduction

Tuberose (*Polianthes tuberosa*) is half hardy, bulbous perennial with fibrous root and perpetuating itself through bulblets. The flora is funnel shaped waxy white, single or double and borne in spike. The flowering spike emerges from a centre of the cluster of leaves. It is now not like other plants those are simply supposed for ornament, it additionally used for several purposes and in different forms. Potassium is critical plant nutrient for proper bloom and improvement of flowers (Ahmed *et al.*, 2017) [1]. Plant life do not grow without potassium. Potassium has a major function in controlling stomata opening and closing as well as water retention. It stimulates the formation of meristematic tissue, initiates certain enzymatic events, facilitates protein synthesis and nitrogen metabolism, catalyzes the actions of certain mineral elements, and helps the metabolism and translocation of carbohydrates. Potassium also lowers the chance of bulb rot. Potassium may be very crucial for tuberose blossoming. An increase in potassium can guarantee that tuberose blossoms have a healthy start. For bulbous plants to produce early and high-quality flowers, the ideal planting depth is crucial. The planting depth ranges from 3.0 to 7.0 cm, contingent on the bulb's diameter and soil composition. It needs to be 2.5 times more than the bulbs' diameter. Bulb planting should be done deeper if the bulbs are large in size. Just like this, bulbs ought to be planted in sandy soil at a deeper depth than in clay soil, and as a result, sprouting will take longer. This study aims to evaluate the impact of varying potassium levels and planting depths on the yield and quality of tuberose (*Polianthes tuberosa*).

### Materials and Methods

The purpose of the field trial, which took place in the PG Research Unit of College of Agriculture, Nagpur in 2019 -

20 was to analyse the effects of planting depth and potassium on yield and quality of tuberose. This study had 3 replications and a Factorial Randomized Block Design with twelve treatment combinations. The experiment consisted of element a) Potassium tiers *viz.*, K<sub>0</sub> - Control (0 Kg ha<sup>-1</sup>), K<sub>1</sub> - 150 Kg ha<sup>-1</sup>, K<sub>2</sub> - 200 Kg ha<sup>-1</sup>, K<sub>3</sub> - 250 Kg ha<sup>-1</sup> and element b) Planting Depth *viz.*, D<sub>1</sub> - 5 cm, D<sub>2</sub> - 7.5 cm, D<sub>3</sub> - 10 cm and has the treatment combinations of 12 *viz.*, T<sub>1</sub> - K<sub>0</sub>D<sub>1</sub> (Control + 5 cm depth), T<sub>2</sub> - K<sub>0</sub>D<sub>2</sub> (Control + 7.5 cm depth), T<sub>3</sub> - K<sub>0</sub>D<sub>3</sub> (Control + 10 cm depth), T<sub>4</sub> - K<sub>1</sub>D<sub>1</sub> (150 kg K ha<sup>-1</sup> + 5 cm depth), T<sub>5</sub> - K<sub>1</sub>D<sub>2</sub> (150 kg K ha<sup>-1</sup> + 7.5 cm depth), T<sub>6</sub> - K<sub>1</sub>D<sub>3</sub> (150 kg K ha<sup>-1</sup> + 10 cm depth), T<sub>7</sub> - K<sub>2</sub>D<sub>1</sub> (200 kg K ha<sup>-1</sup> + 5 cm depth), T<sub>8</sub> - K<sub>2</sub>D<sub>2</sub> (200 kg K ha<sup>-1</sup> + 7.5 cm depth), T<sub>9</sub> - K<sub>2</sub>D<sub>3</sub> (200 kg K ha<sup>-1</sup> + 10 cm depth), T<sub>10</sub> - K<sub>3</sub>D<sub>1</sub> (250 kg K ha<sup>-1</sup> + 5 cm depth), T<sub>11</sub> - K<sub>3</sub>D<sub>2</sub> (250 kg K ha<sup>-1</sup> + 7.5 cm depth) and T<sub>12</sub> - K<sub>3</sub>D<sub>3</sub> (250 kg K ha<sup>-1</sup> + 10 cm depth).

The experimental plot was ploughed, followed by harrowing, before the research began. The field was then cleaned by clearing off any clods and debris. Rotten FYM at a rate of 20 tons per hectare was evenly dispersed into the soil prior to the final harrowing. Raised beds measuring 2.4 m by 1.2 m were constructed by allowing 30 cm between rows and 30 cm between plants.

The best quality planting material 20 - 30 g weight of bulbs of the Shringar variety of tuberose were collected from IIHR, Bangalore. Before planting, the bulbs had been stored in well ventilated semi shady place for one month. Older leaves emerging from the neck of the bulbs were trimmed off. Total 32 plants were kept in each treatment.

The recommended dosage of fertilizer (200 kg N, 150 kg P and 200 kg K ha<sup>-1</sup>) for tuberose was used to calculate the quantity of phosphorous and nitrogen fertilizer needed for the experimental area. From this, a full dose of P and a half-dose of nitrogen had been applied at the time of planting.

The leftover nitrogen was divided into two doses; the first was administered 45 days after planting, and the second was administered 90 days later. In keeping with the treatment plans, a basal amount of potassium was administered.

Following bulb sprouting, five plants were chosen and tagged in order to collect data on yield and quality characteristics such as the spikes plant<sup>-1</sup>, spikes plot<sup>-1</sup>, spikes ha<sup>-1</sup>, florets spike<sup>-1</sup>, bulbs plant<sup>-1</sup>, bulbs plot<sup>-1</sup>, bulbs ha<sup>-1</sup>, bulblets plant<sup>-1</sup>, bulblets plot<sup>-1</sup>, bulblets ha<sup>-1</sup> and quality parameters like length of spike, diameter of spike, length of floret, diameter of floret, length of rachis, diameter of bulb and vase life of flower.

## Results and Discussion

### Yield parameters

#### Spikes plant<sup>-1</sup>, Spikes plot<sup>-1</sup>, Spikes ha<sup>-1</sup> (lakh)

Significantly maximum number of spikes plant<sup>-1</sup> (2.16), spikes plot<sup>-1</sup> (68.98), spikes ha<sup>-1</sup> (2.39 lakh) were recorded with the treatment K<sub>2</sub> i.e. potassium 200 kg ha<sup>-1</sup>. It is observed that, spikes plant<sup>-1</sup>, spikes plot<sup>-1</sup>, spikes ha<sup>-1</sup> in tuberose increased with the growing degree of potassium and the highest spikes were recorded with potassium 200 kg ha<sup>-1</sup>. This might be due to the fact that, the beneficial effect of potassium on excessive uptake of nutrients. Potassium is an essential part of the process of photosynthesis, it required for the general health and vigour of the plant, maintain transpiration and photo-respiration, efficient water and nutrient uptake and resistance to environmental stresses, thus leading increased in spikes plant<sup>-1</sup>, spikes plot<sup>-1</sup>, spikes ha<sup>-1</sup>. Similar results have been additionally recorded by Sharma *et al.* (2008) in tuberose.

Significantly maximum number of spikes plant<sup>-1</sup> (1.86), spikes plot<sup>-1</sup> (61.91), spikes ha<sup>-1</sup> (2.23 lakh) had been harvested from the treatment D<sub>2</sub> i.e. planting depth of 7.5 cm, which was found at par with the treatment D<sub>3</sub> i.e. planting depth 10 cm (1.68). Whereas, significantly minimum number of spikes (1.47) was recorded in the treatment D<sub>1</sub> i.e. where, shallow planting depth of 5cm has kept. The number of spikes plant<sup>-1</sup>, spikes plot<sup>-1</sup>, spikes ha<sup>-1</sup> in tuberose increased with the increasing level of planting depth 7.5 cm, the maximum number of spikes were harvested plant<sup>-1</sup> from the treatment of planting depth of 7.5 cm, there after there was slight decrease in the yield of spikes. This might be due to deeper planting results in maximum number of spikes, because planting the bulbs deeply enhances the better food intake as a result of strong root system. Similar results were also reported by Hussain *et al.* (2016)<sup>[10]</sup> in tuberose.

#### Florets spike<sup>-1</sup>

The number of florets spike<sup>-1</sup> (26.22) were recorded significantly maximum with the treatment K<sub>2</sub> i.e. potassium 200 kg ha<sup>-1</sup>. In tuberose progressive increased in the number of florets spike<sup>-1</sup> with increasing level of potassium. The maximum florets spike<sup>-1</sup> were recorded at potassium 200 kg ha<sup>-1</sup>, this might be due to high uptake of nutrients. Potassium is an essential part of the process of photosynthesis. Similar findings were also obtained by Desai *et al.* (2017)<sup>[7]</sup> in tuberose.

Significantly, the highest number of florets per spike (25.66) was found in treatment D<sub>2</sub>, which involved planting the

bulbs at a depth of 7.5cm.

This result was similar to treatment D<sub>3</sub>, where bulbs were planted at 10 cm depth, yielding 24.58 florets per spike. In contrast, treatment D<sub>1</sub>, which used a planting depth of 5 cm, produced the lowest number of florets per spike, at 23.20. As the planting depth increased, the number of florets per spike also increased, with the highest count observed at 7.5 cm. This is likely because deeper planting encourages a better root system, which helps the plant absorb more nutrients, leading to improved growth and flowering. These results align with the findings of Tehranifar and Akbari (2012)<sup>[21,22]</sup> in their study on tuberose.

#### Bulbs plant<sup>-1</sup>, Bulbs plot<sup>-1</sup>, Bulbs ha<sup>-1</sup> (lakh)

The number of bulbs plant<sup>-1</sup> (6.08), bulbs plot<sup>-1</sup> (194.67), bulbs ha<sup>-1</sup> (1.99 lakh) were recorded significantly maximum with the treatment K<sub>2</sub> i.e. potassium 200 kg ha<sup>-1</sup>. In tuberose progressive increased in the yield of bulbs plant<sup>-1</sup> with increasing level of potassium. The maximum bulb yield plant<sup>-1</sup>, bulbs plot<sup>-1</sup>, bulbs ha<sup>-1</sup> were recorded at potassium 200 kg ha<sup>-1</sup> may be attributed to accelerated increase parameters *viz.*, plant height, leaves plant<sup>-1</sup> and leaf area of tuberose and various yield contributing characters *viz.*, bulbs plant<sup>-1</sup>. Potassium is noted especially for its role in capturing and converting energy into plant food material and helps in protein synthesis. Similar findings have been also acquired with the aid of Kashyap *et al.* (2014)<sup>[12]</sup> in tuberose.

Significantly maximum number of bulbs plant<sup>-1</sup> (5.48), bulbs plot<sup>-1</sup> (175.36), bulbs ha<sup>-1</sup> (1.80 lakh) was recorded with the treatment D<sub>2</sub> i.e. planting depth of 7.5 cm. This might be due to the fact that, all the growth and flowering parameters significantly increased by deep planting of bulbs, because of deep rooting system helps in absorbing nutrients. The results could point in the same direction of Naeem *et al.* (2016) in lily.

#### Bulblets plant<sup>-1</sup>, Bulblets plot<sup>-1</sup>, Bulblets ha<sup>-1</sup> (lakh)

The number of bulblets plant<sup>-1</sup> (31.67), bulblets plot<sup>-1</sup> (1013.33), bulblets ha<sup>-1</sup> (35.18 lakh) were recorded significantly maximum with the treatment K<sub>2</sub> i.e. potassium 200 kg ha<sup>-1</sup>. Progressive increased in the yield of tuberose bulblets plant<sup>-1</sup>, bulblets plot<sup>-1</sup>, bulblets ha<sup>-1</sup> (lakh) with increasing level of potassium. The maximum bulblets yield plant<sup>-1</sup> were recorded at potassium 200 kg ha<sup>-1</sup> may be attributed to increased growth parameters *viz.*, plant height, leaves plant<sup>-1</sup> and leaf area of tuberose and various yield contributing characters *viz.*, bulblets plant<sup>-1</sup> and bulblets plot<sup>-1</sup>. Similar findings were also obtained by Singh *et al.* (2016)<sup>[19]</sup> in tuberose.

Significantly maximum number of bulblets plant<sup>-1</sup> (24.91), bulblets plot<sup>-1</sup> (797.33), bulblets ha<sup>-1</sup> (27.68 lakh) was recorded with the treatment D<sub>2</sub> i.e. planting depth of 7.5 cm followed by D<sub>3</sub> i.e. planting depth 10 cm (22.91). Whereas, the treatment D<sub>1</sub> i.e. planting depth 5 cm recorded minimum number of bulblets plant<sup>-1</sup> (20.56). Per plant yield of tuberose bulblets increased with increase in the level of planting depth of the bulbs and the maximum yield recorded at 7.5 cm planting depth. This might be due to fact that, all the growth and flowering parameters significantly increased by deep planting of bulbs, because of deep rooting system helps in absorbing nutrients. The results

could point in the same direction of Pal and Singh (2018) <sup>[17]</sup> in tuberose.

### Quality parameters

#### Length of spike (cm)

The treatment K<sub>2</sub> i.e. potassium 200 kg ha<sup>-1</sup> produced significantly maximum length of spike (77.28 cm). The increased spike length with increasing potassium levels might be due to high uptake of nutrients. Potassium is an essential part of the process of photosynthesis. Similar results are recorded by Sharma *et al.* (2008) in tuberose.

The treatment D<sub>2</sub> i.e. planting depth 7.5 cm produced significantly the maximum length of spike (74.09 cm). It is clear from the data that, planting depth of 7.5 cm produced maximum length of spike in tuberose and it was slightly decreased with further increase in level of planting depth. These observations are in accordance with Mane *et al.* (2006) <sup>[16]</sup> in tuberose.

#### Diameter of spike (cm)

The treatment K<sub>2</sub> i.e. potassium 200 kg ha<sup>-1</sup> registered significantly maximum diameter of spike (0.99 cm). There was an increase in diameter of spike in tuberose with increase in potassium level up to 200 kg ha<sup>-1</sup> and there after it was slightly reduced. This may be due to the potassium activity. Similar results reported by Mahgoub *et al.* (2006) in iris.

The treatment D<sub>2</sub> i.e. planting depth recorded significantly maximum diameter of spike (0.98 cm). There was an increase in diameter of spike in tuberose with increase in planting depth level up to 7.5 cm and there after it was slightly reduced. Similar results were reported by Arya and Singh (2006) <sup>[4]</sup> in tuberose.

#### Length of floret (cm)

Significantly maximum length of floret (4.89 cm) was noticed with the treatment K<sub>2</sub> i.e. potassium 200 kg ha<sup>-1</sup>. These may be due to the association of potassium resulting in semi permeability of cell walls, thus mobilizing more water in flowers and also increased the synthesis of iron which promotes cell size in turn increased the flower size. Similar results were recorded by Gajbhiye *et al.* (2013) <sup>[8]</sup> in gladiolus.

The length of floret (5.35 cm) was recorded significantly maximum under the treatment D<sub>2</sub> i.e. planting depth 7.5 cm followed by the treatment D<sub>3</sub> i.e. planting depth 10 cm (4.09 cm) and D<sub>1</sub> i.e. planting depth 5 cm had recorded minimum length of floret (3.95 cm). Similar results were also noticed by Pal and Singh (2018) <sup>[17]</sup> in tuberose.

#### Diameter of floret (cm)

The diameter of floret was significantly influenced with the various levels of potassium. Significantly maximum diameter of floret (3.91 cm) was recorded under the treatment K<sub>2</sub> i.e. potassium 200 kg ha<sup>-1</sup>. The results are in close association with the findings reported by Rajesh and Rao (2016) <sup>[18]</sup> in gladiolus.

The diameter of floret (3.84 cm) was recorded significantly maximum under the treatment D<sub>2</sub> i.e. planting depth 7.5 cm followed by the treatment D<sub>3</sub> i.e. planting depth 10 cm (3.56 cm) and D<sub>1</sub> i.e. planting depth 5 cm had recorded minimum length of floret (3.47 cm). Similar results are also noticed by Pal and Singh (2018) <sup>[17]</sup> in tuberose.

#### Length of rachis (cm)

The length of rachis was significantly influenced with the various levels of potassium. Significantly maximum length of rachis (20.36 cm) was recorded under the treatment K<sub>2</sub> i.e. potassium 200 kg ha<sup>-1</sup>.

The results are in close association with the findings reported by Rajesh and Rao (2016) <sup>[18]</sup> in gladiolus.

The length of rachis (20.33 cm) was recorded significantly maximum under the treatment D<sub>2</sub> i.e. planting depth 7.5 cm followed by the treatment D<sub>3</sub> i.e. planting depth 10 cm (18.90 cm) and D<sub>1</sub> i.e. planting depth 5 cm had recorded minimum length of rachis (18.47 cm). Similar results are also noticed by Pal and Singh (2018) <sup>[17]</sup> in tuberose.

#### Diameter of bulb (cm)

The diameter of bulb was significantly influenced with the various levels of potassium. Significantly maximum diameter of bulb (4.85 cm) was recorded under the treatment K<sub>2</sub> i.e. potassium 200 kg ha<sup>-1</sup> which was followed by the treatment K<sub>3</sub> i.e. 250 kg ha<sup>-1</sup> (4.70 cm) and K<sub>1</sub> i.e. potassium 150 kg ha<sup>-1</sup> (3.88). The results are in close association with the findings reported by Rajesh and Rao (2016) <sup>[18]</sup> in gladiolus.

The diameter of bulb in tuberose significantly influenced with the different levels of planting depth. The diameter of bulb (4.38 cm) was recorded significantly maximum under the treatment D<sub>2</sub> i.e. planting depth 7.5 cm followed by the treatment D<sub>3</sub> i.e. planting depth 10 cm (4.18 cm) and D<sub>1</sub> i.e. planting depth 5 cm had recorded minimum diameter of bulb (4.05 cm). Similar results are also noticed by Pal and Singh (2018) <sup>[17]</sup> in tuberose.

#### Vase life of flower (days)

Regarding vase life of tuberose cut flower as influenced by different levels of potassium had shown significant differences. The treatment K<sub>2</sub> i.e. potassium 200 kg ha<sup>-1</sup> recorded significantly maximum vase life of cut flower (9.07 days).

The post harvest behavior of tuberose cut flower differed significantly with the potassium 200 kg ha<sup>-1</sup> with maximum vase life. Sharma and Singh (2007) also reported that maximum vase life of gladiolus. This might be due to higher carbohydrate deposition in the vegetative cells that resulted in thickening of cells and hence, the vase life of tuberose flower might have been increased due to application of potassium 200 kg ha<sup>-1</sup>.

Maximum vase life of tuberose flower was recorded with planting depth 7.5 cm. This might be due to the fact that root absorption of nutrients. This is similarly reported by Mane *et al.* (2006) <sup>[16]</sup> in tuberose.

**Table 1:** Effect of potassium levels & planting depth on yield of tuberose

Potassium (P)	Spikes plant <sup>-1</sup>	Spikes plot <sup>-1</sup>	Spikes ha <sup>-1</sup> (lakh)	Florets spike <sup>-1</sup>	Bulbs plant <sup>-1</sup>	Bulbs plot <sup>-1</sup>	Bulbs ha <sup>-1</sup> (lakh)	Bulblets plant <sup>-1</sup>	Bulblets plot <sup>-1</sup>	Bulblets ha <sup>-1</sup> (lakh)
P <sub>0</sub> – Control	0.96	43.93	1.52	21.33	4.17	133.55	1.28	13.22	423.11	14.69
P <sub>1</sub> – 150 kg ha <sup>-1</sup>	1.45	54.00	1.87	24.72	4.67	149.44	1.68	20.00	640.00	22.22
P <sub>2</sub> – 200 kg ha <sup>-1</sup>	2.16	68.98	2.39	26.22	6.08	194.67	1.99	31.67	1013.33	35.18
P <sub>3</sub> – 250 kg ha <sup>-1</sup>	2.13	68.49	2.37	25.67	5.63	180.09	1.76	26.33	842.67	29.25
SEm+	0.09	2.17	0.07	0.54	0.19	6.24	0.06	0.76	20.11	0.69
C.D. at 5%	0.26	6.38	0.22	1.59	0.57	18.31	0.18	2.25	58.99	2.04

Planting depth	Spikes plant <sup>-1</sup>	Spikes plot <sup>-1</sup>	Spikes ha <sup>-1</sup> (lakh)	Florets spike <sup>-1</sup>	Bulbs plant <sup>-1</sup>	Bulbs plot <sup>-1</sup>	Bulbs ha <sup>-1</sup> (lakh)	Bulblets plant <sup>-1</sup>	Bulblets plot <sup>-1</sup>	Bulblets ha <sup>-1</sup> (lakh)
D <sub>1</sub> – 5 cm	1.47	53.94	1.86	23.20	4.85	155.22	1.55	20.58	658.66	22.86
D <sub>2</sub> – 7.5 cm	1.86	61.91	2.23	25.66	5.48	175.36	1.80	24.91	797.33	27.68
D <sub>3</sub> – 10 cm	1.68	60.69	2.01	24.58	5.08	162.72	1.66	22.91	733.33	25.45
SEm+	0.07	1.88	0.06	0.47	0.16	5.40	0.05	0.66	17.42	0.60
C.D. at 5%	0.23	5.53	0.19	1.38	0.49	15.85	0.15	1.94	51.09	1.77
Interaction effect (P x D)										
F test	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
SE (m) ±	0.19	4.61	0.16	1.15	0.41	13.24	0.13	1.62	42.67	1.48

**Table 2:** Effect of potassium levels & planting depth on quality of tuberose

Potassium (P)	Length of spike (cm)	Diameter of spike (cm)	Length of floret (cm)	Diameter of floret (cm)	Length of rachis (cm)	Diameter of bulb (cm)	Vase life of flower (days)
P <sub>0</sub> – Control	65.23	0.76	4.05	3.28	18.40	3.40	7.49
P <sub>1</sub> – 150 kg ha <sup>-1</sup>	70.24	0.85	4.41	3.56	18.49	3.88	8.06
P <sub>2</sub> – 200 kg ha <sup>-1</sup>	77.28	0.99	4.89	3.91	20.36	4.85	9.07
P <sub>3</sub> – 250 kg ha <sup>-1</sup>	74.89	0.93	4.51	3.75	19.70	4.70	8.57
SEm+	1.20	0.03	0.17	0.07	0.21	0.04	0.11
C.D. at 5%	3.54	0.11	0.52	0.22	0.61	0.13	0.33

Planting depth	Length of spike (cm)	Diameter of spike (cm)	Length of floret (cm)	Diameter of floret (cm)	Length of rachis (cm)	Diameter of bulb (cm)	Vase life of flower (days)
D <sub>1</sub> – 5 cm	69.91	0.82	3.95	3.47	18.47	4.05	7.63
D <sub>2</sub> – 7.5 cm	74.09	0.98	5.35	3.84	20.33	4.38	9.05
D <sub>3</sub> – 10 cm	71.72	0.84	4.09	3.56	18.90	4.18	8.20
SEm+	1.04	0.03	0.15	0.06	0.18	0.04	0.10
C.D. at 5%	3.07	0.09	0.45	0.19	0.53	0.11	0.29
Interaction effect (P x D)							
F test	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
SE (m) ±	2.56	0.08	0.37	0.1	0.44	0.09	0.24

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