

## Pusa Shobha – A new variety of onion

**There is year round demand of onion in Indian kitchen. The productivity of onion in India is quite low, which can be improved by adoption of newly released varieties. Pusa Shobha is a recently notified variety which gives 64.08% higher yield than check varieties. Onion is also processed and dehydrated onion is the major item for commerce. This variety has high total soluble solids and suited for processing too.**

**O**NION is required everyday in almost every kitchen. It is essential ingredient of Indian cuisine. It is consumed fresh as *salad*, cooked or processed. The demand for onion is almost constant round the year and considering its health benefit the consumption of onion is increasing both in rural and urban areas. India ranks second globally in area and production of onion and it is the most important vegetable in India after potato with respect to area and production. As per National Horticulture Database, India produces 20.93 million tonnes from an area of 1.32 million ha. Apart from fresh consumption, significant quantity of onion is also processed and the major processed product is dehydrated onion. India ranks second globally in dehydrated onion business. A good number of varieties have been released and notified for commercial cultivation by the farmer to boost the productivity, which at present is quite low (17.3 t/ha). A new variety Pusa Shobha, developed at Division of Vegetable Science, has been recently notified for commercial cultivation during *rabi* season in zone III (Delhi, Uttar Pradesh, Haryana, Bihar and Punjab), IV (Rajasthan and Gujrat) and V (Madhya Pradesh, Chattisgarh and Orissa). The average yield is 25.04 t/ha, which is 64.08% higher than check variety tested in different networking centre.

### Pusa Shobha

Pusa Shobha, a brown skin colored variety with white flesh has been developed at Division of Vegetable Science from segregating material collected from Himachal Pradesh. The breeding method employed was selfing and massing. The bulbs of this variety are compact, flat globe, brown in colour and suitable for storage, drying, processing and export. Average equatorial diameter of bulbs ranges from 4.5 – 6.0 cm, polar diameter ranges from 4.8-6.5 cm and single bulb weight ranges from 70.0 – 100.0 g. The flesh is white with high TSS ( $17 \pm 2^{\circ}$  Brix) and suitable for processing purpose. The quantitative estimation of important morphological traits are presented in Table 1.

The biochemical properties of Pusa Shobha were compared with other white varieties which were considered superior for processing and superiority of Pusa Shobha over the other two varieties were established for most of the traits (Table 2).

### Cultivation practices

**Nursery raising:** Pusa Shobha is best suited for bulb production in *rabi* season. Nursery sowing needs to be completed by last week of October to first fortnight of November when the atmospheric temperature is around

**Table 1.** Comparative morphological traits of onion variety Pusa Shobha

Trait	Pusa Shobha	Pusa White Round	Pusa White Flat
Plant height (cm)	44.11	42.06	42.02
Polar diameter of bulb (mm)	49.32	51.81	50.89
Equatorial diameter of bulb (mm)	54.44	66.08	65.69
Bulb size index	0.9	0.78	0.77
Number of leaves per plant	6.52	6.47	6.47
Collar thickness (mm)	8.44	7.02	9.1
Neck thickness of bulb (mm)	7.3	8.54	7.81
Weight of 10 bulbs (kg)	0.9	1.3	1.3
Moisture content (%)	90.44	92.18	84.68

25-33°C (max) and 13-20 °C (minimum). Raised nursery bed (10-12 cm) cm from the ground, 80-120 cm diameter and length as per convenience but preferably 4-5 m are preferred. Around 8-9 kg seeds are required for preparing seedlings for 1 ha. The beds of approximately 3-3.5 m length and 80-120 cm wide are preferred and a gap of 60-70 cm is kept between beds to facilitate intercultural operations like weeding and hoeing. The soil should be fertile, sandy loam soil texture is preferred. Before sowing, the seeds are treated with Bavistin @ 2 g/kg seed to prevent damping off disease in the nursery. Besides, application of biocontrol agent like *Trichoderma viride* @ 4 g/kg also improves seedling health. The seeds are continuously sown in line at a spacing of 5-7 cm between lines and the seeds are placed at a depth of 2-3 cm. Following sowing, the seeds are covered with dry grasses (mulch) and watered with rose can. The mulches help in moisture conservation and help early emergence of seedlings. If sufficient moisture is there in the soil, irrigation is given on alternate days. The nursery requires close observation on daily basis and as soon as the seedlings emerge, the mulches should be removed. Once the seedlings establish properly and reach a height of 4-5 cm, hoeing should be done between lines, to provide aeration at the root zone and it promotes healthy growth of the seedlings. In some parts of North India, the initial growth stage of seedlings coincides with occurrence of frost. During this period, the seedlings should be protected from frost by applying flood irrigation in the nursery bed area. In subsequent period, overwatering should be avoided as it favours disease incidence. By first fortnight of January, the seedlings become ready for transplanting.

### Crop management

**Land preparation:** The land should be prepared by repeated ploughing and it should be properly leveled too for easy irrigation and drainage. During last ploughing, 20 t/ha well decomposed FYM, N, P, K and S @ of 75:50:80:50 kg/ha are added to the soil.

**Transplanting:** Before uprooting seedlings, adequate watering is done in the nursery to facilitate easy uprooting of the seedlings. Slurry of ridomil @ 2g/lit is prepared and seedlings are dipped for half an hour before transplanting.



Pusa Shobha

**Spacing:** A spacing of 8-10 cm × 12-15 cm is generally followed.

**Weed management:** Immediately after transplanting, Pendimethalin @ 3-4 ml/lit or Oxyflurofen @1.5-2.0 ml/lit. It followed by flood irrigation and 2 manual weeding at 30 and 60 days after planting is recommended to control weeds. Apart from weeding, 3-4 hoeing at 25-30 days interval improves aeration in the root zone and improves bulb size and quality.

**Nutrition:** The nutrient requirement varies with soil type, preceding crop, availability of water, available nutrients to the soil and environmental factors. The first dose of nutrient is given during land preparation. Another two doses of nitrogen (25 kg each) is applied 30 days and 45-60 days after transplanting.

**Water management:** Adequate water supply ensures good initial seedling establishment, sufficient vegetative growth and satisfactory bulb yield. It is a surface rooted crop and bulb formation and early bulb development is

**Table 2.** Biochemical traits of onion variety Pusa Shobha

Trait	Pusa Shobha	Pusa White Round	Pusa White Flat
CUPRAC ( $\mu\text{mol trolox/g FW}$ )	3.39	1.69	1.21
FRAP ( $\mu\text{mol trolox/g FW}$ )	1.35	0.71	0.43
Total phenolics ( $\mu\text{g gallic acid equivalent (GAE)/g FW}$ )	2037.5	1843.75	1725
Pungency ( $\mu\text{mol pyruvic acid}$ )	5.09	2.89	2.47
Potassium (mg / 100g)	46.4	51.63	49.2
Calcium (mg / 100g)	19.45	11.9	12.4
Magnesium (mg / 100g)	38.7	15.8	16.9
Zinc (mg / 100g)	0.57	0.38	0.43
Iron (mg / 100g)	0.73	0.56	0.61
TSS ( $^{\circ}\text{Brix}$ )	16.3	12.8	12.2

the critical stages for water supply. Water shortage followed by adequate or over watering results in more number of doubles or multiple bulbs and renders them unmarketable or the bulbs fetch lower market price. The water requirement is approximately 8 acre-inch which is provided through 7-8 irrigation. The frequency of irrigation depends on soil moisture condition and weather condition. Irrigation



should be withheld 15 days prior to harvesting to facilitate neck fall and proper skin development of the bulb.

**Harvesting:** Pusa Shobha becomes ready for harvesting at 110-115 days after planting. The harvesting maturity is judged by neckfalling of around 75% plants in the field. The bulbs are easily pulled out with *khurpi*. Following harvesting, the leaves are cut leaving approximately 2.5 cm and shade dried (curing).

**Plant protection:** Damping off is a major fungal disease of the nursery which results in heavy mortality of the seedlings. The incidence of damping off is managed by seed treatment with bavistin @ 2g/kg seed or drenching the

posses serious threat. Thrips is controlled by spraying of 0.2% carbosulfan, 0.1% fipronil or 0.1% profenofos. Mite is effectively controlled by spraying of dicofol (0.2%) or sulphur (0.05%). In all the sprays, stickers should be incorporated for better efficacy of the plant protection chemical.

nursery with ridomil @ 2%. Purple blotch, Stemphyllium blight, anthracnose are important disease of the main field. The disease is managed by alternate application of hexaconazole @ 0.1%, mancozeb @ 0.25%, tricyclazole @ 0.1% or propioconazole @ 0.1 % at 15-20 days interval from 30 days after planting or as soon as disease symptom appear in the field. Among pests, thrips and mites

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