

Onion (*Allium cepa* L.)

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SUMMARY

Onion is mainly cultivated for bulb, which is used almost daily in various forms in every home. Its main use is due to its aromatic, volatile oil ally-propyl disulfide that impart cherish flavor to the food. India ranked first in area and second in production of onion in the world. Production technologies have key role in enhancing the production and productivity of onion. All cultural requirements depend upon soil type, season and geographic conditions for cultivation of the onion. Yield determinant of onion are the bulb size and bulb numbers produced from per unit area. Its potentials can be realized from well-drained soils, where water is not limited and nutrients are readily available. Affect of high temperature, drought, floods and insect-pests at critical stages significantly harm the growth and lower the productivity. Plant density and spacing are essential for determining bulb size and numbers. Yields are higher, where early leaf cover is produced and then maintained for a long period prior to bulb formation. Hence, for increasing productivity and making availability of we have to focus on development of high yielding varieties/hybrids, improved production technologies, efficient crop management practices and better post-harvest handling and proficient marketing systems. Hence understanding precise cultivation techniques is essential for optimizing both crop yield and quality. In light of this perspective, here is a concise overview of these practices.

INTRODUCTION

Onion (*Allium cepa* L.) is a globally significant vegetable bulb crop, cultivated in various regions around the world. Belonging to the Alliaceae family with a chromosome count of $2n=2x=16$ and has been believed to be originated from Central Asia. In India, prominent states for onion production include Maharashtra, Karnataka, Tamil Nadu, and Andhra Pradesh. Onions are versatile, finding use in both raw and cooked forms, adding flavor to dishes, serving as a crucial ingredient in pickles, and acting as a spice in a wide array of Indian cuisine. White onions are particularly well-suited for dehydration.





Soil:

The right soil conditions are essential for successful onion cultivation. Ideal soils should be rich in humus with good drainage. Sandy soils require more frequent irrigation and promote early maturation, while heavy soils can result in misshapen bulbs and make bulb harvesting challenging. The optimum soil pH range falls between 5.8 and 6.5, with highly alkaline and saline soils being unsuitable.

Climate:

Onions are considered as cool-season crops, and they don't thrive in regions with average monsoon rainfall exceeding 75-100 cm. To support healthy growth, around 70% relative humidity is necessary. For robust vegetative growth, temperatures between 12.8-23°C are required before bulbing, and bulb development necessitates temperatures between 20-25°C. A significant drop in temperature at the outset can lead to bolting, while a sudden temperature rise encourages early maturity, resulting in smaller bulbs in the Rabi season. Long-day cultivars require more than 14 hours of daylight and lower temperatures for proper bulb development, while Kharif onion varieties thrive with 10-11 hours of daylight, and Rabi varieties require relatively higher temperatures and 12-13 hours of daylight.

Onion type	Botanical name	Features
Common Onion	<i>Allium cepa</i> L.	Widely used as bulb vegetable.
Shallot	<i>Allium cepa</i> var. <i>ascalonicum</i>	Perennial onion. Rarely produces seed. Propagation- bulblets
Potato/ Underground/	<i>Allium cepa</i> var. <i>aggregatum</i>	Noted for its hardiness and earlier ripening. It is grown as closely packed clusters of bulbs underground. It does not

Multiplier Onion		produce any seed.
Tree Onion or Egyptian tree onion	<i>Allium cepa L. var. viviparum/proliferum</i>	Viviparous. Produces cluster between 2- 16 bulblets at the top of the stem in place of inflorescence. Bulblets- Propagation, pickling and seasoning. Resistance to all known pests and diseases.
		
Common Onion	Shallot Onion	Potato Onion
		
		Tree Onion

Seed Rate and Spacing

Nursery practices:

Onion seeds are typically sown in raised beds with dimensions of 15-22.5 cm in height, 0.45 m in width, and 3-4 m in length. A spacing of approximately 45-60 cm is maintained between these beds to facilitate essential tasks such as watering and weeding. Prior to sowing, it is recommended to treat the soil with Thiram at a rate of 0.2% or 4-5g per square meter, while the onion seeds themselves should be treated with Thiram at a rate of 2-3g per kilogram of seeds. If signs of damping off are observed, drenching with Thiram at 2-3g per liter becomes necessary for prevention. Weed control is addressed by applying Stomp (Pendimethalin) at a rate of 3.35 liters per hectare before sowing. Sowing should be conducted in lines spaced 5-7 cm apart. The nursery is considered ready for transplanting when the plants reach an age of 6-7 weeks and have a diameter of 0.6-0.9 cm for Kharif, or 8-9 weeks for the Rabi season. To produce seedlings for one hectare, approximately 5% of the area is required.

In the southern regions, the optimal time for sowing early Kharif crops is April-May, for Kharif, it's May-June, and for Rabi crops, sowing is carried out in September-October.

A. Onion is generally grown from seedlings raised in nursery beds: The seed rate of big onion is 8-10 kg per hectare. The distance between rows is 15cm and between plants is 10 cm.

B. Seeds of big onion, seeds of small onions, bangalore rose are sown directly in small flat beds: Seeds are sown by broadcasting or in rows. The distance between rows is 30 cm. The seed rate for broadcasting or sowing in rows is 20-25 kg per hectare.

C. Multiplier onions are propagated vegetatively by planting bulblets: About 1.5 tonnes of bulblets are required for planting in one hectare. The distance between ridges is 30-45 cm x 10-15 cm.

D. Green onion/Spring onion: Seed sowing is done in August and transplanting during October it takes 75- 80 days after transplanting to harvesting. Early grano (46t/ha), Pusa White Flat (44t/ha) and Pusa White Round (43t/ha) are recommended for growing as green onion.

Varieties

Type	Colour	Institute	Varieties
Common Onion	Red	IARI	Pusa Red (25-30 t/ha), Pusa Rathnar (30-40 t/ha), Pusa Madhavi (30-40 t/ha)
		PAU	Punjab selection (20 t/ha), Punjab Red Round (30 t/ha)
		Niphad	N- 53 (15-20 t/ha), N-2-4-1 (15-20 t/ha)
		MPKV	Baswant 780 (20-25 t/ha)
		IIHR	Arka Nikethan (33 t/ha), Arka Kalyan (33 t/ha), Arka Bindhu (25 t/ha)
		NHRDF	Agrifound light red (30 t/ha), Agrifound dark red (20-25 t/ha), Agrifound Rose (19-20 t/ha)
		Udaipur	Udaipur 101 (20-30 t/ha), Udaipur 103 (25-30 t/ha)
		Hisar	Hisar II (20 t/ha)

	White	Kanpur	Kalyanpur red round (20 t/ha)
		IARI	Pusa White Flat (33- 35 t/ha), Pusa White Round (30- 33 t/ha)
		PAU	Punjab 48 (30 t/ha)
		Niphad	N- 257-9-1 (25-30 t/ha)
	Udaipur	Udaipur 102 (30-35 t/ha)	
	Yellow	IARI	Early Grano (50-60 t/ha), Brown Spanish (50-60 t/ha)
Multiplier Onion	Red	TNAU	CO 1(12 t/ha), CO 2 (12 t/ha), CO 3(16 t/ha), CO 4(18 t/ha), MDU 1(15 t/ha)
		NHRDF	Agrifound Red (18-20 t/ha)

Manures and fertilizers:

For effective onion cultivation, it's essential to apply 20-25 tonnes of farmyard manure (FYM), along with 100 kg of nitrogen (N), 50 kg of phosphorus (P), and 50 kg of potassium (K) per hectare. The entire quantity of P and K, as well as half of the N, is applied as basal fertilization. The remaining half of the N is top-dressed evenly twice, at 30 and 45 days after transplanting.

Weeding and intercultural:

Weed management and intercultural practices are vital for a successful crop. This includes the use of Tenoran at 2.5 kg/ha, applied 3-5 weeks after transplanting, Basalin at 1 litre/ha right after transplanting, and Stomp at 3.35 litres/ha applied immediately after transplanting and before the first irrigation. Combining these measures with manual weeding provides the best results.

Irrigation:

Irrigation requirements vary with the season. In *Kharif* season depending upon the rains 8-10 irrigations are enough. In late *Kharif* crop and in *rabi* seasons 15-20 irrigations are given. Irrigation should be stopped ten days before harvesting.

Harvesting, yield and storage:

The timing of onion harvesting depends on the season. For Rabi onions, the optimal time is approximately one week after 50-75% neck fall. In the Kharif season, where tops do not fall, harvest when the leaves start turning slightly yellow, and the tops begin to dry. Typical yields for big-sized common onions are around 25-30 tonnes per hectare, while small-sized common onions yield 16-20 tonnes per hectare, and multiplier onions yield 15-18 tonnes per hectare. To ensure successful storage for about 6-8 months, it's recommended to store onions at 0°C with a relative humidity (RH) of 65-75%.

Packaging, transportation and marketing:


For safe handling 40 kg open mesh jute bags having 200-300g weight are packed for domestic market. For safe transportation, sorting and grading must be practiced thoroughly and also suitable packages of jute 9 x 10 mesh per inch m² should be used. Marketing and post harvest losses of 30- 40% is reported in Onion. About 5% of total supply is exported and remaining 60- 65% is consumed internally and used as seed material.

Dehydration:

Regarding dehydration, the preferred drying ratio is 6:1, yet many of our onion varieties have a higher drying ratio of 10:1. Specific varieties such as Pusa white flat, Pusa white round, Punjab-48, N-257-9-1, and Udaipur 102 have been identified as suitable choices for dehydration purposes.

Plant protection:

Sl.No.	Disease/Pest	Causal Agent and Symptoms	Management
1.	Damping off	<i>Fusarium spp.</i> , <i>Pythium spp.</i> : Seed rotting, pre and emergence damping off of seedlings.	Seed treatment/Drech- Thiram 2.5g/kg
2.	Purple Blotch	<i>Alternaria porri</i> : Bleached lesion with purple centre on leaf, bulbs rot.	Spray Dithane M-45 (0.25%)
3.	Stemphylium	<i>Stemphylium vesicarium</i> :	Spray Mancozeb (0.25%)

	blight	Yellow/orange spots in middle of leaf and flower stalk	
4.	Black mould	<i>Aspergillus niger</i> : Black powdery spore mass on and between scales	Store the bulbs at 0°C
5.	Bottom rot	<i>Fusarium oxysporum</i> : Yellowing and dying back from tip of leaf, roots turn pink and decay	Store the bulbs at 0-1°C. Drench-Thiram @0.2%
6.	Thrips	<i>Thrips tabaci</i> : Silvering of leaf	Spray 0.1% Malathion
			
<p style="text-align: center;">Damping off Purple blotch Stemphylium Black mould Bottom rot Thrips</p>			

CONCLUSION:

In conclusion, the cultivation of onions requires careful attention to various practices to ensure a successful harvest. Proper soil preparation, spacing, and irrigation are crucial for optimal growth. Additionally, the management of pests and diseases is essential to protect the crop. Overall, adopting these practices will result in healthy and flavorful onions for both home gardeners and commercial growers.

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