

# INTRODUCTION

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The group of bulb crops includes onion, garlic, leek, shallot, welsh onion and chive. All bulb crops belong to the family Liliaceae and genus *Allium*. Onion is a commercially important bulb crop grown extensively in India. The area under onion cultivation in India is about 2,98,000 hectares producing more than 3 million tons of bulbs annually which forms about one tenth of the world's onion production (Phirke, 1993; Mital and Srivastava, 1975) India exports annually 7 to 8 lack hundred weights of onion mainly to Japan, Burma, Ceylon, HongKong, Africa and Iran. The most important onion growing states are Maharashtra, Tamil Nadu, Andhra Pradesh, Bihar, Karnataka, Rajasthan and Punjab. Nasik-Niphad and Jalgaon in Maharashtra, Bellary and Dharwar in Karnataka and Madurai in Tamil Nadu are important onion growing regions.

#### Origin and Taxonomy

Onion has been cultivated for thousands of years and its origin is difficult to determine. Its wild ancestors are not known but probably it is native to Mediterranean region or Southern Asia. The onion belongs to the family Liliaceae, genus *Allium* and species *cepa*. The genus *Allium* consists of about 300 species which are mostly bulbous and some of the wild species produce bulbils instead of seeds in the flower clusters (Choudhury, 1967).

## Uses

Onion is used both in immature and mature bulb stages as a vegetable and as a spice. Onions are used as salad and cooked in various ways in curries, fried, boiled, baked used in soup making, in pickles and for other purposes. The nutritive value of onion varies from variety to variety. It contains a little protein, sufficient sugars, calcium, phosphorus, iron and vitamins A, B, C etc. The pungency in the onion is due to a volatile oil known as allyl-propyl disulphide which varies with the variety, maturity, type of soil, growing temperature and storage period. The pungency is maximum just before tops began to fall over (Purewal, 1957). The outer skin of the bulb contains yellow pigment called Quercetin.

With common salt onion bulbs are used as a domestic remedy for colic and scurvy. Raw bulbs are diaretic and emmenagogue. It is applied as poultic to indolent boils, bruises and wounds in raw state or after roasting. It relieves heat sensation. Bulb juice is used as smelling salt in fainting, convulsions, headache, epileptic and hysterical fits. Its hot juice is used to relieve earache. It is applied locally during insect bites, scorpion stings and in skin diseases. It is used with other medicines in treatment of jaundice, dyspepsia, malaria, piles etc. (Chavan, 1965).

## **Varieties**

Onion varieties are known by their size, shape, colour, keeping quality, pungency and maturation habits. They are classified into two groups depending upon the size of the bulb.

### **(i) Varieties with big sized bulbs**

The bulb diameter is 2 to 4 inches and the colour may be red skin, silver or white skin and yellow skin. These onions are less pungent and sweet in taste. Among desi varieties of big sized onion, Red Globe, Yellow Globe, White Globe, White Patna, Large Red, Patna Red, Poona Red, Nasik Red, Yadgiri Red or Bellary Red and Dhulia are important. The IARI, New Delhi has released the following varieties having big sized bulbs.

(1) *Early Grano* (Yellow salad onion) - Yellow coloured, large globular bulbs, mildly pungent. Do not have a good keeping quality.

(2) *Pusa Red* - Medium sized, red coloured, less pungent bulbs.

(3) *Pusa-Ratnar* - It is a new variety released by IARI. Bulbs are large round, deep red in colour and have a good storage quality.

### **(ii) Varieties with small sized bulbs**

This group includes early maturing local varieties commonly grown by farmers and usually with small sized bulbs

in clusters. The colour of the bulbs may be white or red. Prize Taker, Market Gardner, Yellow Globe, the Queen and Paris Silver skinned are some of the improved varieties. A few imported varieties like White Portugal, Australian Brown, Sweet Spanish, Red Italian etc. are grown on a limited scale.

Mital and Srivastava (1975) have classified the high yielding onion varieties on the basis of the bulb colour into four types - Deep Red, Red, Yellow and white varieties. Yellow onion varieties are popularly used for mature bulb production and for raw consumption in Rajasthan while White varieties are used for green bunch onion and pickling. According to Rao and Purewal (1954) white skinned varieties are mild and good flavoured than the Red ones which are more pungent but can be stored for a longer period due to the presence of catechol and protocatechuic acid in the skin.

#### **Climatic Requirements**

The onion is a winter or cool season crop and affected by length of day. The requirement of day length varies in different varieties. In most of the commercial varieties a high temperature and a long photoperiod is essential for bulb formation. The varieties transplanted early (before November) may form seed stock. Due to

favourable climatic conditions it is grown in some parts of Maharashtra (Nasik) in Kharif as 'Pol' and in late Kharif as 'Rangda' in addition to winter crop as 'Garva" (Phirke, 1993).

#### **Soils**

Onions are grown on all types of soils but the crop is sensitive to acidic soils. It grows well in the soil with optimum pH range between 5.8 to 6.5.

#### **Harvesting**

Green onions are harvested when they are of the diameter of a lead pencil and used as a vegetable . When the tops dry up the mature bulbs are harvested. They may be left in the field in mild weather for curing. After thorough curing and drying they are stored under proper conditions. A low temperature, low humidity, proper maturity and freedom from disease infection keeps the bulbs in better condition over a longer period.

#### **Bolting in Onion**

Onion is a biennial crop which produces bulbs in the first season and seeds in the next year. Sometimes seed stocks are produced at a premature stage in a crop grown for bulbs. It is known as 'bolting'. A tendency to bolt is not desirable as the yield of the bulbs is affected. The

production of bolts taken place at the cost of the reserve food in the bulbs which therefore become light and fibrous. Sometimes stored onions also sprout and do not keep long during storage. The seed produced on a bolt does not have a good seed vigour. The problem of bolting has been thoroughly studied by Chaugule and Khuspe (1957). According to them the tendency of bolting is maximum in the crop taken in later kharif or early rabi seasons. Bolting may be due to heredity, change in temperature, poor seed quality, poor soil, spacing in seed bed or in the field, the photoperiod etc. Chaugule and Khuspe observed that a spray of 0.5 % MH-40 applied 2  $\frac{1}{2}$  months after transplanting controls bolting effectively.

#### **Morphology and Floral Characteristics**

*Allium cepa* L. is a herbaceous biennial plant producing a shallow fibrous root system from the base of a very short stem. The stem gives out hollow cylindrical leaves around it which have a sheathing base, a cylindrical green blade separated by a short membranous ligule. The onion bulb is formed during the vegetative growth of bulbs by thickening of the leaf bases. Thus the final bulb consists of a short stem surrounded by a number of fleshy leaf bases protected by thin membranous outer leaves.

Inflorescence is produced by the elongation of

stem apex into a scape. It is hollow, cylindrical, 1 to 2 feet in length and carries a terminal umbel protected by a membranous spathe in young stage. An individual flower consists of six greenish white perianth segments, six stamens, three carpels and a superior ovary. The stamens have thickened filaments at the base and oblong anthers.

The two varieties undertaken for the present study are -

**Var. N-53 :** It is released by onion research station at Nasik in Maharashtra. It is big bulb sized variety having red colour, a mild flavour, sweet taste and less pungency.

**Var. N-2-4-1 :** It is released by Mahatma Phule Agricultural University, Rahuri (Dist. Ahmednagar) in Maharashtra. The bulbs are medium to big sized with light red colour. This variety has a good keeping quality.