



## Seed production technique of onion

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Onion (*Allium cepa* L.) is most important vegetable crops grown and consume in India. Onion is used as salad and is cooked in various way in curries, fried, boiled, used in soup making, pickles etc. It is used as fresh and dehydrated forms and has many medicinal properties. Onion is export oriented crops earning valuable foreign exchange for the country.

Onion is normally produced from seeds except multiplier onions where production is taken up vegetatively from bulblets. Onion is grown in *Kharif*, late *Kharif* and *Rabi* seasons. While looking into the average production per hectare and productivity, it is quite low compared to other countries. Among the several constraints have been found to be responsible for restricting onion production and productivity in our country, non-availability of quality seed or planting material and suitable  $F_1$  hybrids in adequate quantities is important.

### Status of requirements and supply of quality seed of onion and garlic in India :

The estimated requirement of quality seed of onion and garlic is about 12169.6 ton (assuming seed rate 10 kg/ha) and out of that only 9.6 per cent of the demand is catered by public sectors organizations viz., NHRDF, NSC, ICAR institutes (IARI and IIHR) and SAU's). The most of the demands of the quality seed was either meet by private sectors or unorganized program or own saved seed. Therefore, it is becomes important to increase the supply of quality seed through the efficient use of the technology. On the other hand sincere efforts should be made for the developed and release of hybrids.

**Potential areas for seed production:** In India, the short day types of onion is cultivated on large scale in the northern plains, central and southern part of the country except higher hills where the long day types onion varieties

like brown spanish and yellow spanish etc. are grown over a limited area. The major areas for onion seed production are in Maharashtra, Gujrat and Karnataka. Therefore, the seed production of the short day types of onion is done in central part of the country particularly in Mandore and Khandawa region of MP, Nasik and Pune of MS and Rajkoat district of Gujarat. However, Northern state like Punjab, Haryana and Rajasthan are not preferred by the seed industry due the sever attack of *Stemphylium* and purple blotch and lower seed yield but there is a potential for seed production in north under delayed planting.



### Method of seed production of onion:

The seed production onion is very difficult phenomena. Seed producers should be well conversant with good cultural practices required for bulb production, variety, method of seed production, seed cleaning, packing and storage etc. There are two methods of onion seed production in practice:

**Seed or in situ or annual method :** The bulb is as such left and allow bolting and flowering in the same field where transplanting was earlier done. The seeds are sown in the nursery from June to August and transplanting is done from August to October. Bolting starts in January-February and seeds are ready for harvesting by mid May.

The seeds of onion varieties like Agrifound dark red, Balwant-780, Arka Kalyan and other *Kharif* varieties are produced by this method. Low cost of seed production, early maturity and no need to store bulbs are the merits of this method. Whereas, comparatively low yield and poor quality of seed produce by this method.

**Bulb to seed method or biennial method :** In this method, bulbs are lifted from field after proper selection they are replanted in the field. Higher yield and quality of seed produced by this method. But it takes more time, causes

losses of bulb during storage and also cost of seed production is more. In this method, the seed is sown in raised bed at 4-5 cm spacing for raising the seedling. The seedlings of 12-15 cm length are transplanted and this height attained 7-8 weeks after the seed sowing. Thus, 8-10 kg seed ha<sup>-1</sup> is sown. The seedlings are transplanted in previously developed beds in 15x10 cm spacing. The weedicides (Stomp) is sprayed within 3 days of the transplanting and followed by irrigation to check the growth of the weeds in early crop growth stage. The recommended cultural practices followed to raise healthy bulb crop.

The bulb are lifted when the 75 per cent plant show neck fall/top die down. The bulbs are dried/curing under naturally ventilated place then neck is trimmed leaving 2-3 cm attached with bulb. The bulbs are roughed at this stage based upon the colour, shape and size. The damaged, twin bulbs and long necked bulbs if any are discarded. The medium size bulbs weighing (50-80 g) bulbs are selected and stored. The bulbs are examined again before replanting in the following season.



One hectare of bulbs from the first year will plant 3-5 ha for the seed production. The bulbs selected for seed production and usually referred to as mothers bulbs. However, the area coverage is greatly affected by storage method and losses occur during storage. The storage temperature also influences seed yield. The temperature ranging from 4.5 to 14 °C with an optimum of about 12 °C is the best for the storage of mother bulbs that are to be planted for seed production. The plants from such bulbs produce early and heavy yield than those grown from bulbs that have been stored at higher or lower temperature. The roots of the bulbs should be left intact after harvest.

The 1/3 parts of the bulb are cut before planting to examine the number of glumes, which is related to the compactness, and shape of the bulbs. More the number of glumes flatten the shape and poor the storability. To avoid rotting due to fungal infection of the bulb in field, Bavistin 10 g in 10 lit of water is used for dipping the bulbs before planting. This should be practice in NS/BS seed production.

*F<sub>1</sub> hybrid onion seed production* : The production of hybrid onion seeds is a little bit difficult than OP seed. Incase of hybrid, both male and female parent are required. The usual ratio of male: female rows are 1:4 or 1:8. The pattern and ratio depend upon mechanization and the amount of pollen grains produced by male parent. Remove off-type plants with male fertile flowers in male sterile female parent. Seed produced on male parent are harvested first to avoid mixing. The other practices for raising of mother bulb and further multiplication etc are same as that for production of open-pollinated varieties.

*Seed production of multiplier onion* : Healthy and uniform bulblets are selected and used for planting. The planting details including cultural practices followed for production of planting materials are same as that for production of bulb for consumption.

The details of package of practices, seed certification standards and other operation are given below in details:

**Climatic requirements:**

Temperature throughout the year and day length during the season set broad limits to the areas that are suitable for seed production. When seeds are produced from the bulbs that have been raised during the preceding year, the

length of growing season that is required for the crop is relatively short. The long days early in the season which are characteristic of high latitude favour rapid bulbing rather than flowering. A fairly cool temperature Over the considerable time usually while bulbs are in storage or over wintering in the field conditions the plant for seed stalk formation. Temperatures of 4.5-14.5°C is favourable for conditioning. It is important to have hot and dry weather during the harvesting, curing and threshing of seeds.

**Land requirement:** Select fields in which an onion was not grown in the previous year unless it is the same variety and certified by seed certification agency for its purity. The soil should be rich in organic matter and have good water holding capacity. The pH of soil between is 6-7 suitable for good crop.

**Land preparation:** The field is ploughed to a fine tilth by giving ploughing by tractor drawn implement or deshi plough. Planking should be done for proper levelling. The field is divided into beds and channels.

**Time of planting:** Mid of October to mid November is

the best time of planting/sowing. Around 2000 square meters of nursery is sufficient to plant one hectare onion crop. The time of planting has great impact over the seed yield and incidence of the disease. Whenever the seed crop is planted in first fortnight of October is subjected to the heavy incidence of diseases and resulting poor seed yield.

#### **Bulb weight and size of onion:**

Bulb size 2.5- 3.0 cm diameter – 15 q of bulbs /ha

Bulb size 3.0 – 4.0 cm diameter – 40 - 50 q of bulbs ha.

The bulb weight has markedly influenced the seed production in onion. The increases in bulb weight an increased the seed yield. Although an increase in wt. and size of bulb results in higher seed yield, but very large size bulbs (< 90 g) if used will need a very high seed rate (60 q/ha) which is not economical. Large size bulbs (3-4 cm diameter) and weighing < 90 g may seed yield 10.00 q/ha.

**Transplanting :** 8-10 weeks old seedlings are planted in small seed beds in well prepared fields by following a spacing of 45\* 30cm depending upon the bulb size and type of soil.

**Isolation requirement :** Onion is largely cross-pollinated crop with up to 93 per cent natural crossing. It is chiefly pollinated by honeybees. For pure seed production the seed fields should be isolated by at least 1000 m for foundation seed production and 500 m for certified seed production. However, the maximum permissible limit for bulb not confirming to the varietal characteristics is 0.10 percent and 0.20 percent (by numbers) for foundation and certified seed during mother bulb production. The maximum permissible limit of off- types is 0.1 per cent and 0.2 per cent for FS and CS at and after flowering during seed production. Onion seed crop must also is isolated from any flowering multipliers types of onion and shallots.

**Manures and fertilizer :** About 20-25 tonnes of FYM/ha is required to use at the time of field preparation. The requirement of nutrients depends on soil type, region of growing, variety etc. About 100 kg of nitrogen, 60kg of P<sub>2</sub>O<sub>5</sub> and 50 kg of K<sub>2</sub>O /ha is recommended in general. The whole quantity of phosphorus, potash and half of nitrogen should be mixed in soil before planting. The rest half dose of nitrogen should be given as topdressing in two equal split doses, first dose should be applied 30 days after planting whereas second 45 days after planting.

The ratio of N: P: K applied during seedbed preparation should be 1: 2:2 but the nitrogen ratio can be increased according to the status of the soil. During, mother bulb production the deficiency of copper or manganese should not be allowed. The deficiency of copper is indicated by

bulbs of poor colour with this, fragile scales that come off in handling. Therefore, the application of 80-120 kg powdered copper sulphate control the deficiency.

**Irrigation :** High soil moisture in the seedling year performed high seed yields. Water stress during bulb sprouting and beginnings of the anthesis reduce the number of umbels and flowers/plant. However, in practice, the soil surface should not be continuously wet because it will predispose the crop to infection to root rot/damping off. The methods of irrigation also greatly influence the seed yield and seed quality of onion. Onion and garlic are shallow rooted crops. Drip method of irrigation can give higher seed yield and seed vigour index than the surface irrigation.

**Field Inspection of onion:** A minimum of two field inspections shall be made as follows:

–The first inspection shall be made after transplantation of seedlings in order to determine isolation, volunteer plants, off types including bolters and other relevant factors.

– The seed inspection shall be made after the bulbs have been lifted to verify true characters of bulbs.

#### **Rouging of seed crop :**

*First year :* It is desirable to begin rouging in the field before bulbs are harvested, look for plants having different foliage or plant type or late maturing bulbs. After harvesting, the bulbs should be rouged for colour and such off type's thick necks, doubles, bottlenecks or any other type.

*Second year :* Plant only selected true to type bulbs and remove plants not confirming to varietal characters before flowering.

**Harvesting and curing of bulbs :** Well-matured bulbs should be harvested. When seed inside capsules become black and 20-25 per cent black seed are exposed the umbel should be cut with 10-15 cm stem attached. Maturity is also indicated by the tops drooping just above the bulb, while the leaves are still green. After harvesting the bulbs should be topped leaving an half-inch neck. Before storage a through selection and curing of bulbs should be done. The length of time required for curing depends on weather conditions and may take 3-4 weeks.

**Threshing, cleaning and seed extraction:** Seed is ready for harvest when first formed seed in the heads get blackened. 2-3 pickings are necessary to harvest the heads. Seed heads after harvest are thoroughly dried with air circulation. Heads are threshed either by rubbing with hands manually or by movement of bullocks or tractor on seed umbels or heads. Seed is cleaned by using hand

winnower and fans. Dipping of seeds in water for cleaning, in no case is done for more than 2-3 minutes as otherwise the germination is affected adversely. Upgrading is further done on gravity separator.

**Storage of bulbs:** The essentials of successful storage are :

–The bulbs should be well matured dried and cured before storage.

–Storage should be well ventilated.

–Storage should be done in shallow trays with perforated bottoms

–Storage temperatures should be 0-4.5°C until three to 4 weeks prior to planting. Then it is increased to 10°C.

**Drying, packaging and storage of seed :** The onion seeds are short lived. For safe storage, seeds of onion are dried to a level of about 6 per cent moisture and then packed in aluminium foil or tins which are moisture proof.

Seeds are then stored in air-conditioned and dehumidified store having temperature of 16-20°C and relative humidity of 30-40 per cent.

**Seed yield :** The seed yield of onion is 8-10 q/ha depending upon variety and the regions where they are grown.

**Disease and pest :** Purple blotch, *stemphylium blight* and *Colletotricum blight* are the major disease in onion. Spraying of Mencozeb (0.25%) or chlorothalonil (0.20%) along with sticker found effective both seed and bulb crops trichoderma viride@ 1250g per hectare with FYM if applied in soil before planting is effective against basal rot in seed crop.

Thrips is major insect pest in onion. Application of cypermethrine 25 EC @ 0.01 per cent or deltamethrine @0.01 per cent is recommended for control of thrips.

Received : 09.01.2016

Revised : 03.04.2016

Accepted : 05.05.2016

RN : UPENG/2006/17689

Accredited by NAAS: NAAS Score: 3.19

ISSN: 0973-4775

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ONLINE ISSN: 0976-7231

An International Research Journal

RNI No. : UPENG/2010/32275

ONLINE ISSN : 2230 - 9403

ISSN : 0976 - 1276



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