

Onion Seed Production Technology: To Meet the Demand of Quality Seeds

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SUMMARY

Onion (*Allium Cepa*) is a major bulbous vegetable as well as condiment of family Alliaceae widely grown in India. The most important aspect in maintaining continuous supply of high quality seeds to cultivator is to produce genetically pure seeds and to preserve the quality of seeds from harvest to next sowing. The seed growing area under cultivation of onion requires proportionately increased quantity of quality seed. The quality seed production in onion can be enhanced by proper selection of bulb, mulching, plant geometry, pollination, intercultivation operations, drying and storage practices.

INTRODUCTION

The onion (*Allium cepa* L.) belongs to the genus *Allium* of the family Alliaceae. Onion contributes significant nutritional value to the human diet and has medicinal properties and is primarily consumed for its ability to enhance the flavor of other foods (Randle, 2000). It is rich source of vitamin C and E and having medicinal value also. The quality of onion seeds, supplied by the private or unorganized sector in most cases is not good enough. The problem is worsening by the short shelf life of onion seeds which lose viability more rapidly than the seeds of other crops. Onion seeds viability for 6 to 12 months under ambient conditions. Onion seeds have poor storage capacity and lose viability within a year. Seed vigour and yield are poor, as farmers harvest seeds from their own onion crop because of poor maintenance. Owing to these, onion growers are using more quantity of seeds per hectare as opposed to the recommended rates. Because of this farmers incur more cost, besides the ever increasing price of onion seeds on the local markets. These become obstacles for the advancement of onion production. Therefore, it is necessary to increase the supply of quality seeds through the efficient use of technology and participation of private sectors and farmers of onion seed production.



Onions have a shallow root system which extracts water from top layers of soil. Thus upper layers of the soil should be moist to stimulate root growth and provide adequate water and nutrients for growth and development of plants. Mulching is an important agro-technique which conserves soil moisture, manages weeds and insect pests and enhances yield by more efficient utilization of soil nutrients (Rhu *et. al.* 1990). Mulch when applied makes root zone temperature favorable, promotes the uptake of water and mineral nutrients which in turn promotes better foliage, growth and fruit set (Verma *et. al.* 2016). White polythene mulch gave higher growth and yield of onion (Hamma, 2013). The drip irrigation methods give a higher yield and seed vigour index than flood irrigation in onion seed production (Tomar *et. al.* 2004).

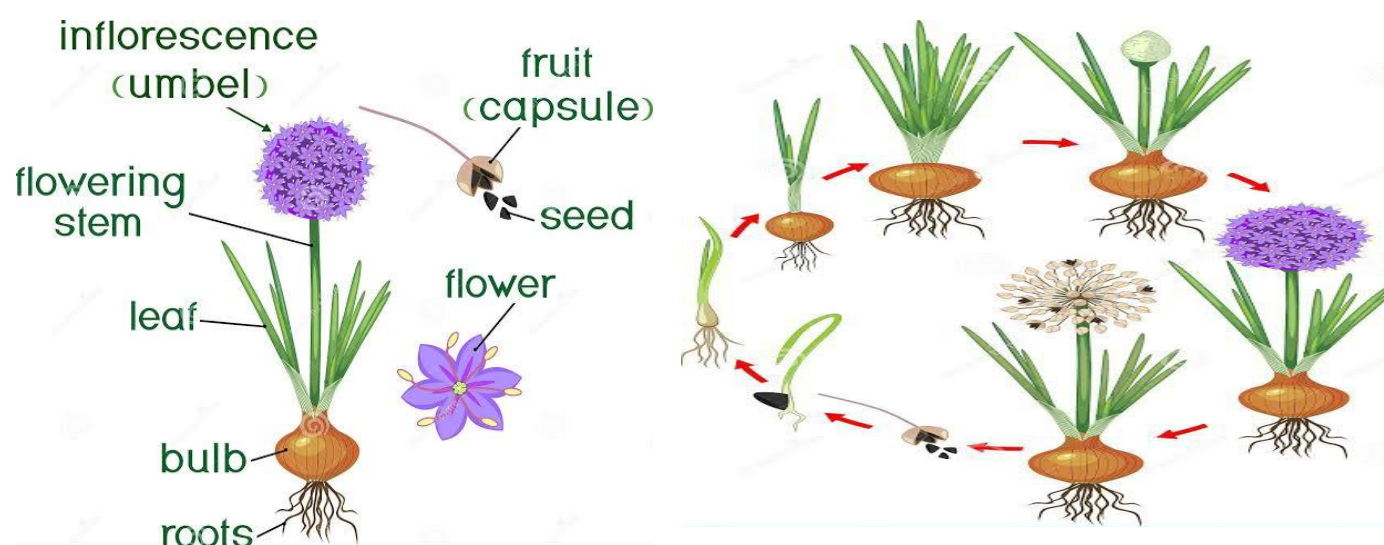
Methods of Seed Production

Seed to Seed Method

Seed to seed method is not popular because all the varieties are not suitable for annual seed production due to poor bolting ability and lower seed yield. The seeds produced in this method are not suitable for further multiplication.

Bulb to Seed Method

In this method the seeds are sown in the first (*kharif*) season. When the seedlings are 12-15 cm in height and attained 45-50 days are transplanted to the main field, to raise healthy bulb crop. The bulbs are harvested when 75 per cent plants show neck fall or top die down. After curing, damaged, twin bulbs and long necked bulbs are discarded. The medium (50-80 gm) and large (100 gm) sized bulbs are selected and stored. These selected and stored bulbs are called mother bulbs. The optimum temperature about 12°C is the best for the storage of mother bulbs. The plants from such bulbs produce early and higher seed yield. The bulb to seed method requires the same cultivation practices as a commercial bulb crop.



Soil and Climate

The field to be used for seed production of onion should be free from volunteer plants. Onion seeds can be produced in different types of soils. Sandy loam or clay loam soils are best suited. Higher organic matter will lead to production of vigorous seed. The pH should maintain 6-7. Onion is a photo-thermo sensitive crop for bulb development and biennial for seed production. Onion requires cool season and grows well under mild climate without extreme heat or cold or excessive rainfall. The ideal temperature requirement for vegetative growth is 13-21°C. Flowering induction is sensitive to temperature, photoperiod and number of leaves. Optimum temperatures required for vernalization are 7-12°C.

Nutrient Management

The land should be ploughed three times and the field to be prepared well with 25 tons of farm yard manure per hectare. After the preparation of land the recommended doses of N, P and K (nitrogen, phosphorous and potassium) fertilizers has to be given. Seed crops need 80-100 kg of N, 60 kg of P and 50 kg of K/ha.

Selection of Bulb

The bulb weight has markedly influenced the seed production. The increase in bulb weight will increase the seed yield. Bulbs weighing 50 to 80 gm and measuring 4-5 to 6.5 cm in diameter should be selected for

planting. About 25-30 quintal bulbs are required for one hectare area. The top 1/3rd portion of the bulb has to be cut down for planting. The cut bulbs if, treated with Gibberlic acid (GA-3) at 50 ppm, seed weight will increase.

Sowing and Spacing

The seeds are sown in May-June for harvesting bulb in October-November. Selected bulb are planted in October-November to produce seed in April-May for the use of next season. Crop geometry enhances the growth and development of plant due to reduced competition between the plants for the resources such as water, light, aerial space and nutrients thereby increases the seed yield. Bulbs can be planted in double row or single row per ridge and bulbs are planted in plots (flat beds). The recommended spacing is 45 x 30 cm between bulbs.

Isolation

Isolation of onion seed fields is more important to maintain genetic identity, because of variation in onion bulb colours and also it is a cross pollinated crop mainly by honey bees and other beneficial insects. Onion seed crop should be provided a minimum isolation distance of 500-1000 meters from other varieties. So that genetic contamination can be avoided.

Irrigation

High soil moisture content contributes to high seed yields. Up to full flowering, irrigation is given at 7-10 days interval and then at every 10 days interval followed by 10-15 days near maturity depending on soil types. The methods of irrigation also greatly influence the seed yield and seed quality of onion.

Weeding and Plant Protection

One hand weeding at 45 days gives good control of weeds. The mechanical cultivation in onion seed crop is difficult due to high plant density. Thrips attack was very common during dry months and it is very difficult to control the thrips. Thrips attack can be controlled effectively by cultivation practice like deep ploughing of the fields immediately after harvesting to eliminate resting conditions of the pest. Crop rotation is also one of the tools to control the pest. Rotating fields with unrelated crops reduces build up of insects. Important diseases of onion seed crops are umbel blight, downy mildew, pink rot disease and Fusarium basal rot.

Rouging

The onion seed field, removal of off type plants, weeds and disease infected plants is to be done scrupulously before it comes to harvest to avoid the genetic contamination.

Pollination

Onion is highly cross-pollinated and due to protandrous nature of the onion out-crossing becomes more important. Onion produces good quality seed only in the presence of abundant pollinators and quality of seed is directly proportional to the bulb yield in the successive generation. Onion is entomophilous crop that is pollinated by insects and honeybees act as the main pollinators of onion.

Harvesting

All umbels of a plant do not mature at one time due to difference in the stalks to flowering. The best time of the harvest is when 50 per cent of the seeds in the umbel are exposed. Harvesting may be done 3-4 times. The cut heads should be supported in the palm of hand and held between fingers to avoid seed shattering. The best seed quality is obtained when seed moisture content is between 50 and 65 per cent.

Drying

The harvested umbels should be dried by spreading the umbels on canvas and putting under shade or in the morning or late afternoon sun for few days. The seeds must be properly separated from the umbels. Seeds can be threshed by moving or by rubbing of dried umbels and then cleaning the seeds by winnowing followed by seed separation by floatation. The extracted seed must be dried under shade for 8 to 10 hours after spreading over the

gunny bags. Then it can be dried further under open sunlight between 8 to 12 noon and 3 to 5 pm. After seed extraction, they should not be dried under direct sunlight and also seeds should not be dried continuously from morning to evening.

Storage

Onion seed is a poor storer and it loses its viability very rapidly. For short term storage seed moisture content should be reduced to 7 to 8 per cent and can be stored in cloth bag. For long term storage, seed moisture content should be reduced to 6 per cent and stored in moisture and vapour proof containers. Onion seeds should not be stored in plastic bags for long time.

CONCLUSION

Seed is the basic and crucial input in onion production. The bulb to seed method are widely used for onion seed production. The growth and development, flowering and yield of plants totally depends on the quality of the mother bulb. Proper sowing season, nutrient management, irrigation scheduling and methods, intercultural operations, isolation distance, rouging, drying and storage operations very important for production and maintains of quality of the seeds. More care should be required during pollination and harvesting stage for more efficient production of the seeds.

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