

Approaches to Produce Quality Seeds in Onion

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<https://doi.org/10.5281/zenodo.8229814>

Introduction

Onion (*Allium cepa* L.) is one of the major bulb crops in the world and important commercial vegetable grown all over the world and occupies a premier position amongst the vegetables due to its high preference in food, remunerative price and regular demand in the market. Major onion growing states in India are Maharashtra, Karnataka, Madhya Pradesh, Rajasthan, Bihar, Odisha and Gujarat. Seed is the basic unit of crop production and has greater contribution than environmental and cultural factors. Major problem in onion is low quality seeds resulting in slow and asynchronous germination as well as seeds producing a high number of abnormal seedlings. Seedling establishment is an important factor in bulb production of onion, it largely depends on the seed germination and vigor. Onion seeds are small in size, irregular in shape hence resulting difficulty in sowing and ultimately crop establishment. Seed enhancement techniques like film coating and encrusting help in giving uniform size, singling seed and facilitate better sowing. The reasons for lower productivity of onion in India could be attributed to the limited availability of quality seed and lack of development of hybrids in onion are the major limiting factors among the others.

Potential Seed Production Areas

In India, the short-day types of onion are 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. 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 Madhya Pradesh, Nasik and Pune of Maharashtra and Rajkot 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.

Floral Biology and Pollination in Onion

Anthesis occurs in early morning (6-7 hrs). Anther dehiscence is between 7.00 and 17.00 hr and on next day also with peak between 9.30 and 17.00 hr. Pollen fertility is highest on the days of anthesis. Stigma receptivity is also high on the day of anthesis. The duration of anthesis is approximately 4 weeks on individual umbel. The anthesis begins from outer flowers and goes centrally in succession. The flower is protandrous in

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nature and stigma becomes receptive when shedding of pollen is over. Onion is cross- pollinated in nature and bees, flies and other insects do pollination. It is essential to ensure that there is sufficient population of pollinating insects to achieve the full potential of onion seed.

Bulb weight and size for onion seed production

The bulb weight has markedly influenced the seed production in onion. The increase in bulb weight can also increase the seed yield. Although an increase in wt. and size of bulb results in higher seed yield, but very large size bulbs (< 90 gm) if used will need a very high seed rate (60 q/ha). Large size bulbs (3-4 cm diameter) and weighing < 90 gm may seed yield 10.00 q/ha.

1) Method of seed production

a) Seed to seed method

Seedlings after transplanting are allowed to over winter in the field. The bulbs are not lifted and allowed to flower in the same field. This method is not preferred because it doesn't allow the examination of true to typeness of the onion bulb and rouging of off types and diseased and multicentre bulbs. The genetic purity of the seeds produced from such method is usually poor, though the cost of seed production is less compared to bulb to seed method but this method is not preferred.

b) Bulb to seed method

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, the required seed rate is 6-8 kg per hectare. The seedlings are transplanted in previously developed beds in 15 x10 cm spacing. The weedicides (Stomp) is sprayed after 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 bulbs are lifted when the 75% 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 and 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 mother 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^oC to 14^oC with an optimum of about 12^oC is 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 gm in 10 lit of water is used for dipping the bulbs before planting. This should be practice in nuclear seed and breeder seed production.



Maintenance of isolation for genetic purity

Onion seed field shall be isolated from contaminants viz; fields of other varieties and the fields of the same variety not confirming to varietal purity requirement for certification at least 5 m for foundation seed and certified seed during mother bulb production and 1000m and 500m for foundation and certified seed production respectively, during seed production. However, the maximum permissible limit of off-types is 0.1% and 0.2% for foundation seed and certified seed at and after flowering during seed production. Onion seed crop must also be isolated from any flowering multipliers types of onion and shallots.

Climate and seasons

Onion flowering is a thermo-sensitive phenomenon, short day tropical types flower under low temperature 25°C day and 10-15°C night, long day temperate types requires low temperature 0-25°C. Oct-Nov is the best time for planting tropical types. As per recommended package of practices, the mother bulbs of rabi crop should be produced and has to be stored up to October. Bulbs must be stored in well-ventilated storage structure with temperature 25-30°C and RH 65-71%.

Spacing

Spacing (cm)	Av. Bulb Weight(g)	Quantity of bulbs (q/ha)
45 x 30	50/60/70/80	26/31/36/41
60 x 20 (on drip)	50/60/70/80	30/35/40/ 45

Fertilizers

The recommended dose of fertilizer is FYM @ 15 tons/ha and NPK @ 100:50:50 kg/ha. Apply 50:50:50 kg/ha NPK at the time of planting and remaining nitrogen in 2 split doses, one at 30 days and second at 45-60 days after planting. Give 1% spray of polyfeed (19:19:19, NPK) at 30 & 60 days after planting and one spray of multi-K (0:0:50) after 60 days of planting.

Rouging

Plot should be visited regularly. Yellow and lanky plants should be removed before flowering. The plants with differential umbel height should be removed before opening of flowers. The plants affected by aster yellow and stemphyllium blight should be removed before seed harvest.

Weed Management

Spray oxyfluoran @ 1.5 ml/L after planting of bulbs and one weeding after 45 to 60 day after planting should be done.

Drying and Threshing

Dry umbels in open sun, threshing of seed can be done by rolling, threshing machine or combines. The seed should be dried in sun dried till 6 to 7 per cent moisture level is attained.

Average Seed yield

500 – 800 kg seed/ha, in best management and climatic conditions 1000 to 1200 kg seed can be obtained

Seed packing

Seed should be packed in 400-gauge poly bags after perfect drying.

Storage of seed

Room temperature: 30-35°C for 15-18 months

Cold Storage: 15°C with 30-40% RH for 3-4 Years.

