

# *From Bulb to Seed: Advanced Strategies for Profitable Onion Seed Farming*

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## **ABSTRACT**

Producing onion seeds (*Allium cepa* L.) profitably demands enhanced, strategic farming practices. The wide differences in seed yields across genotypes underscore the importance of selecting top-quality bulbs and superior cultivars. Optimal planting timing, spacing, nutrient application, irrigation, and pollinator support greatly influence seed yield and quality. Integrated pest management and strict isolation distances are crucial for maintaining varietal purity. Timely harvesting and proper seed storage maintain vigour and market value. Adopting these evidence-based methods can significantly increase seed production and farmers' earnings.

## **INTRODUCTION**

**O**nion (*Allium cepa* L.) seed yield varies widely among germplasm lines (0.4-27.2 g per plant), highlighting strong genetic diversity and the need for advanced cultivation practices. Higher productivity is closely linked with traits such as more and taller scapes, larger umbels, and heavier seeds, with superior lines averaging 12.8 g per plant serving as valuable material

for hybrid breeding and seed programs. Maximising seed yield and maintaining genetic purity requires selecting elite genotypes and integrating improved agronomic practices, including optimal spacing, balanced nutrition, precise irrigation, pollination support, and effective pest management for sustainable production. (Luitel *et al.*, 2024).

### **Quality Seed and Bulb Selection for Successful Onion Seed Production:**

High-quality seeds and carefully selected bulbs are key to profitable onion farming, particularly where local seed supply is limited, and seedlings make up 18% of costs. Germplasm yields range from 0.4-27.2 g/plant, with superior lines (avg. 12.8 g/plant, including  $\geq 50\%$  male-sterile ones) excelling due to more/longer scapes, larger umbels, and heavier seeds-prime for hybrids. Choose healthy, true-to-type bulbs (5 cm diameter, disease-free, undamaged) post-1-month storage for even vernalization. Double-row planting (50 cm between rows, 30 cm between plants, 20 cm between doubles) plus targeted irrigation drives strong scapes, umbels, and seed quality. (Beji *et al.*,2025)

### **Suitable Varieties and Ideal Conditions for Onion Seed Production:**

High-yield onion seed production depends on selecting adaptable hybrids and maintaining optimal growing conditions. In Charsadda trials, Macarena and Capri F<sub>1</sub> outperformed others in growth, bulb size, uniform maturity, and storage, proving suitable for profitable farming at 25 × 30 cm spacing. Onions require 15-20°C for early growth and 20-27°C for bulbing, well-drained loamy soils (pH 6.0-7.0), and 350-550 mm consistent irrigation due to shallow roots. Adequate moisture during bulb formation is essential, as water stress can reduce yields drastically, while regulated irrigation improves efficiency and seed quality.

### **Right Time of Planting for Better Flowering:**

Timely planting significantly improves onion flowering and seed yield by aligning vegetative growth with cooler conditions that enhance scape development and pollination. In Taherpuri, sowing on October 25 using large mother bulbs (16-20 g) at 25 × 20 cm spacing

produced superior growth, maximum umbels, higher flower numbers, and peak seed yield (1075 kg/ha) with excellent seed quality (3.75 g per 1000 seeds, 88.33% germination). Delayed sowing in November reduced performance due to warmer temperatures affecting pollination and seed filling, while early October planting improved photosynthate accumulation and flowering potential. (Asaduzzaman *et al.*,2025)

### **Scientific Spacing and Field Preparation:**

Precise spacing and field preparation are vital for modern onion seed production, ensuring ideal plant density, uniform growth, and nutrient uptake for maximum yields. For medium bulbs (4.5x3.0-6.0x4.5 cm), 45x30 cm spacing delivers top results (9.76-9.87 q/ha) with larger umbels (6.33 cm), higher 1000-seed weight (3.61 g), and taller plants (100.43 cm), outperforming wider 60x30 cm spacing. Prep fields with tractor/disc ploughing, power tiller cross-ploughing, harrowing for fine tilth, and laddering for levelling; use 0.5m plot gaps and 1m block separations in split-plot RCBD (5.4 m<sup>2</sup> net plots). For the RO-1 cultivar sown mid-October in Jaipur's semi-arid climate, this yields a 1:3.36 cost-benefit ratio.

### **Balanced Fertilisation, Proper Irrigation and Bee Pollination for Maximum Seed Production:**

Balanced fertilization (375 kg/ha nitrophos in three stages: 8-12 cm height, 20% and 60% flowering), proper irrigation, and bee pollination maximise onion seed production in Phulkari variety trials. This moderate N-P dose boosted umbel weight (8.04 g) and seeds/umbel (45.22) under 100% open pollination at 0.45 m row x 0.15 m plant spacing (RCBD), outperforming low (188 kg/ha) or high (750 kg/ha) levels, where yields dropped due to poor pollinator attraction. Honey bees (*Apis florea*) excelled at low-moderate doses (9.27 g single-visit efficacy);

syrrhids favoured high doses. Ecological intensification via balanced nutrients and natural bees delivers peak productivity without excess environmental costs.

### **Protecting Seed Crop from Pests and Maintaining Isolation for Quality Seed:**

Effective pest control and adequate isolation distances play key roles in boosting onion seed yields and preserving genetic purity. Research shows thrips and purple blotch infestations can slash yields by 30-40%, while downy mildew during flowering harms seed set and quality. It advocates integrated pest management (IPM), with timely insecticides and fungicides applied at economic threshold levels to cut losses. To safeguard varietal purity in this highly cross-pollinated crop, maintain 1000 m isolation for foundation seed and 500 m for certified seed from other onion fields, preventing cross-pollination. Following these practices delivers true-to-type seeds, curbs disease transmission, and improves yield plus market value.

### **Scientific Harvesting, Post-Harvest Processing and Safe Storage for High-Quality Onion Seed:**

Timely harvesting and evidence-based post-harvest handling are vital to curb the 30-40% losses common among onion farmers. Data reveals 90.83% harvest at 120 days after sowing, at physiological maturity, guided by 50% neck fall and bulb yellowing, using hand pulling (100% adoption). Post-harvest, every farmer (100%) trims necks to 3-5 cm above the bulb and cures in the field or under shade; none opt for artificial curing. Grading is manual for 97.50%, with just 2.50% using motorised equipment. Storage leans traditional: 65.00% use local structures, 35.00% improved ones, and 0% cold storage. Materials include plastic bags (55.00%), gunny bags (27.50%), and wire bags (25.83%). Overall, widespread basic practices contrast with sparse adoption of modern storage tech,

hindering quality retention. (Karuna *et al.*,2026).

### **CONCLUSION:**

Boosting onion seed yields requires a comprehensive, science-driven strategy not isolated practices. Start with elite germplasm and healthy, true-to-type bulbs, backed by ideal climate, soil, timely planting, optimal spacing, balanced nutrition, precise irrigation, and strong pollination. Integrated pest management plus sufficient isolation ensures genetic purity, while prompt harvesting, careful curing, grading, and storage uphold seed quality. This holistic approach sustainably lifts productivity, vigour, and farm profits.

### **SUMMARY:**

Profitable onion seed production relies on a comprehensive, research-based strategy. Start by choosing top-quality germplasm, disease-free bulbs, and varieties adapted to your region's conditions. Key factors include ideal temperatures (15-27°C), well-timed planting, and accurate spacing to boost flowering and seed output. Apply balanced nutrients, smart watering techniques, and robust pollination, particularly from honeybees, to drive higher yields. Use integrated pest control and maintain strict isolation distances to protect seed purity. Harvest at full physiological maturity, cure seeds properly, grade them meticulously, and store them effectively to preserve vigour and market appeal. These steps collectively deliver superior yields, excellent seed quality, and long-term economic gains.

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