

Seed Problems in Onion

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ABSTRACT

Onion (*Allium cepa* L.) is a crucial bulb crop cultivated globally. India is one of the major producers of onion. The quality and yield are significantly affected due to seed-related problems, viz., poor viability, low germination rates, and seed-borne diseases. Improper storage also adds to the above issues. Overwatering affects seed germination, whereas purple blotch and downy mildew impair seed quality. Proper bulb choice and planting schedules can make a big difference in production. Seed priming and integrated pest management improve the seed quality. Higher yields can be obtained by growing climate-resilient varieties and adopting innovative seed treatment methods. These measures can improve onion seed quality and increase overall crop yield significantly.

INTRODUCTION

Onion (*Allium cepa* L.) is among India's most commonly cultivated bulb crops and belongs to the Amaryllidaceae family. The chief onion-producing states are Maharashtra, Karnataka, Gujarat, Odissa, Andhra Pradesh, Uttar Pradesh, Bihar, and some districts of West Bengal. Onion possesses very valuable

flavour, fragrance, and unique taste. It is called the "Queen of the Kitchen" (Selvaraj, 1976; Griffiths *et al.*, 2002). Depending on the cultivar type, it can be grown biannually or perennially. It gives a characteristic odour when crushed (WHO, 1999). Open, sunny, dry land with humid climates suits most onion species.

The bulb is the economically valued part of the onion. It consists of characteristic odour, pungency, and flavour. As an everyday dietary staple, onions provide a wealth of flavonoids containing a perfectly balanced combination of three essential phytochemicals: flavonoids, fructans, and organosulfur compounds (Pareek *et al.*, 2017). The pungency in onion is due to a sulphur-containing compound allyl-propyl-disulphide. The significant phytochemicals present in onion are saponin, quercetin, and anthocyanin. Quercetin is responsible for the anti-cancer properties of onion. It also has anti-inflammatory, anti-microbial, anti-diabetic, and hepatoprotective properties.

The quality and yield of onion seeds are affected by multiple factors, including seed viability problems, germination failures, seedling diseases, pest attacks, and environmental stress. One of the major contributors to poor seed quality is fungal infections, extended flowering periods and suboptimal storage. Furthermore, planting onion seeds too early, deep, or in overly moist soil can hinder germination.

SEED VIABILITY

Onion is propagated by sowing seeds in the primary nursery, and then they are transplanted. The factors influencing the viability of a seed include storage conditions, seed age, and long flowering period, which results in different maturity stages of the seed in the umbel. Onion seeds have a very short span and lose their viability immediately after harvest (Panghal *et al.*, 2023). They are short-lived under ambient conditions (Yanping *et al.*, 2000). Seed viability is affected by various pre-harvest, harvest, and post-harvest conditions (Basu, 1995). At a constant temperature, it loses viability faster with increasing moisture content (McDonald, 1999). The rapid loss of viability is due to increased temperature and seed moisture content.

1. In addition, onion seeds are also usually treated carelessly or stored under inappropriate conditions, which results in a crucial phase referred to as seed deterioration, involving the deterioration of seed quality, vigour, and viability.
2. Onion seed viability and vigour can be preserved for over a year by lowering the moisture content of the seeds to 6 ± 1 % and keeping them in moisture-proof containers at 4-15 °C and 40-60 % relative humidity (RH).

SEED BORNE DISEASES

Onion cultivation and storage are greatly threatened by numerous fungal and bacterial diseases, which are purple blotch, leaf blight, damping-off (*Pythium* spp., *Rhizoctonia solani*), and anthracnose (*Colletotrichum* spp.) (Khan *et al.*, 2019). Seeds produced from the infected bulbs show a reduction in germination percentage—*Aspergillus* spp. *Penicillium* spp. and *Fusarium* spp. can reduce the quality of onion seeds in storage.

1. Munoz *et al.* (1984) and Kumar (2020) found that purple blotch significantly impacted seed production by decreasing the seed yield of onion.

SEED PROBLEMS

onion seed yield and quality are influenced by factors like cultivar, soil, climate, season, production method, bulb size, date of planting, and planting density, influence. Determining the best combination can improve onion seed production and quality (Asaduzzaman *et al.*, 2012). Ashagrie concluded that appropriate planting dates with accurate bulb size could be practised to increase the yield and quality of onion seed production. Therefore, onion seed producers should be encouraged to plant onion bulbs in early October with (4.1–5 cm) bulb size to produce better yield and quality onion

seed. Other problems with onion seeds are poor germination, bolting, and damping off.

FUTURE PROSPECTIVES:

The prospects of addressing seed problems in onion cultivation are developing climate-resilient varieties, following Integrated pest management, and improving soil health. Seed priming methods like hydro priming, Osmo priming, and hormonal priming enhance germination and seedling vigour (Selvarani & Umarani, 2011).

1. Seed priming is a physiological seed hydration and drying technique to improve the metabolic process before germination. This fastens the germination, seedling growth, and crop yield under normal and different biotic and abiotic stress conditions.

CONCLUSION:

In short, seed problems in onion cultivation can be addressed by choosing high-quality seeds, good soil preparation, and using appropriate sowing techniques, such as advanced methods like seed priming. Problems in cultivation can be addressed by controlling pests and diseases, controlling the water supply, and cultivating varieties that are tolerant to environmental fluctuations. In addition, ensuring balanced nutrition, using appropriate storage techniques, and encouraging ongoing education and training can improve seed germination and crop health.

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