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Effect of Storage Temperatures on Longevity of Onion Seeds

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Onion cv. Nasik Red seeds were stored at different temperatures, viz,—18°C, 5°C and room temperature. Seeds were viable for 12 months under ambient conditions, whereas seed longevity was extended to 48 months at 5°C or —18°C without affecting the seedling vigour.

Conservation of gemplasm variability has assumed considerable significance in the recent years. Various conservation strategies have been practised to avoid frequent regeneration of germplasm in the field as well as to cheek the genetic erosion. Gene bank for the conservation of seed crops has shown that germplasm can be stored for considerably long span of time. However, it is yet to be fully established as to what kind of containers would be most appropriate. The present studies relate to the effects of storage containers and temperatures on onion seed longevity.

MATERIALS AND METHODS

The experiment was conducted with the seeds of onion cv. Nasik Red. The seeds were extracted from fully matured umbels, dried to 6.5 per cent moisture content in shade, and stored in different packaging material, viz, glass bottle, polyethylene bags laminates, butter paper and kraft paper bags at ambient conditions (16-35°C, RH 25-90%), low temperature (5°C, RH 40%) and sub-zero temperature (—18°C, RH 85%). Seed viability and vigour were tested at regular intervals. Seed viability was assessed by the germination of seeds in seed germinator by paper top method at 25°C and seedling vigour was evaluated as per the ISTA standard (Anon., 1985). Shoot length was recorded on seven days old seedling to compare the seedling vigour. The moisture content of seeds was estimated by oven method at 105°C for 24 hours.

RESULTS AND DISCUSSION

Seed longevity differed significantly with the packaging material and storage temperatures. The high germination (90%) of seed was maintained for only six months in all the storage containers under ambient conditions. Further, seed viability declined to 30 per cent at twelve months of ambient storage, however; high seed germination was recorded in seeds stored in laminates and glass containers. It appears that seed moisture equilibrium attains faster in paper bags.

At low temperature (5°C) storage, percentage germination of seed was 89 in glass, 73 in polyethylene, 74 in laminate, 29 in kraft paper and 12 in butter papar bags after fifth year of storage.

Seed viability of 95 per cent was maintained for three years in glass bottle, polyethylene bags and laminate and the reduction was more in seeds stored in polyethylene bags than seeds stored in laminates or glass containers at fourth year of storage; whereas initial viability was maintained for two years in paper containers. It appears that none of the containers were completely moisture proof. However, high germination capacity of 89 per cent in glass bottle and 73 per cent in polyethylene bags or laminate was preserved for five years with low temperature (5°C) storage. The initial germinability of seed was maintained for four years at −18°C and subsequently, there was slight reduction during fifth year of storage which is still at par with low temperature (5°C) storage of seeds. At freezing temperature storage, seeds stored in laminates gave 90 per cent of germination followed by those stored in polyethylene bags (82%). There was significant reduction of viability to 10 per cent in seeds stored in paper bags at −18°C. For long-term storage, dried seeds are to be packed in laminates and stored at −18°C. Further, the laminate foils are relatively moisture proof, reusable and inexpensive. The loss of seed viability in paper container was due to increase in seed moisture content (Table 1).

TABLE 1. MOISTURE CONTENT OF ONION SEEDS STORED IN DIFFERENT CONTAINERS AT DIFFERENT TEMPERATURES AT 60TH MONTH OF STORAGE

Storage containers	Storage conditions		
	5°C	−18°C	Ambient
Glass bottle	6.7	7.7	6.5
Polyethylene bags	7.1	8.5	6.3
Laminate	6.8	7.5	6.0
Butter paper	8.2	15.1	5.7
Kraft paper	8.0	14.0	5.7

The seedling growth was significantly affected in seeds stored at ambient conditions. The shoot length was high during sixth month of storage and subsequently it declined, which also coincides with rapid decline in seed viability. Shoot length was maintained by storing the seeds at 5°C or −18°C.

Onion seeds are short-lived for only six months under room temperature while seed viability improves with cold storage. Fonseca *et al.* (1980) reported that seeds in ambient temperature began to deteriorate faster and exhibit lower germination and low seedling vigour. The decline of seed viability was slower at cooler temperature (Harrington, 1972), but at low temperature, seeds require moisture proof container especially when the relative humidity is high for preserving seed viability. Among many physiological manifestation of seed deterioration, reduced germinability has been widely accepted as major criterion (Abdul-Baki and Anderson, 1972) which could be minimised predominantly by conserving the seeds

at low temperature and low moisture or relative humidity. The period of storage of seeds depends on the individual requirement and purpose for which seeds are stored. Accordingly, one can select economically viable temperature and container for storage. In this study, seed viability of 75 per cent was successfully preserved for five years at 5°C. Both polyethylene bags and low temperature are easily available and economically possible. According to Villareal *et al.* (1972), polyethylene bags are as good as laminated foil in dry conditions and the germination of seeds from paper bags was the poorest when stored at high relative humidity. High humidity or moisture of seed was more harmful when stored in small encloser than ambient storage (James, 1967). The laminates are relatively impermeable to moisture and thus retained high viability of seeds.

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