

Storage Conditions for *Allium cepa*, L., Pollen¹

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Abstract. Freshly dehisced pollen of *Allium cepa* L. was stored under various conditions of temperature and relative humidity for up to 198 days. One series of treatments was freeze dried before storage. The degree of viability was determined by germination percentages at periodic intervals. Germination of approximately 60% of the initial germination was maintained in pollen samples freeze dried and stored at -18° and 5% relative humidity. Without freeze drying, approximately 38% of initial germination was maintained in samples of onion pollen stored 198 days at -18° and 10% relative humidity. Pollen stored at -18° and 80% relative humidity germinated 34% of initial germination after 56 days of storage and gradually declined to 4% by 170 days.

INTRODUCTION

PLANT breeders may overcome differentials in crop plant flowering times by storing pollen of the desired male plant until pollination can be performed. The literature indicates that pollen can be maintained for prolonged periods at low temperature and low relative humidity (1, 2, 3, 4, 5, 6, 7, 8, 9, 10). Storage conditions, however, may be specific for different plant species. The objective of this investigation was to study the effects of environmental factors such as temperature and relative humidity on onion pollen storage.

MATERIALS AND METHODS

Plants of *Allium cepa* L., cv. 'Yellow Sweet Spanish' were grown on Utah State University's Greenville Farm in North Logan. Ten uniform, randomly selected, male fertile plants in full bloom were brought into the greenhouse. Each plant had from 3 to 5 umbels.

Samples of pollen were collected from the plants between 1300 and 1700 hr and placed in a clean petri dish from which the pollen was transferred to 30 vials (5 vials per treatment). The open vials were stored in desiccators that were placed in controlled temperature rooms. The humidity in the desiccators were controlled by means of calcium chloride salt. The desiccators containing the vials were stored as follows: A) 26°C at 10% and 30% relative humidity; B) 16° at 10% and 45% relative humidity; C) 7° at 10% and 95% relative humidity; D) 0° at 10% and 80% relative humidity; E) -18° at 10% and 80% relative humidity; and F) freeze-dried followed by storage at -18° and 5% relative humidity. The freeze drying was done by pouring liquid nitrogen over the pollen-filled vials for 30 min. The vials were then placed in a desiccator at 3 cm of Hg pressure for 10 hr.

The viability tests were made every 3 days during the first 9 days, then once a week for 3 weeks, and finally at intervals of 2 weeks until the experiment terminated. Viability of the stored pollen grains was judged on the basis of germination on an artificial medium consisting of 1 g agar in 75 ml distilled water with the addition of 25 ml of freshly prepared onion bulb extract. A Camel's hair brush was dipped into the vials, and the pollen was sown on each medium by holding the brush over

the medium and moving the bristles of the brush with forceps to scatter the pollen grains. Germination percentages were determined after 5 hr incubation at 25° by counting random samples of 100 pollen grains per 3 replications for each storage condition.

RESULTS AND DISCUSSION

The results of the longevity tests, expressed as a percent of initial germination, are presented in Fig. 1 and 2. Pollen vigor was not greatly affected by storage at the low temperatures and low relative humidities. However, there was a definite decrease in the viability of the pollen stored at 26°C as compared to that stored at the lower temperatures after only 3 days of storage. The decrease in pollen viability was accentuated with time in storage and relative humidity. For example, when stored at 26° and 10% relative humidity, no pollen germinated after 16 days of storage. By contrast, when stored at 10% relative humidity and 16° , 7° , 0° and -18° , the pollen, although greatly reduced as compared to the initial germination, remained viable for 23, 30, 72 and 198 days, respectively. Likewise, as the storage temperature decreased, pollen viability could be maintained at the higher relative humidities for a longer period of time. At 95% relative humidity and 7° , pollen grains became moist and clumped together. Only about 1% of the pollen grains germinated after 23 days under these conditions. There was essentially no difference in pollen viability up to at least 100 days to pollen freeze-dried and stored at -18° and 5% relative humidity compared with samples at -18° and 10% relative humidity without freeze drying.

Our data are in agreement with Linskens' (6) statement that pollen viability depends on the degree to which vital activity can be reduced without reducing the germinating power. Based on these data, humidity and temperature are very decisive to onion pollen longevity as viability is best retained with low temperatures and low relative humidities.

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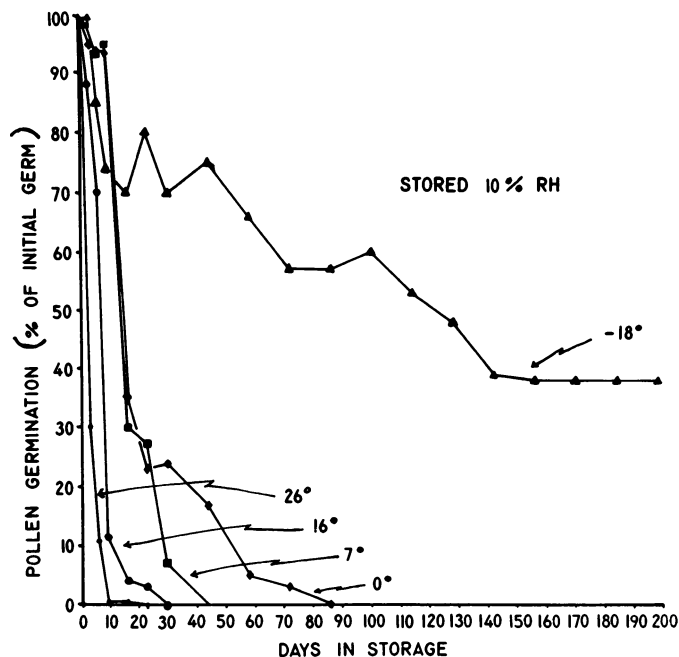


Fig. 1. Germination response of *Allium cepa* pollen stored at various temperatures and 10% relative humidity.

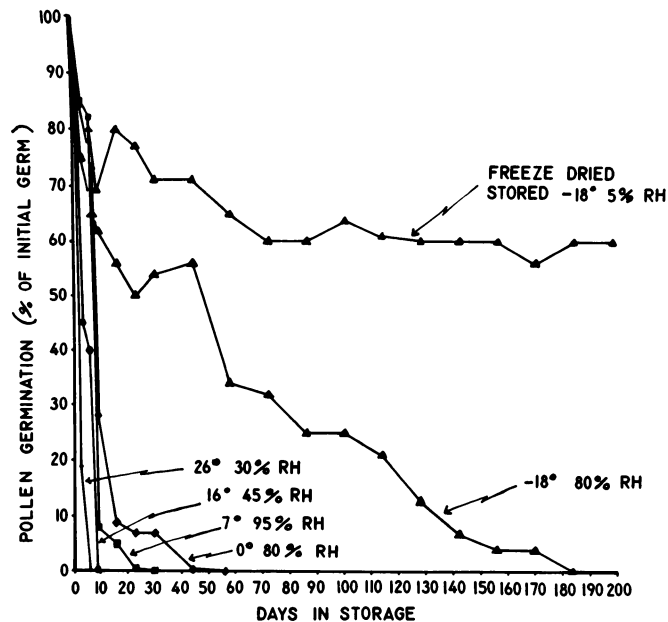


Fig. 2. Germination response of *Allium cepa* pollen stored at various temperatures and various relative humidities.

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Thinning Peaches with 3-Chlorophenoxy- α -Propionamide^{1,2}

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Abstract. Several peach varieties were sprayed with 3-chlorophenoxy- α -propionamide (3-CPA) at different stages of fruit development. The timing of the application was critical, and varieties differed greatly in their thinning response. The 'Ranger' variety was thinned with ease, but attempts to thin 'Cardinal' with 3-CPA were unsuccessful. Fruit thinning apparently increased the cold hardiness of the flowers during the following bloom period. Several spray additives were found to increase the thinning effectiveness of 3-CPA.

INTRODUCTION

SEVERAL growth regulators promote the abscission of peaches when applied after shuck fall (1, 2, 5, 6, 11, 13). However, only 1 of these, 3-chlorophenoxy- α -propionamide (3-CPA), has proved to be worthy of commercial development as a peach thinner. A 3-CPA formulation³ has been available for commercial use since 1966.

Recent reports indicate that post bloom peach thinners, as represented by naphthaleneacetic acid (NAA),

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³Fruitone CPA—7.9% 3-CPA + 0.4% 3-CP, Amchem Products, Inc., Ambler, Pa. This formulation was used in all experiments reported in this paper.

⁴Method proposed by Weaver (unpublished), described by Leuty and Bukovac (9).

are most effective when applied at the beginning of endosperm cytokinesis (9, 10). At this time endogenous auxins in the ovule reach a peak in concentration (10, 12). Pericarp length is a good indicator of this stage of development (9), but most researchers have used ovule length as a guide for timing sprays in recent years. Stahly and Thompson (12) reported the beginning of endosperm cytokinesis in 'Halehaven' when the ovule length was about 8.5 mm, and this ovule size apparently coincides with the critical stage of development in many varieties.

This paper reports experiments conducted over several years with 3-CPA, in which the regulant was applied to several peach varieties at different stages of fruit development.

MATERIALS AND METHODS

All experiments were randomized complete blocks with single-tree plots and at least 4 replications. The