

# Long-Term Storage of Raspberry Pollen

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Plant breeders are sometimes faced with the necessity of storing pollen for extended periods of time. When pollen is stored in such standard facilities as a refrigerator or home freezer, it remains viable for only a few weeks at best. The development of a reliable method to store pollen for extended periods would facilitate crosses among plant with poor blooming synchrony. While investigating *in vitro* raspberry pollen germination, we found a simple storage method that greatly prolonged pollen viability.

Pollen of red raspberry, *Rubus idaeus* cvs. Fallgold, Fallred, Southland, and Heritage and purple raspberry, *R. neglectus* cv. Purple Autumn was collected from flowers picked one day before anthesis. The flowers were allowed to dry at room temperature, approximately 23°C, for one to two days until the anthers dehisced. The pollen was then deposited in small Petri plates which in turn were stored in covered, but not hermetically sealed, plastic food boxes. Humidity within the boxes was lowered by placing a layer of  $\text{CaCl}_2 \cdot \text{XH}_2\text{O}$  on the bot-

tom. Cotton batting then covered the  $\text{CaCl}_2$ . The pollen was stored at five different temperatures (Table 1).

Two separate experiments tested the viability, rated as percent germination, of raspberry pollen under differing regimes. One determined longevity within a range of temperatures, the other the possibility of prolonged storage at the most favorable temperature.

Samples were withdrawn from the boxes at intervals and checked for viability on a modified Brewbaker and Kwack medium (1). The pollen was germinated for a period of 4 hours at 25°C. One hundred pollen grains per treatment were observed for germination. A pollen grain was recorded as germinated if it had at least a distinct tubelike protuberance arising from the pollen wall. No distinction was made between short and long pollen tubes. Two successive readings of less than 1% germination were required to declare the pollen as inviable.

As expected, pollen viability at room temperature declined quickly,

Table 1. Storage life of red raspberry pollen at several temperatures.

Storage temperature (°C)	Storage life (weeks) <sup>a</sup>		
	Fallred	Fallgold	Heritage
23	1	—	not tested
3	6	—	not tested
-15	5	3	3
-20	21	3	4
-40	> 35	4	5

<sup>a</sup>Number of weeks until < 1% germination was observed.

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Table 2. Germination of three raspberry cvs. at  $-40^{\circ}\text{C}$  (%).

Cv.	Storage time (months)							
	0	2	3	4	5	6	12	51
Fallred	79	61	68	77	61	80	—untested—	
Purple Autumn	49	28	26	37	27	38	34	—
Southland	63	59	61	64	56	68	76	34

and in less than one week the pollen was dead (Table 1). Pollen stored at  $3^{\circ}\text{C}$  germinated for six weeks. The coldest temperature,  $-40^{\circ}\text{C}$ , proved to be the best. This was supported by long-term storage of Fallred, Southland, and Purple Autumn pollen (Table 2). These cultivars were tested as above using only the  $-40^{\circ}\text{C}$  temperature. Pollen of all three cultivars maintained a high level of germination through the time period. Purple Autumn declined after the initial testing, but then remained at about 33% germination. The results in both tables demonstrated that the cultivars differ in storage life.

One sample of Southland pollen was stored for over 4 years at  $-40^{\circ}\text{C}$ . Approximately 34% of the 4-year old Southland grains germinated on the

medium. Its ability to effect fertilization was demonstrated by using it to pollinate Fallred and Heritage flowers. The pollen set 66% of the pistils of Fallred and 41% of those from Heritage. After proper treatment, the seed from these crosses germinated and produced seedlings. The plants are normal in vigor, morphology, and have produced fruit.

As seen, this technique for pollen storage is uncomplicated but effective. The major factors in the process are 1) storing fresh pollen and 2) maintaining a continuous low temperature and humidity until the pollen is used.

#### Literature Cited

1. Hellman, E. W., R. M. Skirvin, and A. G. Otterbacher. 1982. Unilateral incompatibility between red and black raspberries. *J. Amer. Soc. Hort. Sci.* 107:781-784.

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