

Pollination of Squash Before and After the Day of Anthesis

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Cucurbit breeders usually pollinate on the morning of anthesis for both the male and the female flowers. Squash plants to be used as parents generally have male flowers open each day but may not have a female flower at anthesis on some days, preventing self pollination then. This is particularly a problem with plants grown in pots in the winter greenhouse, since they generally have fewer flowers each day than those grown in the field. It could be advantageous to be able to make pollinations before or after anthesis so that self or cross pollinations could be made on days when plants do not have open male and female flowers.

Munger (7) found that pistillate flowers of cucumber are receptive to pollination for at least 24 hours after anthesis. Pollinations he made in the winter greenhouse on the afternoon of anthesis or on the following day had good set of fruit with normal amount of seed. Wehner and Horton (10) confirmed that cucumber pollinations can be successfully made in the greenhouse on the day after anthesis.

Cucurbita pepo can also be successfully pollinated after the morning of anthesis. Summer squash pollinations I made in a winter greenhouse with open staminate flowers and with pistillate flowers on the morning after anthesis were successful.

The ability of cucurbits to produce seed from afternoon pollinations in a winter greenhouse, where the temperature can be controlled, does not guarantee that afternoon pollinations will be successful on days when high temperature may affect gamete viability. Munger (7) reported that cucumber pollinations made in the field in New York on the afternoon of anthesis were ineffective although those made in the Philippines were successful. Wehner and Horton (10) concluded that cucumber pollinations made when the temperature exceeded 35 C at North Carolina were unsuccessful.

Pistillate flowers of summer squash are receptive to pollination for at least 48 hours before anthesis. Viable seed was produced in the field and greenhouse at Geneva NY when staminate flowers at anthesis were used to pollinate pistillate flower buds that would not reach anthesis until one or two days later. Kumazama and Minikawa (6), Kodama (5), and Hayase (3) also found that *Cucurbita* stigmas are receptive to pollination

on the morning of the day before anthesis. Hayase and Hiraizumi (4) reported that *Cucurbita* pollen germination was poorer on the morning of anthesis than on the previous evening but Hayase (3) and Kodoma(5) determined that pistillate flowers were more receptive to pollination on the morning of anthesis than on the previous day.

Preanthesis pollination has the advantage of eliminating the need to enclose the female flower before pollination in order to exclude pollinating insects. Another possible advantage of bud pollination is that it may be useful for difficult interspecific crosses. Hayase (1) determined that pollen tube growth was slower for unsuccessful interspecific *Cucurbita* pollinations than for successful crosses, and he reasoned that bud pollination would permit additional time for the pollen tubes to grow sufficiently to achieve fertilization.

Male as well as female gametes of *Cucurbita* are functional before anthesis. Hayase (2) and Sisa (8) reported that squash pollen had good germination on the day before anthesis. I obtained fruit with viable seed when pollen extracted with a dissecting needle from staminate flowers of *C. pepo* on the morning before anthesis was used to self pollinate open pistillate flowers.

C. pepo pollen may be viable on the day after anthesis. Some pollinations I made in the greenhouse with pistillate flowers at anthesis and staminate flowers on the day after anthesis were successful, but fruit set was less than when both flowers were at anthesis when pollinated.

Pollinating squash on weekends can be avoided without missing any pollinations by using open staminate flowers and pistillate flowers that will not be open until Saturday to pollinate on Friday. Monday pollinations can be made with staminate flowers open that day and pistillate flowers at anthesis the previous day, taking care to prevent insect pollination. Pollinations are possible with flowers opening several days apart. *C. pepo* pollinations were successfully made with male flowers on the day before anthesis and female flowers on the day after anthesis.

Pollen storage offers another opportunity to make pollinations with flowers reaching anthesis on different days. Hayase (3) stored *Cucurbita* pollen for 32 hours

at 10 C, then used it to successfully pollinate pistillate flowers at anthesis. Although pollen of many species can have a long storage life if kept in a freezer at low humidity, this treatment is lethal for *Cucurbita* pollen. Wang and Robinson (9) found that freezing and low humidity both caused *Cucurbita* pollen to quickly lose viability, but pollen life was extended for as much as two weeks by storing male flower buds in a refrigerator at high humidity.

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