

Effect of Pollination on Pumpkin Production, Plateau Experiment Station, 2000

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Interpretative Summary

Hand pollination or application of GA through foliar sprays had little effect on production of 'Howden' pumpkins.

Introduction

Producers of pumpkins have reported that fruitset and yields of 'Howden' pumpkins have been decreasing in the Plateau area of Tennessee in recent years. Diseases such as anthracnose are expected to be part of the problem, but pollination is expected to be another problem in lower yields. Honeybee populations have reduced in number in recent years due to insect and disease problems. Pumpkin plants produce male and female blooms and pollen transfer to female blooms is essential to successful pumpkin production. Squash trials have indicated that weather conditions affect the ratio of male to female blooms. Blooms open early in the morning and are closed by noon on the Plateau. Chemical applications have been used in some crops to substitute for pollen transfer and possibly change gender of blooms, both of which lead to a higher fruit set. An experiment was conducted at the Plateau Experiment Station at Crossville, TN in 2000 to evaluate yield of pumpkins using hand pollination and chemical applications of GA to promote fruit set.

Materials and Methods

The site was prepared for planting by conventional tillage methods. Fertilizer was broadcast at 400 lb/A of 15-15-15 and incorporated with a disk on June 13. Bensulide (Prefar) was applied at 6.0 lb ai/A on June 13 and soil incorporated with the final disking. Plots were direct seeded with 'Howden' pumpkin on June 13. Plot size was one row, 12 by 20 ft. Each row contained 5 hills with 3 seeds/hill. After germination, hills were thinned to 2 plants/hill. Experimental plot design was a randomized complete block with four replications. A preemergence application of clomazone (Command) at 0.375 lb ai/A was made on June 13 for weed control.

Border rows of several cultivars of pumpkins were planted to provide pollen for the test. Pollination treatments were initiated on July 24, and were continued daily for three weeks. Male blooms were present at the initiation of treatments, but female blooms started soon afterward. Only one day of pollination and spraying was missed during this period due to rain. Chemical sprays and pollen transfers were made at approximately 9 AM each morning. Pollen was sufficiently dry at this time of day to be easily separated from the blooms. Pollination treatments were 1) check - no pollination or spraying, 2) pollen from 'Howden' blooms transferred to female blooms, 3) pollen from a mix of

cultivars transferred to female blooms, and 4) GA at 250 ppm sprayed on plant leaves to runoff. The form of gibberellic acid used was GibGro 4 ls, a 4% liquid.

Insect control was by esfenvalerate (Asana) at 0.05 lb ai/A alternated with carbaryl (Sevin) at 1.0 lb ai/A on a 7 to 10 day frequency. Fungicides were azoxystrobin (Quadris) at 0.25 lb ai/A alternated with a combination of chlorothalonil (Bravo) at 2.0 lb ai/A plus myclobutanil (Nova) at 0.125 lb ai/A applied with each insecticide treatment. Pumpkins were harvested on October 5. Harvested pumpkins were sorted according to sizes of over 20 lb, 15 to 20 lb, 10 to 15 lb, and less than 10 lb. Number and weight of pumpkins in each weight range were recorded. All data were analyzed by analysis of variance methods, and means were separated by Duncan's multiple range tests at the 0.05 level.

Results and Discussion

Treatment had little effect on pumpkin productivity (Tables 1 and 2). Yield in tons per acre was not significantly different due to treatment for any size classification. Average pumpkin weight was higher with the GA treatment than with all treatments except cross pollination with 'Howden' pollen.

Little about the effects of pollination on pumpkin fruit set was learned from this study. Bee activity was good, and the season was excellent for pumpkin production. The effects of cross pollination may have been offset by having different cultivars in the border rows, but pumpkins are likely self fertile. In studies with squash, environmental conditions were found to have a tremendous effect on the sex of blooms. In some growing conditions, few female blooms were set in those studies. It was hoped that GA could be used to change male to female blooms in this pumpkin trial.

More research is needed to find ways to improve fruit set in pumpkins.

Table 1. Yield in tons per acre of different size classes of pumpkin with pollination treatments at The University of Tennessee Plateau Experiment Station at Crossville, 2000.

Treatment	total yield - tons/A	Pumpkins< 10 lb tons/A	Pumpkins 10-15 lb tons/A	Pumpkins 15-20 lb tons/A	Pumpkins >20 lb tons/A	Pump average wt - lb
check	14.8 a ^z	0.5 a	3.6 a	6.4 a	3.8 a	15.8 b
Howden pollen - hand crossed	19.8 a	0.5 a	3.8 a	7.7 a	7.7 a	17.5 a

mixed pollen - hand crossed	18.4 a	0.5 a	3.6 a	7.3 a	4.9 a	15.0 c
GA spray	12.5 a	0.1 a	2.5 a	3.1 a	6.5 a	18.1 a

^z Means within a column followed by the same letter are not significantly different at the 0.05 level of probability, Duncan's multiple range tests.

Table 2. Yield in number per acre of different size classes of pumpkins with different pollination treatments at The University of Tennessee Plateau Experiment Station at Crossville, 2000.

Cultivar	total yield - no./A	Pumpkins < 10 lb no./A	Pumpkins 10-15 lb no./A	Pumpkins 15-20 lb no./A	Pumpkins > 20 lb no./A
check	1906 a ^z	227 b	590 a	771 a	318 a
Howden pollen - hand crossed	2223 a	136 b	590 a	862 a	635 a
mixed pollen - hand crossed	2450 a	590 a	590 a	862 a	408 a
GA spray	1407 a	91 b	410 a	363 a	544 a

^z Means within a column followed by the same letter are not significantly different at the 0.05 level of probability, Duncan's multiple range tests.

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This research represents one season's data and does not constitute recommendations. After sufficient data is collected over the appropriate number of seasons, final recommendations will be made through research and extension publications.