on trees on M.9/MM.106, but the differences were not always statistically significant between the interstems (Fig. 1). Average fruit size was not affected by rootstock or interstem during the 5 season it was measured (data not presented).

If cumulative yield/ha is calculated using actual spread as the in row spacing and this distance plus 2.5 m for between row spacing, cumulative yield for M.9/MM.106 was 67.3 tons/ha; with M.9/MM.111, 46.8 tons/ha. Even though tree density was much higher at 800 trees/ha for trees on MAC.9, calculated cumulative yield/ha was only 33.9 tons. Much lower than the interstem trees. Long-term productivity of other cultivars on MAC.9 has not been high in previous Ohio studies (1).

MAC.9 and interstems were successful in reducing tree size of 'Mutsu', however, trees on interstems were more productive. Although they were not significantly higher, yields of trees on M.9/MM.106 were consistently slightly higher than trees on M.9/MM.111 over the 9 years of this study.

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Fruit Set of Eight Rabbiteye Blueberry (*Vaccinium ashei* Reade) Cultivars in Response to Gibberellic Acid Application

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Abstract

Eight rabbiteye blueberry (*Vaccinium ashei* Reade) cultivars were treated with gibberellic acid (GA_3) under greenhouse conditions to determine the growth regulator's effectiveness in inducing parthenocarpic fruit set. Cultivars were 'Baldwin', 'Bluebelle', 'Briteblue', 'Brightwell', 'Climax', 'Premier', 'Tifblue', and 'Woodard'. All cultivars had less than 10% fruit set in the absence of pollination or GA_3. Fruit set of most cultivars was increased to 25% or more by a single application of 250 mg/L GA_3 applied at stage 5 to 6 of development (just before anthesis). A second application of GA_3 7 to 10 days later further increased fruit set of all cultivars except 'Premier' and 'Woodard'. Fruit set in response to GA_3 ranged from 30% for 'Briteblue' to over 74% for 'Brightwell'. Average weight of the parthenocarpic fruit ranged from 0.62 g/berry for 'Briteblue' to 1.08 g/berry for 'Baldwin'. These results suggest that exogenously applied GA_3 can induce parthenocarpic fruit on many rabbiteye cultivars, although the resulting fruit set and size may vary.

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Introduction

Barker and Collins (2) demonstrated that parthenocarpic fruit set could be induced in blueberry by applications of gibberellic acid (GA_3). Subsequent experiments with the growth regulator indicated that the resulting fruit set was often highly variable, particularly for rabbiteye blueberries (1,4,5,11,12). However, recent research by NeSmith and Krewer (13) disclosed that the degree of activity of GA_3 depends on the stage of flower bud development at the time of application. It was further demonstrated that GA_3 could be used to induce fruit set of freeze damaged blueberries (15). Information on rabbiteye response to different rates of GA_3 has recently been reported (14). GA_3 has become widely used by growers, particularly in the southeastern U.S., to increase fruit set and yield of rabbiteye blueberries which typically experience poor fruit set due to pollination problems (8,10) or early spring freeze damage (15).

Much of the research with GA_3 to date has been with one or two rabbiteye cultivars (13,14,15). Hence, there has been uncertainty as to how fruit set of other cultivars might respond to the growth regulator. This research was conducted to determine the extent of parthenocarpic fruit set of eight rabbiteye blueberry cultivars in response to applications of gibberellic acid.

Materials and Methods

One-year-old potted blueberry plants were obtained from a commercial nursery in the fall of 1994. Cultivars selected were 'Baldwin', 'Bluebelle', 'Briteblue', 'Brightwell', 'Climax', 'Premier', 'Tifblue', and 'Woodard'. The blueberries were taken to the Georgia Station (Griffin, GA) where they were subjected to 700 hours of artificial chilling (temperature <7 C). This amount of chilling more than met the requirement for these cultivars (7). After chilling, the blueberries were moved to a greenhouse to force bud break. When a majority of flowers were at stage 5 to 6 of development (just prior to anthesis) (16), GA_3 was applied as described by NeSmith and Krewer (13). There were three growth regulator treatments for each cultivar: 1) no GA_3, 2) a single application of GA_3 at stage 5 of bud development, and 3) an application of GA_3 at stage 5 of bud development followed by a second application 7 to 10 days later. Cultivars were sprayed individually according to their stage of flower development. There were 6 plants of each treatment for each cultivar. A growth regulator application consisted of spraying the whole plant to the point of drip with a solution of 250 mg/L of GA_3 (ProGibb 4%, Abbott Laboratories, Chicago, IL) and the nonionic surfactant X-77 at 0.25%.

After treatment, plants remained in the greenhouse to monitor development

Table 1. Total flower number and fruit set for 8 rabbiteye blueberry cultivars subjected to no GA_3, 1 GA_3 application (single), or 2 GA_3 applications (double)[z].

	Total Flower Number per plant			Total Percent Fruit Set per plant		
Cultivar	No GA_3	Single	Double	No GA_3	Single	Double
Baldwin	146ab	197a	181a	2.9ab	24.9ac	44.1b
Bluebelle	143ab	145ac	127bcd	2.7ab	40.6a	51.5ab
Briteblue	72c	106bc	89d	0.0b	6.9c	30.1b
Brightwell	135ac	167ab	166ab	6.2ab	17.4bc	74.6a
Climax	104bc	81c	105cd	2.0ab	45.1a	56.3ab
Premier	187a	172ab	147ac	1.4ab	36.7ab	38.3b
Tifblue	142ab	191a	174a	8.6a	27.8ab	49.4ab
Woodard	176a	188a	188a	3.9ab	32.0ab	37.2b

[z] Values within a column followed by the same letter were not significantly different at the 5% probability level.

and fruit set. Flower buds were counted on each plant and were classified according to stage of development the day of growth regulator application. The average number of flowers per bud was determined later by counting flowers for 100 buds of each cultivar. This number was used to estimate the total number of flowers per plant. Fruit set was assessed six weeks after treatment by counting the number of fruit on the plants and dividing by the number of flowers. As fruit matured, 20 to 30 fruit of each cultivar were harvested and weighed individually. Fruit weight was not assessed for the no GA_3 treatment due to the lack of fruit available. All data were subjected to analysis of variance for a factorial experiment with cultivar and GA_3 treatment as main effects. Means were separated by least significant difference tests.

Results and Discussion

Table 1 shows the total number of flowers per plant for each cultivar and GA_3 treatment combination. Generally there was more than 100 flowers per plant from which fruit set estimates were made. Fruit set for each cultivar and GA_3 treatment combination is also listed in table 1. These data are expressed as percent of fruit set for all flowers regardless of the stage of development. Fruit set for control plants receiving no GA_3 was less than 10% for all cultivars. Such poor fruit set is expected on rabbiteye blueberry plants where there is little or no cross pollination (9) as was the case in the greenhouse. Most cultivars showed substantial increases in fruit set following a single application of GA_3. Notable exceptions were 'Brightwell' and 'Briteblue'. The remaining cultivars had 25% or greater fruit set following one application of the growth regulator. A second application of GA_3 further increased fruit set of most cultivars. Exceptions were 'Premier' and 'Woodard'. 'Brightwell' displayed a tremendous increase in fruit set with the second application of GA_3.

Table 2 shows data similar to Table 1, except that the numbers are based only on flower stages 4 through 7. Previous research (13) indicated that GA_3 applied at these stages of growth had a positive influence on fruit set, with stage 5 being the most receptive stage. Expressing fruit set as a percentage of flowers at stages 4 through 7 at the time of treatment revealed that two applications of GA_3 set fruit on over 50% of those flowers for all cultivars. 'Climax', 'Baldwin', and 'Tifblue' all set fruit on over 70% of the flowers when buds were at stages 4 to 7 at the time of growth regulator applications. 'Brightwell' had more than 90% fruit set when expressed as percent of flowers at stages 4 to 7 with two applications of GA_3.

The average flower number per inflorescence, or flower cluster, differed

Table 2. Number of flowers at stages 4-7 and fruit set for 8 rabbiteye blueberry cultivars subjected to no GA_3, 1 GA_3 application (single), or 2 GA_3 applications (double).[z]

	Stages 4-7 Flower Number per plant			Stages 4-7 Percent Fruit Set per plant		
Cultivar	No GA_3	Single	Double	No GA_3	Single	Double
Baldwin	101a	123ab	113ab	4.5ab	43.1ab	71.4ab
Bluebelle	118a	119ab	113ab	3.1ab	48.2a	56.3b
Briteblue	47b	53c	45c	0.0b	13.8c	59.5ab
Brightwell	106a	129a	124a	7.7ab	22.8bc	91.6a
Climax	90ab	58bc	69bc	2.5ab	62.1a	78.7ab
Premier	108a	103ac	88ac	2.1ab	61.0a	62.3ab
Tifblue	95a	131a	111ab	12.4a	40.0ab	71.7ab
Woodard	115a	149a	114ab	6.3ab	39.6ab	52.3b

[z] Values within a column followed by the same letter were not significantly different at the 5% probability level.

among the cultivars (Table 3). 'Baldwin' had the highest number of flowers per cluster and 'Climax' had the lowest number. Lyrene and Goldy (9) reported flower number per cluster for several rabbiteye cultivars. Those cultivars common to this study and the flowers per cluster in the 1983 research were 'Briteblue' (6.0), 'Tifblue'(6.1), and 'Woodard' (6.8). The reasons for differences in flower numbers per cluster for the common cultivars of the two experiments are not known, but the relative ranking was similar.

Average weight of the fruit resulting from GA_3 applications is shown for the various cultivars in Table 3. There was no difference in fruit weight between the single and double applications, so data for these treatments were combined. There were not enough fruit available from those plants not treated with the growth regulator to obtain fruit weight. Cultivars differed substantially in fruit weight. 'Baldwin' had the heaviest fruit, followed by 'Tifblue'. The parthenocarpic fruit weight for these two cultivars was not greatly different than that reported for fruit of several rabbiteye cultivars resulting from pollination (6). However, fruit weight of the other cultivars in this experiment were less than the pollinated fruit weights reported by Hellman and Moore (6).

Others have reported that blueberry fruit resulting from GA_3 applications are often lighter and less seedy (5,12,15,17). However, GA_3 applications do not always result in reduced fruit weight (1,3). Even though fruit resulting from the growth regulator can be small, they are still usually of marketable quality. Mainland and Eck (12) concluded that the disadvantages of small fruit would be more than offset by increased yield in years when fruit set was low due to poor pollination. The same would be true for years when moderate freeze damage greatly suppresses yields (15).

These results have practical implications for the rabbiteye blueberry industry. It appears that most rabbiteye cultivars will set fruit in response to applications of GA_3 although, the resulting fruit weight may vary. Multiple applications of GA_3 will likely give the best results for most cultivars, as increased fruit set was observed for double as compared to single applications. Also, multiple applications did not reduce average fruit weight as compared to a single application. The data from this experiment confirm the importance of making applications at the proper stages of growth. Growers should consider making the first application of GA_3 when a majority of blooms are at stage 5 to 6 of development. This will result in a few flowers being past this stage. The initial application should be followed by at least one other application around 10 days later.

Table 3. Average number of flowers per cluster and average berry weight of eight rabbiteye blueberry cultivars in response to GA_3 application.[z]

Cultivar cluster (g)	Flower number per	Berry Weight
Baldwin	5.8a	1.08a
Bluebelle	5.3bc	0.59de
Briteblue	5.3bc	0.56e
Brightwell	5.6ab	0.62de
Climax	4.5d	0.69cd
Premier	5.0c	0.80bc
Tifblue	5.3bc	0.87b
Woodard	5.2bc	0.65de

[z] Values within a column followed by the same letter were not significantly different at the 5% probability level.

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Call for Wilder Medal Nominations

The Wilder Medal Committee of the American Pomological Society (APS) invites nominations for the 1997 Wilder Silver Medal Award. All active members of APS are eligible to submit nominations. The Wilder Medal was established in 1873 by the American Pomological Society in honor of Marshall P. Wilder, the founder and first President of the Society. The award consists of a beautifully engraved medal which is presented to the recipient at the annual meeting of APS, held during the ASHS Annual Meeting.

The Wilder Medal is conferred on individuals or organizations which have rendered outstanding service to horticulture in the broad area of pomology. Special consideration is given to work relating to the origination and introduction of meritorious varieties of fruit. Individuals associated with either commercial concerns or professional organizations may be considered as long as their introductions are truly superior, and have been widely planted.

Significant contributions to the science and practice of pomology other than fruit breeding will also be considered. Such contributions may relate to any important area of fruit production such as rootstock development and evaluation, anatomical and morphological studies, or unusually noteworthy publications in any of the above subject areas.

Specific nomination guidelines can be obtained by contacting committee chairperson, Dennis J. Werner, Department of Horticultural Science, Box 7609, North Carolina State University, Raleigh, NC 27695-7609 (phone 919-515-1226, e-mail = Dennis-Werner@NCSU.edu).

Please submit your nominations by May 15, 1997. Thank you.