

THE POTENTIAL OF AUTUMN-BEARING RED RASPBERRIES AS AN ANNUAL CROP FOR FLORIDA

ROBERT J. KNIGHT, JR., JONATHAN H. CRANE,
HERBERT H. BRYAN, WALDEMAR KLASSEN, BRUCE SCHAFFER
University of Florida, IFAS
Tropical Research and Education Center
18905 S.W. 280 Street
Homestead, Florida 33031-3314

CARLOS F. BALERDI
Dade-IFAS Cooperative Extension Service
18710 SW 288 Street
Homestead, Florida 33030-2309

Additional index words. *Rubus idaeus*, primocane fruiting, annual cropping, crop range extension, south Florida, winter fruit crops.

Abstract. Need exists to supplement farmers' income eroded by competition from offshore. Local availability of imported red raspberries at premium prices suggested the advisability of growing them in Dade County as an annual crop for winter and spring markets. Dormant plants of 'Autumn Bliss' and 'Heritage' were set in the field in late January 1996, broke dormancy immediately and yielded the first ripe fruit in late March. Bearing continued throughout April and May, first from the old primocanes that had borne earlier (in Michigan) in the summer and fall of 1995, and later from young primocanes that grew in the field at Homestead. Results to date support the feasibility of this crop, with a potential yield at high density of as much as 3,225 pounds per acre.

Destruction by Hurricane Andrew of traditional fruit crops grown in southeastern Florida (lime, avocado, mango) freed newly-vacant land available for other crops and focused growers' attention on the need for crops less vulnerable to the vagaries of climate. Intensification of offshore competition brought about by implementation of the North American Free Trade Agreement (NAFTA) also served to emphasize the need for new crops. Since Hurricane Andrew, acreage planted to carambola, lychee and longan (three prominent examples) has expanded (Crane, personal communication). At the present time, any crop with a perceived potential for profit is of wide interest. In the fall of 1995, Dr. Paul M. Lyrene suggested to us that red raspberries be tested in southern Dade County as an off-season crop with high return potential. He pointed out that in Spain, summer-cropping red raspberries have been transplanted from their normal zones of culture after the chilling requirement has been met and brought into winter fruit production in southern coastal areas of the country. The availability in Florida supermarkets of imported fruit from fall-fruiting (primocane) red raspberries, at premium prices, also indicated the desirability of evaluating this crop at Homestead. Previous efforts to grow summer-ripening raspberries in Florida indicated

that 'Dormanred' was the only cultivar tolerant of hot, humid conditions, and its quality was poor (Andersen et al., 1995).

The objective of this research was to investigate the potential of primocane-fruiting raspberries as an annual, winter-grown crop in southern Florida. One cultivar known to us was 'Heritage', originated by G. L. Slate of Cornell University at Geneva, New York (Lawrence, 1980), selected in 1960 and tested as New York 696. Named and released in 1969, it has since become the world's predominant primocane-fruiting red raspberry cultivar (Daubeny et al., 1992). In regions with relatively high summer temperatures, such as Maryland, 'Heritage' canes produce longer laterals, contributing to increased yields. It was also found to show a moderate degree of resistance to root rot caused by *Phytophthora erythroseptica* in southwestern Washington state (Babbit et al., 1981). This cultivar thus appeared a prime candidate for testing under Florida conditions. 'Autumn Bliss', a British cultivar now grown in Guatemala and Chile for export to North America was also suggested for trial by a nurseryman because of its precocity and large fruit size. Our strategy thus was to test 'Autumn Bliss' and 'Heritage' for their field performance in south Florida during wintertime.

Materials and Methods

Land preparation in early January 1996 included the incorporation of Florida Organix processed sludge at the rate of 3 tons per acre. Wire supports and overhead and drip irrigation were provided. Support was provided by three wires anchored to a creosoted post at the end of each of four 90-foot rows, reinforced by 5-foot steel re bars (normally used for stake-grown tomatoes) placed at 10-foot intervals in the row.

Drip irrigation was applied throughout the experiment at the rate of 0.64 gallons per minute per 100 feet for 3 hours daily (10:30 a.m. to 12:00 m. and 3:00 to 4:30 p.m.). Overhead irrigation at the rate of ½ inch per hour was applied for frost protection on only one occasion, February 17th.

Fertilizer and nutrient applications were as follows: 1600 pounds per acre of 8-16-6 (N-P-K) analysis were incorporated into the soil prior to planting, and at time of planting plants were drenched with liquid Sol-u-gro 12-48-8 at the rate of 5 pounds per 100 gallons. On February 26, one month after planting, the following were applied: ¼ pound per plant of granular 8-3-9; 5 lbs/gallon of Sequestrene 138, to supply elemental iron, and 5 lbs/100 gallons each of Fer-a-gro and potassium nitrate. Granular fertilizer was applied again in midsummer.

We bought 250 dormant, bare-root plants each of 'Autumn Bliss' and 'Heritage' raspberry plants from a Michigan nursery at a cost of \$0.75 per plant, and these were shipped by UPS at a cost of \$64.14, making the total cost for 500 plants and shipping \$439.14. These arrived on January 25 and were set in the field on January 26, 1996. The plants were spaced 9 inches apart in the row, which would amount to 4,840 plants per acre if the rows were placed 9 feet apart, a spacing that allows maneuverability with machinery and permits maximum use of the space available. Mulch was applied to a depth of 4 inches on January 30, 1996. The plants broke dormancy im-

Acknowledgment. The authors thank Dr. Randy Ploetz for help in identifying pathogenic fungi and Dr. Richard Baranowski for help in insect identification.

mediately, and first flowering was observed on February 26. Fruit set well and the first color break was noted on March 25. The first ripe fruit was picked on March 26, 1996, and the last picking was made on September 6. Fruit was counted and weighed after each picking to evaluate cropping performance.

Results and Discussion

Cropping data are summarized in Table 1. The canes of 'Heritage' left over from the summer of 1995 gave the best performance, bearing over 1,900 pounds per acre between 26 March, the date of first picking and 10 June, the date of last picking from the old canes of the previous season. This production amounted to just over 6,110 5-ounce units, the normal quantity of imported raspberries sold in American supermarkets. The new canes of 'Heritage', which appeared in the spring of 1996, first began to fruit on 31 May and were still bearing ripe fruit on 6 September when picking was abandoned because of declining fruit size and quality. During this time their production amounted to more than 1,317 pounds per acre, or more than 4,215 5-ounce units. The production of 'Autumn Bliss' was considerably less, amounting to 957.24 pounds per acre on the 1995 canes (3,063 5-ounce units) and only 439.4 pounds per acre (1,578.9 5-ounce units) on the 1996 canes.

The superior production of 'Heritage' is undoubtedly related to its demonstrated heat tolerance, whereas 'Autumn Bliss', of British origin, was obviously selected under quite different environmental conditions. The performance of 'Heritage' in 1996 suggests that it has definite potential as an annual crop in south Florida, but more than one season's performance needs to be observed before large-scale plantings can be recommended. The winter of 1996 was cooler than usual, and the summer was much drier than normal in the Homestead area. This latter fact may account for the unexpectedly prolonged production into the summer season.

Diseases and pests were not observed in excessive quantities, perhaps because the short time the plants were in the field did not allow a significant build-up of problems to occur. In the early days of the planting, pythium fungus was isolated from sick and dying plants that probably were winter-injured before they were set in the field in Florida. Immature forms of a stink bug (*Nezara* sp.) were collected from plants on April 17, 1996, and mature forms throughout the summer. Several

Table 1. Yields of two primocane red raspberry cultivars at Homestead, Florida in the spring and summer (26 March-6 September) of 1996.

Cultivar	Average			
	No. fruit/acre ^a	Fruit wt./acre (lb)	Wt./fruit (oz)	Number of 5-oz units/acre
Spring (1995) canes				
Heritage	619,531	1909.50	0.056	6110.4
Autumn Bliss	243,043 ^y	957.24 ^y	0.063 ^{ns}	3063.2
Summer (1996) canes				
Heritage	518,493	1317.4	0.041	4215.7
Autumn Bliss	151,546 ^y	439.4 ^y	0.052 ^y	1578.9

^aCalculated on the basis of 9 inches between plants in row and 9 feet between rows.

^y=significant at $P \leq 0.01$, ^{ns}=not significant; n=not significant.

beetles were collected during the course of the work, some destructive, and these were controlled with rotenone compounds. Anthracnose disease appeared on foliage late in summer after rainy weather, but no control measures were taken at that time.

In summation, two primocane-fruited raspberry cultivars were brought to fruiting during the winter in southeastern Florida, and one of them yielded well. Two possible uses of this fruit in addition to the obvious one of field culture for the fresh market are in pick-your-own operations, which have long been popular in south Florida with growers of strawberries and vegetables, and in producing container-grown fruiting plants for sale in late winter and spring to consumers of ornamental and flowering plants. Results to date are sufficiently promising to justify further investigation.

Literature Cited

- Andersen, P. C., T. E. Crocker and J. G. Williamson. 1995. Status of deciduous fruit crops in Florida: a current and retrospective analysis. Proc. Fla. State Hort. Soc. 108:340-345.
- Babbitt, B. H., P. C. Crandall and P. R. Bristow. 1981. Red raspberry clones resistant to root rot. Fruit Vars. J. 35(2):60-62.
- Daubeny, H., K. Maloney and G. R. McGregor. 1992. 'Heritage' red raspberry. Fruit Vars. J. 46(1):2-3.
- Lawrence, F. J. 1980. The current status of red raspberry cultivars in the United States and Canada. Fruit Vars. J. 34(4):84-89.