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Rabbiteye Blueberry

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Rabbiteye blueberries (*Vaccinium ashei* Reade) are the most important species of blueberries native to the South. The first known commercial planting was made in 1893 in western Florida, using bushes transplanted or propagated from the wild. Similar plantings were later made in Alabama, Georgia, Louisiana, Mississippi, North Carolina, and South Carolina. At one time, more than 3500 acres (1400 ha) were planted in the south, consisting mainly of unselected bushes, many of which produced small, dark, gritty-fleshed berries that lacked flavor. These characteristics gave rabbiteye blueberries a poor reputation in markets and most commercial plantings were eventually abandoned.

A cooperative cultivar development program between the Georgia Coastal Plain Experiment Station, North Carolina Agricultural Experiment Station and the U.S. Department of Agriculture was started in 1940 to improve the horticultural quality of rabbiteye blueberries. Later, the University of Florida initiated blueberry breeding studies and presently most southern states conduct research on rabbiteye blueberries.

During the past 10 years, rabbiteye blueberry production has greatly increased in the south. In 1979 less than 2000 acres were in commercial production, with Georgia, North Carolina, and Florida being by far the leading states in rabbiteye acreage. States such as Alabama, Mississippi, Louisiana, and Texas had about 5 to 50 acres of blueberries per state.

From this point, acreage has increased 400% and in most southern states, blueberries are now listed along with other fruit crops as being a valuable commercial agricultural enterprise.

Paul Eck, in *Blueberry Science* (Rutgers University Press) stated that perhaps the greatest improvement in cultivated blueberry fruit quality has occurred in the rabbiteye as a result of cultivar development research for the past two decades by the Georgia, Florida, and North Carolina Agricultural Experiment Stations in cooperation with the USDA. The following cultivars are listed in order of acreage currently being planted (Table 1).

'Tifblue' is the leading rabbiteye cultivar, accounting for over 50% of the present acreage. It is the most popular cultivar in all southern states except Florida where chilling is not sufficient for normal flowering. Plants are very vigorous and widely adapted. Fruit ripens mid- to late-season and has good quality. This cultivar was released from the Georgia-USDA pro-

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Table 1. Rabbiteye blueberry production.

Principle cultivars	1989 %
Tifblue	53
Climax	23
Brightwell	6
Woodard	5
Premier	4
Beckyblue	4
Delite	2
Aliceblue	2
Southland	1
Bonita	1

gram in 1955. Current recommendation for southern states (except Florida) include from 50 to 70% *'Tifblue'* in new plantings. It appears this cultivar will continue to be dominant for in the next 10 years

'Climax' was introduced by the Georgia-USDA program in 1976 as an early season cultivar with concentrated ripening. These characteristics have made the cultivar popular in the last 10 years with some states recommending plantings of 25 to 50% 'Climax.' However, plants flower earlier than 'Tifblue' and in the past 5 years fruit production has been low in certain areas due to late spring freezes. Current recommendations usually include from 15 to 25% 'Climax.'

'Brightwell' is also an early cultivar, ripening about 3-5 days after 'Climax' Introduced by Georgia-USDA in 1983, this cultivar flowers later than 'Climax' and is becoming increasingly popular. Most recommendations include from 10-30% 'Brightwell.'

'Premier' was introduced in 1978 by the North Carolina USDA breeding program This plant ripens early, about the same time as 'Climax' and is increasing in acreage planted, especially in North Carolina, Mississippi, Alabama, Texas, and Louisiana. Recommendations in these states include about 10-25% 'Premier.'

The next three cultivars were introduced by the University of Florida and, due to their low chilling requirements, are grown primarily in Florida.

'Beckyblue' is early ripening and extends the cultural range of rabbiteye blueberries into south central Florida. Some plants are also grown in areas of Texas, Louisiana, Mississippi and Alabama bordering the Gulf of Mexico. Introduced in 1977, about 30% of rabbiteye plantings in Florida are 'Beckyblue.'

'Aliceblue,' introduced in 1977 is similar to and often interplanted with 'Beckyblue.'

'Bonita,' introduced in 1985, is recommended for mid-to northern Florida and accounts for about 7% of rabbiteye acreage in that state.

'Woodard,' 'Delite,' and *'Southland,'* all released by the Georgia-USDA program in the 1960's, have declined in popularity and are not being currently planted except for home or pick-your-own use. Prior to the release of 'Climax,' 'Woodard' was the earliest ripening rabbiteye and still comprises about 5% of the total rabbiteye acreage. The other cultivars account for less than 1%.

Environmental Relations

Native to the Gulf South, rabbiteye blueberries inherently have low-chilling requirements. Cultivars such as 'Tifblue' require about 500 hours of chilling (hrs $< 7°C$) and 'Climax,' 'Premier' and others, especially those developed for Florida, have lower chilling requirements. 'Climax' and 'Premier' often receive too few chilling hours at Gainesville, Florida to flower and fruit properly and fruit yield is greatly reduced in that area. Plants often bloom before danger of frost is over and spring cold damage has been the major problem in most states the past several years. Over the past 5 years, late spring freezes have reduced early rabbiteye ('Beckyblue,' 'Climax,' 'Premier,' 'Bonita') production in Flor-

ida by 50%. Other states (Mississippi, Texas, Georgia, Alabama, South Carolina, Louisiana) have had similar reductions in 'Climax' and 'Premier,' the main early ripening rabbiteye cultivars. 'Tifblue' is usually damaged less by spring freezes than all other cultivars.

Culture

Rabbiteye blueberries will grow well on various soil types but do best on light, well-drained soils with a soil pH between 4.2 and 5.5. Most soils used for rabbiteye blueberry production are extremely low in organic matter and planting instructions include incorporating peat moss into the backfill soil at planting. Plant spacing usually ranges from 5 to 8 ft (1.5 to 2.4 m) between plants in a row and from 12 to 14 ft (3.6 to 4.3 m) between rows.

Rabbiteye blueberries, in general, have some degree of self-incompatabilty. Cross-pollination results in increased berry size and earlier ripening of fruit and planting of 2 or more cultivars is recommended.

Most fertilizer recommendations include a complete fertilizer with ammonium as the nitrogen source; $(NH_4)_2SO_4$ to lower the soil pH, urea as a neutral nitrogen source. Rabbiteye blueberries have a low tolerance to salinity and growers should avoid using irrigation water containing over 50 ppm sodium.

Irrigation is usually considered necessary for maximum production. Most states report 80-90% of growers irrigate but Georgia, the leading state in acreage, has only approximately 50% of its acreage under irrigation.

Fruit and Plant Development

Rabbiteye blueberries are sufficiently vigorous to produce a heavy fruit crop and still produce sufficient fruiting shoots. Little yearly pruning is required but may be desirable to keep bushes from becoming too tall and unmanageable.

Flower buds from rabbiteye blueberries are initiated during the late summer and bud development continues throughout the fall and winter. Due to this long development period and the vigor of rabbiteye blueberries, plants pruned immediately after fruit harvest (mid-July) can produce new fruiting wood and buds for fruit the following year

Pests

Diseases are usually not a serious problem in rabbiteye blueberries, since in general, rabbiteye cultivars are more resistant than highbush to the predominant fungal pathogens. Stem blight, mummy berry, stem canker, and Phytophthora root rot are the main diseases reported. These diseases and others are found only in isolated incidents and most southern states have no disease spray program for rabbiteye blueberries.

Generally, rabbiteye cultivars are also more resistant to insect damage than the highbush cultivars. A number of insects attack rabbiteye blueberries, but infestations are infrequent. As more plantings of rabbiteye blueberries are made, the need for insect and disease control will probably increase.

Harvesting

Harvesting of commercial rabbiteye blueberries begins in late-May in Florida and continues into August in North Carolina. The harvest period, depending on cultivars grown, is usually 6 to 8 weeks long (approximately 3 weeks per cultivar).

Ten years ago, most rabbiteye plantings consisted of 10 or fewer acres and the crop was usually hand harvested for local sales or by pick-your-own customers. The industry has developed past the pick-your-own or local sales stage and most southern states now have strong marketing cooperatives. At present, approximately 75% of harvested fruit is shipped to markets and this percentage should increase in the next 10 years.

Table 2. Rabbiteye blueberry production in 1. Highbush states, 2. Rabbiteye states, and 3. Florida (Low-chill).

States	Hectares	(Acres)	Cultivars	%
1. AR, KY, NC, TN, VA	254	(635)	Tifblue	62
			Premier	11
			Woodard	9
			Climax	6
			Others	12
2. AL, GA, LA, MS, SC, TX	2740	(6850)	Tifblue	58
			Climax	23
			Brightwell	7
			Woodard	5
			Others	6
3. FL	400	(1000)	Beckyblue	30
			Climax	30
			Aliceblue	15
			Tifblue	7
			Others	18

Marketing

Six southern states, Georgia, Mississippi, Texas, South Carolina, Alabama, and Louisiana, grow essentially only rabbiteye cultivars and account for over 80% of the total rabbiteye acreage in the United States (Table 2). Acreage in these states is expected to steadily increase in the next 5 years (Table 3).

Table 3. Estimated acreages of Rabbiteye Blueberries in 12 southern states.

States	Estimated Acreage		
	1984	1989	1994
Alabama	250	500	750
Arkansas	50	75	100
Florida	750	1000	1250
Georgia	2500	3250	4000
Kentucky	15	20	25
Louisiana	50	200	350
Mississippi	250	1000	1500
North Carolina	325	400	500
South Carolina	400	600	700
Tennessee	30	80	100
Texas	400	1300	2000
Virginia	40	60	100
Total Acres	5,060	8,485	11,375
Hectares	2,024	3,394	4,450

Marketing in these states ranges from 90% local sales in South Carolina to 95% shipping in Georgia (Table 4). South Carolina is the only state with more than 200 acres that ships less than 70% of rabbiteye fruit.

Florida has approximately 1000 acres of rabbiteye blueberries and 300 acres of low-chill (Southern) highbush with southern highbush acreage increasing faster than rabbiteye. Five states: Arkansas, Kentucky, North Carolina, Tennessee. and Virginia, grow rabbiteye and highbush blueberries. In these states, only North Carolina has sizable acreage (400 acres) and rabbiteye production in these 5 states is not expected to greatly expand in the next 5 years.

Current Research and Future Cultivars

In the south research and extension support has increased over the past 10 years, with most states having active cultivar and/or cultural trials. In 1983, the Southern Regional Blueberry Germplasm Evaluation Program was initiated. Scientists from 12 southern states cooperatively measure plant performance and fruit quality from advanced rabbiteye or southern high-

Table 4. Market outlets for rabbiteye blueberries in 12 southern states.

States	Hectares	(Acres)	Market outlet	
			Local Sales %	Shipped %
Alabama	200	(500)	15	85
Arkansas	30	(75)	100	0
Florida	400	(1000)	30	70
Georgia	1300	(3250)	5	95
Kentucky	8	(20)	100	0
Louisiana	80	(200)	60	40
Mississippi	400	(1000)	25	75
North Carolina	160	(400)	25	75
South Carolina	240	(600)	90	10
Tennessee	32	(80)	80	20
Texas	520	(1300)	30	70
Virginia	24	(60)	100	0
Total	3394	(8485)	25%	75%

bush rabbiteye selections grown in replication studies To date, plantings have been made in 1984, 1986 and 1988.

Active rabbiteye blueberry breeding programs are present in Florida, Georgia, Texas, North Carolina, and Mississippi. Emphasis is being placed on development of late-blooming plants which ripen uniformly and early. Interspecific hybridization using rabbiteye, highbush, and wild southern blueberry germplasm has produced 6 newly released southern highbush cultivars with adaptability in the rabbiteye growing area. These plants lack the vigor of rabbiteye but have potential for producing early fruit with more freeze tolerance than rabbiteye.

Rabbiteye characteristics such as wide soil-type adaptability, heat tolerance, disease and insect resistance, firm fruit with small scar, and high vigor need to be included in any new blueberry cultivars developed for the South.

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Changes in the Lowbush Blueberry Industry[1]

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Introduction

Munson (24) described the wild blueberry (principally *Vaccinium angustifolium* Ait.) industry in Maine as exceeding 150 thousand acres of blueberry barrens, utterly worthless for agricultural purposes but which through management may be improved for the cultivation and systematic improvement of the fruit. The management at that time consisted of periodically burning over land which had been burned by Indians in the past or opened by logging. Much has changed with the blueberry industry since that time, but despite these changes the lowbush blueberry is still very much a wild crop.

The lowbush or wild blueberry is a rhizomatous shrub averaging 20 cm in height (42) which occurs from Northern Quebec to the isolated uplands of the Appalachian mountains of Virginia. There is an estimated 50,000 acres of commercial blueberry land in Maine, and an equavilent area in the Canadian Provinces of Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland (25). Quebec has thousands of acres of semi-managed Crown land which is harvested when the yield and price is favorable. There are also a few hundred acres in New Hampshire and Massachusetts.

Although there are several named varieties of the lowbush blueberry released through the Agriculture Canada breeding program (8), few commercial plantings exist. Culture consists of managing wild stands by biannual pruning, fertilizing, and the use of chemical and cultural controls for pest management. Most of the wild blueberry crop is frozen but there has been an effort to increase fresh sales in recent years (12). Harvesting is done by hand with a scooptype rake and several mechanical harvesters are now available and are increasing in use (11). Adaptation of improved cultural practices and favorable weather conditions have resulted in the average yield in Maine increasing from less than 20 million pounds to nearly 40 million pounds over the past 10 years

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