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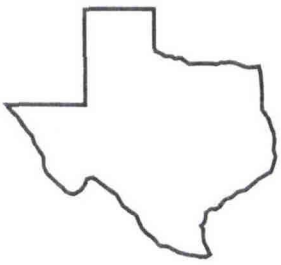

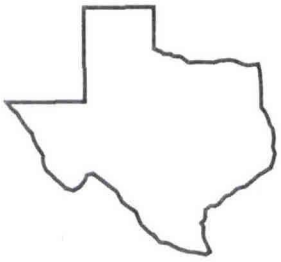

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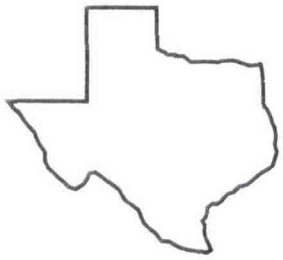

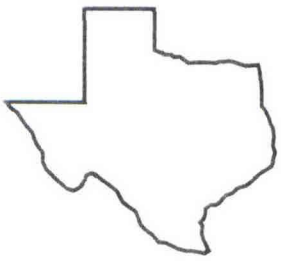

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COLD TOLERANCE OF LOWCHILL HIGHBUSH AND RABBITEYE BLUEBERRY CULTIVARS

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Background. Cold temperatures in recent years during bloom have increased East Texas blueberry growers' awareness of potential frost damage. There are two ways that a plant reduces susceptibility of its flowers to spring frost injury. One is to avoid having susceptible flowers during frost, i.e., late bloom. This mechanism is called avoidance. Tolerance is the other plant mechanism to reduce frost damage. This is the ability of the flower to tolerate cold temperatures and still set fruit. Tolerance is usually genetically determined. Lowchill southern highbush and rabbiteye blueberry cultivars were evaluated for tolerance to spring frost.

Research Findings. Four lowchill highbush cultivars ('Cape Fear','O'Neal', 'Blue Ridge', and 'Georgiagem') and four rabbiteye cultivars ('Tifblue', 'Climax', 'Brightwell', and 'Baldwin') were evaluated for their tolerance to cold damage. On March 14, the temperature fell to 24°F for 2 hours and was below 29°F for a total of 7 hours. Two days later, the percentage of flower buds that was damaged by frost was rated across 3 stages of development (stage 4 - individual flowers distinguishable, stage 5 - individual flowers distinctly separated, corollas unexpanded and closed, and stage 6 - corolla expanded and open, full bloom). Flowers in all 3 stages that appeared undamaged were tagged and evaluated 1 month later for fruit set.

All rabbiteye blueberry flowers in full bloom (stage 6) that were exposed to low temperatures were killed (Table 1). This was in contrast with the lowchill southern highbush cultivars which had 18 to 47% undamaged flowers. Georgiagem and Blue Ridge appeared to have the most hardy flowers during bloom. For stage 5 flower buds, the lowchill highbush and Brightwell were the most hardy, while Tifblue and Climax were the least. At stage 4, Climax had more bud loss than all other cultivars.

The lack of visible damage did not mean that those buds were completely uninjured. Fruit set for flowers with visually undamaged corollas varied across stage of development and cultivar (Table 1). As a group, the lowchill southern highbush cultivars set better than the rabbiteye cultivars. There were no data for Tifblue and Baldwin flowers in stage 6 because no open flowers were found at that stage. All stage 6 Climax flowers were damaged. For all cultivars except Tifblue, flowers that looked undamaged appeared to have adequate fruit set. For Tifblue, however, fruit set was lower than expected indicating that flowers which had visually undamaged corollas (petals) had other damage that resulted in reduced fruit set.

The following year, temperatures dropped from 80°F on February 2 to 12°F on February 3 and temperatures stayed below freezing for 6 days. On February 13, the percentage of live flower buds was measured on swollen but unopened flower buds for the same cultivars previously evaluated. Cold damage occurred although the plants were in a dormant stage. Lowchill southern highbush had only slight damage, while rabbiteye bud damage ranged from only 25% live buds for Climax to 85% live buds for Tifblue.

Application. One of the complaints about growing the lowchill southern highbush is that they bloom too early and therefore are more subject to cold damage. For example, O'Neal will bloom 10 days before Climax and 14 to 21 days before Tifblue. Despite early flowering, the lowchill highbush cultivars were more cold tolerant during bloom than rabbiteye cultivars.

Table 1. Percentage of live flower buds and subsequent fruit set after 2 hours of 24°F at different stages of development for different blueberry cultivars.

	Flower bud stage					
Cultivars	Stage 4	Stage 5	Stage 6	Stage 4	Stage 5	Stage 6
	---------% live flower buds---------			----------% fruit set----------		
Cape Fear	100	77	20	84	95	92
O'Neal	80	78	18	85	100	75
Blue Ridge	100	74	38	95	73	42
Georgiagem	100	87	47	87	95	37
Tifblue	90	26	0	47	10	---
Climax	70	26	0	70	43	---
Brightwell	100	61	0	72	67	33
Baldwin	100	49	0	54	32	---

Table 2. Percentage of live flower buds (swollen, but unopen) after exposure to 12°F on Feb. 2, 1989.

Cultivars	% Live flower buds
Cape Fear	93
O'Neal	88
Blue Ridge	96
Georgiagem	93
Tifblue	86
Climax	26
Brightwell	56
Baldwin	62