



## Field Evaluation of Palms in Hardiness Zones 7b and 6b

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**Nature of Work:** On April 29, 2004, a replicated field planting eight palm species or varieties of palm species (described below) was established at the UGA Horticulture Farm in Watkinsville (zone 7b). A year later, on June 23, 2005, a replicated field trial of seven palm species or varieties of palm species (described below) was established at the Mountain Research and Education Center in Blairsville, GA (zone 6b). The purpose of these studies is to evaluate the adaptability and winter hardiness of these palms over 5-year period. The palms chosen for the study were suggested by members of the Southeast Palm Society and were known to have good to excellent cold hardiness in their area of origin. The palms used in the studies were container grown by Gary's Nursery in New Bern, NC, with the exception of *Sabal palmetto* which came from Tim and Dave's Nursery in Richmond Hill, GA.. *R. hystrix*, *S. minor*, *T. fortunei*, and *S. palmetto* were planted from 3-gallon containers; *S. xtesensis* and *S. 'Louisiana'* were planted from 5-gallon containers, and *S. 'Birmingham'* was planted from 15-gallon containers. In addition, at the Watkinsville location, replicated plantings of *T. fortunei* were established from 3 container sizes: 3 gallon, 7 gallon and 15 gallon, to determine if container size and initial plant size affected growth rate after transplanting.

All palms were irrigated via drip irrigation as needed and fertilized uniformly with a 16-4-8 fertilizer + minors in April and July of each year. Growth measurements were taken at the end of each growing season.

The Blairsville palms were provided cold protection the first winter after planting, on the advice of members of the Southeast Palm Society. This was done by constructing hoops from welded wire fencing, 4 feet high. The hoops were covered with 6-mil. white plastic. Three bamboo stakes, approximately 8 feet long were placed inside each hoop and tied together with wire like a teepee at the top. The plastic was pulled up and secured tightly to the bamboo poles so the rainfall would easily run off. Before each hoop was sealed, approximately ½ bale of dry pine straw was placed inside to provide extra insulation. The top fronds were left uncovered to allow some photosynthesis to occur. The hoops were sealed on December 15, 2005 and removed April 6, 2006. Indoor/outdoor thermometers were attached to two hoops to monitor the day and night temperature differences inside and outside the hoops. The coverings were opened and vented during warm days of late winter to prevent heat injury.

The following is a description of palms planted at each location.

### Watkinsville, GA Planting (zone 7b)

**Needle Palm, *Rhapidophyllum hystrix*** Native to Georgia, Needle Palm can be found growing wild along the banks of the Ogeechee River in southeast Georgia. It prefers moist, swampy sites and partial shade. It is thought to be the world's most cold-hardy palm and is known to survive temperatures as low as -15°F. Needle Palm is a clumping palm (does not form a trunk). It is a slow grower, eventually reaching 10 to 15 feet tall and wide. Needle-like spines, 6 to 8 inches long, form at the base of the

leaves as the plant ages. In landscapes, a moist site with afternoon shade is preferred, although this palm will adapt to full-sun when provided sufficient moisture.

**Dwarf Palmetto, *Sabal minor*** A shrub-sized palm growing 4 to 6 feet tall and wide. Hardy to -5°F, with leaf damage beginning at around 5°F. North Carolina to Texas, extending inland to northeastern Alabama and southeastern Louisiana.

**Birmingham Sabal Palm, *Sabal* sp. 'Birmingham'** Birmingham Sabal Palm comes from offspring of a single cultivated specimen in Birmingham, Alabama. It is thought to be a type of *Sabal palmetto*, but certain traits, such as deeply divided leaves, indicate it may be a hybrid between *Sabal minor* and another species. It is known to be hardy to 0°F and is reported to have survived sub-zero temperatures in Oklahoma. It may prove to be one of the most cold-hardy trunk-forming palms.

**Brazoria Sabal Palm, *Sabal xtexensis*** Also called the Brazoria Palmetto, this palm is native to Brazoria County, Texas. It is thought to be a hybrid between *Sabal minor* and *Sabal mexicana*. If this is the case, hardiness should be good to excellent, since *S. mexicana* has been reported to take temperatures to 10°F without injury, while *S. minor* is known to be tolerant of temperatures below zero. It is a trunk-forming palm, growing to 20 feet after several years.

**Louisiana Dwarf Palmetto, *Sabal minor* var. 'Louisiana'** This is a coastal variety of dwarf palmetto. It is also called the Blue Dwarf Sabal Palmetto. It is native to coastal Louisiana and eastern Texas. It forms large, blue-green leaves and eventually forms a trunk to 10 feet. Although it is a coastal palm, it has shown adaptability to inland sites and hardiness to zone 7 (perhaps 6).

**Windmill Palm, *Trachycarpus fortunei***, Windmill palm is very common in cultivation and among the hardiest of all the trunk-forming palms. It has been known to recover from below-zero temperatures. It looks its best when planted in afternoon shade, and it prefers clay soils over sandy soils. It grows to 30 ft. tall.

**Kumaon Palm, *Trachycarpus takil*** India is becoming renowned as a source for newer species of cold-hardy palms. The Kumaon Palm is among the more famous. It was introduced into cultivation more than a hundred years ago, lost, and then re-discovered by plant explorers Martin Gibbons and Tobias Spanner. The Kumaon Palm resembles the much more common *T. fortunei*, but it is larger in all respects, tolerates heat better, and may be more cold hardy than the windmill palm. Mature height is predicted to be 35 ft.

**Cabbage Palm, Sabal Palm, *Sabal palmetto***, Almost ubiquitous along the Georgia coast, the Cabbage palm has adapted well to coastal and inland areas of zone 8. Beautiful, hardy, and native to Georgia, the Cabbage palm is best planted in informal groups of varying heights. Mature height is approx. 60 ft.

**Blairsville, GA Planting (Zone 6b):**

**Needle Palm, *Rhapidophyllum hystri***, Described above

**Louisiana Dwarf Palmetto, *Sabal minor* var. 'Louisiana'** Described above

**Birmingham Sabal Palm, *Sabal* sp. 'Birmingham'** Described above

**Brazoria Sabal Palm, *Sabal* x 'texensis'** Described above

**Bulgarian Windmill Palm, *Trachycarpus fortunei***, The Bulgarian Windmill Palm was grown from seed collected from Windmill Palms in Bulgaria. In Bulgaria, these palms are called Polar Palms, due

to their adaptability to the Bulgarian winters. In Plovdiv, Bulgaria, where the Mother palms are growing, the climate is similar to that of zone 7a. However, unlike the Southeast, the Mediterranean climate is much drier year-round. The palms that served as a source for these seeds have experienced winter temperatures to -5°F with no damage.

**Taylor Form Windmill Palm, *Trachycarpus fortunei***. Taylor Form Windmill Palms in this study were grown from seed collected from a Mother plant at Taylor’s Nursery outside Raleigh, North Carolina. Offspring were planted throughout the park system in Raleigh, and trees were noted to survive temperatures below zero.

**Dwarf Palmetto, *Sabal minor* ‘McCurtain County’**. Dwarf Palmetto, like needle palm, is native to Georgia and the southeastern U.S. The McCurtain County Dwarf Palmetto was grown from seed collected from a plant in McCurtain County, Oklahoma, and is one of the most inland forms of this species. Parent plants have survived sub-zero temperatures.

**Results and Discussion:** Tables 1, 2 and 3 show average percent growth rate of the palms at the two locations since planting.

**Table 1: Average Growth Rate of the Watkinsville Palms**

Plant Name	Ave. % Growth Change <sup>L</sup> 10/22/04 to 9/30/05	Ave. % Growth Change 9/30/05 to 10/8/06
Needle Palm	0	+1
Dwarf Palmetto	+32	+21
Birmingham Sabal	+15	+29
Brazoria Palm	+64	+35
Louisiana Dwarf Palmetto	+83	+36
Windmill Palm	+46	+50
Kumaon Palm	+22	+31
Sabal Palm	+12	+81

<sup>L</sup>Growth index = (Height + (width +width)/2)/2. Numbers are the average of 3 replications.

Needle palm has shown very little growth since planting. Two of the three replicates of *S. palmettos* died the first winter. The remaining rep grew little the first year, but it showed tremendous growth the second year, once it was well established. Next highest growth rates were shown by Windmill palm, Louisiana Dwarf Palmetto and Brazoria Palm.

A weather station on site recorded five nights during the winter of 2004/05 when the temperature dropped below 20°F (Dec. 20 – 16°F; Dec. 21 – 18°F; Jan. 18 – 16°F; Jan. 19 – 17°F and Jan. 24 – 13°F (the coldest night of the winter). There were an additional 20 nights when the temperature was between 20°F and 30°F. There also was a major ice storm in January with about ½ inch of ice accumulating.

During the winter of 2005/06 the lowest recorded temperature at the Watkinsville location was 20°F on Dec. 22. There were eight additional nights when the minimum temperature ranged between 20°F and 25°F, and 19 nights when the minimum night temperature ranged between 25°F and 30°F.

**Table 2: Effect of container size on growth rate of *T. fortunei* after transplanting at the Watkinsville location.**

Container Size	Ave. % Growth Change 10/22/04 to 9/30/05	Ave. % Growth Change 9/30/05 to 10/8/06
3 gal.	+ 46	+50
7 gal.	+78	+40
15 gal.	+57	+47

<sup>z</sup> Growth index = (Height + (width + width)/2)/2. Numbers are the average of 3 replications.

The data indicate that container size does influence initial growth after transplanting, with the larger container size resulting in more rapid growth. *T. fortunei* transplanted from the 7 gallon container grew faster initially than those in the 3 gallon or 15 gallon containers. During the second year, however, initial container size at transplant had little effect on plant growth.

**Table 3: Average growth rate of palms at the Blairsville location.**

Plant Name	Ave. % Growth Change <sup>z</sup> 4/6/06 to 10/4/06
Needle Palm	0
Bulgarian Windmill Palm	+23
Taylor Form Windmill Palm	+21
Dwarf Palmetto (McCurtain Co., OK)	+11
Louisiana Dwarf Palmetto	+62
Birmingham Sabal	+16
Brazoria Sabal	+17

<sup>z</sup> Growth index = (Height + (width + width)/2)/2

At the Blairsville location, *S.* 'Louisiana' showed the greatest growth increase the first year after planting. As in the Athens study, needle palm showed no increase in growth during the first year. All other palms showed comparable growth increases.

During the winter of 2005/06 there were 18 nights when the minimum temperature was between 20°F and 25°F, eleven nights when the minimum temperature ranged between 15°F and 20°F, and three nights when the minimum temperature was between 10°F and 15°F. Coldest nights were Dec. 21 – 14°F, Dec. 22 – 11°F and Dec. 23 – 13°F. However, the minimum temperatures within the hoop coverings was about 10 degrees warmer than the outside temperatures during the night and 15°F to 20°F warmer during the day, depending on the amount of sunlight.

No winter protection is being given the palms during the winter of 2006. On the night of December 7, 2006, temperature dipped to 6°F. However, it's too early to assess if any damage from this hard freeze.

**Significance to Industry:** Since this is intended to be a five-year study, we can not make recommendations at this point as to which, if any, of the palms in our trials are suited for planting in zones 7b and 6b. However, if we can find some reliable selections, it could greatly expand the plant pallet and market for both nurserymen and landscape professionals.