

in any additional information on the subject.) Based on this we decided to look for Sweetbay in the southern part of the Everglades National Park.

There are very few routes into the Everglades especially in the southern region. Fortunately, it is the southern part that has the park's main entrance and visitor center. At the visitor center I gathered some of the local literature hoping to get some clues on its possible whereabouts. One guide book indicated, "... Sweetbay is far from common within our area, but it is sometimes seen in the wet cypress stands ..."* The attendant showed us where this area would be on the map and away we went.

At about 15 miles into the park we entered the cypress swamps (they drop the "Bald" from Baldcypress). Unfortunately the area consisted almost entirely of dwarfed Baldcypress bayheads, with very little other tree diversity. As we neared the southwest border (the end of the cypress swamps, 18 miles from the southern tip of mainland Florida) of the area at the road junction of the PA-HAY-OKEE overlook, we spotted what looked like a group of Sweetbay. Closer examination revealed several *M. virginiana* trees 10 to 20 feet high with several flowers in bloom. As far as we could tell, these trees looked very much like our northern Sweetbay except for generally narrower and smaller leaves. We took several photos and went happily on our way. It turned out that this was the only place (along the Everglades Parkway) that we saw *M. virginiana* in the park.

Northbound

Our trip back north was slightly different in that the route brought us up the east coast of Florida along I-95. This experience was generally similar to the southbound trip except that *M. grandiflora* was far less abundant than we had encountered in the western and north central areas of the state along I-75. *M. virginiana* continued to be quite abundant, as Red Maple is to us in New Jersey, all the way up through Virginia. By the time we got to Georgia most of the Sweetbay were beginning to defoliate for the winter. We only identified a few wild *M. grandiflora* along I-95 in Georgia. North of Georgia we did not see it in the wild state. Interestingly, in cultivation *M. grandiflora* was last seen (from our highway vantage point) near exit 143 on the Garden State Parkway, Newark, New Jersey.

**Guide to Plants of the Everglades National Park*, Alex D. Hawkes, Tropic Isle Publishers Inc., Coral Gables, Florida, 1965.

How Hardy is *Magnolia Campbellii*?

by JERRY HETZER

Magnolia campbellii can sometimes flower at Christmas around San Francisco. It did so on some trees at Golden Gate Park there in 1976, along with *M. x loebneri* 'Spring Snow', whose original tree at Urbana, Illinois, is more likely to

be decked with both flowers and real snow during the month of April. At this writing, in late February 1977, both *M. campbellii* (as first year topworked grafts) and *M. x loebneri* have remained equally dormant during -12 deg. F. in December and -20 deg. in January at Urbana. That was too harsh for *M. campbellii* 'Samson et Delilah' grafts which are now dead throughout. 'Spring Snow' has endured similar hard winters and many of our fickle springs before; it looks good now.

Jerry Hetzer and her husband, Ed, own the Little Lake Nursery in the hills of Mendocino County, California, which has a considerably less equable climate than the San Francisco Bay area where they grew up. *Ed.*

It was a warm, mild fall the year of 1972 and we put off from day to day the job of moving our tender container plant material into the carry-house. On December 6th light rain began falling and the temperature started to drop, and the next day it was much colder. The morning of December 8th we woke to snow, ice, and a temperature of 5 deg. F. with everything frozen solid.

Magnolias, michelias, manglietias, were all coated with ice and the cans frozen to the ground. For three weeks the daytime temperature did not reach 32 deg. and we assumed that the plants were lost — there just was no chance of survival with frozen stems and roots.

In spring 1973 the magnolias, michelias, and manglietias, all of which had gone dormant, sent out new leaves, and only two of the many maglietias had damage and these both recovered within a few months. It was at this point I became intrigued with the hardiness of Magnoliaceae, especially *Magnolia camp-*



14 ft. circumference *M. acuminata*, largest in New Jersey (R. Figlar photo)

bellii, and was convinced that *M. campbellii* was not as tender as supposed and I was determined to prove my point.

I started writing letters to anyone I knew who had visited any of the countries where *M. campbellii* is found: Nepal, Upper Burma, Assam, S.E. Tibet, Bhutan, Sikkim, S.E. and S.W. China. Letters went to authors, the National Climatic Center, U.S. Army, Library of Congress, universities, arboretums, people recommended by friends, and people growing *M. campbellii* in their gardens. I was sure that somewhere there was the information on culture and weather I needed to prove my theory.

Letters and telephone calls started arriving from all over the world answering my questions, and it was a giant jig-saw puzzle with one piece after the other falling into place.

A telephone conversation with the National Climatic Center, Asheville, North Carolina, gave weather information taken over a seven year period at a U.S. Army air field operating in Upper Burma. The air field is located in a deep valley at an elevation of 1342', latitude 27 deg. 20', longitude 90 deg. 1', with an average high mean temperature of 93 deg. and the average low 36 deg., and a rainfall of 139" a year. July is the wettest month, receiving 40"; August 30"; September 25"; October 2"; November .04"; and December an average of .02". The major rainfall is between June and September.

Textbooks from the University of California, Department of Climatology, stated a general rule used by meteorologists, and this rule was confirmed by the National Climatic Center. For every 1000' gained in altitude the temperature drops 3 deg. to 5 deg. depending on the humidity. Using this rule of the winter temperature at 1342' is 36 deg. then at 8,000-11,000 ft. the elevations where *Magnolia campbellii* is found, the winter temperatures would average below 0 deg. A published report from the U.S. Army Natick Laboratories, Natick, Massachusetts, confirmed the climatic conditions at these elevations.

The report referred to magnolias growing in hardwood forests at high elevations, and also stated that the magnolias were generally found in deep, shaded canyons with a northern exposure, growing beneath, or between, larger trees. The report also noted that there was little ground litter from decomposing organic material, and that the general soil covering was moss, or sometimes a tumbling of rock that was encrusted with moss. These facts were also confirmed by the U.S. Army Engineers Topographic Laboratories, Fort Belvoir, Virginia.

A botanist who visited Nepal wrote about seeing *M. campbellii* blooming toward the end of April at an altitude between 8,000-9,000 ft. Notes from the explorations of Frank Ludlow and George Sherriff in N.E. Bhutan mention *M. campbellii* at an altitude of 9,000 ft. with flowers damaged by hail on May 5, 1933.

At this point I was sure I had the most important pieces to my jig-saw puzzle and even though letters continue to arrive I find that almost all the information repeats facts that I have already gathered.

M. campbellii trees in their areas of distribution bloom from the middle of April into the first part of May, which suggests that the trees are dormant until shortly before this time. Magnolias found generally in shaded canyons, or under high tree cover, would stay dormant until later in the spring and so miss much of



M. X loebneri 'Ballerina'

the late frost damage. This information coupled with the time of bloom convinced me that reference books referring to *M. campbellii* time of flowering as February were correct only for gardens in the very mild winter areas.

To test how late in the spring magnolias would stay dormant we planted 5 gallon size *M. campbellii*, *M. sargentiana* var. *robusta*, and *M. sprengeri* 'Diva' in a very cold, winter shaded location and also placed some of our containers of *Magnolia campbellii* close to the same location. This area of our nursery has heavy frost and sometimes does not thaw for weeks at a time, and often has a snow cover that will stay for long periods. As a control we also planted other magnolias in more warm locations so we could time any difference in beginning growth.

In spring 1976 we had three day heat waves with high temperatures of 105-111 deg. followed by weeks of heavy frost and morning temperatures averaging 23 deg., and then another three days of heat. These diverse temperature conditions lasted until July 4th when we had our last frost and a morning temperature of 28 deg.

The magnolias planted in the warm, sheltered locations began to flower toward the middle of March, and the flowers were blasted by frost. With the continuing variance in temperature from day to day, from heat to frost, the beginning new growth received frost damage and we had 18" to 24" stem die-back and completely lost three large stock plants, but the magnolias planted in the cold location remained dormant. May 28th the first of the magnolias in the cold location began growth with the terminal leaf appearing, and by June 15th *M. campbellii* subspecies *mollicomata*, the last remaining dormant magnolia, un-