

One and Counting: *Asimina tetramera* endangered 4-petal pawpaw at Jupiter Inlet Lighthouse Outstanding Natural Area (JILONA)

By Anne Cox PhD



Jan. 2014 - Anne standing beside JILONA 4-PPP #1060
Photo: W. Said

Once upon a time there was one (1) four-petal pawpaw (*Asimina tetramera*) plant at JILONA in Jupiter Florida. This plant, affectionately known and tagged as #1060, had probably been growing there for a long time before it was documented by Biologist Steve Farnsworth on 8/9/1988, back in the dark ages of the endangered pawpaw. As later research into the life history of this plant indicated, 4-petal pawpaw plants could possibly live as long as a hundred years. This does not mean that the above ground parts, stems and leaves actually live that long, but the underground "stems" and roots survive fire, hurricanes and even mowing machines, and new shoots regenerate readily from healthy underground parts, thus ensuring the longevity of the plant.

The JILONA site was part of a Four-petal Pawpaw Survey conducted from May to August, in 1988 in Martin and Palm Beach Counties, organized by the Florida Natural Areas Inventory (FNAI). In this study, only 15 of the 31 sites visited, or 48%, contained 4-petal pawpaws and 749 individual plants were noted. Before the 1988 FNAI Study, two papers were published about the endangered 4-petal pawpaw, Kral in 1960 and Austin and Tatje in 1979, and only an estimated 100 plants existed (Austin and Tatje 1979). By the 1990's other site visits were made and the estimate of sites remained at 15 (although some sites were "lost" to development and several new sites were found) and the number of plants noted was increased to approximately 1,000 plants. Current unpublished information as of 2010, from Palm Beach County ERM and my personal records, indicate that over 2,000 plants now exist in 15 sites. The increase in plant numbers is due to prescribed fire that increases flowering and removing canopy; finding additional plants in habitats, and new seedlings generated from effects of prescribed fire. The 15 "sites" are not all the same, as all the private sites known in the 1990's have been destroyed and three additional populations have been located in the past 10 years on existing lands but in separate areas on the sites.

But back to plant #1060 at JILONA, recently renamed #60. Sometime in the late 1990's, a second adult plant (#61) was noted at JILONA and in 2007 the flowers were hand cross-pollinated with the intention of planting the seeds to increase the population. From 42 cross-pollinated flowers, 7 fruits were formed on plant #61 and none on #60, very disappointing for this first plant, almost 6 feet tall and considered very old. But the twigs were small and no fruit set. Note too, that plant #61 had resprouted from the base following a 2003 prescribed fire (see below) and the new sprouting stem was large and vigorous flowering occurred. Fruit with seeds from #61 were sent to Bok Tower Garden (BOK) for germination and growth with the intention to plant back out at JILONA to increase the population.

Continued on pages 5-6



Photo: A. Cox

The four-petal pawpaw, *Asimina tetramera*, is an aromatic shrub or small tree in the Annonaceae family. *Asimina tetramera* is limited to sand pine scrub habitats in Martin and Palm Beach Counties on the Atlantic Coastal Ridge in southeast Florida. Habitat loss and fragmentation have led to a small number of remaining individuals, questionable reproductive success, narrow endemism, and escalating pressure on public and private land use, all of which are reasons why this species was listed as federally endangered in 1986 (Moyroud 1985). The four-petal pawpaw may never have been abundant within the range.

Plant Description

Grows up to three meters tall, with one to many stems arising from an underground stem with a deep taproot (Small 1926 & 1933, Kral 1960, USFWS 1999). This perennial shrub is fire adapted, resprouting quickly after a fire, producing numerous flowers and fruit. Recruitment primarily occurs following infrequent fire (20-100 years), but may occur intermittently during the long fire-free intervals (Cox personal comm.)

This plant profile was excerpted from :
The Center for Plant Conservation
www.centerforplantconservation.org

Asimina tetramera flower



Photo: J. Bradford

<http://treasurecoastnatives.wordpress.com>



**2011 Planting in JILONA
Cheryl Peterson with volunteers**



**Melisa Tolbert checking status
of pawpaw plants in 2012.
Note scrub oak regrowth.**



**February, 2014 - Anne with
healthy pawpaw from 2008
planting. Photos: W. Said**

One and Counting *Continued from page 4*

Although 7 of 42 (17%) flowers producing fruit is not an impressive number for the amount of time and effort required to pollinate flowers (just ask the beetles and flies), it is not unusual for only a few fruit to set, especially if the two plants were closely related. Research in the 1990's clearly showed that cross pollination from unrelated plants produced larger fruit and more viable seeds to replenish the populations. Based on the assumption of the longevity of the 4-petal pawpaw plants, if only one plant per hundred years grew to adulthood a population would be sustainable. Also assume that the population numbers are greater than two plants. In populations that have 60 or more plants, there is natural recruitment and the fruit and seeds are spread by the gopher tortoises, mice and other small animals. It also helps considerably to have prescribed fire in the scrub. Note that at Jonathan Dickinson State Park (JDSP), Juno Dunes and Jupiter Ridge, the pawpaw populations seem to be increasing in number; whether that is because more plants are found following fire, or because of more recruitment due to more flowers and more fruit set following fire has only been confirmed at JDSP.

Following a prescribed burn in 2003 at JILONA, two additional young plants (< 1 m tall, branching) were documented in overgrown scrub to the north of the original #1060 and #61 bringing the natural population at JILONA to four (4). Since a population of four endangered plants is not adequate to sustain the population, the land managers at JILONA considered a "pilot project" to augment the four-plant population.

By fall of 2008, the managers of JILONA, Faye Winters, biologist with the Bureau of Land Management (BLM) in Mississippi, and Melisa Tolbert, Palm Beach County ERM, worked out a plan with Cheryl Peterson, Endangered Species Biologist at Bok Tower Gardens (BOK) who had been growing plants from seeds collected in 2007 from JILONA, Jupiter Ridge, the Pawpaw Preserve and from plants growing at BOK.

On December 3, 2008, 134 seedlings grown from Bok Tower Gardens (BOK) were planted with the assistance of BOK, Jupiter High School Academy, USFWS, and numerous volunteers from ERM and elsewhere. The plantings were in the vicinity of #60 and #61, with the consideration that at some point in time, the new plants would mature, flower and possibly be cross pollinated with these two resident 4-petal pawpaws at JILONA. Much of this area was open sand, and the areas that had oaks were very low growing and there were numerous sand openings. Irrigation was installed to assure the seedling's survival. Planting was done carefully to assure the fine roots on the seedlings were not disturbed, as research had shown this was a critical aspect of survival. Monitoring was conducted at six month intervals by ERM.

The second Pawpaw planting occurred on December 15, 2011, when 108 seedlings were planted. The area planted was to the north of the 2008 planting and pawpaw #60 and #61, in the vicinity of the two young plants found in 2003. The habitat was dense oaks, chopped to the ground and any bare sand areas were much smaller than those in the 2008 area. Planting occurred in the same manner as the 2008 planting with the deep citrus pots split along the sides, the entire plant and pot "planted" and the sides of the pots carefully removed. Irrigation was also set up to water these plants until they became established.

continued

Note that in the spring after planting, some of the plants in both project areas set flowers; 2008 (8 plants) and 2011 (5 plants). Many species, including the 4-petal pawpaw, will flower in response to stress. Fire, mowing, drought, or planting from pots into the ground all are considered stress to plants. Some of the 2008 and 2011 plants set fruit the first year and a few have flowered or set fruit in subsequent years, so we know the pollinators have found the new plants at JILONA. Flowering and fruit set monitoring in spring 2014, will be interesting since these plants have had time to adjust and after a wet winter in Jupiter.

Plant survival results from the 2008 and 2011 plantings showed a sharp decrease. By the third year after planting, 78 plants or 59% of the 2008 plants were still alive and 72 plants, or 67% of the 2011 plants were alive. After five years, the 2008 population has declined to 62 plants or 57% of the original 134. There are no previous data for survival of 4-petal pawpaw seedlings out-planted from container germinated seeds, so comparisons can only be made between these two plantings. However, the survival of these two plantings are similar to a pilot study of seed germination in the natural scrub habitat at the Hawks Bluff site in the Savannas Preserve State Park (Cox and Shropshire). In 2001, 500 seeds were planted from hand-pollinated flowers. In 2005, survival was 67% in shaded transects and 44% in more sunny locations, but overall survival of 55% at four years after planting. For the JILONA plants, after five years the 2008 plants survival was at 47%. The plant survival at JILONA continues to decline and has not stabilized. At each monitoring season, fewer plants are recorded as survival.

From one plant (# 1060) in 1988 to four plants in 2003 to a total of 134 plants is a good beginning for establishing a viable reproductive population at JILONA. Continuous monitoring will give us more information about flowering, fruit set and survival and establishment of plants from nursery grown seedlings. Since these 4-petal pawpaw plants are estimated to live for 100 years, it is now very important that we recruit young people to help with monitoring. Did I mention that the leaves and flowers have a very distinctive odor, and that some of these compounds attract the flies, beetles and other insects to the flowers for pollination? It may be that some of these compounds may “enslave” humans to monitor these plants over long periods of time to assure that the endangered 4-petal pawpaw populations survives and flourishes.

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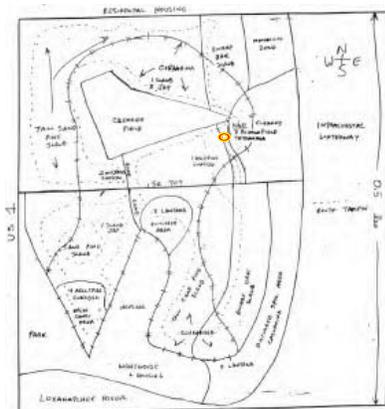
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Left: 1988 map of JILONA habitats prepared by S. Farnsworth. Red circle indicates location of pawpaw #1060.

Right: Recent aerial photos of northern JILONA. The green outline indicates location of 2008 pawpaw planting. The second planting (2011) is located north of the green outline in an area of dense oak scrub. Zoom in on these maps to view details. They are also provided in larger format as inserts for those not viewing this document electronically.



The Jupiter Inlet Lighthouse Outstanding Natural Area is managed by Palm Beach County ERM.

For more information:

www.co.palmbeach.fl.us/erm/natural/natural-areas/jupiter-inlet/