

Native Plants: An Overview¹

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Introduction

Over the past 20-30 years, awareness and use of native plants has steadily increased. In 2005, sales of Florida native plants were estimated at \$316 million, which represented about 11% of total sales (4). However, the use of native plants has been and continues to be a somewhat controversial matter. The goal of this publication is to present an overview of the issues related to native plants so that growers and consumers can make informed decisions about their production and use.

The growing demand for native plants largely has been a reaction to the nationwide onslaught of invasive, nonnative plants (see "Terms Relevant to Native Plants") that have displaced and continue to displace species that have existed here for centuries. To help alleviate this onslaught, local, state, and federal agencies are more and more commonly requiring the use of native plants. Preserving local, state, and national heritage has been another factor driving the market for native plants.

Despite the more widespread use of native plants, they remain under-utilized in commercial and residential landscapes. There are many beautiful species in our own "backyard" that are not available or are in very limited production (Fig. 1).



Figure 1. Fringed Bluestar (*Amsonia ciliata*) is a wildflower native to Florida that is a good landscape plant for sunny, dry, sandy sites throughout much of the state. It is one of the few native wildflowers with true blue flowers, but its availability is extremely limited.

There are several reasons contributing to the relatively limited availability and/or use of native plants.

- The market for many native plants frequently is much more regionalized than that for nonnative plants.
- Nurseries specializing in the production of native plants typically are relatively small and lack the capital to work out efficient production protocols for each species.

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- Capital to advertise and promote the use of native plants is limited.
- Native plants often are more expensive than nonnatives. The greater cost could be because many native plants are sold at small, locally-owned nurseries and garden centers specializing in native plants.
- Florida's native wildflower seed industry is very young and dominated by part-time growers. Seed is expensive because demand far exceeds supply. Introduction of seed of new species is expensive and time consuming.
- The controversial nature of native plants. The controversy has arisen out of regulations requiring the use of native plants, lack of a consensus about what constitutes a native plant (See "What is a Native Plant?"), and limited availability.
- Many people are creatures of habit. They use plants that they are familiar with, that their neighbors use, and that they remember from childhood.
- There is a misconception that native plants, in general, are not that ornamental based on what's observed in the wild.
- Plant explorers frequently seek species overseas to bring back to the U.S. to develop into the "hot" new landscape plant, which is at least partly due to the relatively high level of prestige associated with international plant exploration.

What is a Native Plant?

Native is a term that is widely used to describe a plant species that has naturally existed in an area for an extended period of time. "Native" species are widely understood to be those that occurred within political borders before European contact (~1500), and not as a result of direct or indirect human influence. Below are definitions of native plants used at the federal level and in Florida.

Federal

Executive Order 11987: " 'Native species' means all species of plants and animals naturally occurring, either presently or historically, in any ecosystem of the United States."

National Park Service (6): "Native species are defined as all species that have occurred or now occur as a result of natural processes on lands designated as units of the national park system. Native species in a place are evolving in concert with each other."

U.S. Fish and Wildlife Service (11): "Native. With respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem."

Florida

Florida statute 5B-40.00: "A plant species that is presumed to have been present in Florida before European contact."

Florida Native Plant Society (2): "For most purposes, the phrase "Florida native plant" refers to those species occurring within the state boundaries prior to European contact, according to the best available scientific and historical documentation. More specifically, it includes those species understood as indigenous, occurring in natural associations in habitats that existed prior to significant human impacts and alterations of the landscape."

There are many species that nearly all experts agree on regarding their nativity. However, scientific and historical evidence about the nativity of numerous other species is too limited to accurately declare whether these species are native to Florida. Species for which evidence is lacking often are presumed not native to Florida. The nativity issue is further complicated by the fact that the Territory of Florida once extended into what are called the Florida parishes of Louisiana. How are species native to these parishes to be classified? Are historical and scientific records precise enough to differentiate between species that occurred in these parishes but not within the current Florida boundaries?

What is not addressed, too, is that many of Florida's native wildflowers are ruderal species, that is, they are adapted to disturbed habitats. Since disturbed habitats are often considered to be closely associated with human activities, some ruderal species are considered nonnative since they were not observed until after European contact. However, ruderal species that are widespread today might have existed in very small, localized populations hundreds of years ago. Pockets of disturbed habitat would have been created by native Americans as well as by fires, floods, and hurricanes. The earliest plant explorers easily could have missed these small populations, or they could have observed a disturbed habitat at a time of year when a species was not present. As European colonization expanded, there was a concomitant increase in the amount of disturbed land that not only created more habitat for these ruderal species but increased the likelihood of these ruderal species being discovered. Moreover, significant plant exploration in Florida did not begin until that of the Bartrams in the 1700s. There is thus a 200+ year gap between the "cutoff date" for a plant species being declared native and the time of the first reliable observations.

NOTE: The Florida Native Plant Society presents a good summary of the many issues surrounding criteria for declaring a plant native on their web site (<http://www.fnps.org>).

Terms Relevant to Native Plants

Below are terms associated with native plants. Understanding the true meaning of these terms is important in order to more fully comprehend native plant issues that you read about or are involved with on a personal or professional level. Some of this information is excerpted from "Glossary of Expressions in Biological Control" (<http://edis.ifas.ufl.edu/IN673>).

Adventive - A term used to describe a species that has arrived by any means in an area to which it is not native; arrival in an area could have been natural (wind, animal, etc.) or mediated by humans (intentional or otherwise). See *Introduced*.

Alien - A somewhat confusing term that has been used to describe a species that exists in an area but is

native to somewhere else. It has been equated with *exotic*, and could be confused with *adventive*.

Ecotype - A population of species, whether native or not, that has adapted to a particular set of environmental conditions through a process of natural selection. This is a very important concept to consider when using native plants. An ecotype could be adapted to and perform equally well in suitable habitats over hundreds of square miles. Conversely, an ecotype could be very narrowly defined. For example, one population of a species could be best adapted to the moist conditions of a flatwoods habitat while another population of the same species only a mile or two away could be best adapted to the dry soils of an upland sandhill habitat.

Endemic - This term has been incorrectly used to describe a species that is native to only one particular area, such as Florida. The authors of "Glossary of Expression in Biological Control" note that *endemic* should be used to describe a species that "occurs constantly in an area in small numbers." As they point out, though, the incorrect usage of this term is deeply embedded in the literature and old habits are hard to break. See *Precinctive*.

Exotic - This term simply means that a species is native to someplace else. It has become widely used to describe plant species from overseas that have become invasive and displaced species native to the U.S. The correct manner to describe plants like kudzu, Brazilian pepper, etc. would be *adventive* species. Like the term *endemic*, however, the term *exotic* is now deeply entrenched in the literature.

Fitness - A measure of a plant's or population's *sustainability*. *Fitness* takes into account survival, seed production, and the occurrence of new seedlings or plants.

Indigenous (= *native*) - See "What is a Native Plant?"

Introduced - A term used to describe a species that has been intentionally brought by humans into an area in which it is not native (=nonindigenous). Essentially, it is a subcategory of *adventive*.

Invasive - This term is most often applied to major nonnative plant pest species, such as cogongrass, Japanese climbing fern, and melaleuca, that have displaced native vegetation. Such plants should be described as *invasive adventive species*. In addition, *invasive* is not restricted to nonnative species. Cattail is a native species that can completely take over a shallow pond or retention basin.

Native (= *indigenous*) - See "What is a Native Plant?"

Naturalized - A term used to describe a species that is not native to an area but has established a *sustainable* population in that area.

Phenotypic plasticity - A term used to describe the ability of a species or ecotype to express different characteristics such as flower color, leaf size or shape, and tolerance of site conditions. For example, an ecotype that is only able to grow in wet soil would have a low level of phenotypic plasticity with regard to site conditions, whereas an ecotype that is able to grow in wet or dry sites would have a higher level of phenotypic plasticity.

Precinctive - The correct term used to describe a species whose range is limited to only one particular area. See *endemic*.

Sustainable - In the context of plants, a population of a species that has become established in an area and can maintain itself over a long period of time through the recruitment of new plants via sexual (seed) and/or asexual (rhizomes or stolons) reproduction.

Weed - A plant growing where it is not wanted. Just like corn is a weed in a soybean crop, native species can be weeds too. Many of our native wildflowers, like blanketflower (*Gaillardia pulchella*), are excellent reseeding species. When they are planted in a landscape bed, their seedlings are often found growing in the lawn next to the landscape bed.

What Should I Plant or Produce?

Plant origin, that is the naturally occurring population from which all other crop plants are derived, can be a very important factor when deciding which plants to produce or use.

Growers

Plant origin is an important consideration for producers of woody, deciduous plants. Species that are derived from natural populations of more northern climates, like dogwood (*Cornus florida*) and red maple (*Acer rubrum*), are adapted to longer winters than those we have here in Florida. Because winters are relatively short and warm in Florida, deciduous species like dogwood and red maple might not leaf out or flower as well here as they do up north.

Those producing plants or seeds of native wildflowers or grasses need to consider plant source, especially for species that occur in other parts of the U.S. For example, black-eyed Susan (*Rudbeckia hirta* L.) is considered native to a large part of the U.S. However, black-eyed Susan derived from other parts of the U.S. might not grow well under Florida conditions, which would affect plant quality or seed yield. Flowering, growth, and survival of black-eyed Susan can be affected by seed source (1, 5, 10). Moreover, seed of native wildflowers and grasses derived from naturally occurring populations in Florida not only is highly marketable (restoration, mine reclamation, roadsides) but such seed commands a high price. Another important issue for those collecting seed or cuttings from natural populations is *inbreeding depression*, which is discussed later.

Seed producers also need to take steps to ensure that the genetic diversity of the seed crop matches as best as possible the genetic diversity of the original, naturally occurring population(s) from which the crop was derived. While there is very limited information about how much loss of diversity can occur, the longer lived a plant, the less of a concern about loss of genetic diversity. On one end of the spectrum are the true perennials, including woody plants. Seed of these plants will be harvested from the same plants over several years. At the other end of the spectrum are annuals. Each year's crop will be

derived from the previous year's seed, thereby increasing the possibility that genetic diversity could decline each year. In between are the biennials and the short-lived perennials; loss of genetic diversity is less of an issue, but still one that needs to be considered.

To help minimize loss of diversity, growers could reserve part of the original seed used to establish a crop, and re-introduce it least every 3 or 4 years. Seed reserves should be stored under cold, dry conditions to preserve seed quality. Use transplants to ensure that these plants are included; seed that is planted might not germinate. However, using transplants is only practical for landscape fabric production seed production systems (7). There are no formulas for determining the number of plants per row to use. One suggestion is to plant a new seedling every 10-15 ft within a row.

Consumers

The importance of plant origin to the end user mainly depends on the how the plants or seed will be used. For restoration or conservation projects, plant material that is best adapted to those sites will help to ensure that a sustainable population is established. An additional goal for conservation projects often is to preserve the genetic characteristics of the existing populations of native species. Conservationists want to prevent "genetic pollution" of the existing population that can occur when nonlocal plants hybridize with the plants of the local population. *Outbreeding depression*, which is discussed later, is a potential result of genetic pollution. The grower should be able to provide information about the origin of the plant (county, habitat).

Plant origin is also important when the goal is to establish self-sustaining roadside or meadow plantings of native wildflowers and grasses. Seed source can affect growth, flowering, and survival of native wildflowers under the low-input conditions of roadsides and meadows (5, 8, 9, 10). To increase the likelihood of long-term sustainability of a planted population of native wildflowers or grasses, use seeds or plants that are genetically diverse. Some information about potential diversity can be obtained from the grower. While it's extremely unlikely that the grower has any information about the actual

genetic diversity of the crop, ask the grower about how much variation he/she has observed with respect to flowering (date/season, color and size), foliage characteristics, and growth habit. Generally, the greater the variation, the greater the genetic diversity. Florida producers of native plants and seed tend to be knowledgeable and reliable, and should be able to provide some information about the native plants they sell.

Under residential or commercial landscape conditions, plant origin usually is much less of a critical issue (3), although there are some cases where origin is very important (for example, deciduous woody plants like dogwood). In addition, do not assume that native plants always, or nearly always, are more stress tolerant and pest resistant than nonnative species. Under garden conditions, or in areas surrounding homes or buildings where there is "fill dirt," select native species for their aesthetics (Fig. 2), for philosophical reasons, or because it's the "right plant for the right place," not necessarily for their stress tolerance or pest resistance. For native plants of local, state, or regional origin, the sites described above are very unlike natural habitats, so native plants cannot automatically be expected to have the same level of tolerance to moisture stress or pests as they would have in their natural habitats.



Figure 2. A small meadow-like planting ("mini-meadow") of a Florida ecotype of lanceleaf tickseed (*Coreopsis lanceolata*) in a residential landscape. Narrow strips of turf are maintained between the planting, the road, and the neighboring property to define the planting.

Inbreeding Depression

This is a case where a population has reduced or "depressed" *fitness* resulting from the exchange of pollen among genetically similar plants. It tends to occur in small, isolated populations, and is an issue mainly with native wildflowers and grasses that originated from natural populations.

While inbreeding depression might not be a factor to consider for some species because of their breeding and/or seed dispersal mechanisms, this information is often not known to the producer. Hence, producers that collect seed from natural populations should make their collections from several large populations in a region.

Inbreeding depression is also an issue for the end user to consider. When purchasing seeds or plants, it's important to find out from the producer as much information as possible about the natural population(s) from which the seed or plants were derived. And if purchasing seed, also find out how long that seed has been in production. The genetic diversity of a seed crop might be much lower than that of the original natural population(s) for seed crops of some species, especially annuals, biennials, or short-lived perennials. Again, this will vary depending on the breeding mechanism of the species (or ecotype), but in many cases this information is limited or not known. There has been very little research about this issue for ecotypes of native wildflowers and grasses that are in production.

Outbreeding Depression

Outbreeding (also called outcrossing, cross fertilization, and cross pollination) occurs when pollen is exchanged among plants that are genetically different and results in production of seed. The issue of outbreeding depression arises out of a concern that the *fitness* of the new plants resulting from a nonlocal population hybridizing with the local population will be reduced or "depressed." Outbreeding depression is mainly a concern for species in which seed production relies primarily or entirely on pollen exchange among genetically different plants. However, pollination mechanisms for many native species are not understood, so to play it safe, plants derived from locally adapted populations are sometimes specified to prevent potential outbreeding depression.

In some cases, the plant source specified must be from an on-site population or one adjacent to the site to be restored. The "fifty mile rule" (and its variants) is sometimes referred to; such rules stipulate that the naturally occurring population from which plants or seeds were derived must be within a certain number of miles of the planting site. Experimental evidence supporting "mileage rules" is limited at best. Moreover, there may be limited or no availability of plants or seed derived from within the specified number of miles of the planting site. When considering plant origin for restoration or conservation, matching the habitats and climates of the donor and planting sites is a practical approach. If plants or seed are to be purchased from a commercial producer, the likelihood of a producer having plants or seeds that match the habitat and/or climate is much greater than a producer having plants or seeds derived from populations within a specified number of miles of the planting site. If such plants or seed are absolutely required, the end user likely will have to contract with a grower to produce the specified plants or seed, or the end user will have to collect their own seed and grow their own plants.

Cultivars of Native Plants

In the wild, plants have been discovered that have one or more ornamental characteristics that are superior or substantially different compared to the typical plant of that species. When these selections are propagated and produced in a manner to preserve the desirable characteristics, they are often referred to as cultivars. Cultivars typically are evaluated under landscape conditions to determine their potential use in residential and commercial sites. For cultivars derived from naturally occurring populations outside of Florida or areas bordering Florida, cultivar origin is an important issue to consider as mentioned previously. For example, a dogwood cultivar derived from a natural population in the northeastern U.S. would not be appropriate to use in Florida.

The other issue to consider is man-made cultivars of native plants. Many native plant experts and enthusiasts do not consider man-made cultivars as being native, although it might be argued that selections or hybrids could have occurred under natural conditions. It is very unlikely, however, that

man-made selections or hybrids with "double flowers" (the reproductive parts of the flowers develop into petals so that there appear to be twice the number of petals) would be found in the wild for species that rely on seed for reproduction. Such species with "double flowers" would not be able to reproduce.

Native plant cultivars are suitable for residential and commercial landscapes because they have been shown to perform well under those conditions. Under low-input conditions such as roadsides or meadows, cultivars probably are not appropriate unless they have been designed for those conditions.

Use of cultivars in restoration or reclamation should be done with caution because genetic diversity could be very limited. Potential consequences of inbreeding and outbreeding depression also need to be considered.

Conclusions

The native plant issue is complex and widely debated. Use plants that you believe are native based on information in this publication and the views of local experts, but choose "the right plant for the right place." When purchasing native plants, ask for a plant by its scientific name. Also ask about the origin of the plant. Plants that were derived from seed or plants of natural populations in other parts of the country might not perform well in Florida.

There are many beautiful native species that are under utilized or not used at all in our landscapes. Don't let the appearance of plants in their natural habitats discourage you from using native plants. Under landscape conditions, these plants can express their full potential and beauty that is often suppressed in their natural habitat.

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