

# *Contortae*, The Fire Pines

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*Contortae* includes 4 species occurring in the United States and Canada. Leaves are usually 2 per fascicle and short. The seed cones are small, and symmetrical or oblique in shape. These cones are normally serotinous, remaining closed or opening late in the season, and often remaining for years on the tree. Cone scales may or may not be armed with a persistent prickle, depending upon species.

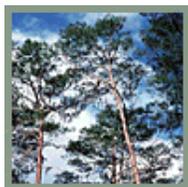
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*Contortae* includes 2 species in the southeastern North America:

*Pinus virginiana*  
Virginia pine



*Pinus clausa*  
sand pine



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# *Pinus virginiana* Mill.

## Virginia pine

(Jersey pine, scrub pine, spruce pine)

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### Tree Characteristics:

- **Height at maturity:**  
Typical: 15 to 23 m (56 to 76 ft)  
Maximum: 37 m (122 ft)
- **Diameter at breast height at maturity:**  
Typical: 30 to 50 cm (12 to 20 in)  
Maximum: 80 cm (32 in)
- **Crown shape:** open, broad, irregular

- **Stem form:** excurrent
- **Branching habit:** thin, horizontally spreading; dead branches persistent

Virginia pine regenerates prolificly, quickly and densely reforesting abandoned fields and cut or burned areas. This pine is a source of pulpwood in the southeastern United States on poor quality sites.

**Human uses:** pulpwood, Christmas trees. Because of its tolerance to acidic soils, Virginia pine has been planted on strip-mine spoil banks and severely eroded soils.

**Animal uses:** Old, partly decayed Virginia pines are a favorite nesting tree of woodpeckers. Serves as habitat for pine siskin (*Spinus pinus*) and pine grosbeak (*Pinicola enucleator*). A variety of songbirds and small mammals eat the pine seeds. Deer browse saplings and young trees.

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# *Pinus virginiana* Mill.

## Bark

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### Bark characteristics:

- young bark thin, smooth; dark brown
  - mature bark thin; separated into broad, flat, scaly plates
  - 0.8 to 1.3 cm (0.3 to 0.5 in) thick
  - brownish-orange to light brown
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# *Pinus virginiana* Mill.

## Leaves and Buds

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### **Bud Characteristics:**

- 8 to 12 mm (0.3 to 0.5 in) long
- conical, acuminate
- dark brown scales
- resinous

### **Leaf Characteristics:**

- 4 to 7 cm (1.6 to 2.8 in) long
- 2 needles per fascicle
- dark green to grayish-green
- acicular; rigid, often twisted
- persist 3 to 4 years

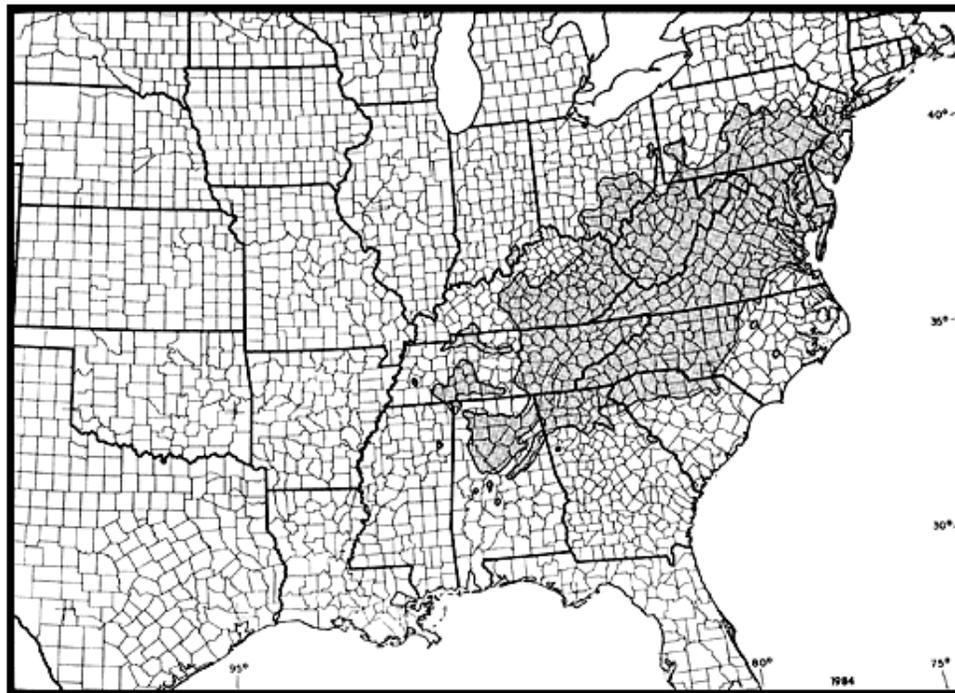
- fascicle sheath 10 mm (0.4 in) long; persistent

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# *Pinus virginiana* Mill.

## Range and Habitat



The native range of Virginia pine. (From Little, 1971.)

## Geographic Range

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According to Carter and Snow (1990): "Virginia pine generally grows throughout the Piedmont and at lower elevations in the mountains from central Pennsylvania south-westward to northeastern Mississippi, Alabama, and northern Georgia. It is also found in the Atlantic Coastal Plain as far north as New Jersey and Long Island, NY, and extends westward in scattered areas into Ohio, southern Indiana, and Tennessee."

## Climate

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According to Carter and Snow (1990): "The annual precipitation in the native range of Virginia pine averages 890 to 1400 mm (35 to 55 in) and is fairly well distributed throughout the year. Rainfall generally is greatest in the southwestern portion of the range. The climate throughout most of this area is classified as humid.

"Summer temperatures average about 21 to 24 degrees C (70 to 75 degrees F); winter temperatures range from -4 to 4 degrees C (25 to 40 degrees F); and the average number of frost-free days varies from more than 225 on the eastern and southern edge of the Piedmont to 160 days on the more mountainous areas to the west and north."

## Soils and Topography

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According to Carter and Snow (1990): "Virginia pine grows well on a variety of soils derived from marine deposits, from crystalline rocks, sandstones, and shales, and from limestone to a lesser extent. These are classified as Spodosols and Inceptisols. After harvesting or fire, these soils are subject to moderate sheet and gully erosion; erosion can become severe on shale soils. On many areas that now support Virginia pine, much of the A horizon is gone because of past erosion under intensive agricultural use.

"The species grows best on clay, loam, or sandy loam; it generally does poorly on serpentine soils, shallow shaly soils, and very sandy soils. It thrives only in moderately well drained to well drained soils and is less tolerant of wet sites and impeded drainage than pitch and loblolly pines (*Pinus rigida* and *P. taeda*). Virginia pine generally tolerates soil acidities ranging from pH 4.6 to 7.9. Soil beneath a Virginia pine stand was more acidic and contained more organic matter than soil under shortleaf (*P. echinata*), loblolly, or white (*P. strobus*) pine stands.

"Virginia pine usually is found at elevations of 15 to 760 m (50 to 2,500 ft). It comes in freely on abandoned farmland throughout its range."

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# *Pinus virginiana* Mill.

## Reproductive Structures

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### Male cones

- occur in clusters at base of new shoots in lower crown
- 1 to 2 cm (0.4 to 0.8 in) long at maturity
- orangish-brown at maturity
- release pollen March through May

### Female cones

- occur singly, in pairs, or in clusters near the tips of on new shoots throughout crown
- pale green at time of pollination
- 3 to 6 cm (1.2 to 2.4 in) long at maturity
- reddish brown, glossy
- ovoid-conic
- usually sessile, but also pedunculate
- apophysis reddish-brown with inner tip of scale covered by a purple band

- umbo armed with a sharp, slender, persistent prickle
- mature and release seed September through November of second season
- persist on branch up to 15 years

### Seeds

- 3 to 6 mm (0.1 to 0.2 in) long
- dark brown to black
- triangular to oval
- wing 7 to 9 mm (0.3 to 0.4 in) long; light brown

Fertilization takes place in June, usually 13 months after pollination of the female cones. The cones are mature in late September or early November. Virginia pine can produce cones as early as age 3 and as late as age 80, depending on site conditions. Unlike most other pines, this pine produces seed cones in all parts of the crown, not just the upper portion. Seeds are produced every year with large cone crops every 3 or 4 years. Seeds require exposed mineral soil for successful seedling establishment, as Virginia pine is intolerant of vegetative competition and overstory shade.

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# Additional Readings

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# *Pinus clausa* (Chapm. ex Engelm.) Vasey ex Sarg.

sand pine

(Ocala sand pine, Choctawhatchee sand pine, scrub pine, spruce pine)

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## Tree Characteristics:

- **Height at maturity:**  
Typical: 9 to 24 m (30 to 80 ft)  
Maximum: 31 m (103 ft)

- **Diameter at breast height at maturity:**  
Typical: 30 to 50 cm (12 to 20 in)  
Maximum: 63 cm (24 in)
- **Crown shape:** rounded or flattened, open
- **Stem form:** excurrent
- **Branching habit:** short, coarse, spreading limbs; persistent dead branches

Sand pine is found almost exclusively in Florida. Two geographic races are recognized, the Ocala race and the Choctawhatchee race. The Ocala race, *P. clausa* var. *clausa*, occurs from northeastern to southern Florida. This race is distinguished from the other variety by its serotinous cones, which either remain closed for many years, or open after high-intensity fires. This variety grows in dense, even-aged stands. The best development is in the "Big Scrub" in north-central Florida. The Choctawhatchee race, *P. clausa* var. *immuginata*, occurs in northwest Florida and extreme southeastern Alabama. This variety has non-serotinous cones.

**Human uses:** Pulpwood, construction lumber, fuelwood, Christmas trees.

**Animal uses:** Seeds eaten by wild turkey (*Meleagris gallopavo*), bobwhite quail (*Colinus virginianus*), fox squirrel (*Sciurus niger*), gray squirrel (*Sciurus carolinensis*), and mourning dove (*Zenaidura macroura*).

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# *Pinus clausa* (Chapm. ex Engelm.) Vasey ex Sarg.

## Bark

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### Bark characteristics:

- young bark thin, smooth; pale gray
- mature bark furrowed into scaly, narrow ridges
- dark gray to reddish-brown

The thin bark and poor pruning of sand pine allow wildfires to quickly consume entire trees, spreading from crown to crown in the dense stands. However, the hot temperatures cause the closed cones to open, and the newly exposed mineral soil below is suitable for seed germination.

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# *Pinus clausa* (Chapm. ex Engelm.) Vasey ex Sarg.

## Leaves and Buds

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### Bud Characteristics:

- 2 mm (0.1 in) long
- oblong or cylindrical
- reddish-brown scales
- non-resinous

### Leaf Characteristics:

- 5 to 9 cm (2 to 3.6 in) long
- 2 (rarely 3) needles per fascicle
- dark green

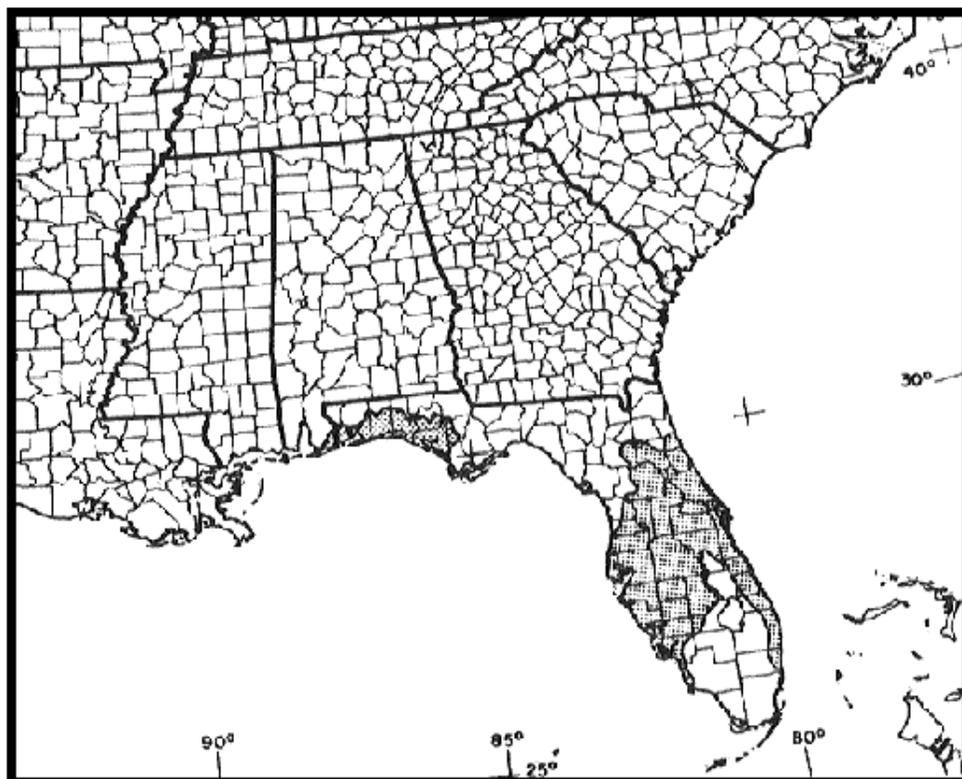
- acicular, slender, slightly twisted
- fascicle sheaths 5 mm (0.2 in) long; persistent

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# *Pinus clausa* (Chapm. ex Engelm.) Vasey ex Sarg.

## Range and Habitat



The native range of sand pine. (From Little, 1971.)

## Geographic Range

According to Brendemuehl (1990) : "Sand pine is one of the minor southern pines with a natural range limited almost entirely to Florida. The largest sand pine concentration is a block of the Ocala variety covering about 101 170 ha (250,000 acres) in north-central Florida, and area often referred to as the "Big Scrub." This variety of sand pine also grows in a narrow strip along the east coast of Florida from St. Augustine southward to Fort Lauderdale. On the Gulf Coast small tracts of Ocala sand pine can be found scattered from a few kilometers north of Tampa southward to Naples. The less abundant Choctawhatchee variety is found growing along the coast in western Florida from Apalachicola to Pensacola and extending westward into Baldwin County, AL. Natural stands of Choctawhatchee sand pine are most abundant in Okaloosa and Walton Counties, FL, covering an area of about 40 470 ha (100,000 acres). Scattered stands of this variety of sand pine can be found 32 to 40 km (20 to 25 mi) inland from the coast in this section of Florida. Sparse stands of sand pine are also found on many of Florida's offshore islands."

## Climate

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According to Brendemuehl (1990) : "The climate of north-central Florida is characterized by hot summers with abundant precipitation and mild, rather dry winters. Precipitation varies from 50 to 75 mm (2 to 3 in) per month from October until April to as much as 200 to 230 mm (8 to 9 in) per month in June, July, and August. About 55 percent of the average rainfall of 1350 mm (53 in) occurs in the 4 months from June through September. Temperature extremes of -11 degrees and 41 degrees C (12 degrees and 105 degrees F) have been recorded. A frost-free period of 290 days is normal.

"Choctawhatchee sand pine thrives in western Florida under climatic conditions that are somewhat different from those of north-central Florida. Rainfall from December through May averages 100 to 110 mm (4 to 4.5 in) per month. It is hot and humid from June through September but slightly less so than in the north-central area. About 43 percent of the average annual rainfall of 1520 mm (60 in) occurs during this period of the year. October and November are the driest months, with rainfall averaging about 75 mm (3 in) per month. Temperature extremes of -17 degrees and 42 degrees C (2 degrees and 107 degrees F) have been recorded. Average temperature for January is 11 degrees C (52 degrees F) and 27 degrees C (81 degrees F) for July. A frost-free period of 265 days is normal."

## Soils and Topography

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According to Brendemuehl (1990) : "Sand pine grows on well-drained to excessively drained, infertile, acid to strongly acid sandy soils of the order Entisols. This sand is of marine origin, much of which was deposited in terraces developed during the Pleistocene epoch.

"Most Ocala sand pine grows in the division of Florida known as the Central Highlands. Elevations range from less than 6 m (20 ft) above sea level near Lake George to nearly 61 m (200 ft) in the highest areas of this region. Numerous lakes dot this area and are indicative of the presence of soluble limestone not far below the surface. Gentle rolling hills characterize the terrain. The major soils on which Ocala sand pine grow, in order of importance, are the Astatula, Paola, and St. Lucie series.

"In west Florida, scattered stands of Choctawhatchee sand pine grow on the excessively drained soils of the Coastal Lowlands; however, the majority of such stands are in the division of Florida known as the Western Highlands. Elevations range from near sea level to nearly 90 m (295 ft) above sea level. The terrain of this area is typified by long, gentle slopes and broad, nearly level ridgetops. Sloping to steep hillsides border most of the streams and small lakes of the area. The waterlevel of the rivers, lakes, and intermittent ponds of the area fluctuates considerably according to the amount of rainfall and seepage from the surrounding deep, sandy soils. Soils common to this region include the Kershaw and Lakeland series".

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# *Pinus clausa* (Chapm. ex Engelm.) Vasey ex Sarg.

## Reproductive Structures

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### Male cones

- occur in clusters at base of new shoots in lower crown
- 10 mm (0.4 in) long at maturity
- pinkish or purplish at maturity
- *P. clausa* var. *clausa* matures and releases pollen from late December through mid-January
- *P. clausa* var. *immuginata* matures and releases pollen from late January through February

### Female cones

- occur in clusters of 2 to 5 near tip of new shoots
- yellowish-green at time of pollination

- 5 to 9 cm (2 to 3.6 in) long at maturity
- serotinous or non-serotinous
- dark brown to yellowish-brown
- ovoid-conic
- short-stalked
- apophysis dark brown
- umbo armed with short, sharp prickles
- persistent on branch 1 to many years
- *P. clausa* var. *clausa* bears both serotinous and non-serotinous cones
- *P. clausa* var. *immuginata* bears mostly non-serotinous cones

## Seeds

- 5 mm (0.20 in) long
- dull black to gray
- triangular to oval
- wing 15 mm (0.6 in) long; glossy brown

According to Brendemuehl (1990) : "Sand pine bears cones at an early age. It is not unusual to find mature cones on 5-year-old trees. Occasionally flowers, usually pistillate strobili, are produced by 9- to 10 month old seedlings growing under nursery conditions. The two varieties of sand pine differ appreciably in cone production, cone size, seed size, and several other characteristics. An abundant crop of cones is produced by Ocala sand pine almost annually. Choctawhatchee cone crops of similar size are produced at 4- to 6-year intervals, with light crops in intervening years.

"The majority of Ocala sand pine cones are serotinous: they remain closed when mature and require heat to open. Consequently, seed dispersal is minimal. The cones are very persistent and may accumulate in large numbers on a single tree.

"Seed dissemination of Choctawhatchee sand pine differs from that of Ocala sand pine. The majority of Choctawhatchee cones open when mature and most of the seeds are disseminated during September, October, and November. In western Florida the prevailing winds during the fall are from the west and northwest, and consequently seeds are distributed more evenly and to a greater distance on the eastern and southeastern sides of stands of seed-bearing age."

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# Additional Readings

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- Brendemuehl, R.H., 1990. *Pinus clausa* (Chapm. ex Engelm.) Vasey ex Sarg., Sand Pine, pp. 294-301. In R.M. Burns and B.H. Honkala (eds.), *Silvics of North America*, Vol. 1, Conifers, U.S.D.A. For. Serv. Agric. Handbk. 654, Washington, D.C.
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