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Anacardiaceae—Sumac family

Cotinus P. Mill.

smoketree or smokebush

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Growth habit, occurrence, and use. The genus *Cotinus* P. Mill—smoketree— includes 3 or 4 species of deciduous, polygamous or dioecious, small trees or shrubs, widely distributed through central and southern Europe to the Himalayas, southwest China, and the southeastern United States (Hillier 1991; Krüssmann 1984). The smoketrees are cultivated primarily for ornamental purposes. The durable wood of American smoketree has been used for fence posts (Koller and Shadow 1991; LHBH 1976) and it also yields a yellow dye that was widely used during the Civil War (Vines 1960). Common smoketree is used in Bulgarian medicine for its anti-inflammatory, antibacterial, and wound-healing properties (Tsankova and others 1993). The 2 species of interest are described in table 1.

Common smoketree is an upright, spreading, multistemmed shrub that is grown because of its many ornamental landscape qualities and its adaptability to widely divergent soils and pH ranges (Dirr 1990). Several cultivars produce a long period of midsummer floral and fruit ornamentation, showy plumose inflorescences, and vivid autumn foliage color (Dirr 1990; Hillier 1991; Koller and Shadow 1991; Krüssmann 1984). Of special note are 'Nordine Red', the hardiest of the purple-leaf smokebushes, and 'Royal Purple', a cultivar with rich maroon-red foliage and purplish red inflorescences (Dirr 1990). The foliage of this last cultivar accumulates anthocyanin pigments in response to ultraviolet light of wavelengths between 300 and 400 nm and low temperatures (Oren-Shamir and Levi-Nissim 1997).

American smoketree is a large, upright shrub or small, round-headed tree with bluish to dark green leaves that turn a brilliant yellow, orange, red, and reddish purple color in the fall (Dirr 1990). The bark of the American smoketree is a beautiful gray to gray-brown, and scaly mature trunks (that is, with a fishlike scale effect), providing pattern and detail in the winter landscape (Dirr 1990; Koller and Shadow 1991). For a review of *Cotinus* and discussion of selected cultivars, see Tripp (1994).

Flowering and fruiting. The small, usually infertile, yellowish flowers, which bloom in June to July (April to May for American smoketree), are borne in large, terminal panicles (Krüssmann 1984). The pedicels and peduncles lengthen after flowering and are clad with fine hairs, creating the smokelike effect that gives the plant its common name (LHBH 1976). The plumelike inflorescences often persist through September (Dirr 1990). The fruit (figures 1 and 2) is a dry, reticulate drupe about 3 to 6 mm in length, light red-brown in color (ripening to near black), containing a thick, bony stone (Rudolf 1974). Seedcrops are produced annually but are often poor. The kidney-shaped drupe ripens in the fall, which is usually August to October for common

Table 1—*Cotinus*, smoketree: nomenclature, occurrence, growth habit, height at maturity, and date first cultivated

Scientific name(s)	Common name(s)	Occurrence	Growth habit	Height (m)	Year first cultivated
***C. coggygria* Scop.** *C. americanus* Nutt. *C. cotinoides* (Nutt. ex Chapm.) Britt.	**common smoketree**, smokebush, European smoketree, Venetian sumac	Central & S Europe, Himalayas & to SW China	Shrub	2.5–4.6	1656
***C. obovatus* Raf.**	**American smoketree**, yellowwood	Tennessee, S to Alabama & Missouri, W to Texas	Tree	6.1–9.1	1882

Sources: Dirr (1990), LHBH (1976).

Figure 1—*Cotinus obovatus*, American smoketree: seeds.

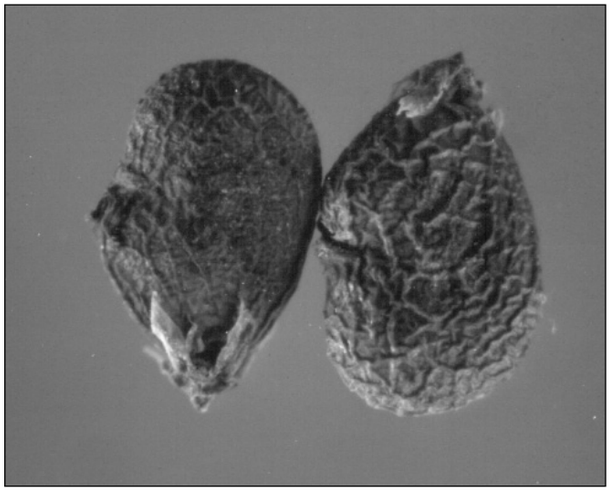
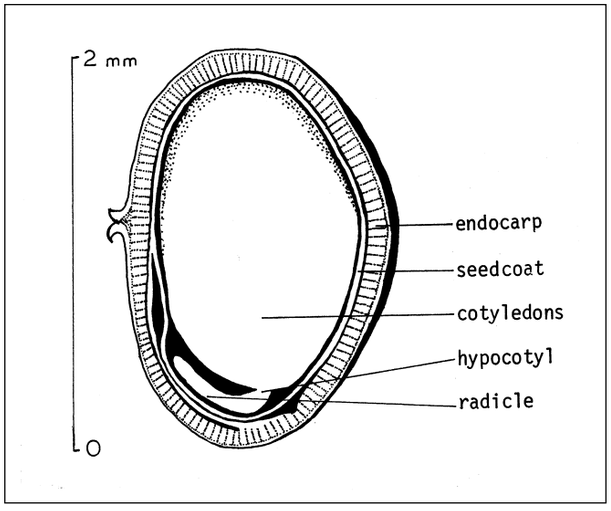


Figure 2—*Cotinus obovatus*, American smoketree: longitudinal section through a seed.



smoketree and June to September for American smoketree (Rudolf 1974).

Collection of fruits; extraction, cleaning, and storage of seeds. The fruits should be harvested by hand as soon as they are ripe (Rudolf 1974). Seeds of common smoketree that are collected green during late August–September and sown immediately can produce high germination percentages the following spring (Dirr and Heuser 1987). Seeds collected from purple-leaf forms produce a mixture of green-leaf and purple-leaf seedlings (Dirr and Heuser 1987). Dry fruits should be run through a hammermill and the debris fanned out (Rudolf 1974). The number of cleaned seeds per seed weight for common smoketree ranges between 99,978 to 118,999/kg (45,350 to 53,978/lb) with 75% germination and 97% purity, depending upon cleaning techniques (Allen 1994). The average number of cleaned seeds per weight for American smoketree is 111,111/kg (50,400/lb) (Rudolf 1974).

Information on smoketree seed storage is limited, but the indications are strong that these seeds are orthodox in storage behavior. One report states that seeds of common smoketree can be stored dry for several years in open or sealed containers at room temperature (Heit 1967, cited by Rudolf 1974). However, the best practice is to store dry seeds in a metal or rigid plastic container that is then sealed and stored in a refrigerator at 0 to 5 °C (Macdonald 1986). Seeds stored in this manner will be viable for a number of years.

Pregermination treatments. Smoketree seeds have both a hard seedcoat and an internal dormancy, thus causing slow and irregular germination. Seeds can be stimulated to germinate more uniformly by sulfuric acid scarification followed by cold stratification (table 2). Seeds from a recent introduction (Dummer hybrids) that were acid-scarified for 3 hours (no cold stratification given) and then planted germinated in 12 days (Dirr 1990).

Germination tests. Pretreated smoketree seeds may be tested for 30 days in sphagnum flats or in seed germinators (Rudolf 1974). Average test results for 2 species are shown in table 3. Tetrazolium staining can be used for rapid estimates. Seeds should be soaked in water for 24 hours before breaking open the seed coat and staining 24 hour at 30 °C in a 1% solution (Enescv 1991).

Nursery practice and seedling care. Smoketree seeds are fall-sown without pretreatment if the fruits are slightly green (Dirr 1990; Macdonald 1986; Rudolf 1974) or with pretreatment in the spring at a rate of 430/m^2 (40/ft^2) (Rudolf 1974). The seed should be covered with 6 to 9 mm ($^1/_4$ to $^3/_8$ in) of soil, and fall-sown beds should be mulched with sawdust (Rudolf 1974). Seedlings may be planted as 1+0 stock (Rudolf 1974).

Several references noted that common smoketree should be propagated by vegetative methods, because many seedlings are male plants lacking the showy flowering panicles (Dirr 1990; Dirr and Heuser 1987; Hartmann and others 1990; Macdonald 1986). In general, softwood cuttings taken in early June to July, treated with 1 to 3 g/liter (1,000 to 3,000 ppm) indole-3-butyric acid solution, and placed in a well-drained medium under mist will root in about 4 to 8 weeks (Blakesley and others 1991, 1992; Dirr 1990; Dirr and Heuser 1987; Hartmann and others 1990; Kelley and

Table 2—*Cotinus*, smoketree: seed pregermination treatments

Species	Scarification in H_2SO_4 (min)	Stratification treatments		
		Moist medium	Temp (°C)	Days
C. coggygria	30	Sand	3	45–60
	30/60	Sphagnum moss	5	90
	20/80	Peat	3	60–80
C. obovatus	20/40	Plastic bag	3	60

Sources: Dirr and Heuser (1987), Gonderman and O'Rourke (1961), Heit (1968) cited by Rudolf (1974), Stilinovic and Grbic (1988).

Table 3—*Cotinus*, smoketree: germination test conditions and results with pretreated seed

Species	Germination test conditions				Germination rate		Germination		Soundness (%)
	Medium	Temp (°C) Day	Temp (°C) Night	Days	%	Days	%	Samples	
C. coggygria	Germinator	20	20	30	—	—	80	2	70
	Sphagnum	21	21	21	—	—	93	2	—
C. obovatus	Kimpak in germinator	30*	20	46	37	11	39	3	60†

Source: Rudolf (1974).

* With light for 8 hours.

† Purity was 96%.

Foret 1977; Macdonald 1986; Siftar 1981). Rooted cuttings must be overwintered without disturbance and transplanted in the spring. Spellerberg (1985, 1986) reported improved shoot growth and higher rooting percentages of common smoke tree cv. 'Royal Purple' cuttings when they were taken in April from mother plants forced under glass than cuttings taken in June from outdoor-grown plants. After rooting, shoot growth was promoted by longer photoperiods, higher carbon dioxide levels, and gibberellic acid treatments. Howard (1996) reported that rooting of 'Royal Purple" cuttings was confined to the period of active shoot growth (late May to early August), and a small benefit was noted with severe stock plant pruning. Common smoketree can also be successfully propagated by French or continuous layering (Macdonald 1986).

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