Hamamelidaceae—Witch-hazel family

Hamamelis L.

witch-hazel

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Growth habit, occurrence, and use. Witch-hazels are deciduous shrubs or small trees that attain heights of 2 to 10 m (table 1). American witch-hazel is native from Nova Scotia to southeastern Minnesota, south to Missouri, southeastern Oklahoma and Texas, and east to central Florida (Little 1953). First cultivated in 1736 (Rehder 1940), American witch-hazel is used in environmental plantings largely because it flowers in late autumn. The species provides seeds for birds and browse for wildlife (Van Dersal 1938). Bark, leaves, and twigs have been used medicinally in the form of extracts. Another species—Ozark witch-hazel—is a shrub of the Ozark region of Missouri, Arkansas, and Oklahoma but is seldom planted. Japanese and Chinese witch-hazels are popular introduced ornamentals that bloom in the spring. *Hamamelis* × *intermedia* 'Arnold Promise', a hybrid of Japanese and Chinese witch-hazels, was first produced at the Arnold Arboretum (Hora 1981).

Flowering and fruiting. The spider-like yellow or rusty red flowers of American witch-hazel open in September or October, but the ovules are not fertilized until the following May. The fruits ripen early the next autumn (Rehder 1940; Van Dersal 1938). Members of the witch-hazel family have catkins for flowers and they are wind-pollinated (Johnson 1973). Ozark witch-hazel flowers from midwinter to spring (Fernald 1970). Capsules (figure 1) burst open when dry, each discharging 2 shiny black seeds (figure 2). There is limited dispersal by birds. Annual fruit production is highly variable, with abundant fruit crops occurring 1 out of 4 years (DeSteven 1982).

Developing witch-hazel seeds are the larval food of the beetle *Pseudanthonomus hamamelidis* Pierce (Curculionidae) (DeSteven 1982). Weevil eggs are laid on the fruits from mid-June to early July and the newly hatched larvae feed on the fruits from mid-July to September. Lepidopteran caterpillars may also consume the seeds. The 2 most abundant species are in the families Gelechiidae and Pyralidae, and 3 other "occasional" species are in the families Nolidae,

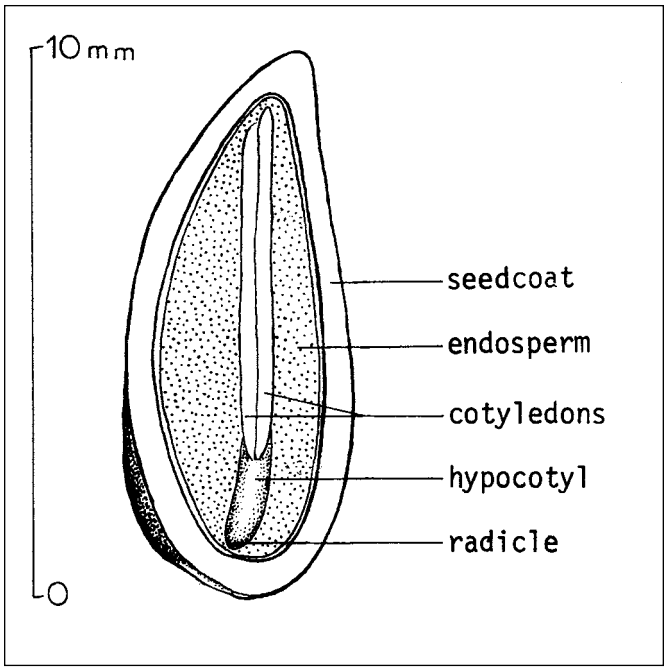
Figure 1—*Hamamelis virginiana,* witch-hazel: fruits (capsules) before and after seeds were discharged.

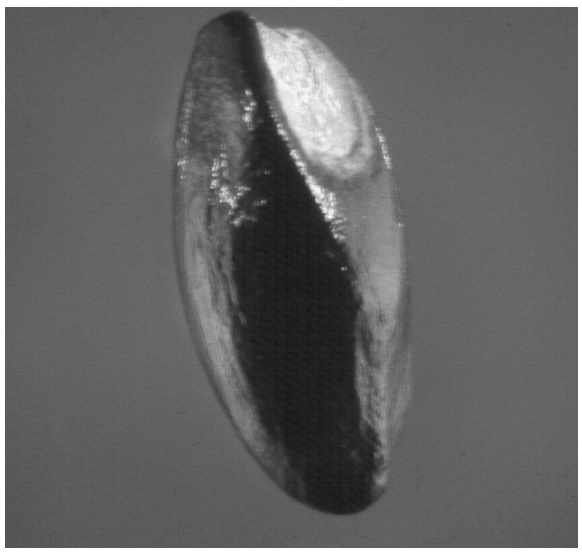
Table 1—*Hamamelis,* witch-hazel: nomenclature and occurrence

Scientific name	Common name	Occurrence	Height (m)
***H. japonica* Siebold & Zucc.**	**Japanese witch-hazel**	Japan	10
***H. mollis* D. Oliver**	**Chinese witch-hazel**	W central China	10
***H. vernalis* Sarg.**	**Ozark witch-hazel**	Ozark Mtns of Missouri & Arkansas	2
***H. virginiana* L.**	**American witch-hazel**	E US & Canada	7–10

Sources: LHBH (1976), Hora (1981).

Figure 2—*Hamamelis virginiana*, witch-hazel: longitudinal section through a seed (**top**) and exterior view (**bottom**).





Phalaenidae, and Geometridae (DeSteven 1982). Small mammals begin feeding on the seeds once they mature in the autumn. Only 14 to 16% of the seeds survive the predation by insects and mammals (DeSteven 1982)

Collection, extraction, and storage. Witch-hazel fruits should be picked in early autumn before they split open and discharge their seeds. Ripe fruits are dull orange-brown with blackened adhering fragments of floral bracts, but the seeds apparently mature as early as August before the fruit coat is fully hardened (Sandahl 1941). Fruits should be spread out to dry so the seeds may be separated from the capsules by screening. Two samples had 19,200 and 24,000 seeds/kg (8,727 and 10,909 seeds/lb) (Brinkman 1974). Fresh seeds can be stored dry in sealed containers at 5 °C for at least 1 year without loss of viability. For overwinter storage before spring-planting, seeds should be stratified in a 1:1 mixture of dampened sand and peat moss at 5 °C. The stratification medium should be 2 to 3 times the volume of seeds (Fordham 1976).

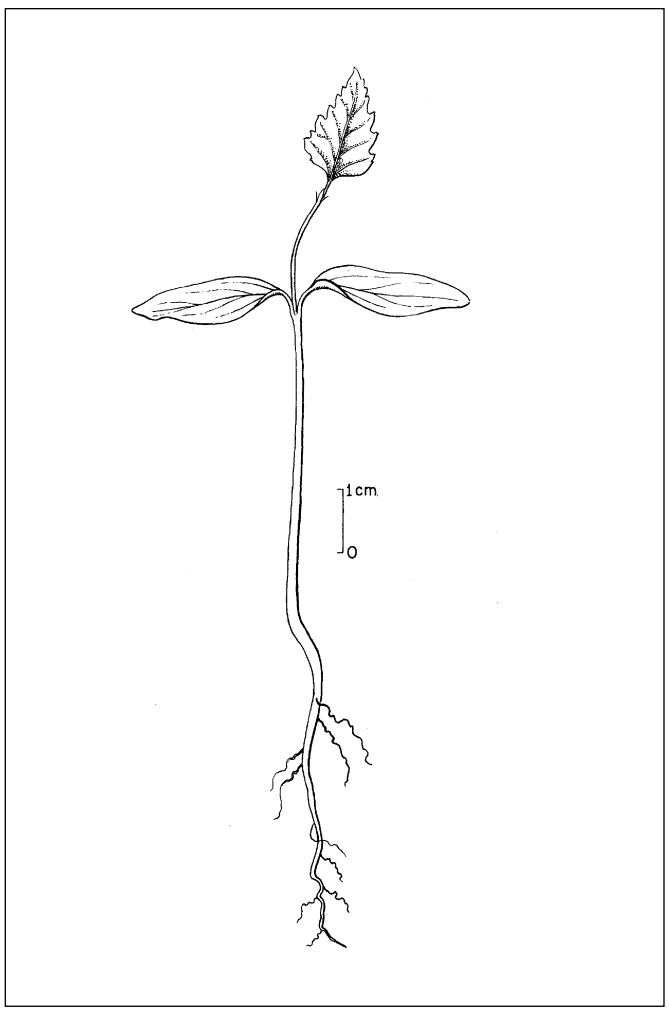
Germination and seed testing. Some stratified seeds germinate in the first spring but many remain dormant until the following year. Dormancy is due to conditions in both seedcoat and embryo, but satisfactory methods for overcoming dormancy have not been found. Rivera and others (1937) subjected witch-hazel seeds to pressures of 2,070 to 413,700 kN/m^2 (300 to 60,000 lb/in^2) at temperatures of 0, 25, and 50 °C and found that none of these conditions resulted in germination. In a series of tests, Brinkman (1974), stratified seeds for 60 days at 30 °C (day) and 20 °C (night) plus 90 days at 5 °C. When tested in sand at 30 °C (day) and 20 °C (night), 17% of these seeds germinated in 60 days.

Work in England on American witch-hazel seeds stratified for 2 months of warm and 2 months of cold, then 2 months of warm and 4 months of cold, produced 88% germination. The same seeds stratified for 2 months of warm and 1 month of cold, then $^1/_2$ month of warm and 4 months of cold, produced 84% germination. Chinese witch-hazel seeds stratified for 3 months of warm and 3 months of cold resulted in 88% germination. Ozark witch-hazel seeds germinated 70% after 3 months of cold stratification; 75% after 3 months of warm and 3 months of cold; 81% after 4 months of warm and 3 months of cold; and 85% after 5 months of warm and 3 months of cold (Dirr and Heuser 1987). A study at the Arnold Arboretum showed that Ozark witch-hazel germinated about as well after cold stratification only as it did after 2 stages of pretreatment (Fordham 1976). The Arnold Arboretum has found that 5 months of warm stratification followed by 3 months of cold treatment was satisfactory for witch-hazel seeds (Fordham 1991).

Chemical staining with 2,3,5-triphenyl tetrazolium chloride (TZ) is the preferred laboratory method for testing the viability of witch-hazel (Moore 1985). One-fourth of the seed opposite the radicle is clipped off to allow for the seed to imbibe the chemical. After staining, the seed is cut longitudinally to expose the embryo for observation. The average viability of 19 samples of witch-hazel seeds was 59% with a range of 0 to 97% (Brinkman 1974).

Nursery practice. Witch-hazel seeds may be fall-sown in the nursery as soon as collected, or stratified seeds may be sown in the spring. Limited trials show that seeds collected as early as August and sown by early October results in as much as 90% germination the following spring (Heit 1968; Sandahl 1941). Fall-sowing is recommended; the seedbeds should be mulched over winter and uncovered at germination time in the spring. For spring-sowing of stratified seeds, seedbeds should be prepared as early as soil conditions permit. Sowing in drills spaced 20 to 30 cm (8 to 12 in) apart will facilitate weeding and cultivating. Secondary leaves may develop on a seedling within 21 days after germination (figure 3). Propagation by layering also is possible.

Figure 3—*Hamamelis virginiana*, witch-hazel: seedling at 21 days after germination.



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