

Rosaceae—Rose family

Heteromeles arbutifolia (Lindl.) M. Roemer

Christmasberry

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Growth habit, occurrence, and uses. The genus *Heteromeles* has only a single species—*H. arbutifolia* (Lindl.) M. Roemer, also known as *H. salicifolia* (K. Presl.) Abrams (Phipps 1992). It is closely related to the large tropical genus *Photinia* Lindl., to which it has sometimes been referred. Christmasberry, also known as toyon, California-holly, and hollywood, is a long-lived shrub or small tree, 2 to 10 m in height, that sprouts freely after fire from a subterranean burl. It has shiny, leathery, evergreen leaves that are sharply toothed along the margins. A common constituent of chaparral vegetation throughout California and Baja California, it is usually found on less harsh, more mesic microsites. Christmasberry is useful for erosion control, is a source of honey, and has leaves and fruits that provide food for wildlife. It has also been widely planted in California as an ornamental for park, freeway, and home landscape use (Magill 1974). The attractive foliage and fruits are cut and used for their decorative value.

Flowering and fruiting. Unlike many chaparral shrubs, Christmasberry is summer-flowering (Magill 1974). The numerous, small flowers are borne in flat-topped or convex terminal inflorescences. The flowers are perigynous and have 5 separate petals, 10 stamens, and a 2- to 3-carpelate ovary. The fruits are bright red to orange, 2- or 3-seeded juicy pomes that are 6 to 10 mm in diameter. They ripen from October through January and are dispersed by birds. Good crops are reported to occur yearly (Keeley 1992).

Seed collection, cleaning, and storage. Christmasberry fruits may be clipped or stripped from the branches once they have attained a bright red or orange color (Magill 1974). They should be soaked in water and allowed to ferment slightly. (However, too-long a soaking period can damage the seeds, which have soft, pliable seed-coats.) The seeds (figure 1 and 2) may then be separated from the pulp by passage through a macerator, followed by flotation to remove the pulp. Small lots can be hand-rubbed through a large-holed screen. The seeds may then be allowed to dry. Once dry, any flat, unfilled seeds can be removed by screening.

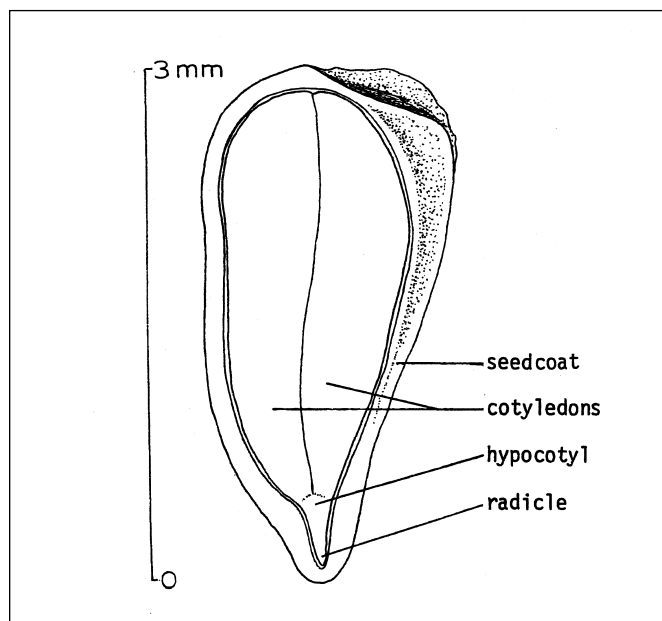
Figure 1—*Heteromeles arbutifolia*, Christmasberry: seeds.



Christmasberry seed weight is apparently highly variable. Magill (1974) reported a mean seed weight of 19 mg and count of 52,630 seeds/kg (23,900/lb), whereas Keeley (1991) reported a seed weight of 5.5 mg and count of 181,820/kg (82,500/lb). Martineja and Bullock (1997) examined Christmasberry seed weight as a function of habitat variables. They found no correlation with latitude or annual precipitation but did find a significant increase in seed weight with increasing elevation. Overall mean seed weight for their 12 Christmasberry populations was 36 mg and seed count was 27,800 seeds/kg (12,600/lb), with weight ranges of 28 to 49 mg and counts of 20,400 to 35,700 seeds/kg (9,200 to 16,200/lb).

Christmasberry seeds have limited longevity at room temperature, but they are probably orthodox in storage behavior. Keeley (1991) reported a shelf life of less than 1 year in laboratory storage. The seeds were also damaged or killed by high temperature treatments. One hour at 70 °C reduced viability from 99 to 33%, and 5 minutes at 120 °C resulted in essentially complete mortality (Keeley 1987). Magill (1974) recommended sealed storage at low tempera-

Figure 2—*Heteromeles arbutifolia*, Christmasberry: longitudinal section through a seed.

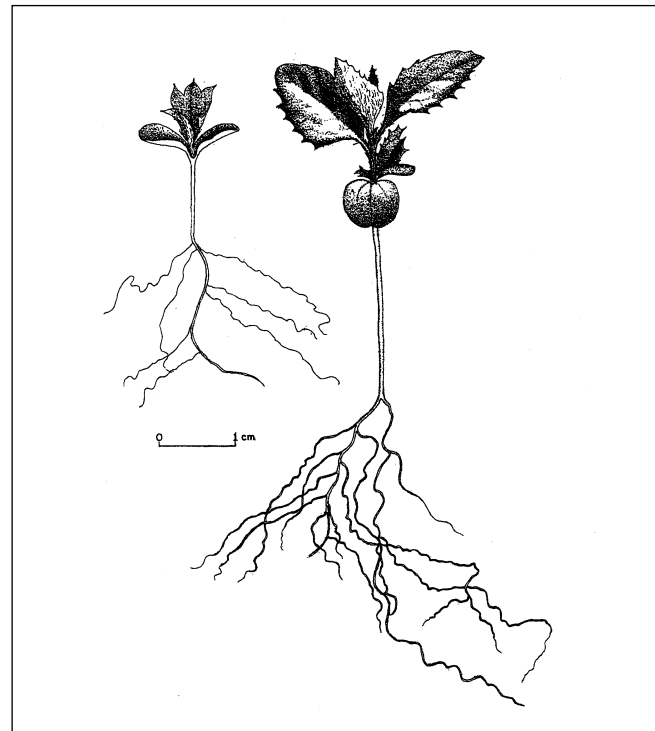


ture but did not give any data on viability retention under these conditions.

Germination and seed testing. Christmasberry seeds are reported to be nondormant at dispersal (Emery 1988; Keeley 1987; Magill 1974), whereas seeds that have been stored are rendered secondarily dormant and require 3 months of chilling at 3 to 5 °C in order to germinate. Under field conditions, Christmasberry seeds germinate within a few months of dispersal and do not form a persistent seed-bank (Parker and Kelly 1989). Germination is epigeal (figure 3). Recruitment of new individuals is rarely observed. Although winter seedling emergence is a common occurrence, the seedlings almost invariably die, either from herbivory or summer drought (Parker and Kelly 1989). Because of the transient seed bank, there can be no recruitment after fire, and new recruitment is in fact restricted to chaparral stands that have been free of fire for at least 50 years (Keeley 1992). The seedlings are not very drought-tolerant and seem to need the shade and the deep litter that develops under adult shrub canopies in old stands in order to survive.

Recently harvested lots of Christmasberry seeds that are well-cleaned to remove unfilled seeds generally have high fill and high viability. Keeley (1987) reported germination of 99% at 23 °C. Such lots should be relatively easy to evaluate, either with a germination test or with tetrazolium staining. A 3-month chill at 5 °C followed by a germination test of 28 days at 20 or 25 °C should give maximum germination. Christmasberry seeds have no endosperm, and the embryo completely fills the seed cavity (figure 2). A procedure similar to that used for apple (*Malus* spp.) or bitter-

Figure 3—*Heteromeles arbutifolia*, Christmasberry: young seedling (left) and older seedling (right).



brush (*Purshia* spp.) can be used for tetrazolium evaluation. The seeds should be soaked in water overnight, then clipped at the cotyledon end. The embryos can then be gently squeezed out, immersed in 1% tetrazolium chloride for 6 hours at room temperature, and examined for staining patterns. Older seedlots that have begun to lose viability and germinate sporadically will probably also have ambiguous tetrazolium staining patterns.

Field seeding and nursery practice. Christmasberry would probably be difficult to direct-seed in a wildland setting because of its establishment requirements (Keeley 1992). The seedlings require shady, moist conditions and deep litter, so they would have difficulty getting established on the open disturbances that characterize most wildland seeding projects. Christmasberry is easily propagated from seeds in a nursery setting, however. The seeds may be planted in flats in sand or soil. If freshly harvested seeds are used, no pretreatment is necessary, and seedlings emerge over a period of 10 to 40 days (Magill 1974). Emergence of 73% has been reported in one case. The seeds may also be planted outdoors in nursery beds. Chilling before spring-planting is recommended (Magill 1974). Greever (1979) reported 100% emergence from March sowing in sand and that there was little difference in seedling size between December and March sowings by May. Propagation by grafting or cuttings is also practiced (Greever 1979; Magill 1974).

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