

Nemopanthus mucronatus (L.) Loes.

mountain-holly

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Growth habit, occurrence, and use. Mountain-holly is a deciduous, branchy shrub occasionally attaining small tree stature that occurs in swamps, bogs, and poor fens from Newfoundland to Minnesota and south to Virginia and Indiana. Heights at ages 5, 10, 20, 30, and 40 years for plants in a shrub-dominated peatland in New York were 1.4, 2.0, 3.5, 4.0, and 4.5 m, respectively (LeBlanc and Leopold 1992). It is regarded as an obligate wetland species: 99% of the plants grow in wetlands (Begin and others 1990; Curtis 1959; Reed 1988; Vitt and Slack 1975). It is typically found on acidic to mildly acidic soils in the shrub zone adjacent to bog mats (Cram 1988).

Nemopanthus is a monospecific genus and is closely related to *Ilex* spp. Similarities between *Ilex* and *Nemopanthus* in anatomical characteristics provide a basis for combining the 2 genera, but at this time it is maintained as a separate genus (Baas 1984). Information from Bonner (1974) for *Ilex* seeds is relevant to *Nemopanthus*. The species was introduced into cultivation in 1802.

Flowering, fruiting, and seed collection. This species is mainly dioecious, with some monocious individuals (Farrar 1995). Flowering occurs in early May to June; fruits ripen as early as July, continuing into August; animals disperse the seeds (Gorchov 1990). The fruit is a scarlet, dull-red berrylike drupe, 0.6 to 2.5 cm in diameter, containing 4 to 5 bony nutlets (Rehder 1940), although Gorchov (1990) found a mean of 2.9 seeds/fruit. The latter are somewhat crescent shaped and are bone colored, with 1 rib on the back (figure 1). Because the fruits are somewhat persistent, they may be collected as late as mid-October (Schopmeyer 1974).

Extraction and cleaning of seeds. Seeds in small lots can be prepared by rubbing the fruits through a #10 screen and then floating off the pulp and empty seeds. There are about 1,600 berries in 0.45 kg (1 lb) of fruit. The number of cleaned seeds per weight (3 samples) ranged from 68,355/kg (31,000 to 66,000/lb), with an average of 99,225/kg (45,000/lb). Seed purity in one sample was 96% and average soundness in 4 samples was 80% (Schopmeyer 1974).

Germination. Seeds are doubly dormant and require a period of after-ripening before the immature embryo will develop (figure 1) (Dirr and Heuser 1987). Consequently, germination is very slow. In 3 tests, germination began several months after sowing and continued for about 2 years, when germination capacities of 14 to 66% were observed (Adams 1927; Schopmeyer 1974). Cold stratification alone did not increase germination rate (Adams 1927; Nichols 1934). Dirr and Heuser (1987) recommended 5 months of warm followed by 3 months of cold

stratification. Propagation by greenwood cuttings is feasible (Bailey 1937; Dirr and Heuser 1987)

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Figure 1—*Nemopanthus mucronatus*, mountain-holly: longitudinal section through a nutlet showing small immature embryo (**left**) and exterior view of nutlet (**right**), H 9.