Cooperative Extension: Agriculture

History

Black chokeberry was imported to Russia in the 19th century. Kask reports that it was present in the botanical gardens in St Petersburgh in 1834, and that it has been cultivated commercially in Russia for juice and wine since the 1940s. A fruit tree census in 1984 reported 17,800 hectares of this crop (Kask). The Russian crop is grown mainly from seedlings because limited genetic variation plus self-fertilization of plants produce a fairly uniform stand from seed.

Propagation

Black chokeberry can be propagated from seed. About 100 pounds of dried fruits produce 8 pounds of seed; one pound of seeds contains 276,000 seeds (Gill and Pogge). Fruit should be macerated to extract the seeds, and the seeds should be separated from the pulp. Seeds should be thoroughly dried before storage and subsequent planting. Dirr and Heuser recommend fall planting of seed, or 2-3 months cold stratification. Gill and Pogge report that seeds' internal dormancy can be overcome by stratification in moist peat for 3-4 months at 32-41 degrees F before planting, and that one pound of cleaned seed yields about 10,000 usable plants, able to be planted in the field as 2-year seedlings.

Propagation of cultivars of black chokeberry are straightforward from softwood or semi-softwood cuttings. Dirr and Heuser recommend softwood cuttings in late May-early June, to be rooted in well ventilated frames, or hardwood cuttings with piece of 3-year-old wood attached.

McKay reports that black chokeberry can also be cloned through division of established plants, which yield as many as 25 divisions per 2-year-old plant.

Micropropagation is another option for rapidly increasing numbers of plants. Brand and Cullina developed a protocol to culture shoot-tip explants taken from mature-phase tissue. Microcuttings from the cultures were rooted, grown first in greenhouse conditions and then nursery conditions. They achieved 83% rooting success in vitro and 96% success in nonsterile conditions, found the plants to acclimate easily to increasingly less controlled conditions, and produced 30-cm plants with 5-7 main branches 3 months after rooting of cuttings.

Field production

Black chokeberries are found in a wide range of climates and a wide range of habitats, suggesting that they tolerate varied conditions. For best performance of this plant as a fruit crop, full sun is required.

***Soil pH and fertility*:** Black chokeberry performs well in slightly acid soil. Reported pH readings vary: McKay recommends neutral to slightly acid; Trinklein recommends pH 6.5-7.0; Strik conducted research in soil with pH 5.7; Minnesota Department of Transportation recommends pH 5.0-6.5.

Low fertility levels are reported to help keep plants small (McKay; Trinklein). Jeppsson 2000 evaluated a range of fertilizer rates on plant growth and on fruit yield and quality of 'Viking' black chokeberries. He found that high fertilizer rates promoted plant growth, but more moderate fertilizer rates favored high levels of organic acids. Jeppsson achieved maximum production of anthocyanins per plant in his field work on sandy soil with these fertilizer rates: 50 kg/ha nitrogen, 44 kg/ha P, 100 kg/ha K (45 lb/A N, 39 lb/A P, 89 lb/A K). Bussières et al., working in cut-over peatlands, reports that fruit yield increases with increasing fertilizer rate, and that annual fertilizer applications improve vegetative growth.

***Plant spacing*:** Kask reports that in Russian production, black chokeberry has generally been planted at 2 meter spacing (6.6 feet) within rows and 4 meter spacing (13.1 feet) between rows. Currently available planting guides vary in their plant spacing recommendations. Trinklein recommends 30-36" spacing within rows. McKay recommends space .8 – 1 meter (31-39 inches) within rows, with plastic mulch in the rows to prevent weeds. Knudson recommends commercial field spacing of 4-6 feet between plants within rows, and 10 feet between rows.

Plant spacing in field research reports also varies. Strik et al. planted rooted cuttings at 2 meter (6.6 feet) spacing within rows. Bussières et al. and Rousseau and Bergeron planted at 1.5 meter (59 inches) spacing within rows and 3 meter (9.8 feet) spacing between rows (density = 2222 plants/hectare, or 900 plants/acre).

***Pruning*:** Pruning recommendations vary. Trinklein and McKay recommend pruning five years after installation, to keep plant centers open. Kask reports Russian research that found that optimal production is achieved when plants are pruned to 1 meter height every 4-5 years after they reach 8-10 years of age.

***Harvest*:** Determination of optimal harvest date is an area of current research. Strik et al. base harvest time on visual assessment. In a study focused on use of black chokeberry for food coloration and antioxidant purposes, Jeppson and Johansson report that the two most important factors that should determine harvest date are yield and anthocyanin level, with fruit browning being a third consideration. In their research in Sweden, maximum yield was reached by 22 August, but on that date anthocyanins were still accumulating, reaching their maximum on 8 September. Browning, a negative attribute for fruit used in the food industry, could be reduced by 32% if harvest was one week earlier, but at a cost of 20% of anthocyanins.

***Yield*:** Reported yields vary greatly, suggesting the importance of local field trials with known cultivars. Trinklein recommends harvesting black chokeberry with a mechanical blueberry harvester, and reports yields of 6-8 tons/acre. Rousseau and Bergeron report an average harvest of 2424 grams per plant, equivalent to 5.2 tonnes/hectare (2.32 tons/acre). Kask reports average commercial yields in Russia to be 5.3-7.7 tonnes/hectare (or 2.36-3.43 tons/acre). Plocher notes that production begins in the second year, but is rather low at that time. Strik et al., in researching six cultivars in Oregon, found 'Nero' to produce the highest yields, with the equivalent of 22 tonnes/hectare (or 9.81 tons/acre) from 3-year-old plants and 43 tonnes/hectare (or 19.18 tons/acre) from 5-year-old plants (these are values extrapolated from small numbers of individual plants in research plots). McKay reports that 5-year-old plants can be expected to yield 5-10 tons/hectare (2.23-4.46 tons/acre).

***Labor*:** Strik et al. reports a hand-harvest efficiency of 7.3 kg fruit per hour, but did not test machine harvest efficiency.

***Problems*:** Many authors, both in research and field production, note no significant disease/pest problems under normal field conditions (Rousseau and Bergeron; Strik et al., McKay). McKay noted aphids on shoot tips and leaf-eating beetles, but indicated that they are not problematic on vigorous plants. Knudson notes that mildew can be problematic under condition of inadequate light and poor air circulation. However, Strik et al. did not harvest during one year of their research because of bird depredation, while Plocher noted that the fruits are very attractive to deer but that ripe aronia berries were not attractive to birds.

Weeds can be problematic. McKay recommends mulching with plastic, and removing it after two-three years as the plants sucker into a hedgerow. Weed control within rows is usually not needed after 3-4 years. Knudson recommends shallow cultivation of weeds, which can also stop the spread of plants by suckerering if desired.

***Harvest*:** Trinklein notes that black chokeberry can be harvested with machines used to harvest blueberries. Jeppsson 1999 notes that the fruits can be harvested with standard black currant mechanical harvesting equipment, and that the fruits are not prone to mechanical damage during transport.