Michigan Technical Note

USDA-Natural Resources Conservation Service

TOPIC - Plant Materials #1

Subject: Comparison of Seed Germination Techniques for Common Elderberry [*Sambucus nigra* L. *ssp. canadensis*(L) R. Bolli] Accession 9084126.

Date: September, 2008

Introduction

Common elderberry is a woody shrub that grows 2 – 5 meters tall (U. S. Forest Service, 1948). Common elderberry can grow in a variety of soil conditions. It can tolerate saturated soils, but usually occupies well-drained slightly acid soil (pH 5.5 – 6.0 bordering streams and in the adjacent bottomlands. It also grows on gray forest soils and muck (Laurie and Chadwick, 1931). Common elderberry has an extensive root system that is useful for stabilizing streambanks, lakeshores, and other moist, erosion-prone sites.

Common elderberry reproduces from seeds, sprouts, layers, and root suckers. Fruit of common elderberry contains 3 to 5 single-seeded nutlets (Krefting and Roe, 1949). Average number of cleaned seed per pound is 232,000 (U.S. Forest Service, 1948). Common elderberry usually bears seed on second-year and older canes (Ritter and McKee, 1964). Vegetative propagation can be achieved through hardwood cuttings (Ritter and McKee, 1964) and through softwood cuttings (Dirr and Heuser, 1987).

Common elderberry seed exhibits variable degrees of hard-seededness and embryo dormancy. Successful germination has been achieved by planting common elderberry seeds in the fall and allowing them to overwinter in cold conditions (Quicksand, KY PMC, 2001). Complete germination often takes 2 years. Common elderberry seeds require pretreatment for good germination during the first year (Worley and Nixon, 1974). Several pretreatment schemes have been described in scientific literature. One pretreatment scheme involves scarification with sulfuric acid for 10 – 20 minutes, rinsing, and cold stratifying (2 – 4^{o}C) for 60 days (Heit, 1967). A second scarification pretreatment scheme involves soaking in hot water for 24 hours, followed by a 60-day warm (24^{o}C) stratification and 60-day cold (4^{o}C) stratification (Schultz et al., 2001). Pretreatments not requiring a scarification treatment included a 60-day warm (24^{o}C) followed by 90-day cold (4^{o}C) stratification (Krefting and Roe, 1949).

The Rose Lake Plant Materials Center conducted evaluations on 31 collections of common elderberry from 1998 - 2001. As the result of those evaluations, accession 9084126 was identified as having desirable characteristics of growth, branching, fruit production, and minimal

incidence of insects and diseases. The Rose Lake Plant Materials Center intends to release this accession through the NRCS Plant Materials Program for use in conservation practices.

Materials and Methods

Fruits from common elderberry accession 9084126 were harvested by hand in September 2007. Berries were depulped using a food blender (blades covered) partially filled with water. The mixture was then hand screened, and empty seeds and debris were separated from viable seed by floating the materials in water (adapted from Quicksand, KY PMC). Seeds were allowed to dry for 72-hours after depulping.

Tetrazolium test on the seed showed 26% total viability.

Seeds were subjected to the following pretreatment schemes:

Scarification	Stratification	Stratification Media
None	None	
None	90-day cold (4^{o}C)	Damp Sphagnum Peat Moss
None	60-day warm (24^{o}C) 90-day cold (4^{o}C)	Perlite
None	60-day warm (24^{o}C) 90-day cold (4^{o}C)	Damp Sphagnum Peat Moss
24 hr Hot Water Soak	60-day warm (24^{o}C) 60-day cold (4^{o}C)	Damp Sphagnum Peat Moss
10 min 90% Sulfuric Acid	60-day cold (4^{o}C)	Damp Sphagnum Peat Moss

All treatments were started on 9/14/07. Seeds receiving no pretreatment were planted in greenhouse containers on 9/14/07. Seeds receiving pretreatment were planted when stratification period was complete. Planting media was Suremix Coir Mix (pH 5.2 – 5.4). Plants were grown in the greenhouse with overhead irrigation + fertilizer and supplemental light.

Three replicates of 100 seeds for each treatment were planted in greenhouse containers. Germination was evaluated 48 days after planting. Germination, expressed as the percentage of seeds planted, was subjected to analysis of variance. Mean separation using Least Significant Difference (0.05) was calculated for the data using Statistix® 8.

Results

Germination results are as follows.

Scarification	Stratification	Stratification Media	Germination (%)[1]
None	None		1.3 bc
None	90-day cold (4°C)	Damp Sphagnum Peat Moss	9.3 b
None	60-day warm (24°C) 90-day cold (4°C)	Perlite	18.0 a
None	60-day warm (24°C) 90-day cold (4°C)	Damp Sphagnum Peat Moss	18.0 a
24 hr Hot Water Soak	60-day warm (24°C) 60-day cold (4°C)	Damp Sphagnum Peat Moss	0 c
10 min 90% Sulfuric Acid	60-day cold (4°C)	Damp Sphagnum Peat Moss	19.0 a

[1]Means followed by the same letter are not statistically different using Least Significant Difference mean separation.
Note: Total viability of seed lot, as determined by tetrazolium test, was 26%.

Germination using either a sulfuric acid scarification followed by a 60-day cold stratification, or a 60-day warm stratification followed by 90-day cold stratification was significantly higher than other treatments in the test. Cold stratification alone was not as effective in promoting germination as acid scarification followed by cold stratification, or warm stratification followed by cold stratification.

Recommendation

When propagating common elderberry accession 9084126 by seed, a pretreatment scheme of sulfuric acid followed by a 60-day cold stratification, or a 60-day warm stratification followed by a 90-day cold stratification should be used to enhance germination. Propagation of other common elderberry populations may be enhanced by using these pretreatment techniques as well.

References

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