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GERMINATION REQUIREMENTS FOR *ACER MACROPHYLLUM*, BIGLEAF MAPLE.

Recently, native plants have become increasingly popular with landscape architects, the general public, and a number of nurseries. But, many such present problems to growers because information on collection, handling, and cultural requirements is lacking. Further difficulties arise because of limited availability. Obtaining commercially suitable plants from wild populations is often difficult and may even be illegal. In such cases information needs to be collected so that plants may be propagated by nurseries and made available in quantities large enough for utilization in landscaping to be practicable.

Among the native plants now considered useful in the Northwest for landscaping purposes is Bigleaf Maple, *Acer macrophyllum*. Bigleaf Maple is common along the Pacific Coast and Sierra Nevada mountains and is found from sea level to 1,000 feet in British Columbia, and from 3,000 to 7,000 feet in Southern California. Specimens have also been reported as far east as west central Idaho (1). Bigleaf Maple produces an abundance of seed annually, and natural reproduction by seedlings is excellent. But, for nurseries wishing to avoid transplanting problems and interested in production of uniform, high quality plants, information on seed handling and germination requirements is desirable.

We have conducted a series of experiments designed to determine the requirements for seed germination of Bigleaf Maple. Since this species is known to exhibit embryo dormancy and to require a period of chilling for 40 to 60 days before germination occurs, we set out to determine the optimum conditions for storage, stratification and germination. Attempts were also made to determine if several growth regulators could speed or improve germination.

Materials and Methods

Fruits of *Acer macrophyllum* were collected in October in the Seattle area. Since it has been reported (9) that seeds of *Acer macrophyllum* will not store even for short periods at room temperature or at low temperature, seeds collected were not air dried and were kept at 9°C for only one week prior to use.

To test different stratification temperatures, some seeds were soaked overnight in distilled water, dusted with Captan, placed in plastic bags, and stored at 2, 9, 15, 20, or 23º C on November 6.

Growth regulators were applied after various periods of stratification ranging from 0 to 30 days at 3°C. Growth regulators tested included a gibberellin (GA_4/GA_7), a cytokinin (6-benzyl aminopurine, BA) and ethylene (C_2H_4). Prior to treatment the wings were removed from the fruits. Seeds were placed on 2 layers of Whatman No. 1 filter paper (9cm diameter) moistened with 10ml growth regulator solution or distilled water in 15 x 90mm petri plates. For ethylene treatment seeds were placed on 2 layers Whatman No. 1 filter paper (5.5cm diameter) moistened with 10ml distilled water in 125m1 Erlenmeyer flasks sealed with serum caps. Controls were similarly treated. Half the treatments were conducted at 23°C and half at 15°C.

Germination tests were conducted by placing seeds in sand in plastic trays and incubating them for 25 days at 3, 9, 15, 20, 23, and 28°C.

Results and Discussion

Maples exhibit a range of types of seed dormancy including: complete nondormancy *in Acer rubrum* and *A. saccharinum*; seedcoat-imposed dormancy in *A. negundo*; embryo dormancy in *A. saccharum*, *A. tataricum* and *A. platanoides* and a combined embryo and seedcoat-imposed dormancy in *A. pseudo latanus* (4, 7, 9). Gibberellins and/or kinetin have been shown to overcome seed dormancy in *A. pseudoplatanus* (5, 8). *A. saccharum* (6), *A. negundo* (3), and *A. floridanum* (2). These growth regulators have also stimulated germination of bare dormant embryos in *A. tataricum* and *A. platanoides* (5), suggesting that endogenous cytokinins and gibberellins might play a role in breaking dormancy in these species. In spite of these results, none of our growth regulator treatments of Bigleaf Maple seeds resulted in germination. Regardless of temperature (15 or 23° C) and concentration (GA, 1, 10, 100 ppm; BA, 1, 10 ppm; C_2H_4, 20 ppm) all seeds failed to germinate. A tetrazolium test (9), however, indicated that the seeds were still viable after 50 days incubation. It was concluded that the seeds remained dormant and that exogenous gibberellin, cytokinin and ethylene were ineffective in breaking dormancy.

Study of stratification temperature effects showed that after 79 days incubation at 3, 9, 15, 20, and 23° C, only those seeds at the two lowest temperatures germinated. Germination was 65% after storage at 3°C and 15% after storage at 9°C. Apparently no stratification occurred at higher temperatures.

Study of germination temperatures after seeds had been stored 50 days at 3°C indicated that the optimum temperature for germination was 15°C (Fig. 1). Seedlings did not develop at 3°C or at temperatures much above 23°C.

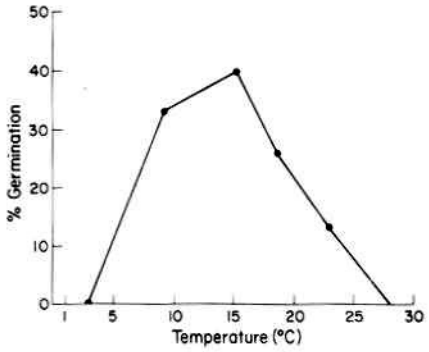

Fig. 1. Effect of temperature on germination of *Acer macrophyllum* seeds stratified 50 days at 3°C.

In summary, for germination of Bigleaf Maple, seeds must first be stratified at temperatures near 3°C and for periods of at least 50 days. Germination and growth proceed most rapidly at 15°C, with higher and lower temperatures resulting in reduced seedling development. Exgenous gibberellin, ctyokinin, or ethylene appear to be of no value in overcoming the stratification requirement.

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