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Effects of different pretreatments on germination of *Prunus serotina* seed sources

Derya Esen*[1], Oktay Yildiz[1], Murat Sarginci[1] and Kani Isik[2]

[1]Abant Izzet Baysal University, Duzce Forestry Faculty, Konuralp Yerleskesi, Konuralp, Duzce-81620, Turkey
[2]Akdeniz University, Faculty of Arts and Sciences, Biology Department, Antalya-07058, Turkey

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Abstract: *Establishing intensive plantations of fast growing hardwood tree species that have high market values in the forest industry can narrow the gap between Turkey's demand and the supply of quality hardwood products. Black cherry (P. serotina Ehrh.) is a fast growing hardwood species with a high market value. Introducing and intensively growing black cherry (BC) in Turkey may significantly reduce the country's quality wood shortage. Adequate seed germination constitutes the first essential step for successful establishments. In this paper, effects of different pretreatments, including artificial and natural stratification, on the seeds of different BC seed sources (SSs) were studied. Pretreatments had substantial effects on the dormancy breaking and germination behaviours of the SSs. Consecutive periods of complex warm and cold artificial stratification regimes longer than 90 days or natural stratification (where seeds were assumed to be naturally exposed to this complexity) resulted in best dormancy breaking and, in turn, germination among all pretreatments. Deeper dormancy and reduced germination rates of some BC seeds as the altitude of the source increases might suggest an ecological adaptive strategy of the species. BC may have deeper morphophysiological dormancy than is commonly believed. Seed size may have a positive effect on seed germination.*

Key words: *Black cherry, Forestry, Prunus serotina, Seed stratification, Germination*

Introduction

Establishing industrial plantations with fast-growing native and introduced hardwood species on some forest and agricultural land is recommended to narrow the gap between Turkey's demand and supply of quality hardwood (Boydak and Dirik, 1998). Black cherry (P*runus serotina* Ehrh.) is well-known for its fast growth rate and highly prized wood throughout U.S. and European markets (Grisez, 1974; Marquis, 1983; Savill, 1991; Brown *et al.*, 1996). Introducing and intensively growing BC in Turkey may significantly fulfill the country's quality wood requirement.

Successful seed germination constitutes the first essential step for successful establishment (Radosevich *et al.*, 1997). Cherries generally have deeply dormant seeds. There are great variations in the methods and lengths of pretreatments for breaking seed dormancy as well as germination behaviour, both within and among different cherry species (Suszka, 1962; Grisez, 1974; Catalan, 1985; Ellis *et al.*, 1985; Finch-Savage *et al.*, 2002). For example, wild cherry (*Prunus avium* L.) requires a very complex stratification regime with consecutive warm and cold periods (Grisez, 1974; Esen *et al.*, 2006). There is a variation in literature regarding the stratification method and period for BC seed. Generally, a period of cold stratification sufficiently breaks the dormancy of BC seed and can results in a high germination rate (86%) (Grisez, 1974). A two week warm period prior to a 189 days cold period resulted in slightly greater germination success for BC seed (90%) (Suszka, 1967). Soaking BC seeds for two days in 0.1% citric acid solution enhanced germination (89%) when compared to the mean germination rate of untreated seeds (57%) in another study (Jones, 1963).

This great variation in seed germination for BC will bring about problems with seedling propagation in forest nurseries and plantation management. Therefore, elucidating the germination behaviour and dormancy breaking of BC seed is urgently needed prior to its introduction into Turkish forestry. In addition, there has been a paucity of studies in BC seed pretreatments between the 1960s and the present. This paper evaluates data on the present germination behaviour of *Prunus serotina* seed originating from various sources in Europe and the USA in different pretreatments, including various combinations of cold and warm periods and natural stratification.

Materials and Methods

Seed material: Stones (hereafter termed seeds) of four different seed sources (SSs) of BC were obtained from Sheffield's Seed Company, Inc., NY, and Lawyer Nursery, Inc., MT, USA (Table 1). Three Virginia SSs were also supplied by the USDA Forest service northeastern forest research station. All seed lots were stored in a refrigerator at 3°C for four months before the experiment.

Physical characteristics of the Seeds: The weight per 1000 seeds, seed number per kg, mean seed diameter, moisture content and seed soundness (percentage of stones with fully developed seeds) of each SS were determined. Moisture contents

***Corresponding author:** E-Mail: guzelfethiye@yahoo.com, Tel.: +90 380 541-3723, Fax: +90 380 541-3778