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Effects of Fruit Collection Date on *Phillyrea latifolia* L. Seed Germination

^{1,2}Cengiz Yücedağ and ³H. Cemal Gültekin

¹Faculty of Engineering, Bartın University, Bartın, Turkey

²School of Forest Resources and Environmental Science,
Michigan Tech University, Michigan, USA

³Poplar Research Institute, 41050, Izmit, Turkey

Abstract: This study was conducted to determine the effects of date of fruit collection on the germination of *Phillyrea latifolia* L. Fruits were collected between September and December of 2007, in Egirdir, Turkey. It was found that the one thousand seed weight for the species seeds was 400 g, with significant differences among dates of fruit collection. The highest germination percentage of 58% was obtained from the seeds collected on the ground from previous years on the 1st of September 2007. The seeds from crown on the 1st of September 2007 had a germination percentage of 42%. Moreover, seeds from crown on the 1st of November and December 2007 and 15th of October and November 2007 did not germinate. In conclusion, *P. latifolia* seeds collected on the ground from previous years could be sown in early autumn to obtain a high germination rate.

Key words: *Phillyrea latifolia* L., seed, germination, fruit collection

INTRODUCTION

Phillyrea latifolia L., typical species of the Mediterranean coastal maquis, belongs to the family Oleaceae (Gucci *et al.*, 1997; Pieroni and Pachaly, 2000). The species is a shrub or tree that grows to 5 m in height with opposite, simple, coriaceous leaves and bluish-black berries. It is present mostly in dry places with macchie, *Pinus brutia* or deciduous *Quercus* forest and mixed deciduous shrub forest at 10 to 1350 m above sea level (Davis, 1978; Longo *et al.*, 2007).

P. latifolia is a species of tree with a range of uses including soil conservation, ornamental and medicinal values. It is known to be one of the most drought-resistant species due to its morphological and eco-physiological characteristics (Schiller *et al.*, 2002; Ogaya *et al.*, 2003). For this reason, it has a great potential for landscaping owing to its drought and salt tolerance (Gucci *et al.*, 1997; Zencirkiran, 2009). In Spain, Mediterranean Europe and North Africa, people have used infusions prepared from the leaves and fruits of *P. latifolia* as an astringent, diuretic and for the treatment of mouth ulcers and inflammations (Lanza *et al.*, 2001; Janakat and Al-Merie, 2002). In the past, the fruits were harvested and eaten as wild olives (Pieroni and Pachaly, 2000).

Germination ability of a seed is largely determined by its degree of maturity. Anatomically or physiologically immature seeds germinate slowly even in favorable

conditions (Tilki, 2003). Thus, seed maturation time is therefore an important factor to consider during collection. Harvesting too early may result in losses due to incomplete development, while delayed collection may result in reduced viability due to exposure to others factors such as hardening of seed coat, insect-pest and disease damage. Furthermore, environmental conditions during seed formation and maturation have a remarkable effect on seed germination and dormancy (Likoswe *et al.*, 2008).

There are a few studies, some of which have been highlighted above, focusing on the phytochemical and ethno-pharmacological properties of this species, but little experimental research dealing with factors influencing its seed germination. For instance, Salvador and Lloret (1995) reported that the germination of *P. latifolia* seeds was increased by temperature treatments.

The goal of this study was to determine the effect that the date of fruit collection has on the germination of *Phillyrea latifolia* L. Understanding this effect is crucial for the successful production of this long-lived multipurpose tree species.

MATERIALS AND METHODS

The fruits of *P. latifolia* were collected from Egirdir, a locality in southwestern Turkey at 37° 48'N, 30° 50'E and 800 to 1100 m by hand-stripping, between September and December of 2007 (Table 1). The collection was

spread all over the crown as far as possible and the same trees were used every time for the fruit collection. The fruits were obtained from 30 individuals that were at least 50 m apart. All of the fruits were packed in plastic bags, well-sealed and transported to the laboratory. Seeds were extracted from fruits by crushing and separated from pulps by washing in a suitable container. The seeds were randomly divided into subplots on each collection.

The average of one thousand seed weight for each species was calculated by using the International Seed Testing Association (ISTA) equation (ISTA, 1993). This equation is as follows:

$$\bar{X} = \frac{\sum_{i=1}^n X_i}{n}$$

Where, X = Arithmetical mean of measures; X_i = Each Replication (100 seeds) weight (g) and n = Replication number (n = 8).

For the experiment, damaged and unusually small seeds were eliminated and the remaining seeds were soaked in running water under room conditions (at about 20°C) until sowing time. Experiments were conducted in Eđirdir Forest Nursery, Turkey (37° 53' N, 30° 52' E, 926 m.a.s.l). Each sowing time had four replicates with a total of 400 seeds and 100 seeds per replicate. The experiments were laid out in a randomized complete block

design. Seeds were sown in Styrofoam containers with dimensions of 20 × 20 cm, in 50% stream silt and 50% forest soil (from Anatolian Black Pine (*Pinus nigra* Arnold. subsp. *pallasiana* (Lamb.) Holmboe), at a depth equal to the size of the seed. After sowing, mulching was applied on the sowing lines by means of the lawns until germination started. After sowing in the nursery, the Styrofoam containers were irrigated to keep adequate moisture during terms not raining.

Germination percentages were calculated for each experiment. Data was transformed by using arcsin square root and the significance of mean was tested by ANOVA. Means were tested by Duncan's multiple range tests when significant differences were identified. A significance level of 5% was used for all statistical analysis and the results obtained from experiments were separately analyzed. SPSS program was used for statistical analysis (Norusis, 2002).

RESULTS AND DISCUSSION

One thousand seed weight of the species seeds was 400 g. Statistical analysis showed that there were significant differences among dates of fruit collection. The highest germination percentage of 58% was obtained from the seeds collected on the ground from previous years on the 1st of September 2007. The seeds from crown on the 1st of September 2007 had germination percentage of 42%. On the other hand, the seeds from crown on the 1st of November and December 2007 and 15th of October and November 2007 did not germinate (Table 2).

Considering the differences among germination percentages relating to dates of fruit collection, it can be understood that *P. latifolia* seeds have to remain under natural conditions. As a matter of fact, Gezer and Yucedag (2006) stated that this species seeds need to ripen under natural conditions for proper germination due to a physiological germination obstacle.

Piotto *et al.* (2003) suggested that fully ripe fruits of this species must be collected in December before they fall and the seeds must be scarified either mechanically or chemically before sowing, or else sown immediately after collection, or in the following spring. This suggestion does not appear to be consistent with the results from this study. On the other hand, it was determined that applying heat pretreatment to seeds of this species increased their germination percentage by up to 50%

Table 1: Dates of fruit collection and sowing time

Date of fruit collection	Sowing time
1st September 2007 from crown	Five days after each date of fruit collection
15th September 2007 from crown	
1st October 2007 from crown	
15th October 2007 from crown	
1st November 2007 from crown	
15th November 2007 from crown	
1st December 2007 from crown	
1st September 2007 on the ground from previous years	
15th September 2007 on the ground from previous years	
1st October 2007 on the ground from previous years	
15th October 2007 on the ground from previous years	
1st November 2007 on the ground from previous years	
15th November 2007 on the ground from previous years	
1st December 2007 on the ground from previous years	

Table 2: Germination percentage (GP) and F-Ratio for *Phillyrea latifolia* L. seeds

No.	IV	V	VI	VII	III	II	I	XIV	XIII	XII	XI	IX	X	VIII
GP (%)	0.00a ¹	0.00a	0.00a	0.00a	16.25b	29.25c	42.25d	48.25e	52.75f	54.75f	55.55gh	57.25gh	57.50gh	58.00k
F-Ratio														778.217***

***: Means with different letters in each column are significantly different (p<0.001); ¹: Means with the same letter in each column are not significantly different at α = 0.05

(Salvador and Lloret, 1995). As mentioned above, it could also be indicated that *P. latifolia* seeds treated with heat before sowing result in the same good properties as the seeds from fruits which ripened under natural conditions on the trees in the present study.

When the results from this study were assessed in practical terms, *P. latifolia* seeds collected on the ground from previous years could be sown in early autumn to obtain a high germination rate. However, further field studies should be carried out in order to determine ecological demands, relations with associated species and the principles of seed and seedling production with regard to these species for ensuring the economic, social and collective-cultural benefits expected from them. The findings from the present study are suitable for Eğirdir Forest Nursery and the other nurseries having similar habitat conditions.

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