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Effect of *Passer Domesticus* Ingestion on *Daphne gnidium* L. Seed Germination

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ABSTRACT

Understanding the germination traits of plants is important to understanding natural regeneration and dissemination processes. In our study on *Daphne gnidium* L; we compared between 5 groups: seed, fruit treated by chloride acid, seed and fruit non treated and seed collected from feces of *Passer Domesticus* bird. The result show that Ingested seeds had the highest germination percentage which explain the pathway of Ingested seeds to the importance of seed germination of *Daphne gnidium* L.

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INTRODUCTION

Birds play a fundamental role in the functioning of the forest, especially in seed dispersal when it comes to fruit-eating birds. (Boissenin *et al.*, 2006)

Seeds of many trees and shrubs are dormant at maturity (Bewley et Black 1994; Vinemont and Crabbe´ 2000).. Physical or mechanical (hard seed coats), chemical, morphological, and physiological dormancy types have been reported in various tree species (Vie´mont et Crabbe´ 2000). Among these, mechanical dormancy through the impermeability of the seed coat to water is the simplest but most effective means of preventing or delaying germination (Maruyama and Ugamoto 1989; Vie´mont et Crabbe´ 2000).

The effect of the ingestion of birds on seed differ among plant species (Krefting and Roe 1949; Glyphis *et al* 1981. Holthuijzen and Sharik 1985, Lieberman and Lieberman 1986). Several studies have shown this effect by in vitro method (Yagihashi, 1998)

The Tessala mountain has a singularly rich and varied flora. There are about 193 species distributed spermaphytes of 49 families and 146 genera. (Baraka, 2008) The region contains 21 bird species which 2 are frugivorous (Ferkazazou, 2006).

In this study we are interested in the *Daphne plant gnidium* L. in the mountains of Tessala it is a common plant in the Mediterranean (Ziyyat *et al.*, 1997). Traditionally used in the treatment of hair and skin (Bellakhdar, 1997; Bruneton, 1987)

The aim of this work is to understand the nature of the spread of *Daphne gnidium* . L plant by birds

MATERIALS AND METHODS

Fruits of *Daphne gnidium* L. were collected from 15 august to 03 September 2013 in Tessala mountain that is situated in North western of Algeria

We compared the germination rate between 5 groups (for each one 3 repetitions of 20 seed or fruit treated by chloride acid, non-treated seeds and fruits and seed collected from feces of *Passer domesticus* bird . They were placed on damp filter paper in sterile petri dishes in the shade. Bird was fed after sun rise for 7 days and the remains were collected every morning. Seeds and fruits removed from feces

In each observation the number of germinated and ungerminated seeds was recorded for each dish. Emerging seedlings were immediately removed to reduce their effect on the remaining, ungerminated seeds. Germination was defined as the emergence of any seedling part from the seed.

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Data analysis:

One-way analysis of variance (ANOVA) was used to detect differences in percentage germination among individuals and between treatments. This tests whether the three samples come from the same population or from identical populations with the same median (Siegel and Castellan 1988). Differences were significant when $P < 0.05$. The results show that difference between test was significant ($F = 19, 33, F_{\text{theoretical}} = 1,7130$)

Germination rate (GR) was calculated as follows: $GR = (\text{number of germinated seeds} / \text{total number of seeds sown}) \times 100$.

RESULTS AND DISCUSSION

Germination rates of each group are shown in figure 1. Ingested seeds had the highest germination percentage; we can explain these results by the inhibitory effect of pulp's fruit and the seed coat modification, may affect seed germination but it was not essential for this species and we can see that seed treated by HCl have a higher germination rate.

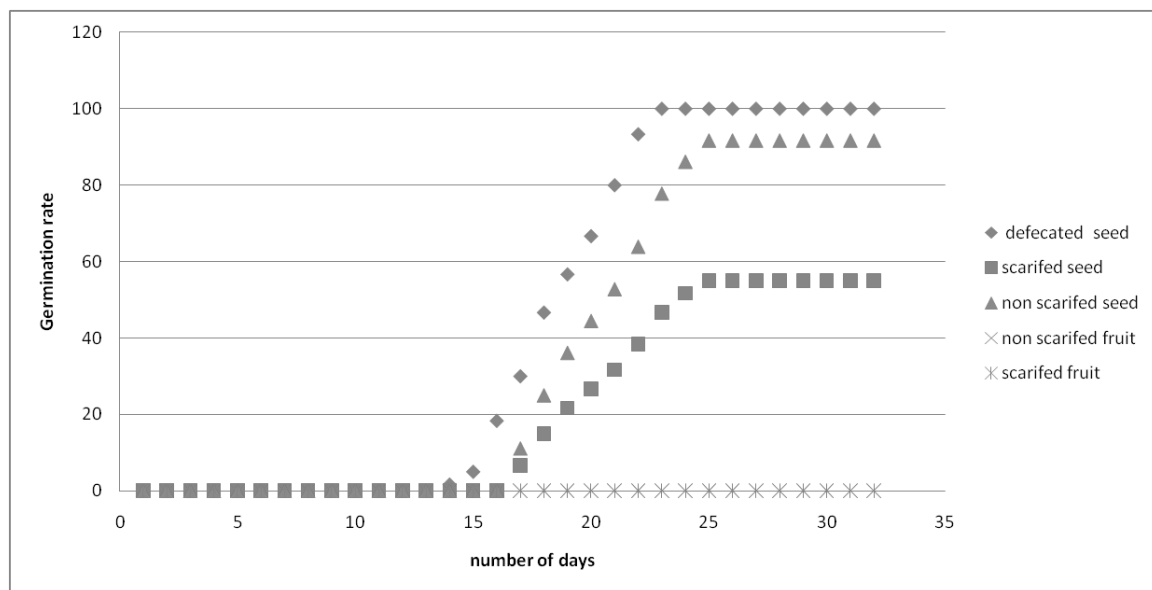


Fig. 1: Germination rate per time curve of seed and fruit of *Daphne gnidium* L.

The effect of bird ingestion on seed germination was done by Izhaki *et al*, 1995 in this study authors conclude that There were differences in seed coats among ingested, ejected and control seeds of *A. andrachne*. The coat of the control and ejected seeds had several holes and the cell wall is evident, whereas the coat of ingested seeds had many holes and the cell wall was destroyed. In the case of *C. siliqua* the cell wall and the waxy substance which fills the cells of the control seed is clear, whereas in the coat of ejected seeds, the cell wall is smoother and that what we found in our research.

Results show that all of scarified fruit and non scarified fruit of *daphne gnidium* L. has not germinated, Barnea *et al*. (1991) showed that there are plant species that require abrasion of the seed coat for germination or that require only pulp removal for germination. *S. commixta* seemed to belong to the latter group of species, since many extracted seeds could germinate without ingestion, while seeds with pulp could not germinate. This observation improve the first result and show the important effect of bird on seed germination of *Daphne gnidium* done to the stomach acidity.

Seed treated by HCl has an important GR then seed non scarified and we can explain this by the results of Tanaka-Oda *et al*, 2009 which showed that sulfuric acid treatment was one of the most effective methods for releasing physical seed dormancy by breaking the impermeable seed coat of *S. vulgaris* seeds.

Concentrated hydrochloric acid treatment acts similarly as seed digestion by animals (Nicholas 1983; Chambers *et al*. 1999), and fruits of *Juniperus* species were found to be consumed by birds, sheep, goats, and jackrabbits (Chambers *et al*. 1999).

Conclusion:

Our data demonstrate that the fruit of *Daphne gnidium*-bird frugivour serves as a seed carrier which takes seeds away from the parent plant and this way affecting the ability of the seeds to germinate.

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