

The Relationship Between Seed Moisture Content and Equilibrium Relative Humidity in Three Fagaceae Species : Implications for Seed bank Management



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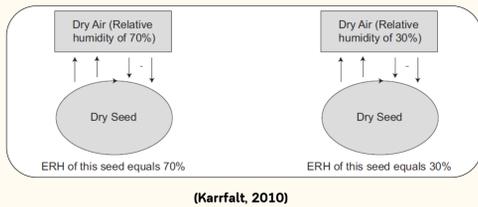
Abstract

In the nursery propagation of trees, the seeds of certain species lose their viability when seed moisture content decreases. Therefore, determining the seed moisture content helps in seed management. This study aims to examine the relationship between equilibrium relative humidity (eRH) and seed moisture content in three species of the Fagaceae family found in Doi Suthep-Pui National Park. The studied species are *Castanopsis tribuloides*, *Quercus rex* and *Castanopsis diversifolia*. The measurement of eRH was conducted by placing the seeds in a sealed flask for 30 minutes at a controlled temperature of 25°C, and readings were taken using a hygrometer. The seed moisture content was determined by comparing the fresh weight and dry weight after drying the seeds at 103°C for 17 hours. The seed moisture content was 34% for *Castanopsis tribuloides*, 35% for *Quercus rex* and 23% for *Castanopsis diversifolia*. The correlation between eRH and seed moisture content was 0.94 for *Castanopsis tribuloides*, 0.63 for *Quercus rex*, and 0.63 for *Castanopsis diversifolia*. A regression analysis indicated that two tree species, *Castanopsis tribuloides* and *Quercus rex*, exhibited a statistically significant linear relationship between eRH and seed moisture content. The results suggest that for certain tree species, measuring eRH can be an indicator of seed moisture content. Therefore, seed management planning should involve experimentation and the development of species-specific methods to optimize seed storage and germination processes.



Introduction

Equilibrium Relative Humidity (eRH)



When the seeds no longer lose water to the air or absorb water from the air they are in equilibrium with the air.

Seed moisture content

Seed moisture content (SMC) is the amount of water in a seed

$$\frac{[(\text{wet weight} - \text{dry weight}) * 100]}{\text{wet weight}}$$

International Rules for Seed Testing (ISTA 2005).



Doi Suthep-Pui National Park



Castanopsis tribuloides (Sm.) A.D.C. *Quercus rex* Hemsl. *Castanopsis diversifolia* (Kurz) King ex Hook.f.



The seeds of some tree species lose their viability when moisture levels decrease. Therefore, determining the initial moisture content helps in effectively managing the seeds.

Objectives

- To determine the relationship between eRH and moisture content in the seeds of three Fagaceae species.
- To determine the viability of seeds in the three Fagaceae species as the equilibrium relative humidity of the seeds changes.

Methods

Reduce moisture in seeds



Change dryingbeads When humidity exceeds 40 %
Replace drying beads until eRH drops below 15 %.

Measuring equilibrium relative humidity



Temperature: 25 °C



Time: 30 min.



Seed moisture measurement.



Divide the seeds into 20 pieces.



Put the seeds in paper bag. 1 seed/ paper bag



Calculate in moisture content formula.



Dry the seeds in a Hot air oven. 103 °C 17 hr.

Seed planting process



Seeds with different ERH values are divided into groups of 30 seeds each.



Divide the seeds into three replicates, with 10 seeds in each replicate.



Sow the seeds in germination trays.

Results

Correlation test

Castanopsis tribuloides : 0.94
Quercus rex : 0.63
Castanopsis diversifolia : 0.63

Regression analysis

Castanopsis tribuloides : p-value < 0.05
Quercus rex : p-value < 0.05

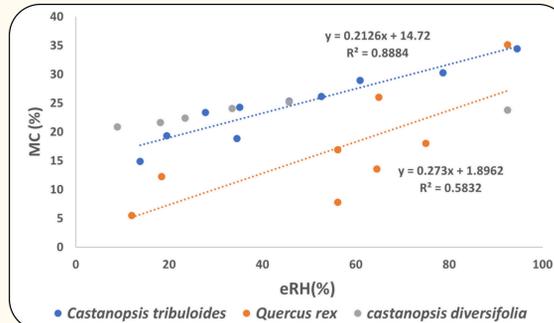


Figure 1. the relationship between equilibrium relative humidity and seed moisture content in three Fagaceae species.

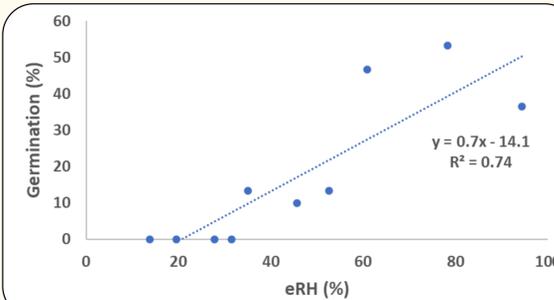


Figure 2. The germination percentage of *Castanopsis tribuloides* at each eRH value.



Conclusion

The results suggest that for certain tree species, measuring eRH can be an indicator of seed moisture content. Therefore, seed management planning should involve experimentation and the development of species-specific methods to optimize seed storage and germination processes.



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Selected References

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