Building a portable after-ripening bucket for relieving dormancy of small seed batches

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Introduction

Storage temperature and humidity are essential factors that need to be controlled to optimize dry after-ripening of native seeds (Figure 1). Manipulating these factors often require expensive equipment such as desiccators (>$80) and incubators (>$500). To reduce cost, we devised a portable dry after-ripening system made from easily sourced components. The total cost to build this system is about $100.

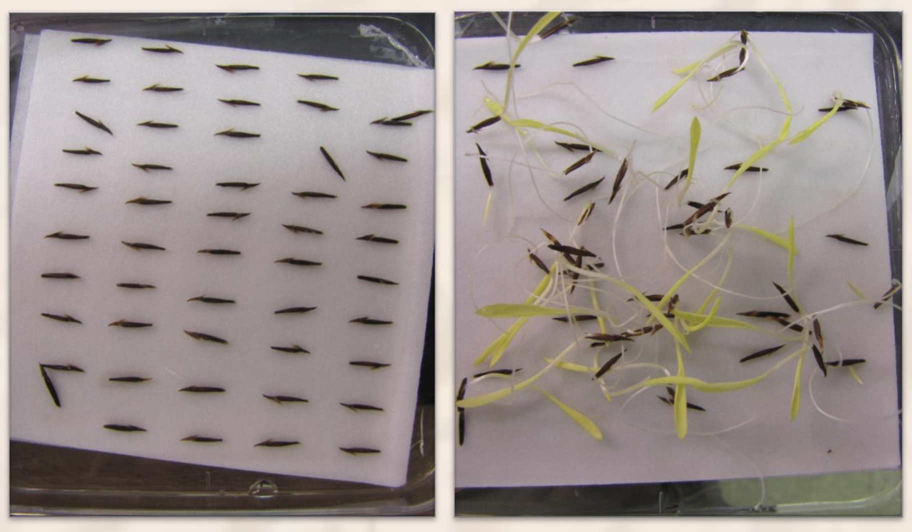

Figure 1. Germination tests of dormant (left) and non-dormant (right) seeds of piligrass (*Heteropogon contortus*). Non-dormant seeds were a result after-ripening for 12 months at 30°C and 12% equilibrium humidity.

Objectives

- Develop an inexpensive dry after-ripening bucket.
- Monitor storage temperature and humidity of the after-ripening bucket for one year to evaluate the suitability for after-ripening seeds.

Materials and methods

A do-it-yourself (DIY) after-ripening system was constructed from the following materials:

- Approximately 3.78 liters (1 gallon) of dried seeds and awns of piligrass (*Heteropogon contortus*) were placed inside the bucket
- A reusable, portable dehumidifier with moisture indicator (Dry Packs, Absorbent Industries, Inc., Harrisburg, NC) and reusable humidity indicator cards (ULINE, Pleasant Prairie, WI) were placed beside the awns and seeds (Figure 2).
- The seed germination heat mat (Jump Start Seedling Heat Mat and Digital Temperature Controller, Hydrofarm, Petaluna, CA) was set at 30°C.
- Temperature and relative humidity was monitored for 1 year using a data logger (Onset HOBO® UH100, Onset Technologies, Bourne, MA) set to record every 15 minutes.

Figure 2. Seeds and awns of piligrass were placed inside the after-ripening bucket together with a portable dehumidifier and humidity indicator cards.

Results and Discussion

Records obtained from the datalogger indicate that the bucket can maintain an average temperature of 30.92±0.98°C) (Figure 2) and an average humidity of 30.81±1.92% (Figure 3).

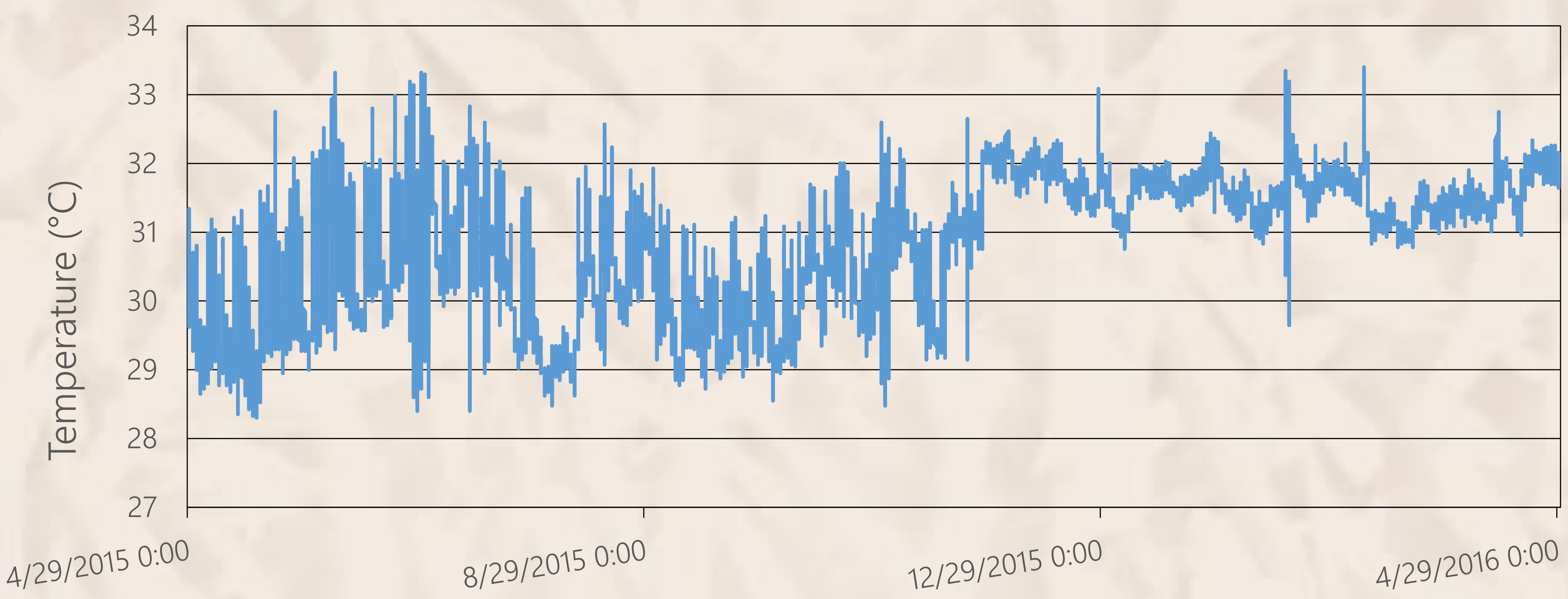

Figure 3. Storage temperature inside the DIY after-ripening chamber from 4/29/2015 to 4/29/2016.

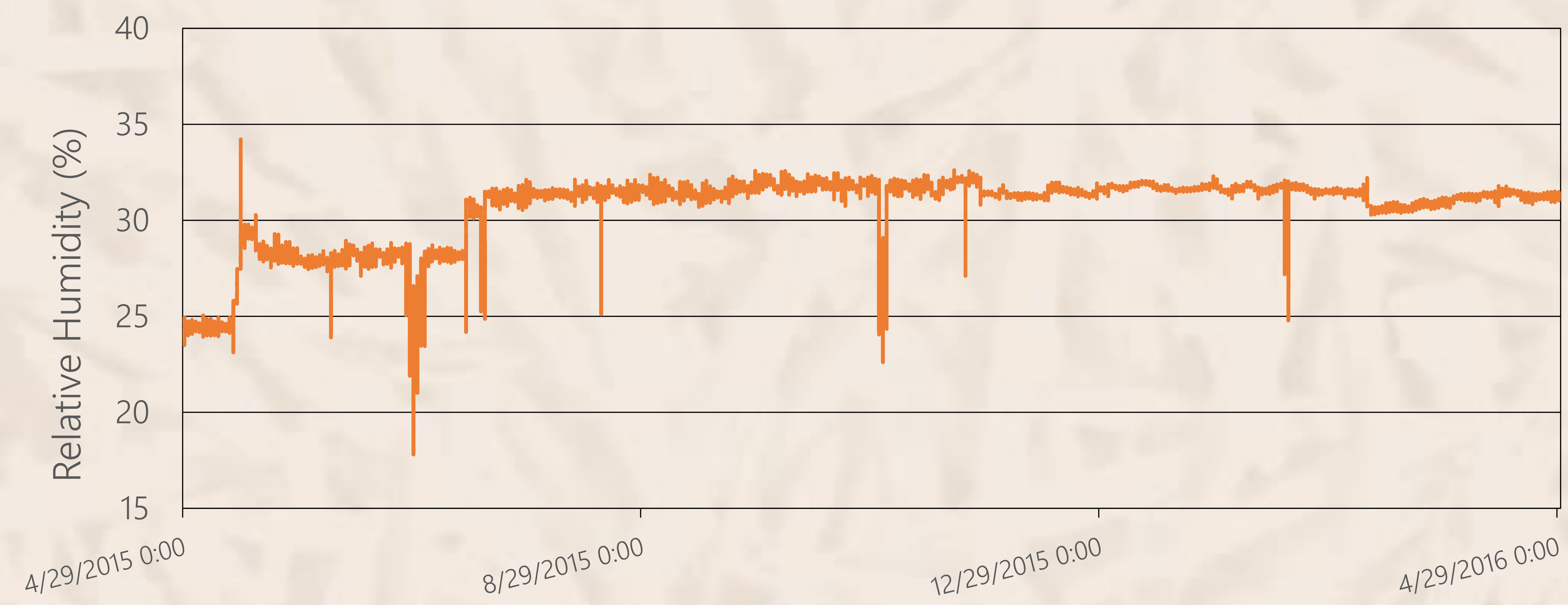

Figure 4. Storage relative humidity inside the DIY after-ripening chamber from 4/29/2015 to 4/29/2016.

A previous study on after-ripening of piligrass indicates that these storage conditions are within the ideal range of storage temperature (30°C) and storage humidities (12% to 50% eRH) that facilitates seed dormancy loss.

Conclusions

Temperature and relative humidity data recorded for one year suggested that the DIY bucket can be used for small-scale after-ripening of piligrass seeds. Additional research is needed to quantify the capacity of the bucket. The potential exists for the modification of the desiccant type and temperature settings to facilitate after-ripening in a greater range of species.

Acknowledgements

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