Automatic Seed Hydration Analyzing (ASHA) SYSTEM*
For predicting germination time of seeds during steeping process

CONTENTS:
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- Barley steeping studies using ASHA system
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*Patented Technology

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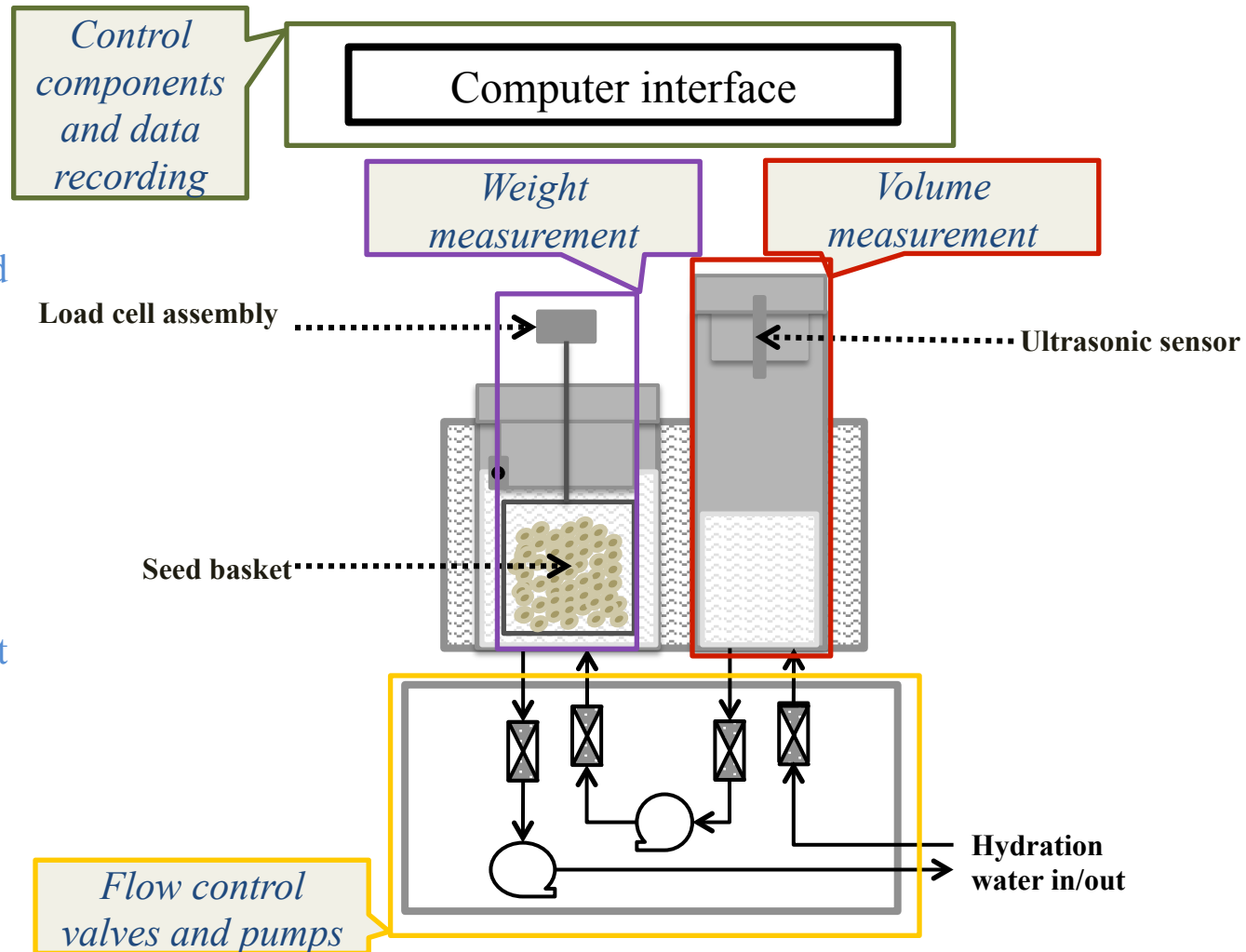# SYSTEM OVERVIEW

Volume measurement
- Measures volume via displacement of water

Weight measurement
- Measures weight via load cell connected to the basket containing seeds

Automation
- Records volume and weight automatically at pre-set intervals
- Runs continuously for set duration for long periods

Control components and data recording

Computer interface

Weight measurement

Volume measurement

Load cell assembly

Ultrasonic sensor

Seed basket

Hydration water in/out

Flow control valves and pumps

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GERMINATION TIME PREDICTION

Steeping Barley in ASHA
- Barley steeped in three steep chambers
- Barley are submerged in water and drained at pre-set regular intervals
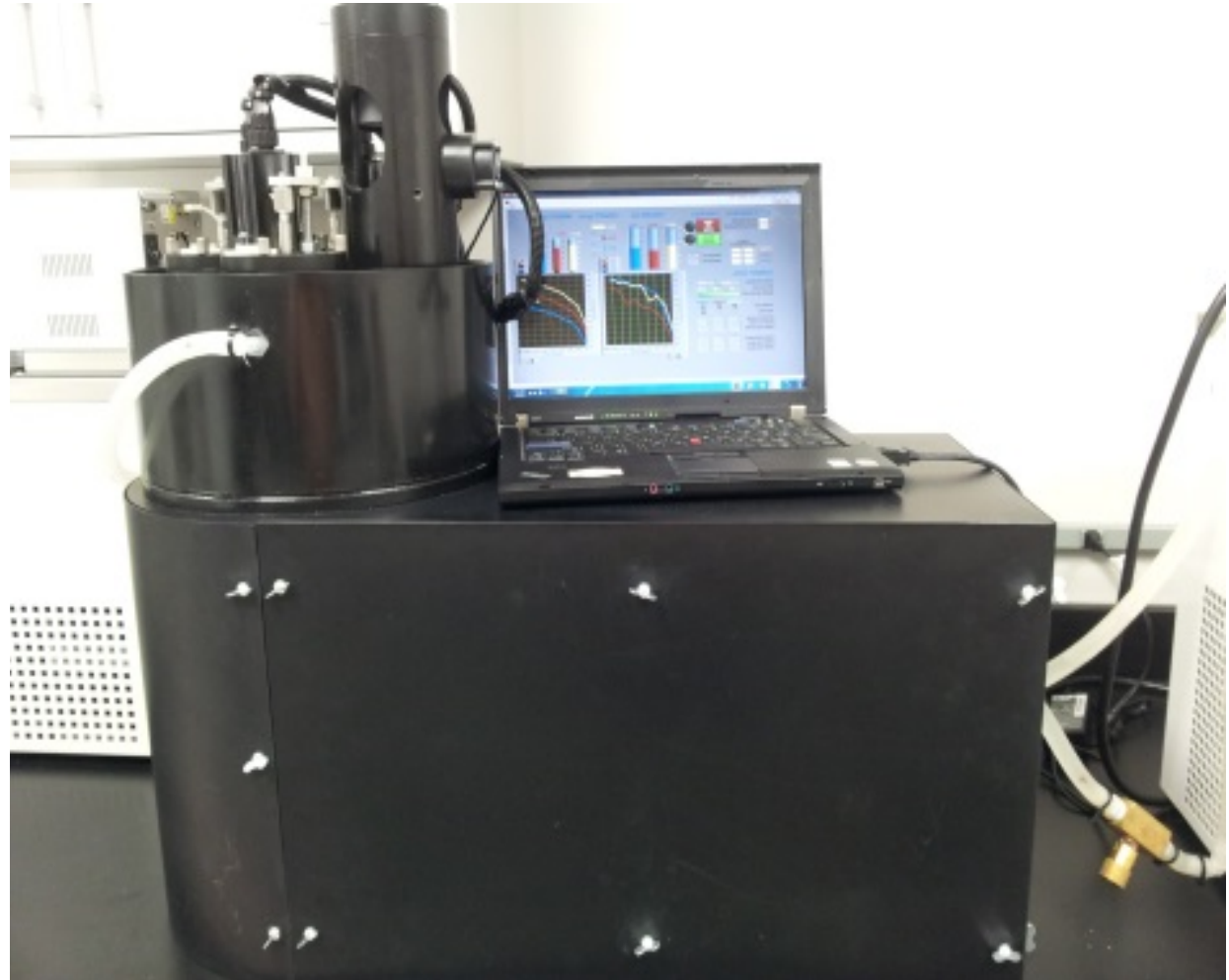
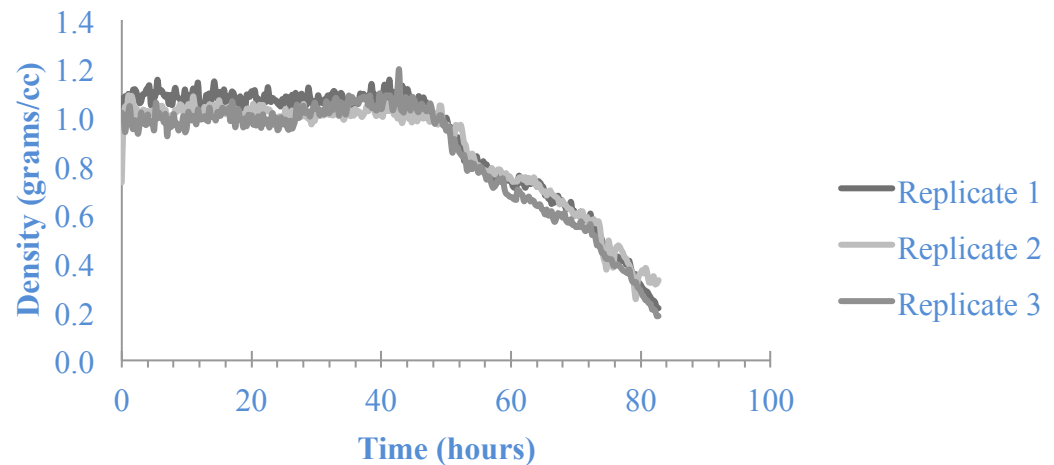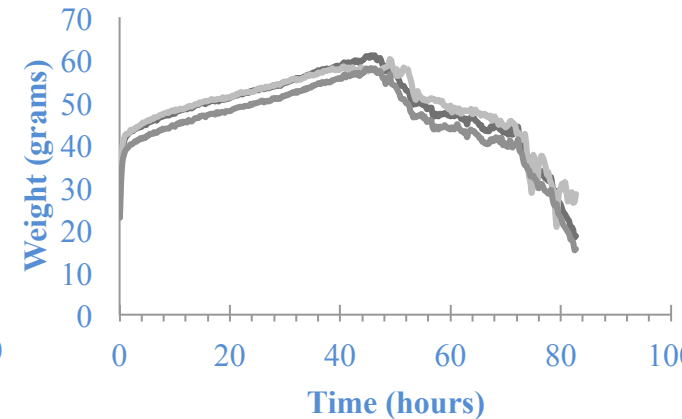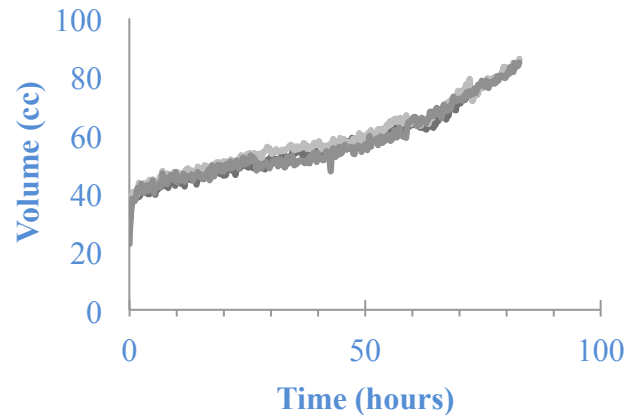*USTPO utility patent application # 13871347: submitted on April 26, 2013

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Data Generated

- Volume and weight of barley seeds while steeping
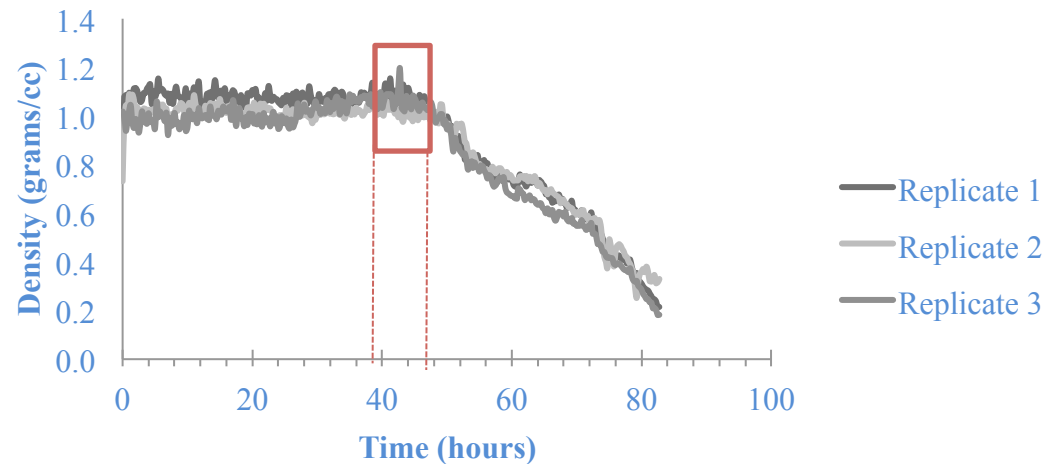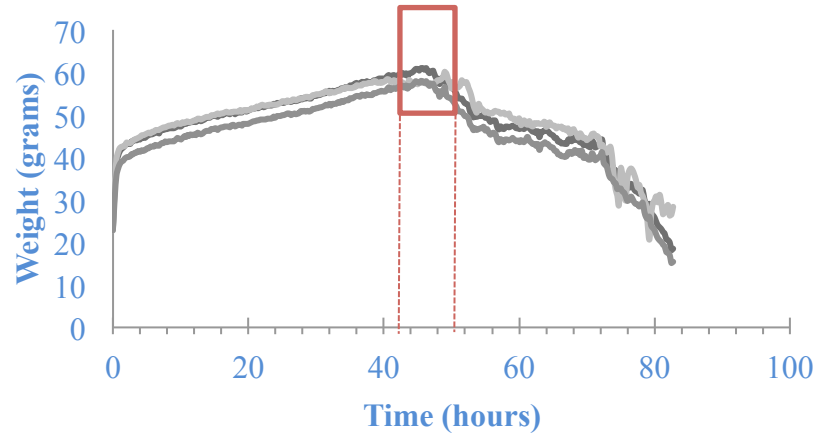- Bulk density is calculated from weight and volume

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Germination time

- Drop in weight and density attributed to germination of barley
- Loss of weight due to increase in sugar consumption to assist root and sprout growth
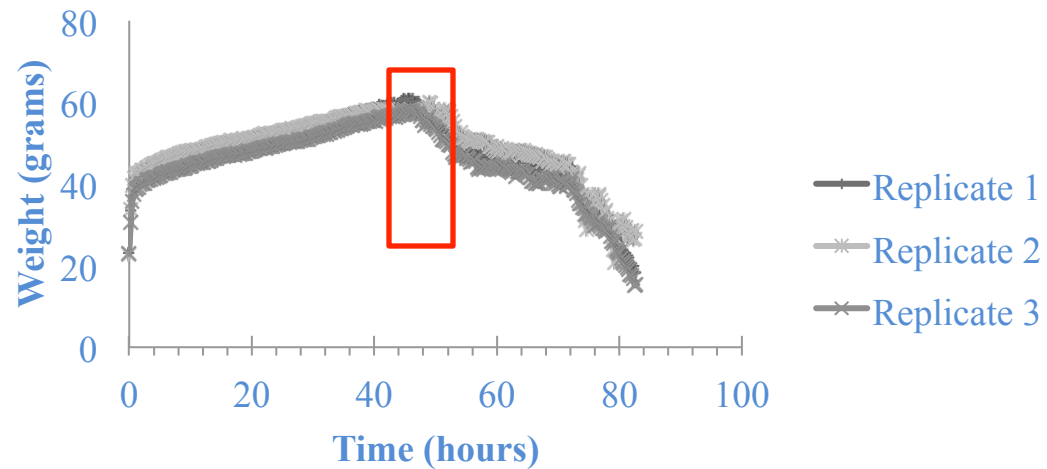
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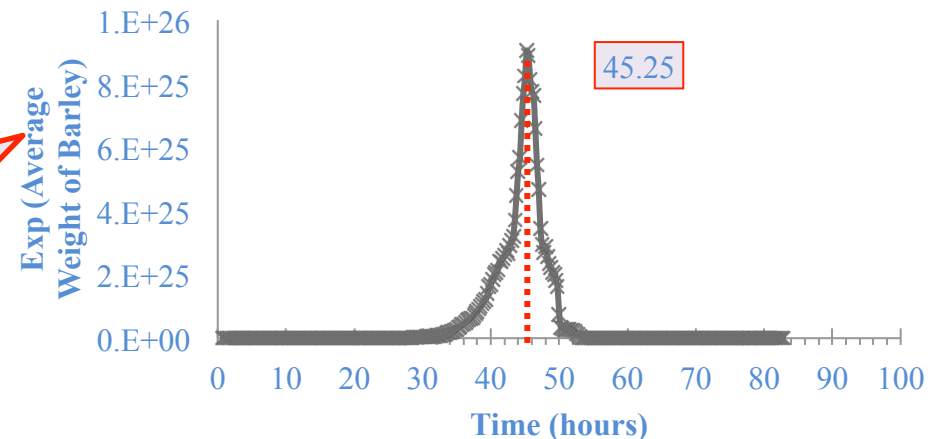
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Predicting Germination time using ASHA

- The weight data from ASHA is used to process further to identify maximum weight drop
- The time at with maximum weight drop occurs can be taken as predicted germination time

Determination of Germination time

Exponential of weight over time

SCOPE:

- Study different steeping parameters (water chemistry, temperature and steeping time) and their impact on germination time of barley
- *Determine germination time to various seeds*
- Optimize steeping conditions to save time and reduce malt loses

IMPACT:

- Optimization of steeping conditions can reduce loss of valuable sugars towards sprout and root growth
- **Test quality of seeds by means of germination**
- Assist in faster and better quality analysis of barley seeds to help in picking better varieties