

# Measurement of Chlorophyll Content and its Relation to Heat Tolerance in Blueberries

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## Introduction



- ❖ Due to the availability of varying cultivars for different climate conditions, the United States is the largest producer of blueberries in the world.
- ❖ The purpose of this study is to determine the heat tolerance of highbush blueberries grown in Northeastern United States to ascertain the potential for blueberry growth in Southern regions of the US.
- ❖ Heat stress is an agricultural problem that affects many parts of the world.
- ❖ Studying the physiological changes in blueberries that affect the development of health in plants can benefit the progress of improving varieties.

## Objectives

- ❖ Measure chlorophyll content in three different highbush blueberry hybrids derived from heat tolerant and susceptible parents

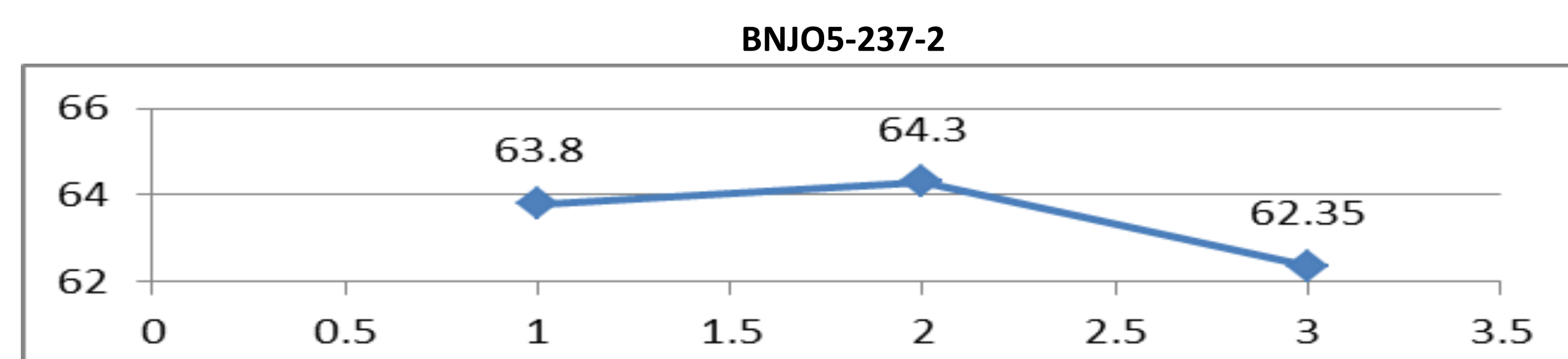
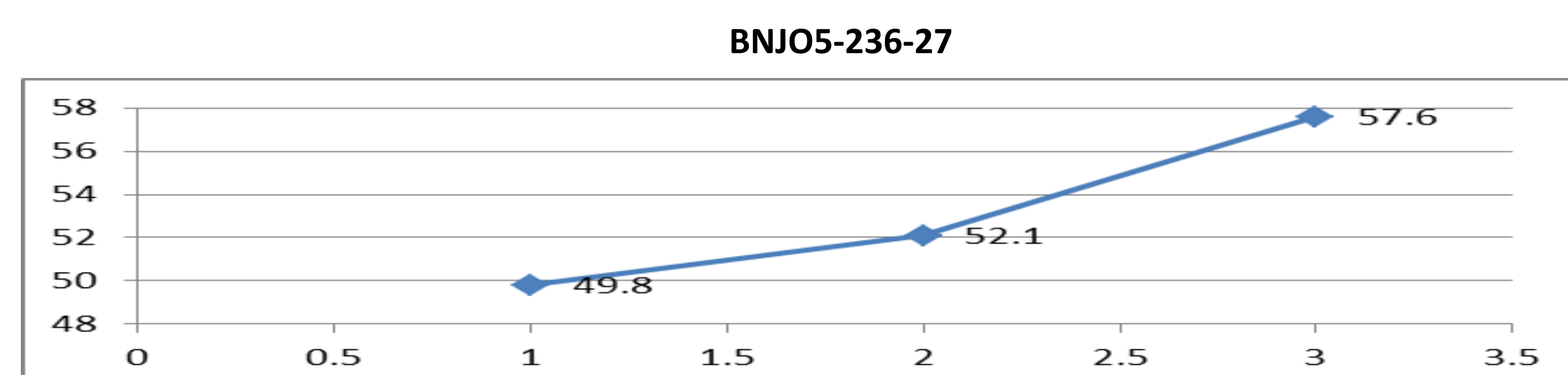
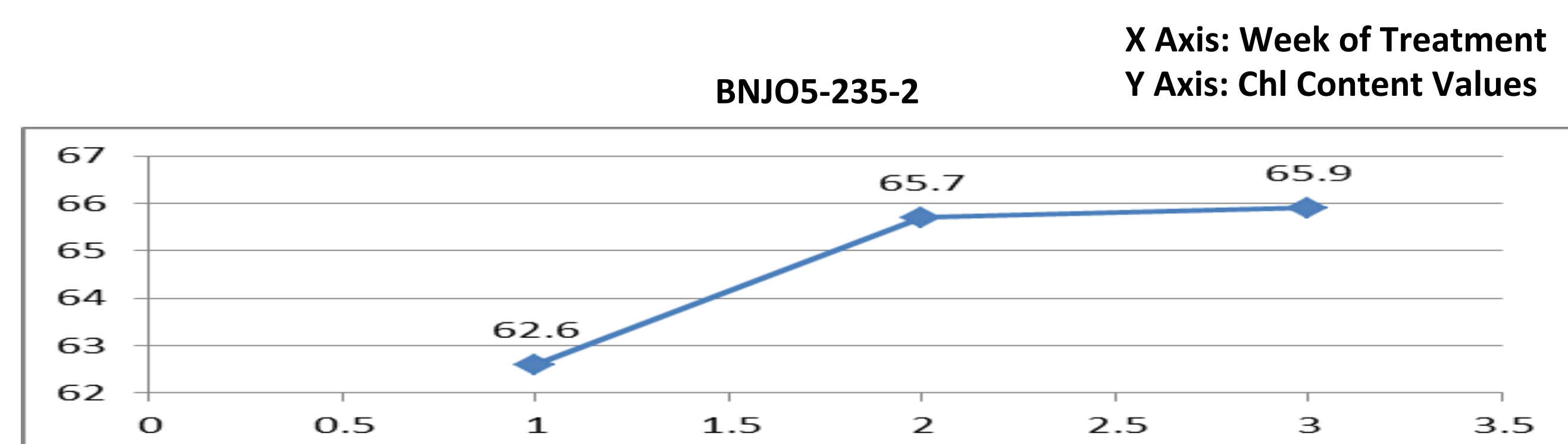
If the plant is thermo-sensitive, or stressed, the chlorophyll content in the plant's leaves will reduce upon exposure to increased heat levels. (A.T. Netto et al. 2005)

## Design and Methods

- ❖ Three highbush blueberry hybrids (BNJO5-235-2, BNJO5-236-27, and BNJO5-237-2).
- ❖ SPAD 502 Plus Chlorophyll Meter and data logger.
- ❖ All three hybrids were exposed to increasing temperature rates (27°C- 45°C) for 6 hours over a 3 week time period.
- ❖ Each week four leaves were gathered from each hybrid, resulting in a total of 12 leaves per hybrid.
- ❖ After picking, samples were stored in a -80°C freezer.
- ❖ Once ready for measuring, leaves were thawed and dried. Each hybrid leaf samples from weeks 1, 2, and 3, were measured using the SPAD Meter, recorded, and averaged.

## Results

- ❖ The chlorophyll content averages for hybrids BNJO5-235-2 and BNJO5-236-27 increased over the three weeks.
- ❖ The chlorophyll content averages for hybrid BNJO5- 237-2 increased during week 2 but decreased by week 3 lower than it was during week 1.



## Discussion

- ❖ By measuring the chlorophyll (Chl) content levels using a SPAD 502 Plus Chlorophyll Meter and data logger, we are given valuable information that this instrument can be effectively used in blueberries.
- ❖ The original hypothesis proved in conclusive as one of the three hybrids (BNJO5-237-2) resulted in a decrease of chlorophyll content. Further testing of the chlorophyll fluorescence is needed to compare the ratio of the two.
- ❖ The preliminary results of this study demonstrate the potential of Highbush Blueberry hybrids BNJO5-235-2 and BNJO5-236-27 to withstand elevated temperatures and grow in the Southern regions of the US.

## Acknowledgments

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## Abstract

Due to the availability of varying cultivars for different climate conditions, the United States is the largest producer of blueberries in the world. The purpose of this study is to determine the heat tolerance of highbush blueberries grown in Northeastern United States to ascertain the potential for blueberry geographic expansion to Southern regions of the country. Heat stress is an agricultural problem that affects many parts of the world. Chlorophyll content is one of the physiological changes affected by heat stress in plants. In our experiment, we imposed heat stress treatment for three highbush blueberry hybrids (BNJO5-235-2, BNJO5-236-27, and BNJO5-237-2) derived from parents *V. corymbosum* X *V. darrowii*. Plants were exposed to high temperatures for 6 hours to increasing temperature rates (27°C- 45°C). Four Leaf samples were collected from each hybrid resulting in a total of 12 leaves for each replication. Samples were stored in -80° freezer until further use. Chlorophyll (Chl) levels were measured using a SPAD 502 Plus Chlorophyll Meter and data logger. If the plant is thermo-sensitive, or stressed, the chlorophyll content in the plant leaves will reduce. Leaves were thawed and dried, leaf samples from weeks 1, 2, and 3, were measured using the SPAD Meter, recorded, and averaged. Measurement findings were graphed using Microsoft Excel. The average chlorophyll content for hybrids BNJO5-235-2 and BNJO5-236-27 increased over the three weeks. Whereas, the average chlorophyll content for hybrid BNJO5- 237-2 increased during week 2 but decreased by week 3. The measure of chlorophyll content is a good indicator of heat tolerance.