Phenotypic and Genetic Analyses of Iraqi Aromatic Rice (Amber) Varieties

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ABSTRACT

The main purpose of this study is to develop a high-yielding aromatic rice. For this, the Iraqi Amber (aromatic) varieties were crossed with a non-aromatic rice variety, 'Antonio' to generate a population for evaluating the aroma. Aroma characters will be studied in the F_6 generation and the F_3 generation is currently grown in the greenhouse in Beaumont, TX. In the second study, agronomic and morphological traits in a set of Iraqi Amber varieties and two aromatic checks were evaluated. Preliminary data analysis shows that 'Amber43', 'Amber', and 'Amber33' had higher plant height. 'Amber Coarse' shows the highest number of tillers m^{-2}. Amber43 had the highest flag-leaf area index, and Amber 33 and Amber had the highest panicle length. The genetic diversity of these eight traditional aromatic rice varieties based on the phenotypic and molecular data is currently underway.

OBJECTIVES

1. Identify QTL/gene associated with aroma in a mapping population
2. Determine genetic diversity of aromatic rice varieties from Iraq based on the agronomic and morphological traits

INTRODUCTION

-Rice (*Oryza sativa*) is one of the important cereal crops worldwide
-It is the staple food for more than three billion people
-Demand for rice expected to rise to 800 million tons by 2025 (Cassman, 1999), which is three fold in a period of 30 years.
-'Amber 33' is one of the most important domestic varieties grown in Iraq that is characterized by its distinctive aromatic odor (Chakravarty, 1976).
-However, genetic control of this trait is not fully understood. This information is highly needed by breeders, especially those interested in incorporating marker assisted selection (MAS) in their programs.
-Amber 33 is low-yielding, and this study aims to develop high-yielding aromatic rice.

MATERIAL AND METHODS

Plant Materials:
-Amber 33 (PI 326029, GSOR 310278)
-Amber (PI 130650, GSOR 310793)
-Amber Coarse (PI 430978, GSOR 311588)
-Amber 43 (PI 430980, GSOR 311672)
-Antonio (non aroma)
-Jazzman (check)
-Della (check)

1. Crossing: Crossing between Amber varieties and Antonio was done in the greenhouse.

2. Agronomic and Morphological Traits :
-Ten rice varieties (Eight aromatic and two non-aromatic)
-RCBD with 3 reps
-Plant height, flag leaf area, panicle length, numbers of tillers and other agronomic and morphological traits in 2015
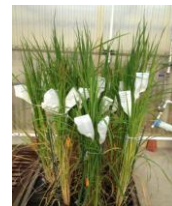-Data analysis: SAS v9.3

RESULTS

1. (P1) Amber ♀ X (P2) Antonio ♂ 2014
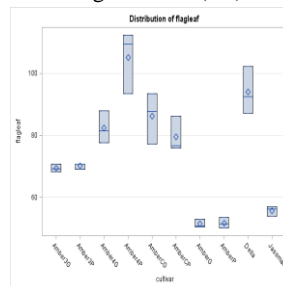↓
F1   2015
↓
F2   2015
↓
F3   2016
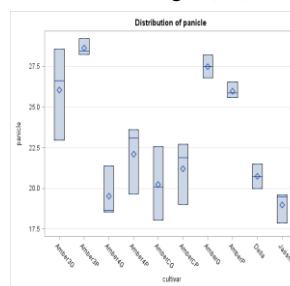(currently in greenhouse)

2. Agronomic and Morphological Traits
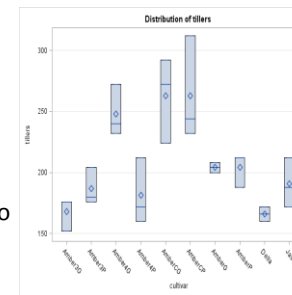

Flag leaf area (cm)

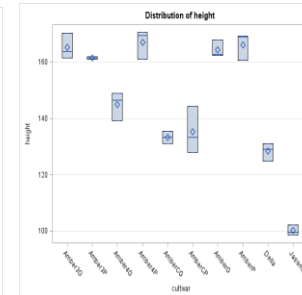Panicle length (cm)

RESULTS...

Numbers of tillers (m^2)

Plant height (cm)

ONGOING WORK

• Develop the progeny to have F_6 seeds, measure phenotypic traits including volatiles (aroma) using GC-MS, and map QTL/genes for aroma
• Repeat the measurement of agronomic and morphological traits of the aromatic and non-aromatic varieties.

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•Chakravarty HL. (1976). Plant Wealth of Iraq. Vol. 1. Botany Directorate, Ministry of Agriculture and Agrarian reform, Baghdad, Iraq. pp. 398- 432.

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