Development of Aromatic Rice Varieties


ABSTRACT

Interest in aromatic rice has increased. The advent of nouveau cuisine has caused a rise in niche markets. Sales of aromatic rice have led rice imports to increase by 31% in the last seven years. The University of Arkansas System Division of Agriculture’s Aromatic Rice Breeding Program at the Rice Research and Extension Center (RREC), near Stuttgart, Ark., was implemented to develop aromatic rice varieties for the southern rice-producing regions. Lines which do not have photoperiod sensitivity have been selected for yield evaluation in the Arkansas Rice Performance Trials (ARPT) and the Uniform Regional Rice Nursery (URRN).

INTRODUCTION

Approximately 13.6 MM cwt of milled rice were imported to the United States in the fiscal year 2011/2012, an increase of 31% in the last seven years (USA Rice Federation, 2009, 2012). The top supplying countries are Thailand, which produces high quality Jasmine rice, and India, which produces highly desired Basmati rice (USA Rice Federation, 2012). United States consumers are purchasing more aromatic and/or specialty rices than in previous years. It has been difficult for U.S. producers to grow the true Jasmine and Basmati varieties due to environmental differences, photoperiod sensitivity, fertilizer sensitivity, and low yields. These difficulties make aromatic rice an expensive commodity to produce. Adapted aromatic rice varieties need to be developed for Arkansas producers which meet the taste requirements for Jasmine and/or Basmati.
PROCEDURES

The aromatic rice breeding program collected parental material from the U.S. breeding programs and the USDA World Collection. Crosses were made to incorporate traits for aroma, yield, improved plant type, superior quality, and broad-based disease resistance. The winter nursery in Puerto Rico is being employed to accelerate generation advance of potential varieties for testing in Arkansas during the summer of 2015.

RESULTS AND DISCUSSION

In 2014, 47 cross-pollinations were made to produce aromatic lines for screening. The F₁ plants from these crosses will be grown in the greenhouse during the winter to produce F₂ seed. The F₂ populations will be planted in 2015 at RREC for observation and selection.

Panicles were selected from 31 F₂ populations in 2014. The parents in these crosses were selected for their aromatic seed quality or high yield potential. Approximately 250 F₃ lines from eight populations were shipped to the winter nursery in Puerto Rico to advance. The harvested seed from Puerto Rico will be planted at RREC for further observation and selections in 2015. Panicle rows from 32 F₄ and F₅ populations will be grown in 2015 for selections. Marker analysis will be conducted to detect or determine the characteristics of aroma, cooking quality, and blast resistance.

In 2014, 47 heterozygous lines from 14 F₃ and F₄ populations were screened through marker-assisted selection for aroma and amylose content. Results of the screening helped to eliminate lines which did not meet breeding program requirements. The entries which are homozygous aromatic and have Pi-ta, Pi-b, or Pi-k blast resistance will move forward into yield trials.

Two preliminary yield trials were planted in 2014. A two-replication trial included 38 aromatic lines and a one-replication test included 37 aromatic lines. The 11 highest yielding lines were screened for aromatic flavor by conducting a taste test. The six experimental lines chosen as having the best flavor and aroma have been entered in the ARPT and are being grown in increase plots in 2015. Four aromatic experimental lines have been entered in the 2015 URRN.

In 2014, six experimental lines were entered in the ARPT and three experimental lines were entered in the URRN. One experimental line that showed promising potential in the ARPT and URRN was EXP141105. This line originated from a cross between Jazzman and a plant introduction line. EXP141105 has excellent flavor and will continue to be examined in the ARPT and URRN in 2015.

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