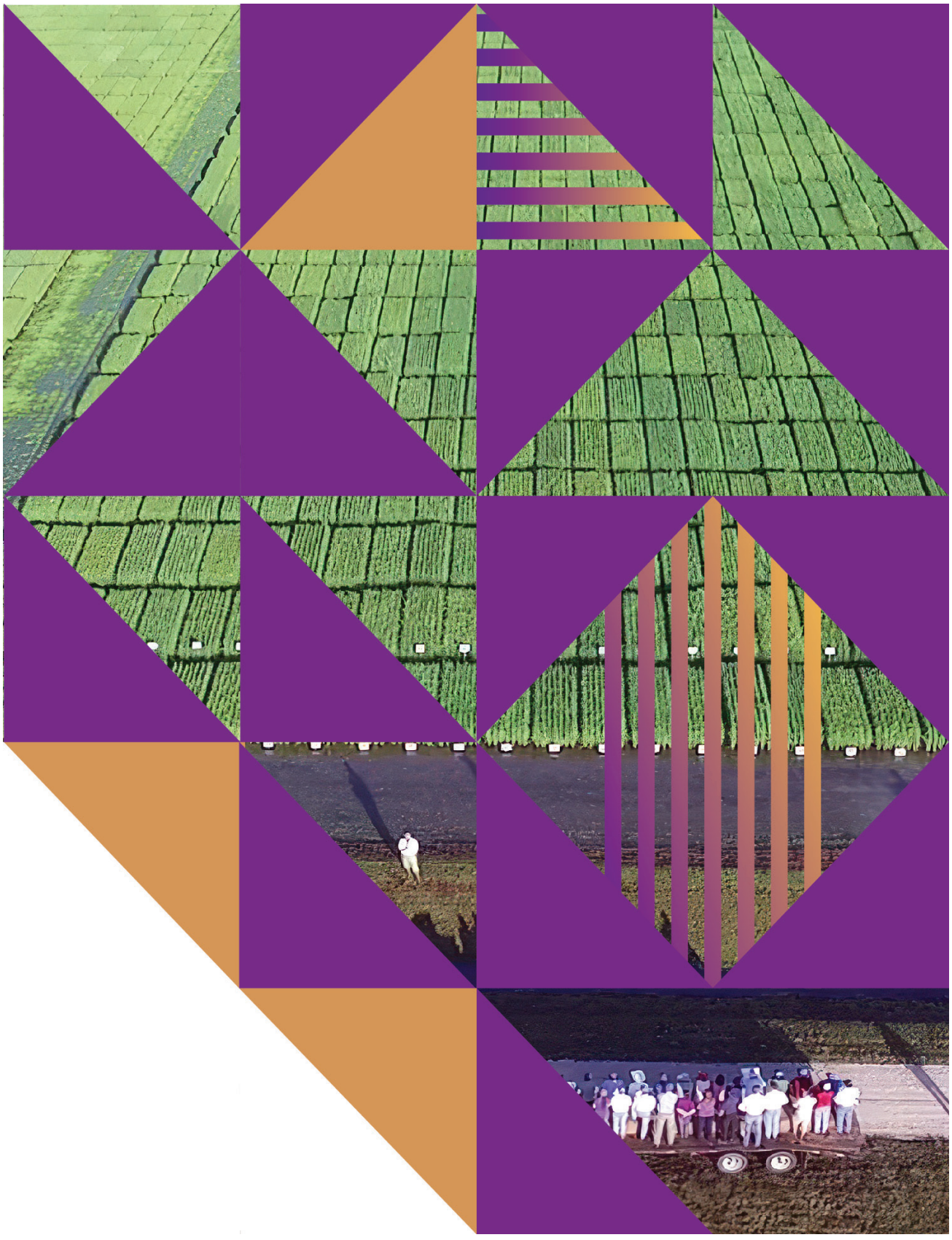
2024 INTERNATIONAL TEMPERATE RICE CONFERENCE



Breeding Indica Germplasm for Early Sowing and Other Stresses in the Temperate Zone of South America

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Most of the rice producing areas in Argentina, Southern Brazil, and Uruguay are sowed with indica varieties, resulting in high yields. Most years Septembers offer optimal soil conditions for early direct seeding, which is the method practiced in the region. However, that month is still cold and heavy rains in October can flood the seeded fields, reducing germination rate and crop establishment. More tolerant germplasm to these early sowing conditions is needed, without risking yield, quality, and disease resistance given by indica background. Since japonica varieties are more adapted to cold and anaerobic conditions, the aim of this study was screening, along several breeding generations, germplasm from the FLAR temperate rice program that was originated from crosses where at least one japonica accession was used as a parent in the last three generations but maintaining most indica traits. To guarantee good performance of the germplasm, in terms of productivity, we previously selected the breeding lines based on yield data. Eight breeding lines originated from two different populations (FL16618 and FL16688) were identified as the best for germination under cold and anaerobic conditions (>50%). Cold and anaerobic germination were evaluated together and separately, and significant correlation was found (0.73).

Early sowing tolerant lines were crossed with FLAR, IRGA-Brazil, and INIA-Uruguay elite lines in 2021 at CIAT in Colombia. Resulting F2 populations were sowed in greenhouse and placed underwater, in controlled conditions, for anaerobic germination. Germinated Individuals under anaerobic conditions were transplanted to the field for seed production and F3 was placed in a germination room at 14°C for selection in low temperature. Selected F4 families were sowed in Santa Rosa Experimental Center in Colombia for evaluation in a rice blast hot spot. F5 families were placed under anaerobic conditions and lines with germination >50% were selected. Seed from 396 lines are being increased in Colombia for yield trials in Uruguay and Argentina in 2024/2025 growing season. Promising lines can impact rice production in temperate South America because good plant standing in early seeding will make coincide reproductive stage with the highest radiation driving to increase yields.

Mutant Rice Traits I Have Known

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Mutant rice traits have made some significant contributions toward rice varietal development in the United States, especially in California. A few have been selected as spontaneous mutations; however, the majority have been induced mutations using ionizing radiation or chemical mutagens beginning in the 1970s and continuing to the present. Some have directly achieved variety status, but most mutant traits have made the jump to the rice variety level through cross breeding and backcrossing to adapted germplasm. Traits have included morphological traits like semidwarf height, maturity, starch characteristics, nutritional traits, and herbicide resistance. Some mutation breeding work was done to improve rice germplasm lines with disease or insect resistance or for