

Resistance to Neck Blast Caused by *Pyricularia oryzae* and Correlation with Leaf Blast in Uruguayan Rice Cultivars

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Rice blast caused by *Pyricularia oryzae* is the most devastating disease affecting rice production in Uruguay. This crop reached 1.396 thousand tons grain produced in 160,7 thousand hectares in the season 2014/15 with around 95% of the produce exported. Rice production in Uruguay is based on a small number of cultivars with three of them covering 70% of the area in 2015, where long grain indica type cultivars El Paso 144 (29%) and INIA Olimar (28%) and the tropical japonica cultivar INIA Tacuarí (13%) are the most important. Even though in 2012/13 these cultivars reached 84% of the rice area, their importance is being reduced in the last seasons. One of the main limiting factors of these cultivars is the high susceptibility to neck blast, and for indica type cultivars also the high susceptibility to leaf blast. Thus, more than 90% of the area is routinely treated with fungicides. The reduction in area of these cultivars has been substituted with new cultivars mostly resistant for leaf and/or neck blast, reaching 20% of the area in 2015/16 season. In the last decades, breeding selection for blast resistance was mostly based on the evaluation of leaf blast. This method, however, is not always representative of what happens in the field at the time of heading or later, when blast can infect the neck and directly compromise yield. Long term studies carried out in countries where blast is a very destructive disease have proven that leaf blast assessments underestimates neck blast disease in several cases. Moreover, blast isolates infecting necks have been proven to be more adapted to rice than those producing early infections in leaves. Therefore, neck blast assessments in nursery has been incorporated in the last years to assist in the selection of resistant cultivars. The objective of the present work is to evaluate the progress of selection for neck blast resistance in rice and the relation to leaf blast in breeding lines and commercial cultivars in Uruguay. Field trials were performed during 2013 to 2016 in the Blast Nursery of the Experimental Unit “Paso de la Laguna”, INIA Treinta y Tres (33° 16' 34'' S 54°10' 02'' W, 22 m a.s.l., Uruguay). Sowing was done in November of each year in rows separated 12 cm each other and transversal to a row of 50 cm wide of the highly-susceptible cultivars “Fanny” and “El Paso 144” used as spreader. Shade and humidity conditions were artificially provided to promote natural infection. Incidence and severity of blast were evaluated in two moments for leaf and in one moment for neck blast. Neck and leaf blast severity was obtained for lines and cultivars studied for three years and effects of cultivar and year were statistically significant at the 0.05 significance level. In the advanced lines studied, 72,3% were classified as resistant (R), 14,9% were moderately resistant (MR), 8,2% moderately susceptible (MS) and 4,6% susceptible (S) to neck blast. For leaf blast, 92% of the lines were classified as R, 3% MR, 5% MS and <1% S. These results show that last years' effort of selecting cultivars with an acceptable blast resistance has been successful. In contrast, commercial cultivars accounting for more than 90% of actual rice area had mostly MS to S responses for neck blast and MR to MS responses for leaf blast. Pearson's correlation coefficient (r) was calculated for neck and leaf blast according to year, cultivar and subspecies. Indica type cultivars had a correlation coefficient between neck and leaf blast of 0.84 ($P<0.001$) and for japonica type cultivars $r=0.47$ ($P<0.001$). These results show that japonica cultivars may be selected mostly for neck blast resistance, but for indica cultivars selection should take into account not only one blast resistance characteristic.