Potential Hybridization Risk in Ex Situ Oryza rufipogon Collections

Common wild rice, (Oryza rufipogon), as the recent common ancestor of cultivated rice (O. sativa L.), plays an important role in rice improvement. In situ and ex situ conservation are two main wild rice protection strategies. While there is a growing awareness of the impact of reproductive mode on ex situ–conserved populations, there has been little discussion on the implication of outcrossing and asexual propagation for ex situ conservation collections.

In an article recently published in Crop Science, researchers compare 30-year ex situ O. rufipogon populations with in situ populations. The in situ O. rufipogon populations clustered into three major groups, which were in accordance with their geographical distribution. However, the nine ex situ–conserved populations showed no population structure, and there was a high heterozygosity for each individual.

The results suggest an opportunity for pollen transfer and asexual propagation among populations and a potential risk of genetic introgression and loss of genetic identity of open-pollinated seeds and mixed plants in the ex situ populations collected from different regions. The difference of diversity, heterozygosity, and population structure between ex situ and in situ conservation populations indicates no post-pollination barriers to hybridization and the importance of spatial isolation as a barrier to interspecific crossing and asexual propagation.

Therefore, to manage these outcrossing and asexual plants collected from different populations in situ and shared pollination vectors in ex situ facilities, spatial isolation should be carefully considered to minimize the possibility of spontaneous hybridization.

Adapted from Liu, S., X. Zheng, L. Yu, L. Feng, J. Wang, T. Gong et al. 2017. Comparison of the genetic structure between in situ and ex situ populations of Dongxiang wild rice (Oryza rufipogon Griff.). Crop Sci. 57. View the full open access article online at http://dx.doi.org/doi:10.2135/cropsci2017.01.0015


Monolith Root Sampling Quantifies Underground Herbivory

Corn rootworms, which are destructive insect pests, have a long history of overcoming management strategies used by farmers. Knowledge of the spatial effects of corn rootworm larval feeding injury on corn root systems is the next step toward continued development of robust rootworm population management strategies.

In an article recently published in Crop Science, researchers report on monolith sampling techniques to quantify root distribution in the soil profile after corn rootworm larval feeding. Soil monoliths from control or infested field plots were grid-sampled, roots were washed from soil, and root length density (RDL, cm of root length cm$^{-3}$ of soil) was plotted on contour plots.

Undamaged plants had a 1.0 cm cm$^{-3}$ threshold RDL extending 5 to 10 cm from the monolith center to a 15-cm depth while rootworm larval infestation restricted this threshold RDL to about 4 cm from the monolith center to an 8-cm depth. The 0.5 to 1.0 cm cm$^{-3}$ RDL extended 10 to 15 cm from the monolith center to a depth of 25 cm in the control while infestation restricted this RDL to 5 to 10 cm from the monolith center.

Experimentation using monolith techniques could be expanded to study soil and crop management effects on root injury–yield loss relationships, interspecific competition between northern and western corn rootworm larvae, and interactions with predator insects.


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