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Paper presented at the International Rice Congress 2023 from October 16-19 in Manila, Philippines.

Perennial Rice Improves Farmer Livelihood and Ecosystem Security – take the research in China as an example

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To tackle food insecurity faced by an ever-growing population, there is an urgent need to develop new forms of highly productive and ecologically-secure agricultural systems. Perennial Rice (PR) is now a reality from theory and practice with the release of three PR cultivars, which are perennial rice 23 (PR23), Yunda25 (PR25) and Yunda107 (PR107) to farmers in the Yunnan Province of China and also testing over the world where rice is staple food. Selected from interspecific hybridization between the cultivated rice Oryza sativa and the wild perennial rice Oryza longistaminata, these PR cultivars have regularly produced grain yields (6.8 t ha-1) comparable with those of seasonally-replanted annual counterparts (6.7 t ha-1) under paddy conditions, with excellent agronomic type combining robust regrowth and acceptable grain quality. Farmer preference is strong, due to reduced labour requirements for land preparation and transplanting, also saved seeds input and seeding nursery preparing, which reduces costs, increases profitability, and reduces drudgery. In combination with no tillage, stubble retention and enhanced surface cover, PR cultivar possessed the benefit of reducing soil deterioration, with potential longer-term benefits to soil fertility (increase rate 0.95 and 0.11 Mg ha-1 year-1 for SOC and TN according to our permilinary result), farming-system flexibility and farmer livelihood compared to annual rice. This is the milestone of release of a hybridized perennial grain crop. This report will outline the breeding schedule and performance of perennial rice, summarized the social-economic, ecological and soil benefits of perennial rice -no tillage cropping system, zoning optimal application area for perennial rice production over the world. This innovation would help maintain food security and ecological integrity, and also inspire research on other perennial grains. This research was Runner-Up for Breakthrough of the Year 2022, according to Science, published by American Academy for Advancement of Science!

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