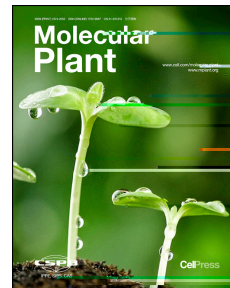


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Global Wild Rice Germplasm Resources Conservation Alliance: WORLD WILD-RICE WIRING

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The Author

Global Wild Rice Germplasm Resources Conservation Alliance:

WORLD WILD-RICE WIRING

Wild relatives of crop are key genetic resources serving as diversity reservoirs for crop improvement under changing environments. Rice (*Oryza sativa*) is one of the most important crops in the world, providing staple food for half of the world's population. Wild rice is thus a critical germplasm resources for sustained global food security, ensuring high production yields, improved quality and stress resistance in the face of climate change. Wild rice is closely related to domesticated rice, has a rich genetic diversity and exceptional adaptability to extreme environments. It has played a pivotal role in the history of rice hybridization and has become a key resource for rice breeding programs. The identification of wild-type cytoplasmic male sterility resources paved the way for the achievement of the "three lines" goal in hybrid rice, leading to a significant increase in rice yields. In addition, the use of resistance alleles found in wild rice is making rice production more resilient to losses caused by environmental stresses. However, the wild rice germplasm resources are threatened due to habitat destruction and other anthropogenic factors. At the same time, the lack of centralized distribution of wild rice has hampered the sharing of basic information on wild rice resources and the utilization and conservation of wild rice in each country, as well as collaboration among scientists.

The Global Wild Rice Germplasm Resources Conservation (GWRGRC) alliance is a a cross-conserving global wild rice germplasm resources and understanding the ecology of wild rice environments. This includes identifying and addressing threats such as habitat destruction and climate change, as well as scientific issues related to biotechnology. Moreover, the Alliance strives to define effective pathways for utilizing wild rice in rice improvement, and provide valuable data for decision-making.

Mission of the Alliance

The Alliance is a non-governmental organization and a global collaboration platform comprising of researchers, scientists and scholars from various countries. The primary focus of the alliance is to promote the conservation, research and utilization of wild rice germplasm

33 resources. The alliance has a grand vision of "establishing a global wild rice system that
34 supports sustainable agricultural development and food security". Its mission is centered
35 around "creating an optimal environment for the exchange of wild rice germplasm resources
36 and promoting rice breeding and seed innovation". The Alliance upholds the values of
37 openness, inclusivity, and equality fostering a spirit of cooperation, mutual learning and
38 sharing to achieve mutually beneficial outcomes. It actively encourages participation from
39 experts and scholars in all countries and fields of study, aiming to collectively contribute to
40 the conservation and sustainable utilization of wild rice genetic resources in order to ensure
41 improved rice productivity or yield, and hence food security.

42

43 **Activities of the Alliance**

- 44 i. Our main task is to ensure sustainable development by strengthening international
45 cooperation and shared commitment to expand scientific collections of wild rice,
46 improve utilization of germplasm resources, and conserve and utilize wild rice
47 germplasm resources globally.
- 48 ii. The Alliance will protect, manage and monitor wild rice germplasm resources in their
49 natural habitats, allowing for their continued natural evolution and ensuring their
50 availability for sustainable utilization.
- 51 iii. The Alliance will address key needs for improving rice yield by using wild germplasm
52 to explore new genes, using cutting-edge breeding methods, applying data mining, and
53 bioinformatics tools, and utilize expertise in crop molecular and biological processes
54 contributed by scientists from various countries.

55

56 **Principles of the Alliance**

57 The Alliance will make significant contributions to the global food security, crop
58 diversity and equitable sharing of benefits with unified regulations.

59 Access principles

- 60 a. The Alliance recognizes the individual sovereignty of each member country on their own
61 genetic resources and accessibility is contingent upon the laws of each respective
62 country.

63 b. The Alliance strictly follows the guidelines of International Treaties on Plant Genetic
64 Resources for Food and Agriculture and the Convention on Biological Diversity, aiming
65 to protect and sustainably utilize all plant genetic resources.

66 c. The Alliance considers the individual wishes of members and allows personnel from all
67 parties related to wild rice to enter without threatening the security of wild rice germplasm
68 resources.

69

70 Resource Sharing

71 Resource acquisition and benefit sharing are core parts of the Alliance. These efforts
72 involve acquisition and utilization of wild rice germplasm resources, working to ensure that
73 any germplasm sharing is contingent upon the laws of each respective country and
74 development of fair and reasonable sharing of the resulting benefits, including technology
75 transfer, information exchange and application of benefit-sharing mechanisms.

76 a. Establish a global system to obtain wild rice germplasm resources, ensuring equitable
77 sharing of benefits among farmers, plant breeders, and scientists based on rules for
78 sharing mechanisms.

79 b. Organize national research teams within the alliance to jointly address key issues in the
80 conservation and use of wild rice. Broad support and participation of countries in the
81 FAO Treaty are crucial for the conservation and sustainable use of these genetic
82 resources.

83 c. Hold regular training and exchange activities on the conservation status and distribution
84 of wild rice to enhance knowledge and understanding among scientists from different
85 countries. Strengthen resilience to climate change impacts, learn from past best practices,
86 and promote transformative adaptation policies, plans, and actions.

87

88 Resource Conservation

89 To ensure the effective conservation and sustainable use of wild rice germplasm
90 resources, we will employ a diversified approach. This will involve adhering to scientific
91 principles and implementing local conservation methods based on the specific conditions of
92 member countries. Our emphasis will be on the following points.

93 a. Establish *in situ* conservation sites for wild rice germplasm resources in their natural
94 habitat (*in-situ conservation*).

-
- 95 b. Develop and implement *ex-situ* conservation plans for wild rice germplasm resources
96 c. Promote the sustainable utilization of wild rice germplasm resources in rice breeding
97 programs.
98 d. Prioritize implementation of conservation plans by conducting feasibility tests and
99 employing specific measures for conservation and sustainable use of wild rice genetic
100 resources. This will help to determine the level of threat and conservation status of the wild
101 rice species or genetic resources.

102

103 Wild rice serves as a vital reservoir of genetic diversity for sustainable rice breeding.

104 The Global Wild Rice Germplasm Resources Conservation (GWRGRC) alliance is
105 instrumental in addressing threats to wild rice, bringing together scientists globally to
106 conserve rice gene pool

107 and interdisciplinary research on the wild rice. The researches may include ecological,
108 morphological, genetic, and biotechnological researches. The wild rice displays a critical role
109 in enhancing rice yield. The alliance's efforts are therefore pivotal for resilient agriculture.

110 Alliance's comprehensive strategy includes identifying and mitigating anthropogenic threats
111 and ensuring the conservation of invaluable wild rice genetic resources. The GWRGRC
112 alliance does not only contribute to wild rice germplasm conservation, but also strives to

113 integrate these resources into rice breeding (improvement) programs and therefore
114 overcoming the existing constraints. Ultimately, the alliance plays a key role in shaping
115 global food security by safeguarding wild rice diversity (species diversity and genetic

116 diversity), promoting sustainable agricultural practices and highlighting the importance of
117 collective action for future generations.

118

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175

176 All authors have equal contributions

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180 Figure 1. Operational overview of the GWRGRC alliance

181 A. Integrate advanced technologies such as global positioning system, remote sensing
182 technology, and geographic information system to survey and collect global wild rice
183 germplasm resources

184 B. Blend interdisciplinary knowledge such as ecology, genetics, molecular biology and
185 environmental science to develop strategies for the *ex-situ* conservation of wild rice
186 germplasm resources

187 C. Leverage resources from global research institutions, academic networks, and
188 collaborative projects, thereby expanding the research area of the Wild Rice Alliance to
189 cover more geographical and ecological regions. We hope to establish a global shared,
190 comprehensive protection, and sustainable utilization system of wild rice germplasm
191 resources, and further promote applied research on wild rice.

192 D. Use phenomics, genome assembly, bioinformatic analysis, and other multi- omics
193 methods for precisely identify of wild rice germplasm resources

