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Salt-tolerant rice hybrids

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The DBT through its SBIRI scheme has provided much required support to Bangalore-based Indo-American Hybrid Seeds for its project on marker-assisted selection for the development of salt tolerant hybrids in rice

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Soil salinity is a global phenomenon, adversely affecting the productivity of more than 1000 million hectare of land on earth. Currently, the extent of salt affected soils in India is 8.6 million hectares. Carbonates and bicarbonates of sodium are mostly found in the alkaline soils with pH of 8.5 to 10.5 while chlorides and sulphates of sodium are usually present in the inland saline soils with pH less than 8.5. Therefore, there is hardly any crop that can grow in these problematic soils and even if it grows, the productivity is very low.

One way to achieve higher yields and increase the productivity in salt affected soil, is salt amelioration using gypsum. This however becomes costly, laborious and time consuming. Keeping this in view, the Bangalore-based Indo-American Hybrid Seeds initiated a project on marker-assisted selection for development of salt tolerant hybrids in rice (Oryza sativa). Initiated in June 2011, the objective was to get satisfactory heterotic advantage for grain yield in all types of salt-affected areas. Hence the focus was put on developing cytoplasmic male sterile (CMS) lines with saline tolerance, as effective salt tolerance maintainers with desired plant type by introgression of major saltol quantitative trait loci (QTL). The project received funding support of 19.96 lakh from the Department of Biotechnology (DBT), under the Small Business Innovation

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Research Initiative (SBIRI).

The company's R&D team was aware that salt tolerance could be achieved by the conventional plant breeding methods which, however is a time consuming process. Thus they chose among the recent strategies such as marker assisted introgression of trait specific QTL to supplement conventional breeding approaches. Achieving a firm progress, the development of BC1F1 generation has been already completed by the team. Based on markers, the plants having more recurrent genome with major saltol QTL region have been identified and further transferred to BC2F1 generation.

Explaining further, Dr Devaraj Achar, head, R&D, biotech division, Indo-American Hybrid Seeds, Bangalore said, â€œThe marker assisted selection (MAS) is complimentary to conventional breeding methods. It greatly increases the efficiency and effectiveness of conventional breeding. The advantages that come with it include simple, efficient and effective compared to phenotypic screening. Besides that, the selection may be carried out at seedling stage and single plants may be selected with high reliability. These advantages will results in greater efficiency or accelerated line development in breeding programs.â€?

Calling the DBT funding vital for the project, Dr Achar added, â€œThe SBIRI supported and supplemented well along with our resources. It is very much important to pursue our envisaged objectives to develop saline tolerant hybrid.â€?

Way Forward

After developing stable CMS line with saltol QTL, the company is now looking at making more saltol hybrids crossing with different restorer lines to test in target salt affected soils. After that is achieved successfully, the selected hybrids will go for seed production and distribution at the mass scale. Given the fact that rice is consumed as a staple diet in a number of Indian states, the creation and cultivation of its salt tolerant varieties can lead to increased production and economical benefit to farmers.

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