

Two high-BNI (biological nitrification inhibition) elite lines available for next users

Project Title: P1361 - Introgress new genetic diversity from wheat wild relatives for priority traits

Description of the innovation: The 3NsbS chromosome arm in wild grass (*Leymus racemosus*) that controls root nitrification inhibitor production was transferred into elite wheat cultivars, without disrupting the elite agronomic features. Biological nitrification inhibition (BNI)-enabled wheats can improve soil ammonium levels by slowing down its oxidation and generate significant synergistic benefits from assimilating dual nitrogen forms and improving adaptation to low N systems.

New Innovation: Yes

Stage of innovation: Stage 1: discovery/proof of concept (PC - end of research phase)

Innovation type: Genetic (varieties and breeds)

Geographic Scope: Global

Number of individual improved lines/varieties: 2

Description of Stage reached: CIMMYT and JIRCAS demonstrated feasibility of enhancing BNI capacity in elite wheats by transferring a chromosome arm 3NsbS controlling BNI traits from wild grass as a wheat *L. racemosus* translocation chromosome (T3BL.3NsbS). Enhanced BNI release from root systems of T3BL.3NsbS resulted in suppression of soil nitrifier activity.

Name of lead organization/entity to take innovation to this stage: CIMMYT - Centro Internacional de Mejoramiento de Maíz y Trigo / International Maize and Wheat Improvement Center

Names of top five contributing organizations/entities to this stage:

- JIRCAS - Japan International Research Center for Agricultural Sciences

Milestones:

- Novel diversity available for yield potential, drought and heat tolerance in lines from crossing bank accessions with elite lines

Sub-IDs:

- 30 - Reduced net greenhouse gas emissions from agriculture, forests and other forms of land-use (More sustainably managed agro-ecosystems)
- 26 - Agricultural systems diversified and intensified in ways that protect soils and water
- 9 - Reduce pre- and post-harvest losses, including those caused by climate change

Contributing Centers/PPA partners:

- CIMMYT - Centro Internacional de Mejoramiento de Maíz y Trigo / International Maize and Wheat Improvement Center

Evidence link:

- <https://doi.org/10.1073/pnas.2106595118>

Deliverables associated:

- D17749 - Alien translocations in elite wheat varieties/synthetic (6x and 8x) derivative lines and new synthetic wheat (**Marked as Confidential**)

Contributing CRPs/Platforms:

- Wheat - Wheat