

# “ESPERANZA”

## A fruitful collaborative research

### First upland/aerobic rice variety coming from rice synthetic population breeding

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#### Introduction

In Bolivia, rice is a very important staple food. Consumption is steadily increasing reaching in the recent years 35 Kg. per capita. Two main rice production ecosystems are present: (1) upland mechanize where the Province of Santa Cruz represents 75% of the total Bolivian rice area and produces 80% of the total production of the country and (2) the manual ecosystem is present in all the Bolivian Provinces where the production is by small farmers. The bolivian overall production is for the domestic market and auto-consumption. One of the main factors limiting the development of the rice sector is the lack of adapted varieties for each ecosystem leading the rice program of CIAT Santa Cruz to invest in breeding with the objective of releasing new varieties better adapted. One of the outputs of the project is the release of new varieties that result of the close collaboration between the Cirad/CIAT upland rice synthetic population breeding project and both the public and private Bolivian rice sector (CIAT Santa Cruz and CONARROZ, respectively).

#### New variety for small farmers and mechanize rice ecosystem

The new upland rice variety with the code name SR 99343 is a CIRAD/CIAT line that originates from synthetic population breeding. The line was selected at La Libertad Experimental Station, Villavicencio-Colombia from the first cycle of recombination of the synthetic population PCT-4 developed in Colombia. Segregating generations were advanced using the conventional pedigree method. The advanced line PCT-4(0)0(1)>S2-1584-4-M-5-M-6-M-M was shipped to Bolivia for local evaluation. At CIAT Santa Cruz-Bolivia, the line passed through the different agronomic selection and evaluation trials and was identified as a promising variety well adapted to both small-farmers' manual and mechanize upland rice ecosystems.

#### Variety development and characteristics

“ESPERANZA”, the first commercial variety selected from the composite population PCT-4, was officially released in Bolivia. The variety is adapted to both upland small-farmer's and mechanized aerobic rice ecosystems. Yield potential in both Bolivian rice ecosystems and the main agronomic characteristics of the variety are presented in the tables 1 and 2 (Viruez *et al.*, 2003). For the small-farmers, earliness and drought tolerance associated with good yield potential are important traits they praise. Cropping the new variety can enhance their agronomic system by allowing crop rotation with other crops (cash or staple). Earliness is also a favorable trait because farmers can put rice on the market early in the season and get good price for it. For the aerobic rain-fed rice mechanized farmers, tolerance to drought is key because field water flooding depends on rainfall. Also, the variety presents good plant type and long-slender grain praised by the rice industry (Taboada *et al.*, 2005). Seed multiplication, field days and technical visits were made during the cropping seasons 2004, 2005 and 2006. The launching of the variety was in early 2006, ten years after the launching of the regional CIRAD/CIAT rice synthetic population-breeding project.

Through the collaboration between CIAT Santa Cruz and the ONG Misión Alianza de Noruega en Bolivia (MAN-B) working in the Caranavi region of the La Paz Department, Esperanza was evaluated and is doing very well in the hillsides ecosystem at altitudes from 500 up to 1000 m.a.s.l. and is adapted to manual cultivation by the small-farmers of the region. Furthermore, ESPERANZA was identified as having a good/high content of Fe and Zn respectively, which is very important for the health of the people of this region (personal communication: R. Taboada and C. Martinez).

Table 1. Yield potential of the variety “ESPERANZA” in both Bolivian rice ecosystems

Upland small-farmers' ecosystem	
ESPERANZA and Checks	
ESPERANZA (SR 99343)	4706
Jacuí	4861
Jisunú	4115
Cheruje	3948
Jasayé	3713
Tapeque	3102
Mechanized aerobic ecosystem	
ESPERANZA and Checks	
ESPERANZA (SR 99343)	4662
Tari	5380
Epagri - 109	4633



Photo 1. Seed multiplication plot

Table 2. Characteristics of the variety “ESPERANZA”

Average grain yield (Kg./ha)	
Upland manual ecosystem	4706
Mechanized ecosystem	4662
Agronomic characteristics	
Vigor	Good
Flowering (Days)	90
Growing duration (days)	120
Plant height (cm.)	112
Lodging	Resistant
Panicle exertion	Good
Panicle length (cm.)	22.8
Grain/panicle	161
Shattering	Intermediate
Diseases	
Leaf blast	Resistant
Neck blast	Resistant
Brown spot	Intermediate
Leaf scald	Intermediate
Grain discoloration	Resistant
Grain characteristics	
1000 grain weight (gr.)	32.2
Grain length - White rice (mm)	7.60
Grain width - White rice (mm)	2.75
Longitude/width - White rice	2.76
Temperature of gelatinization	High
Grain type	Long
White belly	1.8
Visual appearance	Good



Photo 2. Official release



Photo 3. Seed sample distribution



Photo 4. Field day with small-farmers

Viruez, J.; Guzmán, R.; Tabeada, R.; Callaú, V.H. 2003. Adaptación regional de 6 líneas y variedades de arroz (*Oryza sativa* L.) bajo condiciones de secano: verano 2002/03. Resúmenes del Seminario-Taller Internacional de Mejoramiento de Arroz de Secano para América Latina y el Caribe. August 18-23, 2003. Villavicencio-Meta, Colombia  
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