

## Versatile Barley Varieties Help Highland Mexican Farmers Cope with Globalization

*Barley production in the highlands of Mexico dates from the time of the Spanish conquest. Today, all of the barley planted in the region is used for malting to produce beer.*

*Globalization, most notably the North American Free Trade Agreement, is prompting farmers to look for new crops, such as forage barley, which appears to offer an economically viable alternative to malt barley production.*



*Barley trials at Toluca Experiment Station, over 2600 meters above sea level.*

**B**arley has been grown in the highlands (over 2200 meters above sea level) of Mexico since the Spaniards introduced the crop about 500 years ago. It is mostly used to make beer, production of which has increased significantly in the country in the last few years due to an increase in exports. In some Mexican states, such as Hidalgo, where 120,000 hectares are grown annually, barley is the main crop. In other highland states, such as Mexico State, barley is the best alternative in years when the maize crop fails or cannot be planted due to

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adverse weather conditions. Despite the success of Mexican beer worldwide, new trade agreements, specifically the North American Free Trade Agreement, have led to an increase in imports of malting barley from the United States of America and Canada. In response, barley growers are looking for new opportunities, and forage barley appears to be a good

alternative to malting varieties. Although it cannot fetch a premium price for quality, high-yielding forage barley developed by the ICARDA/CIMMYT (International Maize and Wheat Improvement Center) Latin American Regional

**Table 1. Barley grain yield from trials in drought conditions in the State of Mexico.**

Genotype	Yield (t/ha)
Line 12	5.0
Line 10	4.8
Line 37	4.4
Line 33	4.3
Line 52	4.2
Line 39	3.3
Line 64	3.2
<b>Galeras/PI6384//ESC.II.72</b>	<b>2.8</b>
<b>Weebill 1 (wheat)</b>	<b>3.4</b>

Varieties in bold are the drought-resistant checks.

*Crossing block of the ICARDA/CIMMYT barley breeding program.*



*Barley crossing.*



*Field day at Almoloya, State of Hidalgo.***Table 2. Grain yield, protein and reaction to main diseases of promising varieties tested for more than two years in the State of Hidalgo.**

Variety	Grain yield (t/ha)			Grain protein (%)	Rust		Scald
	Tecoco-mulco	Almo-loya	Mean		Yellow	Leaf	
Arupo//K8755/Mora	3.6	5.5	4.5	11.4	MS	R	R
Zig Zig	3.5	5.1	4.3	12.1	R	R	R
Capuchona 20	3.7	4.7	4.2	13.5	R	R	R
Tocte	2.3	4.8	3.6	12.3	R	R	R
Sen	1.9	4.2	3.0	15.7	MS	R	R
Esmeralda (local cultivar)	2.5	3.3	2.9	13.0	MS	MR	MS

R=Resistant MS=Moderately susceptible.

*Hooded barley cultivar 'Capuchona' released in the State of Mexico.*

Program has been proven to deliver a higher total income for growers than does malting barley. Farmers are able to sell the grain when the price is good, or use the barley to feed their lambs and goats when the grain price is low.

The environment in the Mexican highlands is diverse and variable, ranging from very dry, with less than 200 mm of precipitation in some years, to areas where annual rainfall reaches 500 mm. The ICARDA/CIMMYT program is helping in the development of barley varieties adapted to drought (Table 1), as well as varieties adapted to more favorable environments.

In order to achieve success, the program has signed research collaboration agreements with the Agriculture Secretariats of Hidalgo and Mexico State. The strategy includes the generation of variability through targeted crosses at research stations, followed by selection under target conditions, and extensive on-farm testing throughout the target area. The experiments and variety demonstration plots are presented to farmers during field days, which also afford an opportunity to discuss aspects of barley production and market preferences. In Mexico State, a hooded barley variety, 'Capuchona,' has been released and is generating excitement among growers because of its versatility. The cultivar is grazed, cut for silage, or harvested for grain. In Hidalgo, three new cultivars are expected to be released within the first three years of the project.

Results after two years are encouraging, in terms of yield and quality of tested varieties (Table 2), when compared with 'Esmeralda,' the only malting cultivar grown in the region. Besides the increase in production, additional benefits more difficult to measure include the change in attitude among growers, as they become less dependent on the large malting companies and less vulnerable to market fluctuations. ■

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