Highlights

- In 2018, CIMMYT distributed over 10,000 samples of maize germplasm, 42% are landraces.
- Jala maize is a special landrace from Jala valley in Mexico, and has the largest ear and tallest plant of all maize landraces in the world. It is at risk of extinction.
- Rematriation is the process of engaging with the community and transferring germplasm from an institution, that maintained a collection, directly to the original donors or place of origin of the germplasm.
- The project to rematriate Jala maize initiated by CIMMYT genebank is unique, as it intends to build a more integrative and collaborative partnership with producers and, at the same time, promote in-situ conservation among farmers.

Dynamic conservation:
Rematriating the giant maize “Jala”

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Why we need the CIMMYT genebank

CIMMYT - the International Maize and Wheat Improvement Center - is the global leader in publicly funded maize and wheat research and related farming systems. The maize collection at CIMMYT has over 28,000 accessions and includes the world’s largest collection of maize landraces, created and maintained by farmers over many generations, as well as wild teosinte and Tripsacum wild relatives of maize.

The CGIAR Research Program on Maize (MAIZE) continues to achieve significant development outcomes and impacts through varietal release, scale-up, delivery and adoption of CGIAR-derived climate-resilient and nutritionally enriched maize varieties. In 2018, national partners released 81 unique CGIAR-derived maize varieties across Africa, Asia and Latin America; 20 of the varieties are nutritionally enriched.

Data and methods

The data for the Jala rematriation project was gathered through systematic literature review and from the analysis of primary and secondary socio-economic data. For the primary data, we conducted semi-structured interviews and focus group discussions with different stakeholders involved in the conservation of the landrace, such as farmers and scientists from different institutions in Mexico. The secondary data was provided by CIMMYT and consisted of data collected by Rice in 2004 and Camacho and colleagues in 2017.

Dynamic conservation

Dynamic conservation represents an efficient approach to the sustainable conservation of maize genetic resources. The dynamic model, initially proposed by Berthaud in 1997, describes the complementary uses of in-situ and ex-situ conservation methods and how this complementarity creates a dynamic cycle in the utilization and conservation of plant genetic materials.

Jala maize conservation and rematriation

Jala maize is one of the landraces that is at risk of extinction. Researchers have observed phenotypic variations (e.g., size of the maize ear) and a reduction in the area planted with Jala maize. Table 1 shows the ear sizes reported in different articles and how the current average size of maize ear significantly decreased from 60 cm in 1924 to 29 cm in 2018. Similarly, the area planted with Jala decreased by more than half, from about 300 hectares in 1924 to 119 hectares in 2018.

One of the main reasons why farmers replaced Jala maize variety or reduced their area planted to Jala was the lower yield compared to other landraces or varieties. Farmers who continue to conserve and produce Jala maize narrated the legacy and tradition of cultivating this landrace, but observed that consumers are not willing to pay for a price premium for the traditional variety.

Table 1. Changes in the size of the Jala maize’s ear and area planted

<table>
<thead>
<tr>
<th>Author (publication year)</th>
<th>Average length of Jala maize ear (cm)</th>
<th>Area planted (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kempton (1924)</td>
<td>60</td>
<td>324 to 283</td>
</tr>
<tr>
<td>Wellhausen and Roberts (1951)</td>
<td>45 to 50</td>
<td>Not reported</td>
</tr>
<tr>
<td>Aguilar et al. (2006) and Rice (2006)</td>
<td>35 or 40</td>
<td>366</td>
</tr>
<tr>
<td>Montes-Hernández, et al. (2014)</td>
<td>35-44</td>
<td>Not reported</td>
</tr>
<tr>
<td>Current (2018)</td>
<td>29</td>
<td>119</td>
</tr>
</tbody>
</table>

From left: Vanessa Ocampo, Camilo (winner of the Largest Ear of Corn in the World), Emily Josephs (post doc from University of California-Davis). The tape around the cob marks the the length of the winner cob at 43 cm.

Scientists at CIMMYT are facilitating the rematriation process, a circular model to enhance the dynamic conservation and utilization of traditional maize landraces in Mexico, such as Jala maize.

Figure 1. Possible exchanges of genetic materials
Source: author based on (Bellon, Pham and Jackson 1996)

The chart illustrates the rematriation process proposed by CIMMYT and partners.

[Image of maize rematriation process]

In-situ & on-farm conservation

Ex-situ conservation

Participatory breeding

Plant breeding

Evaluation

Market preferences

Landraces & CIMMYT

Modern varieties

Genetic resources

Knowledge & info

“[My father] instilled in us the need to take care of this seed, and he told us that we should never sell this seed or lose it” “not everyone has Jala maize”

“[Mi padre] nos inculcó cuidar esta semilla, y nos dijo nunca se les vaya a ocurrir vender esta semilla o perderla ustedes siganla.” “no cualquiera tiene maiz de húmedo”

Jala farmer, male, 52 years old