

**PROBLEM MAPPING: THE THREAT TO MEXICO CORN BIODIVERSITY
And to LIVELIHOODS of INDEGENOUS FARMERS AND THEIR COMMUNITIES**

I- Problem Landscape: To sow or not to sow GM corn in Mexico?

Current debate

Genetically modified (GM) corn cannot be grown or tested in Mexico, for now. Recently though, the government has made moves to allow the practice. This has angered a plethora of actors who have deplored the dangers of GM corn for the diversity of Mexican corn. In 2001, researchers at the University of California, Berkeley, reported that genetic material from GM corn had already contaminated local populations of native corn cultivars (Quist and Chapela 2001). Regardless, in 2009, Monsanto, Dow and DuPont Pioneer were granted approval to grow GM corn for research. On July 5th2013, a collective lawsuit was filed by a coalition of activist groups to stop them. The coalition consisted of 53 individuals (scientists, journalists, chefs etc.) and 20 civil organisations advocating for the human right to a healthy environment for their development and wellbeing (Public Citizen 2014).

The suit claimed that transgenic corn threatens the biodiversity of traditional varieties grown by subsistence farmers and smallholders throughout Mexico. Opponents argue that GM crops will be less able to withstand the effects of climate change, whereas a diversity of crops will allow farmers to dip into a biological “reservoir” of varieties that have adapted to local conditions. In August 2015 though, a Mexican judge overturned a 2013 ban on sowing GM corn. His decision was yet again appealed by a coalition of activists. The ban remains in force, pending a ruling on the appeal but the case could still end up in the supreme court (Webber 2016). The future of Mexican corn production is uncertain.

Though the region of Mexico is the birthplace of corn, Mexico is no longer self-sufficient in corn production: it imports 30% of its corn (most of it transgenic) from the US (Schepers 2014). Corn though is central to the nation’s identity and to Mexico’s food sovereignty (Pilcher 2012a).

The debate over GM corn in Mexico is one over farming practices, a nation’s self-determination, the right to food sovereignty and environmental impacts (Baker 2012).

Historical background of disenfranchisement

The debate over GM corn in Mexico is related to a complex ecosystem of related issues. The very discussion is a result of a change in the political and infrastructural landscape in Mexico.

At the turn of the last century, the Mexican revolution caused a great displacement of farmers and re-allocation of land, disrupting the country's agriculture¹ (Pilcher 1998; 2012b). Land was initially divided into *ejidos*, communal agricultural land shared into parcels and farmed by individuals within a community. The implementation of the North American Free Trade Agreement (NAFTA) and further legislation aimed at neoliberal economic restructuring, enabled the privatisation as well as sale of *ejidos* (Yetman 2000) and perpetuating the stigma of indigenous farmers as backwards and an impediment to progress (Pilcher 1998; Hernandez 2008). As a result, *ejidal* productivity decreased, contributing to an increase in rural poverty, and mass migration. Since the latter 20th century NAFTA and economic policies have favoured large-scale commercial agricultural holdings and intensive farming practices (Baker 2012).

Who are Mexican indigenous farmers?

These are marginalised producers, subsistence farmers who own 2 hectares of land or less and grow corn traditionally through milpa techniques (intercropping). They plant heirloom corn that they consume and thus conserve *ex situ* a wealth of agro-biodiversity. About 5.5 milpa farmers are in Mexico according to FAO.

Political restructuring

Under the theory of comparative advantage, the majority of Mexico's indigenous farmers and their techniques were considered inefficient as corn yields were lower than the average of the US. Neoliberal policies increased corn imports and encouraged farmers to convert their land to crops that were supposedly at a comparative advantage, such as counter-seasonal and tropical fruits and vegetables (avocados and tomatoes). The effects of NAFTA have diminished Mexico's food security, increased the consumption of imported food, which has risen to 33% of food consumed in Mexico (Schepers 2014) whilst it spends on average \$24 billion (compared to \$1.8 billion before NAFTA) on food imports (Carlsen 2011). In consequence, Mexico is the first obese country in the world (OECD 2014). Small-scale farmers are further marginalised, forced to move to the city where they formed some of the largest slums in the world (Henriques and Patel 2004) or to migrate to the US.

Mexican migration increased by 75% in the five years after NAFTA took effect (Call 2009). At the same time, consumer food prices rose, epitomised by the rising cost of tortillas, the

¹ Mexican elites disseminated the 'tortilla discourse', which claimed that corn was inherently inferior to wheat, profoundly altering Mexicans' diets and agriculture (Pilcher 1998; 2012).

staple food in Mexico. As a result, 20 million Mexicans live in “food poverty” and another 25% of the population does not have access to basic food and one-fifth of Mexican children suffer from malnutrition (Schepers 2014). Transnational industrial corridors in rural areas have contaminated rivers and sickened the population and typically, women bear the heaviest impact (Carlsen 2011).

II- Solutions Landscape: Valorisation and Commercialisation of Mexican Native Blue Corn

Corn is the most produced crop in the world. Maintaining and supporting indigenous Mexican farmers means insuring the preservation of 59 unique landraces native to Mexico. This pool of genetic diversity is one of the cornerstones to facing the challenges of climate change, global food insecurity, chronic issues of hunger, obesity and malnutrition.

Milpa farming is a technological pillar to maintaining agro-biodiversity as it involves the growth of a variety of crops and plants in symbiosis, directly preserving heirloom seeds and indirectly supporting the wildlife and biodiversity that form the ecosystem. Simultaneously, milpa farming is inherent to indigenous culture, a key to human development, social cohesion and cultural practices in rural Mexico.

Why is milpa farming a solution?

Milpa farming is a farming technique in Meso-America using intercropping as a means to produce corn, beans and squash. This system is designed to produce large yields of food crops without the use of artificial pesticides or fertilisers, and is thus self-sustaining whilst supporting a wide range of biodiversity.

It is necessary to incentivise the growth of milpa produce *and* to secure the livelihoods of indigenous farmers as well as the revitalisation of their local economies. To that end, it is important to valorise corn grown from milpa and facilitate the integration of indigenous farmers within the global economy. Despite the coordinated - and till now successful - attempts of conservationists and activist groups opposing GM corn in Mexico, the fate of agro-biodiversity of corn landraces *cannot* depend on the decision of the court. A variety of entrepreneurial initiatives have sought to produce, market and sell native blue corn, one of the most sought after ‘rare’ and ‘exotic’ products (Pilcher 2012a; 2012b) to high-end restaurants in Mexico and the US, and at Mexican festivals in the US.

Masienda

Masienda is a business based in the US that started in late 2014. It aimed to open new markets in the US for producers of about a dozen varieties of native Mexican corn sourced mostly from the southern state of Oaxaca. After importing 400 metric tonnes into the US to supply restaurants last year, the business is aiming to exceed 1,000 tonnes in 2016 (Webber 2016). Despite the success of Masienda, the reach of the business is limited in its scope and reach. It mainly targets a narrow segment of the US consumer base, targeting the gourmet market for rare, fair-trade, products in the retailing sector, and limiting access to other consumer outlets in the US such as health shops or gluten-free markets. It also principally sources its produce from one single region of Mexico.

Amigos and Alianza

Another dual venture started in 2008 with Amigos de Ozolco (based in Puebla) and Blue Corn Alianza (in Philadelphia). These organisations sought to grow and source native blue corn from a small-scale marginalised village in Puebla that was one of the worst hit regions for youth migration (CONEVAL 2010). It transformed blue corn into added-value products, pinole: a powder made of toasted kernels. It then sold foods made from pinole at their Cinco de Mayo festival with unprecedented success (Philadelphia Weekly 2008). The pinole product consumer adoption was immediate and proved that pinole is palatable to an American consumer base. Michelin party chefs were interested in pinole as well as commercial bakeries in Philadelphia, eager to expand their range of gluten-free products with a healthy, yet unknown alternative to wheat (Littaye 2015).

The organisations failed to capitalise on their roaring success. Only two shipments were made of pinole, averaging a ton each. The partnership between Alianza and Amigos ended though because of a lack of leadership and coordination between the two organisations (Ibid.).

Slow Food

The international grassroots organisation Slow Food offers a considerable resource for economic development and support to Mexican traditional farming communities. A 10-year study funded by the European Union demonstrated that the Slow Food model of 'Presidia' supported 47 farming communities by improving 50 indicators that range from the socio-economic to the cultural and environmental. The independent study (demonstrated that Slow Food's methodology supported and consolidated the social, environmental and economic sustainability of these communities.

Slow Food is now scaling its method to incorporate Meso-American communities of traditional farmers in its global network. After a successful application, the movement received a \$250 000 grant by the Ford Foundation to identify, unite and support small-scale indigenous farmers in Mexico. The two-year project aims to map out this network, valorise milpa farming practices, preserve the inherent agro-biodiversity of the milpa, promote

produce to international markets and ultimately, establish a sustainable development for these communities. Slow Food is not a food company though. It cannot act as a trader or, as Alianza, manufacture and sell gluten-free products. Its activities are limited to the development of milpa production.

III- Lessons learned: A Slow Food approach to a multi-faceted issue

The examples of Masiencia, of the partnership between Amigos and Alianza and Slow Food are case-studies that exemplify the interest in native Mexican corn and the viability of developing gluten-free products from pinole. Throughout my own doctoral studies, I discovered that pinole holds an untapped potential for commercial use in the US and around the world and that blue corn has yet to be discovered as a health food.

Why the focus on blue corn?

- Blue corn is the least water demanding corn compared to other corn such as yellow, white or red and thus environmentally more sustainable.
- It is a health food: it has more antioxidants than blueberries (Cevallos-Casals et al. 2003), 30% more protein content than US yellow hybrid corn, and is rich in anthocyanin content that is anti-carcinogenic (Kovacic and Jacintho 2001).
- It is popular amongst running athletes: the legendary Tarahumara, “the running people” in Mexico run 50 or 100 miles at a time with sandals and eat pinole (toasted powdered blue corn) on their runs.
- Over a third of American consumers want to integrate gluten free products in their diets, a demand still not matched in terms of quality or quantity (Strom 2014).

Multi-faceted solution

The case-studies (Amigos, Alianza and Slow Food) I investigated were all limited either through lack of capital, entrepreneurial leadership or marketing strategy. Each case though represents a learning opportunity for other actors to capitalise on the diverse and unique produce of milpa farming, focusing on added-value products made of pinole. They each show how the threat to agro-biodiversity in Mexico is fundamentally linked to issues on three interrelated levels:

- a **socio-cultural scale**
- a **agri-environmental scale**
- an **economic scale**

The production and sale of blue corn pinole products would also help address chronic health issues that plague populations on either side of the Mexican and US border.

Where to start

Slow Food's model offers a scalable foundation for the growth of milpa produce, coordinating producers. Amigos and Alianza demonstrate the market adoption of pinole and the success of pinole foods whilst Masiencia underlines the desire in the US to explore native breeds of corn at high-end retailing. The sustainable development of rural indigenous communities can be sketched by integrating the lessons of all three cases.

The *development, marketing and sale* of pinole products to the US would capture the capital of the growing gluten free and health markets in the US and redirect it to rural Mexican economies whilst boosting their agricultural value and output. Partnering with Slow Food would ensure the redistribution of the sale of blue corn/pinole from the US back to the farmers. At the same time, it can help curb the migration drain that has afflicted the rural countryside. In so doing, it can help counteract a historically and politically rooted rural poverty in Mexico, disseminating the technology of milpa farming that enriches agrobiodiversity, upholding cultural practices and preserving the environment.