

Biomass and Biodiversity

Keywords – title

- > Transgenic soybean
- > Glyphosate
- > Apiculture
- > Honey
- > Pollination
- > Resistance network
- > Court case

The Yucatan Peninsula (YP) is located in the southeast of Mexico. It borders Guatemala and Belize in the South (17°48'43.04"N); the Caribbean Sea in the East (86°41'43.89"O); the Gulf of Mexico in the North (21°34'32.74"N) and West; and the Mexican federal state of Tabasco in the West (92°27'55.12"O). It is comprised of three federal states: Campeche, Quintana Roo and Yucatan, occupying a total area of 14 million hectares.

In this area, a 2012 Monsanto project for commercial plantations of genetically modified (GM) soybean contemplates two polygons, making up an area of 60 thousand ha.

GMOs, honey and biodiversity

In 1991 a new variety of soybean (*Glycine max*) was designed in the genetic engineering laboratories of Monsanto Co. in Missouri, the United States of America (USA). The productive attribute of this new soybean derives from its resistance to glyphosate (Roundup®), a highly effective herbicide also patented by Monsanto Co. Besides soybean, transgenic versions of maize, sorghum, rapeseed, alfalfa, cotton and wheat, also resistant to glyphosate, were designed in 1996, all of them patented with the name of Roundup-Ready®. Since that year, Monsanto Co. has grown vast plantations of transgenic soybean in different parts of the world. Nowadays, soybean cultivation is highly concentrated geographically, with 90% found in four countries: the US, Brazil, Argentina and China. On a lesser scale it is found in Canada, Bolivia, Paraguay and Uruguay. It has also been introduced to several European countries, such as Spain, Portugal and the Czech Republic. In total, 22 countries are growing GM soybean in the world.

This GM soybean was introduced to Mexico in 1998, and is now grown in 9 federal states. In 2011, the Mexican federal government reported 167,889 ha of soybean plantations (14,959 ha in the YP), which produced 141,143 tons (25,786 tons in the YP) sold to the



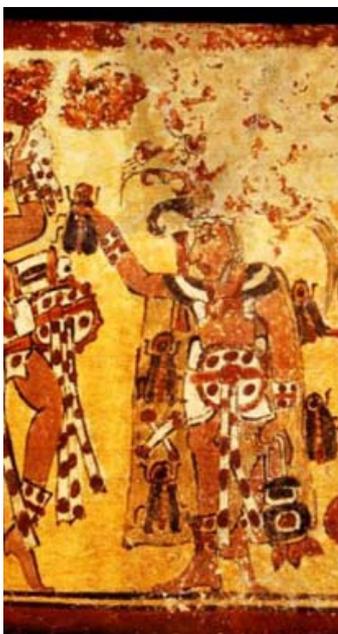
In Mexico, apiculture involves 42 thousand beekeepers.

Photo: 'Agro-meat. Portal de las Agronoticias'

national market and used for the production of human-edible oil and animal food. The vast majority of these plantations are Roundup-Ready. Monsanto introduced this GM plant in the YP in the year 2000. For ten years (2000-2009) production took place under the status of 'experimental' stage. In 2010 and 2011, these plantations became a 'pilot program'.

The Mexican federal GMO Biosafety Law (*Ley de Bioseguridad de Organismos Genéticamente Modificados*, 2005) describes the 'experimental' liberation of GMOs in Mexico as the "intentional and allowed introduction of a genetically modified organism or combination of organisms in the environment, when containment measures have been adopted, like physical barriers or a combination of these and chemical or biological barriers, to restrict its contact with the population and the environment, exclusively for experimental purposes." A 'pilot program' is described by this law as the introduction of these organisms "with or without containment measures [...] constituting the previous stage to the commercial liberation of such organisms, within authorized zones and by the terms and conditions described in the respective permit".

Honey is an ancient resource in the Mayan region. From pre-colonial times, apiculture has developed along with a variety of native and endemic bee species, comprised under the denomination of Mayan bee, known in the Mayan as *Xuna'n Kaab*.





Melipona beecheii (Mayan bee)
Photo: Apis Alimentaria. Apicultores Mayas de Maní, S.C. de R.L.



Meliponan honey as in the beehive
Photo: Apis Alimentaria. Apicultores Mayas de Maní, S.C. de R.L.



Soybean plantations are homogeneous agroecosystems.
Photo: Clasipar



Soybean has become one of the most traded sources of fodder at the global level.
Photo: Visual photos

The most commonly used species has been the *Melipona beecheii*. Unlike the European bee (*Apis mellifera*), the Mayan one does not have a stinger, its honey is darker and Mayans from the Yucatan Peninsula have used it for centuries in a variety of ways: as a sweetener for hot drinks, as the base for alcoholic drinks, and for its medical attributes. The Mayan (dark) bee-wax has also been a traditional resource: for religious rituals related to the agricultural harvest, for religious offerings, ceremonies (as in candles) and decorations, for sculptures (representing humans, animals, and gods), and as a highly valuable monetary unit of trade.

Since the mid twentieth century, apiculture in Mexico has become an industry beyond local religious, medical and food usages. For about seventy years, honey has been produced on an increasing scale for national and foreign export markets. Currently there are 1.9 million beehives in Mexico, cared for by 42 thousand beekeepers. They produce an annual average of 56 thousand tons of honey, with an estimated value of EUR 110 million. The honey production of the Mayan area in the YP accounts for 45% of the nation's honey, 90% of which is exported to the European Union. Most producers employ the European bee.

Within the national livestock subsector, apiculture represents the third greatest source of annual income for the last decade. Mexico is the world's seventh largest honey producer (after China, Turkey, Argentina, Ukraine, US, and India), and third honey exporter (after China and Argentina).

The YP is a biogeographical unit considered one of the world's biodiversity hotspots, both in terrestrial and aquatic ecosystems. There are five types of forest in this region, representing the second biggest tropical forest on the American continent after the Amazon. The system of coral reefs in the Caribbean part of the YP (connected to Central America) and the one in the Gulf of Mexico are considered priority ecosystems of the world: the former is the second biggest and most

important reef system of the world, after the Australian; the latter is the biggest reef in the Gulf of Mexico. Both reef systems shelter a great variety of biological diversity (including high endemism), as do the other ecosystems in the YP, namely forests, sea inlets, wetlands, spring waters, and coastal dunes. The biodiversity of this region includes 6 species of felines, 530 species of birds, and 188 species of amphibians and reptiles. Bees are the most important pollinators in this region, which gives apiculture outstanding socioecological relevance.

The Project

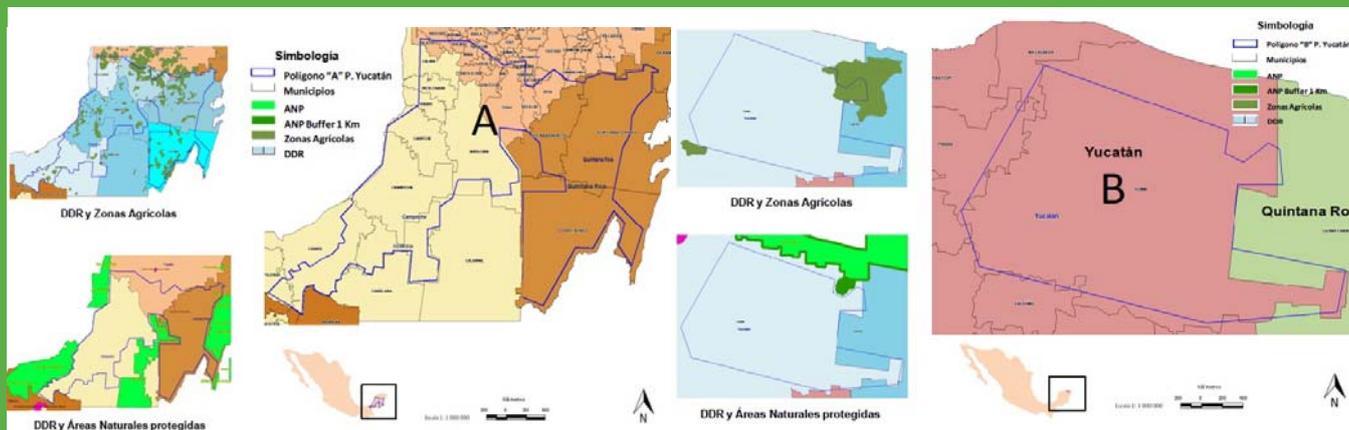
Monsanto Co. applied in February 2012 to upgrade its Mexican soybean plantations, occupying around 250 thousand ha, from the status of 'pilot program' to 'commercial'. Some 26% of these are located in the YP. Three months later, the Mexican Ministry of the Environment and Natural Resources (SEMARNAT for its name in Spanish) issued a pronouncement allowing the commercial cultivation of transgenic soybean across the whole country. As a consequence, in June 2012 the Mexican Ministry of Agriculture, Stockbreeding, Rural Development, Fishery and Food (SAGARPA for its name in Spanish) approved the upgrading of the project.

The Biosafety Law describes the 'Commercial liberation' of GM organisms in Mexico as the introduction of these organisms "without adopting any containing measure [...], realized with commercial, production, bioremediation, or industrial purposes, or for any other purpose different from an 'experimental' or 'pilot program'".

Actors in the conflict

In favour of transgenic soybean plantations in Mexico:

- Monsanto Co.
- Federal executive government of Mexico, through two of its Ministries (SAGARPA and SEMARNAT).
- Commission on Biosafety of Genetic Modified Organisms (CIBIOGEM): formed by the Ministers of five



The location of the project: The geographic coordinates of these two polygons are shown in pages 16-19 of Monsanto's application permit for the commercial cultivation of soybean.

Source: Monsanto Co. 2012. *Solicitud de permiso de liberación al ambiente en etapa comercial*. Available at: www.senasica.gob.mx/?id=1344. Last accessed: 25/02/2013.



Air dispersion of Glyphosate

Photo: 'Más verde. Periódico ecológico'



Beekeepers from Quintana Roo protest against GMOs plantation in the region.

Photo by La Verdad, 19/01/2013

Mexican Ministries (including SEMARNAT and SAGARPA), and the head of the National Council of Science and Technology; it is in charge of establishing policies related to biotechnology security regarding the safe use of GM organisms.

- Genetic and biotechnology researchers led by Dr. Francisco Bolívar Zapata, an internationally recognized biotechnology expert and supporter of transgenic food production. He is an emeritus researcher of the National Autonomous University of Mexico (UNAM), a member of this university's government council, and a member of the two most prestigious academic institutions of Mexico (*Academia Mexicana de la Ciencia* and *El Colegio Nacional*). He has worked in the United Nations (WHO and UNESCO), and has received numerous national and international awards for his findings in genetic engineering.

Against these plantations:

- Mayan beekeepers: those who have organized the resistance, among the 18 thousand beekeepers existing in the YP.
- Honey gatherers and exporters; the main gathering and exporting companies in the YP operate with German capital, which explains why this country is the main destiny of

exportation. There are also cooperatives and stake-holding societies formed by beekeepers.

- Unión de Científicos Comprometidos con la Sociedad* (UCCS): a nationwide non-profit organization, formed by scientists from a variety of study fields, who are concerned with the ethical implications of science production and application in Mexico, and accordingly aim for a political impact on specific issues. Most of the scientists supporting the Mayan beekeepers are members of public universities and research centres, specialized in ecology, apiculture, and sustainable development of Mexican agriculture.
- National and international EJOs, as well as peasant and human-rights organizations, such as *Centro Mexicano de Derecho Ambiental*, *Grupo de Estudios Ambientales*, *Semillas de vida*, and Greenpeace.

Some of the beekeepers, civil organizations and companies against these plantations have formed an activist organization called *Sin Transgénicos*.

Other relevant actors:

- State governments of the YP: Campeche, Quintana Roo and Yucatan.
- United Nations Development Program for the Yucatan Peninsula and Tabasco, directed by Xavier Moya



Demonstration in Oxkintoc, Yucatan. MA means 'no' in Mayan, OGM are the initials in Spanish for GMO.

Photo: Greenpeace Mexico



MA OGM' demonstration in Chichen Itza, Yucatan.

Photo: Greenpeace Mexico

García, who promotes the 'precautionary principle' to ban GM plantations in Mexico, considered in the UN Cartagena Protocol.

- Three environmental institutions of the federal government: a) *Comisión Nacional para el Conocimiento y Uso de la Biodiversidad* (CONABIO); b) *Comisión Nacional de Áreas Naturales Protegidas* (CONANP); and c) *Instituto Nacional de Ecología* (INE). These three institutions separately expressed in 2012 a formal opinion against allowing transgenic soybean in Mexico, as a response to a petition from SEMARNAT to do so. By allowing the commercial cultivation of transgenic soybean in Mexico, the Environmental Minister, Juan Rafael Elvira Quesada, dismissed these opinions.

The Conflict

Mayan beekeepers, honey gatherers and exporters from the YP have created a political network that includes scientific, activist, and governmental institutions from different parts of the country. They have organized meetings and workshops, exchanged information, experiences and research findings, and shared a common political strategy. Based on their information and findings, as well as on national and international laws, they aim to ban transgenic soybean cultivation in Mexico in any of its legal statuses (experimental, pilot program, or commercial). In June 2012, as a reaction to the approval of the Monsanto project for 'commercial' cultivation, the members of this network applied for an appeal in every federal state involved in this project; an appeal which is currently in process.

The groups mobilizing are: Mayan beekeepers, honey gatherers and exporters, the UCCS, and peasant, environmental and human-rights organizations.

There have been five forms of mobilization. First, an appeal against the government's approval of this project, signed by 29 apiculture, peasant, environmental, human rights, and scientific organizations, and brought to every federal state of the Yucatan Peninsula and the state of Chiapas. The appeal considers this approval a violation of the Constitution of Mexico and of several international treaties regarding labour rights, indigenous rights and participation in decision-making, and environmental health as a human right. It also considers the Biosafety Law on GM organisms to be anti-constitutional, since it does not properly implement the precautionary principle, or real participation of indigenous communities. It denounces SEMARNAT for evading its responsibility to protect the environment. Finally, it claims for these four federal states to be decreed as a Transgenic-free Zone.

Second, members of the political network of Mayan apiculture and their allies have participated in meetings and workshops, which have taken place in Mexico City and in the YP to exchange information, findings, and experiences, as well as to design a common strategy to stop this project.

Third, in 2012, *Sin Transgénicos* organized a protest in seven Mayan ceremonial centres and one plantation in the YP. Around two thousand persons participated in this protest. They formed the words 'MA OGM' with their bodies, and demanded local, state and federal governments to declare the YP a transgenic free territory.

Fourth, before the approval of Monsanto's project for commercial plantations of GM soybean, the UCCS sent SAGARPA a petition signed by 660 scientists to reject this project.

Finally, news and opinion-articles have been published in local and national

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newspapers, condemning the governments' assistance to the expansion of transgenic seeds and its ecological, social, and cultural effects. The opinion articles have for the most part been written by researchers who are well-known for their academic work as well as for their public standing on social and environmental issues, such as Elena Álvarez-Buylla, Silvia Ribeiro and Julio Muñoz Rubio.

Impacts of the project

Environmental. On the one hand, the production of transgenic soybean has caused a great loss of timber trees, supplanted by Roundup-Ready soybean plantations in Brazil and Argentina (Altieri y Pengue, 2006). There is no published scientific evidence of forest loss in Mexico due to soybean plantations, but the threat seems latent given the experience in those two South American countries. On the other hand, air, ground and hydric dispersion of glyphosate goes far beyond the GM plantation area in which it is directly spread. This means glyphosate does not only kill weeds within these plantations, but affects every other species in contact with this herbicide, and every ecosystem resource and service depending on the well-being of these species.

Health. The use of glyphosate has caused miscarriage, hypothyroidism, diabetes, birth malformations, and cancer in human populations living close to these plantations, according to scientific research done in Argentina.

Socioeconomic. Glyphosate has also had a considerable impact on apiculture. This industry has been traditionally relevant in various local or even national economies in which Roundup-Ready soybean plantations have been recently introduced, like in Argentina, Brazil, and Mexico. Beekeepers are interested in conserving the landscape that has prevailed for the last century without major transformations because the beekeeping productivity, and thus the economic income and way of life of beekeepers and their families, depend on this type of landscape.

Apiculture is under threat of collapse, not only as an indirect consequence of the inherent ecological impact of glyphosate use, but also because of two other direct impacts caused by this herbicide. First, an increasing number of academic researches have documented what has been called 'Sudden Beehive Death', whereby whole colonies suddenly collapse because glyphosate produces homing failure inhibits the correct function of the bees' proboscis (tongue) for the nectar harvest (Henri *et al.*, 2012). Second, European honey buyers have in some cases completely stopped buying this honey, or have lowered the amount they are willing to pay, alleging YP honey has been 'contaminated' by transgenic pollen. They assert that what is being sold is 'transgenic honey' (and not "organic", as their markets demands) because it has been at least partially produced with transgenic soybean nectar, or with transgenic soybean flour, the latter commonly used by beekeepers to feed their bees during winter. Mexican beekeepers suffered the consequences of this policy against 'transgenic honey' in 2011, when clients from Germany using this argument rejected 10 cargo loads of 25 tons of honey each, 6 of these cargos coming from the YP. The rejection of this honey was consistent with the ruling made on September 2011 by the Court of Justice of the European Union 'against trading honey with signs of genetic modified organisms' (Court of Justice - EU, 2011).

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