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The significance of protecting domestic native corn from genetically modified seeds: a perspective from local Mexican NGOs

Juanamaria Vazquez[1]

[1] Bachelor´s in International Relations (UNAM). Master in International Studies (UNAM). Graduate student in Social Sciences at UNAM.

Abstract During the last decades, there has been an ongoing global discussion about the use of genetically modified organisms (GMO) and their insertion in geographic regions where there is a vast pool of native landraces such as Mexican corn, Indian rice, Peruvian potato. This discussion takes place between those who defend native landraces along with traditional farming knowledge (TK) and those who defend genetic engineering products (GMO), turning the discussion into a running social confrontation between large corporations and domestic NGO's network. Both sides are accompanied by leading scientific communities. Based on the Political Economy perspective of K. Polanyi and his analytical categories, this paper examines the case of the Mexican GMO controversy between predominantly US agroindustry and Mexican NGOs. It shows the performance of NGO's in trying to avoid the insertion of GM corn in México through a legal injunction that is banning the commercialization of this GM corn in the whole territory.

Keywords: GMO controversy, native corn, NGO's activism and Multinational corporations.

Introduction

World scenery has uncovered a strong discussion between those protecting domestic traditional farming knowledge (TK) and native seed landraces, and those promoting the use of new biotechnologies: particularly, genetically modified seeds. Among these opposing viewpoints, it excels the world scientific community whose standpoint is split: those who support the use of new biotechnologies from large agribusiness among rural communities and those who seek to protect the biodiversity through helping to avoiding the insertion of genetic engineering constructions that can potentially destroy these biocultural legacies of vast pools of native landraces. The Mexican case isn't different from the rest of the conflicts in other geographic regions regarding this subject, but in one thing: the reaction of domestic NGO's before the multinational agribusiness.

This social conflict has to be observed in two levels of analysis: the macro level, where the global discussion is set for the safe use of genetically modified organisms (GMO) when large multinational agribusinesses are eager to expand their GM products in local farming communities. And the micro level, where the domestic civil and environmental NGOs are facing the pressure from large agribusiness subsidiaries and their federal governments due to the potential insertion of unfamiliar biotechnologies such as genetically modified seeds in local farming, as it is in Mexican case. Rural Mexican communities are still using old farming techniques as saving seeds, but they are struggling with the pressure from multinational corporations to adopt their products and eradicate old traditions. In this micro level, the Mexican federal government is also trying to introduce these new biotechnologies without consulting its society and without considering local cultural expressions.

The article is divided into 4 sections: section 1 is a brief summary of the conflict, section 2 is about the discussion and analysis of the conflict, section 3 is explaining the methodology used in this article, and section 4 is about the conclusions and perspectives.

Mexican native corn landraces: the story behind the conflict

There are two basic facts around Mexican corn that must be analyzed. a) The relationship with corn regarding the farming technique, and b) The cultural and social determination of having corn as staple food.

Culturally speaking, Mexican society has a long data relationship with corn. Over 5,000 years, ancient indigenous societies living in this territory developed the corn cropping in every single part of the Mexican territory. And there is more than enough evidence to testify this statement. (Boege S. E., 2009; Boege E. , 2009a; Turrent, Wise, & Garvey, 2012; Alvarez-Buylla E. P., 2013; UNESCO, 2010; KATO, T et al, 2009).

This corn farming tradition was unfolded in the whole territory. This situation gave rise to what was called *center of*

origin of corn, which means that a plant will concentrate the best of its qualities and features in one whole region, diversifying it into the soil, and self-adapting to the atmospheric, orographic and hydrologic conditions (Boege E. , 2009a; Boege S. E., 2009; KATO, T et al, 2009).

The center of origin concept was developed by botanist N. Vavilov, after discovering the most important *birthplaces* of the feeding plants on the planet during his long world traveling during the second decade of XX century (Vavilov, 1992). As a result, Mesoamerican region[1] was acknowledged by Vavilov as the corn birthplace, a location where this plant was fully developed botanically speaking (*See figure 1*).

VAVILOV's MAIN CENTERS OF ORIGIN FOR FEEDING PLANTS

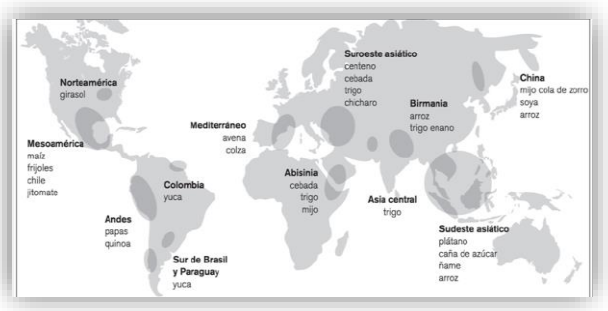

Figure 1: N. Vavilov centers of origin for key food crops. Source: (Boege S. E., 2009)

In fact, during 2010 a Mexican leading institution on biodiversity (CONABIO), performed the largest study ever made, collecting important data about corn: they found 63 landraces and over 22,000 varieties out of the main landraces throughout the Mexican territory[2]. Figure 2 (below) shows the distribution of the Mexican corn landraces and their varieties in the whole territory (CONABIO, 2011). These are just the botanical facts regarding corn. About the social analysis, it can be said that Mexican society has developed a long cultural bond with corn, not only concerning crop farming, but it also developed a strong linkage to corn regarding the use of it, as the most important Mexican staple food.

In fact, in 2010 UNESCO recognized food made out of corn as a Mexican biocultural and immaterial legacy (UNESCO, 2010). From this perspective, maize-corn is understood not only as staple food[3], but as a foundational principle of life for people in the countryside and in the cities (Alvarez-Buylla & Piñeyro N., 2013). There is a whole cultural complexity regarding the maize/corn in México. This complexity view includes solidarity, gratuity, fraternity, non-competitiveness in the countryside inside of the Mexican ancient crop farming called *milpa*[4].

NATIVE CORN LANDRACES (CONABIO DATABASE, 2010)

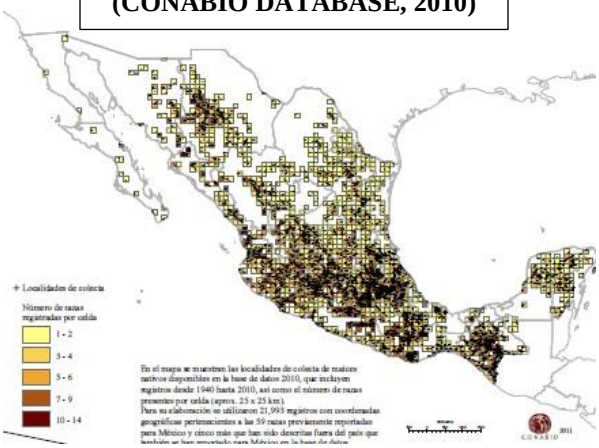

Figure 2: Corn landraces and varieties distribution in Mexican territory. Source: CONABIO (2010)

This is one part of the Mexican claims concerning the debate on GM corn. While it is useful to consider cultural expressions, it is important to assess other factors. Besides any critical debate regarding the safe use of GMO, the environmental discussion in Mexico is focused on the risk of losing the corn biodiversity due to several factors: a) the transgene flow, b) the massive use of toxic agrichemicals in GM crops and c) the commercial contracts dealt with rural communities by large multinational agribusiness along with the intellectual property attached to GM seeds (Fdez-Cornejo Jorge. Wechsler, 2014; Gressel, 2010; De Ita, 2012; Piñeyro N., et al., 2009; Chapela, 2001).

Discussion on transgene flow aggravates the conflict. On one side, scientists claim that farmers blend corn plant cuttings to obtain better and improved landraces using wild relatives (Boege E. , 2009a); however, they accuse GM advocates that genetic engineering is about blending genes from the different type of species (Fdez-Cornejo Jorge. Wechsler, 2014; Alvarez-Buylla & Piñeyro N., 2013; Piñeyro N., et al., 2009; Gressel, 2010).

As an example, Monsanto's Bt corn uses the bacillus thuringiensis, in its biotechnological process. This bacteria is obtained from caterpillars' intestine from which scientists extract the Cry-toxin, which is then applied to corn seed in a very highly complexed process of genetic engineering (Alvarez-Buylla & Piñeyro N., 2013; Nicholl, 2008). In sum, the genetically modified seeds are part of a highly complexed construction from different species, which is not a related with farming old technique of blending different seedlings belonging to the same species such as Zea mays (corn scientific name).

On the opposite side, Mexican scholars such as Bolivar Z. insist claiming that peasants do the same blending work, but with old-fashioned rural techniques (Bolivar Z., 2011). Also,

[1] Now México mainly and Central America.
[2] The study was called *Global Project of Maizes*.
[3] In México, the average human consumption of white corn is about 188 kilograms per year.
[4] Milpa has an indigenous meaning: "what is planted on top of" and it is an ancient old farming technique where live together different kind of species: corn, beans, zucchini, weeds, and cactuses as the natural protection of the *milpa*. Weeds are not an enemy for the crops as they are in large plantations in USA (Boege S. E., 2009).

insist that countrymen should change old farming techniques and accept with no reservation the use of GM corn seeds, but with responsibility. It must be considered that Mr. Bolivar Z., is not only federal government adviser but also and in-charge science, technology and innovation coordinator and a leading sponsor of biotechnology. Additionally, he is one of the founders of Genentech Company Inc. San Francisco, USA (UNAM, 2008). So, he might have a conflict of interest regarding the GM seeds promotion.

Besides, the massive use of fertilizers and herbicides (glyphosate) in the countryside entails the potential harm on health. As a matter of fact, scientific results from the International Agency for Research on Cancer (IARC) were exposed by World Health Organization (WHO) on March 2015 (IARC, Monographs Volume 112: evaluation of five organophosphate insecticides and herbicides, 2015). They revealed that glyphosate broad-spectrum herbicide, the active ingredient of Round-up herbicide sold by Monsanto and used for its GM corn, is potentially carcinogenic. It was classified by the IARC Working Group as probably carcinogenic to humans (Guyton, et al., 2015). This issue has augmented the worldwide discussion regarding the safety of GMO and has evidenced the lack of enough proof from agribusiness corporations to guarantee the safety of its products.

And finally, the eventual subjection of the countrymen to restrictive contracts negotiated by agribusiness. In those contracts, the peasants are not allowed to save any seed for future cropping. Saving the best seeds for new cropping season is a very old tradition among peasants. Once, GM seeds are authorized, peasants won't be allowed to save seeds. It's fully understandable that large corporations have property rights on their GM seeds, what has been part of the global discussion is their attention to eradicating peasants' old traditions (Hutton & Giddens, 2000). These three factors along with cultural expressions are the enough reasons for these NGOs to protect domestic native corn landraces.

So, what is behind the conflict? After reviewing both sides of the conflict, it's worth mentioning that both viewpoints are clashing. They are clashing since their founding principles and goal orientations regarding the farming production are quite different: one side is based on productivity and competitiveness (agroindustry), and the other side is protecting their ancient cultural farming along with traditional practices such as free seed exchange and protecting the native seed biodiversity. The very presence of such as clash entails a conflict (Wynne, 2012; Fitting, 2011).

The focal point of the discussion: domestic Mexican civil organizations are willing to protect to its logical conclusion the vast pool of native corn seeds in México, which represent the corn biodiversity (Boege S. E., 2009; Serratos J. A., 2012a). The problem goes beyond any conflict of interest as it has been told. Neither is it a matter of regulation. Is not. In fact, current governance of natural resources won't help to solve the problem. Mexican corn biodiversity in the NGOs speech is about preservation, legacy, and biodiversity while agribusiness main goal is profit and productivity (De Ita, 2012; Alvarez-Buylla & Piñeyro N., 2013; Turrent, Wise, & Garvey, 2012).

In fact, these Mexican NGO's have appealed to domestic judicial authorities in June 2013 to sue the large agribusiness corporations[5] involved in GM corn tests but also they sued Mexican Federal government and its agencies involved in the controversy. They finally obtained a legal injunction to ban any GM corn experimental test or trial on Mexican farming soil until the trial is over and a final verdict is issued.

This prohibition comes after 13 years of protests, demonstrations, campaigns, networking, discussions and debates claiming they won't accept GM corn in the center of origin of corn. They even had to resort to the Commission for Environmental Cooperation (CEC) derived from North American Agreement on Environmental Cooperation (NAAEC) in 2002.[6] (Chapela, 2001)[7]

Discussion: Protecting domestic corn landraces vs. genetically modified corn: Outdated traditional imposition against global latest leading biotechnology?

The history behind the GM corn conflict shows that it became a major contested issue in México (currently there are major issues since Donald Trump arrival). Seeing the corn issue through the economic view, these are the facts:

Mexico represents an important market demand for large agribusiness corporations, where the goal is to supply 32.75 millions of tons of corn (Montero, 2014; Turrent, Wise, & Garvey, 2012). Therefore, there is an incentive to press for the GM corn authorization. Also, Mexico imports 10.9 millions of tons from the USA. The rest is grown in the country. Since the NAFTA agreement, Mexico has been increasing the imports of corn due to many local producers aren't producing it because of the high costs of production. Regarding the corn production, there are 3.2 million of Mexican corn producers. Out of them, there are two types of producers: In the first group, they are

[5] Monsanto, DuPont Pioneer, Syngenta, Dow Chemical AgroSciences.

[6] This petition was formally accepted by CEC, which started the related proceedings according to Article 13 of NAAEC with the designation of one Advisory Group specialist on Maize and Biodiversity. They won the petition, but the result was not well received by large agribusiness (CEC NAFTA, 2004; Vazquez G., 2014)

[7] (Fitting, 2011) This warning drew the attention Mexican community and two Berkeley University scientists: Mexican-American I. Chapela and his assistant D. Quist made a research and encountered native corn crops contaminated by pollen from genetically modified corn (Chapela, 2001). Afterward, they generated an article, which was initially accepted and published by the journal Nature. However, in 2002 this journal withdrew the article for the very first time in 133-year history arguing and questioning the research validity. At that time, there was a general assumption of external conflict of interests in the journal (Wirz, 2003).

small family farmers (peasants) they own between 0.5 to 3 hectaresOrigenand they produce the 56.4% of the country corn production. In the second group, the major producers, they own more than five hectares and produce the 43.6% of the country corn production (SAGARPA, 2015).

This would lead to the questioning, why doesn't México accept GM corn seed, if the country is importing it from the USA? There are some answers: a) there are international political engagements with USA and Canada such as the NAFTA treaty[8] and we had to import some quota of corn during a certain period of time. Also, b) leading Mexican scholars and farm engineers have performed major projects and their results have supported that domestic producers can achieve higher corn yield if federal government sponsors these type of agricultural projects. Nevertheless, the Mexican government has mainly supported major producers who seem to be interested in GM corn high yields (Turrent, Wise, & Garvey, 2012).

What this situation describes is that even in México, exists a split about the use of GM corn. Major producers in the north of the country rather have higher corn yield, it doesn't matter to them if this is GM corn or native corn landraces, as long as it has a better performance (Turrent, Wise, & Garvey, 2012). Behind the conflict, there are also opposite viewpoints regarding the corn production. A pro-native corn activist and leading executive of ANEC[9]said: "We're interested in higher corn yield, but we want to produce with domestic corn seeds because we know the potential of it. There's no need of GM corn" (SCV, 2014).

In fact, since 2000 Mexican governments have contributed to rising the conflict with NGOs, removing the 1998 moratorium on GM corn, allowing also the GM experimental tests on Mexican soil and finally giving the approval for the biotechnology law. This can be verified from the moment that the *Mexican biosafety law* came into force in 2005. The technical draft bill was prepared by the Mexican Science Academy (MSA), a group that was strongly split regarding the commercialization of GM corn in México. The draft was intensely debated in the Mexican Congress with a constant pressure by the agribusiness lobbying. However, the final document shows no outstanding economic sanctions in case of ecological disaster provoked by any offender (Massieu T, 2006; Vazquez G., 2014).

According to an activist interviewed, the Mexican Congressmen did not consider appropriately, either corn biodiversity or its biocultural legacy. He considered that "the final approved document presented numerous inaccuracies, lack of regulations and sanctions to any offenders along with the constant agribusiness lobbying" (SCV, 2014). As several authors have claimed, these lobbying performances are frequent in the US, and now they are in México.[10] Several authors have long documented them as a source of influence and even intimidation (Stein, 2005; Paul, 2003). There are documented large sums of money granted by agribusiness corporations to US Congress regarding the GMO issues (Vazquez G., 2014).

It's worth mentioning, that some of Mexican Academy Science members have worked for Multinational agribusiness providing them with research to obtain new patents. What it is important to note here is several of these scientists have worked for large multinational corporations such as Monsanto or Syngenta, which represents a clear conflict of interests. (UCCS, 2015a; Greenpeace Mx, 2009a).

Analysis of domestic case of Mexican NGO's protecting domestic corn landraces

GM seeds are part of a global trade of agricultural commodities. This can be better understood through Polanyi's categories, such as *fictitious commodities.* He said, that no natural resource or land could be marketable, unless they become a commodity under a free market system, in the reason of a rent (price). In this case, corn is part of these fictitious commodities (Polanyi, 2012).

According to this global trade, Mexican corn demand represents just another market that can be supplied by the multinational agribusiness. (Ackerman, Wise, Gallagher, Ney, & Flores, 2003). We're living in a globalization era where almost everything is inserted in the global trade: services, natural resources, finances etc. As E. Hobsbawm pointed in *the Age of Capital:* agriculture was transformed by economy through excessive demand (Hobsbawm, 1996, p. 182).

This globalization and free market context are offering too little to peasants, small producers, and indigenous communities from developing countries that want to preserve their traditional knowledge and their own native seed (landraces). Global trade chains want to obtain natural resources and process them in order to sell them to anyone who buys them. In this particular scenery (globalization), Polanyi's counterbalance is quite difficult to reach by civilian organizations network, not impossible. That is the reason why this type of fight against agribusiness and GM seeds are important.

Also, K. Polanyi stated that until XV century, the countryside and its natural resources were not part of the commercial exchange. Later on, he envisaged that free trade of grains was the source of great famines in India (Polanyi, 2012, pág. 218). And right now we're in the age of the commoditization and financialization of natural resources, which brings more negative impacts for peasants and small producers' communities.

Effectiveness of Mexican NGOs in protecting native corn

Mexican NGO's whether environmental or not, are organizations with limited financial resources but unlimited creativity and networks. Their best asset has been so far their endurance and resilience capacity. They can be observed as outdated and obsolete organizations that go against the

[8] Today January 29th, 2017 the agreement is in a weak position due to Donald Trump's executive orders.

[9] National Association of Countryside Small Producers and Trading Enterprises

[10] The Mexican law forbid the lobbying activities to push a bill.

advances of biotechnology. However, it should be analyzed the endurance and perseverance of their fight for over 15 years with demonstrations, protests, appeals, legal actions, etc.

Throughout this time, Mexican NGO's they have been highly supported by one part of leading local scientists and also the network of international scientists with similar research agendas (ENSSER, 2013; Alvarez-Buylla & Piñeyro N., 2013; Chapela, 2001). And the science will prove at the end whether they are wrong or not regarding the genetically modified seeds (Fdez-Cornejo Jorge. Wechsler, 2014). What it's really important in this case is the performance and the perseverance of domestic-international network actions to protect what is the core of their motivation: native corn landraces and its vast biodiversity (Covantes, 2013).

Mexican NGOs involved in this research, both environmental and civil society organizations have been fighting to protect corn biodiversity. According to their statements "activists don't rule themselves by the market rationality" (López, 2013). This seems to be a hard crosscurrent way when trying to preserve their biocultural legacy. Analyzing their documented actions for over a decade, it can be observed that corn goes beyond a meaningful perception. According to one of the interviewees, he said: "practices of protecting seeds and land are connected with life itself. The man is tied to the land by invisible strings through the planting of corn" (López, 2013).

One of the major facts that supported Mexican NGOs activities and protests during all this time has been the constant presence of environmental organizations such as Greenpeace (subsidiary). The demonstrations and activities done by this singular organization have been one of the most appealing and striking. This is so because of the way its activists perform their protests. In fact, most of them have been performed by young people who show themselves as audacious engaged people (Greenpeace Mx, 2009a).

Greenpeace has exposed many conflicts of interest of people working in Mexican government and agribusiness corporations, related to GM corn. They also exposed the corruption between agribusiness and Mexican authorities, showing the conflict of interest and the *revolving doors situation* [11] regarding both actors (Greenpeace Mx, 2009a). In order to increase its credibility, the Greenpeace Mexican subsidiary has asked some leading scientists to carry out for them a research regarding the GM corn issue to validate its fight against GM corn. (Serratos J. A., 2012a).

Methodology

This paper is derived from my master degree project. The theoretical approach was based on the political economy theory using the K. Polanyi's analytical categories (fictitious commodities) and the double counterbalance from society. Also, there were performed some deep interviews to have a better understanding of the conflict.

During one year the leading NGOs actors of the master project were followed: environmental and social organizations defending de native Mexican corn biodiversity from GM corn introduction in Mexican territory. I tracked these organizations and individuals down, then I made some appointments with the interviewees and recorded their statements. It was made a list of essential questions according to my project purposes, to further allow them to freely express emotions, statements or ideas they came out with.

Some of the interviews were performed at their workplaces, some of them were made at a neutral place and even some of them were made at universities or cultural events. The people interviewed are central players in environmental and social organizations who usually defend the corn biodiversity in Mexico. In honoring them, their names shall not be exhibited but only with name initials only. They belong to environmental and social organizations and they have been pressured to the fullest by leading agribusiness corporations and by their representatives in México. The trial is not over already, so they have been really careful with every statement they made.

Conclusions: Final considerations and perspectives

It could be said that everything is negotiable; however, there are certain issues that are not. Is in this regard that NGOs effectiveness relies on society cultural proclivity to corn (biocultural food expression) for as long as it remains. On the other side, they also protect the native corn landraces because of the profuse biodiversity concentrated here. They have been accused of being obsoleted and pre-modern, but at the end, the most important issue will be the prevailing legal outcome from Judicial Authorities.

Their effectiveness goes further. Protecting Mexican native corn from any corporation whether it is Monsanto, Syngenta, DuPont, or any other leading agribusiness corporation, must be considered a challenge. Mexican NGO's have been concerned for over a decade due to the agribusiness push, mainly before Monsanto (Today is already sold off to Bayer).

In the other hand, the interviewees emphasized the standpoint to challenge the commercialization of GM corn in México in order to preserve the native corn landraces. These interviews provided the empirical base to understand a domestic controversy and Polanyi's concepts on political economy emphasized the market value for GM corn in the economy, even though it is considered in Polanyi's categories as a fictitious commodity.

Finally, this is also a social mirror where other centers of origin from developing countries can look at. So far, Mexican NGOs have relied on the Federal Judicial system to try to win an injunction to void permits to commercialize GM corn or even soy seeds, but there's a remain: Multinational corporations have large financial resources to keep performing lobbying activities at any place they want, and to obtain the

[11] They exposed employees from biotechnology companies working inside government offices.

resources they need to maintain the productive wheel spinning; but there is also a society counterbalance movement as Polanyi stated (the self-protection of society), some persistent civilian groups who stand out for their principles and beliefs that always find tools to face any challenge from free market.

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O significado da proteção do milho nativo das sementes geneticamente modificadas: uma perspectiva das ONGs locais mexicanas

Juanamaria Vazquez[1]

[1] [1] Bacharel em Relações Internacionais (UNAM). Mestre em Estudos Internacionais (UNAM). Doutoranda em Ciências Sociais na UNAM.

Resumo Durante as últimas décadas, existe uma discussão global em curso sobre o uso de organismos geneticamente modificados (OGM) e sua inserção em regiões geográficas onde há um vasto conjunto de variedades nativas como milho mexicano, arroz indiano, batata peruana, etc. Esta discussão se dá entre aqueles que defendem as tradições indígenas e seus conhecimentos agrícolas tradicionais (TK) e aqueles que defendem os produtos de engenharia genética (OGM), transformando a discussão em um confronto social entre grandes corporações e redes domésticas de ONGs. Ambos os lados são acompanhados por comunidades científicas líderes. Com base na perspectiva da Economia Política de K. Polanyi e suas categorias analíticas, este artigo examina o caso da controvérsia sobre OGMs mexicanos entre a agroindústria predominantemente americana e as ONGs mexicanas. O artigo mostra o desempenho das ONGs na tentativa de evitar a inserção de milho transgênico no México por meio de uma medida cautelar que proíbe a comercialização desses milhos transgênicos em todo o território.

Palavras-chave: controvérsia sobre OGM, milho nativo, ativismo de ONGs e corporações multinacionais.

Informações sobre a autora

Juanamaria Vazquez
Endereço para correspondência: Avenida Universidad 3000, Cidade Universitária, Coyoacán, 04510 Ciudad de México, México.
Departamento de Ciências Sociais.
E-mail: jmvazquezg7@gmail.com

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