Essay

Production and consumption of corn among milperos: between utopianism and agroecological utopia

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Abstract

A utopianism/agroecological utopia is exposed, theorized from southern epistemology, agroecology and transdiscipline. Utopianism evaluates the application of innovations in corn management, identifies and groups corn growers by their yields and proposes as an agroecological utopia the technological pattern applied by efficient milperos at the local level, nurtured by a dialogue of knowledge, which can expand the less efficient milperos food production. The research found that all efficient producers handled corn as a milpa, where radical and progressive innovations interact, and that the corn producers of low and medium productive efficiency Cohetzala and San Nicolas do not fully satisfy the consumption of corn, but if they applied the technological pattern of efficient corn growers, their yields would grow by 91-24% in Cohetzala and in San Nicolas by 150-38%, respectively.

Keywords: agroecology, milpa management, southern epistemology, transdiscipline and dialogue of knowledge, utopistics-utopia.

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Mexico is experiencing an unprecedented rural crisis; Its origin comes from the application of a predatory and predatory capital accumulation model, which aims to compensate for the fall in the rate of profit in the production process, by substituting variable for constant capital, resulting in social and social impoverishment. food. In addition to this model, the modernization of the countryside has been promoted to boost the international competitiveness of some agricultural goods, avoiding improving the productivity of rainfed corn growers, because peasant production is no longer part of the reproduction of global capital.

By losing the link with capital as a producer, public policies excluded them from comprehensive production plans and included them in welfare projects to reproduce them as a workforce and not as producers (Rubio, 2000). This public policy reduced the production of national corn and increased its importation, causing the loss of food self-sufficiency at the local level.

SIAP (2019) data show that during 38 years (1980-2017) the average national yield of corn grown under rainfed conditions increased 860 kg, from 1650 in 1980 to 2510 in 2017, which meant an annual increase of 1.15% reducing food self-sufficiency, which is achieved when food needs are satisfied through local production (FAO, 2002). Low yields led to increased imports of yellow corn from the United States of America, going from 121 thousand tons in 1992-1993 to almost 4 million in 2003-2004, accelerating as of 2008, reaching the current figure of about 12 million tons (CEDRSSA, 2017).

It is a corn of low nutritional quality, causing in Mexico significant changes in its food consumption pattern that was expressed in greater obesity and malnutrition (Brooks, 2012). The exclusion of milperos also led to greater pluriactivity, which transformed agriculture into a marginal economic activity for peasant families, obstructing, on the production side, the initiatives and capacities of the producers and, on the consumption side, the intake of basic foods (corn, beans, pumpkin, weeds) produced by the family unit.

The production-consumption of these grains have been and are essential to satisfy authentic needs, 'historically arisen and not directed to mere survival, where the cultural, moral and custom elements are decisive and whose satisfaction is a constitutive part of the normal life of the men referred to a certain class of a certain society' (Heller, 1986).

Low or high yields depend directly on the way a crop is managed, be it irrigated or rainfed. It states the way in which the producer combines the productive means available to him during the agricultural cycle (land, work, knowledge, technology), through which, successively executes various tasks at the field level (fallow, sowing, cultivation work, etc.), where it can apply modern technologies (hybrids, agrochemicals, etc.) or peasant technologies (creole seeds, crop association, etc.) or a dialogue of knowledge, when modern (radical) and peasant (progressive) technologies are used at the same time. Management is extraordinarily influenced by endogenous production conditions (climate, soil, flora, fauna, etc.) and exogenous (agricultural development programs, family income, family demographic structure, etc.), which are unalterable in the medium term.

Of the factors applied in this management, technology stands out, which represents scientific knowledge applied in production, specified in objects (machines/artifacts) or management systems of economic activity (Katz, 1999). Innovating means introducing radical technological changes and/or incremental or progressive changes (Oslo Manual, 2006). Radical technological changes were promoted by the green revolution coupled with Fordism which, as a model of capital accumulation, linked agriculture to the massive consumption of agricultural inputs produced by industry. The backbone of the green revolution was the generation of hybrids and production formulas, by reason of the general recommendations method, which includes experimentation, validation, dissemination and adoption of technologies.

The general recommendations have been recognized as the only valid scientific method to generate production formulas, set out in the technological packages recommended by the National Institute of Forestry, Agricultural and Livestock Research (INIFAP). Other knowledge is considered *doxa* and epistemological stumbling that must be overcome (Castro, 2007). For De Sousa (2006), it is about the monoculture of knowledge and rigor, recognized as a sociology of absences: the idea that the only rigorous knowledge is scientific knowledge, and, therefore, other knowledge does not have the validity nor scientific rigor.

The utopianism and agroecological utopia exposed in this study registers with the first the epistemic violence exerted by the technology generated and recommended by INIFAP for the handling of maize and, with the second, it stimulates epistemic disobedience and the de-colonization of knowledge, by recognize and reassess the peasant knowledge applied in the management of the milpa. Utopianism is admitted as a serious evaluation of historical alternatives, as the exercise of our judgment regarding the material rationality of other alternative historical systems (Wallernstein, 1998). Here it is assumed as a rigorous evaluation of the innovations applied in the management of the milpa, to identify, scale and promote efficient technological patterns at the local level, which are alternatives to the technological package recommended by INIFAP.

If utopianism curdles into an efficient technological pattern, it will become an agroecological utopia that as a concrete utopia is objectively possible, because its occurrence is scientifically expected (Bloch, 2004). This pattern is part of the peasant cultural heritage and therefore involves knowledge that is in permanent construction, in a process of becoming, which is not a reiteration of what is already known, but planned knowledge of what is being done, so that he himself contribute to this becoming towards something better (Bloch, 2004).

Evaluating the management of the milpa requires applying a transdisciplinary approach, which transgresses the disciplinary boundaries involved in the study of a phenomenon. To transgress means to go beyond various disciplines that complement and interact with each other, although several of them are not directly related to the management of the milpa. This was reasoned as a concrete or non-systemic totality. Thus, the scope of the study is not reduced to each agricultural practice, a hallmark of unidiscipline, and neither does it overvalue the independence-dependence relationship of everything with everything, typical of the systemic approach that segregates the study of corn management into subsystems.

To study the concrete totality, it is necessary to consider the relationship between crop management, with certain issues from other scientific areas that are pertinent to explain the teleological causes of management. For example: the multiple activity of producers, a specific issue in the economy, influences their specialization in crop management, which will be expressed in efficient or inefficient management and in higher or lower yields per hectare. But it is not the entire economy that influences management, but only some of its edges.

Studying the innovations applied in the management of the milpa, requires doing it from the agroecological approach nourished by a dialogue of knowledge, which implies a: a) communicative process in which two different logics are put into interaction: that of scientific knowledge and that of everyday knowledge, with the intention of understanding each other. […]; b) scenario where truths, knowledge, feelings and different rationalities are put into play, in the search for consensus, but respecting disagreements; and c) encounter between human beings, where both are built and strengthened: a dialogue where both are transformed (Bastidas *et al*., 2007).

In this work, it is considered that the dialogue of knowledge should be specified in the management of crops, through the application of ancestral (progressive) and modern (radical) agricultural technologies invented in different times. This dialogue is the backbone of the agroecological approach, because it is the guarantor of the highest productivity, because key processes emanate from it, which derive from the complementarities, interactions and synergies created by all the elements that intersect and feed back in the management of the agroecosystem. For this reason, evaluating the technologies applied in this dialogue is essential to increase the production and consumption of maize, which is a basic satisfaction of the needs of the peasant family.

This work proposes an agroecological utopia, represented by the technological pattern used by efficient milperos, originated from a detailed evaluation of the innovations that they applied in the handling of corn, to increase the production and food consumption of the less efficient milperos. It proposes as a hypothesis that: productivity has its origin in the dialogue of knowledge that prevails in the management of the milpa, corn producers coexist with different yields and share technologies and general living conditions.

The methodological question

To move from utopianism to agroecological utopia, the management of the milpa was first evaluated. To this end, information was collected regarding the specific and general conditions that converge in this management. A survey was applied to a sample of 60 and 77 producers from Cohetzala and San Nicolas, respectively, chosen from the PROCAMPO register, now productive PROAGRO. The evaluation implied knowing the radical and progressive technologies that they applied in said management, through the IATR and the GETP, respectively.

To evaluate the IATR that took as a reference the INIFAP technological package (Table 1). To do this, the production formulas exposed in the package were compared with the agricultural practices that the corn farmer did *in situ*. The package was assigned a nominal value of 100 points and was weighted according to the impact of each component on productivity: 10 sowing date, 20 variety, 15 plant density, 25 and 5, for fertilizer dose and application date, 6 and 4, for type and dose of herbicide, 6 and 4, for type and dose of insecticide and 5 to combat diseases.

Each weighted value was divided by two, where the first quotient corresponded to the use of the recommendation and the second to its proper management. For example, if a producer used the INIFAP fertilizer dose, he was assigned 25 points, if he used another dose, 12.5 units, and if he did not use fertilizers, his score was zero. This is because the INIFAP recommends production formulas, experimentally tested over several years, and not the use of just any fertilizer.

Table 1. Technological packages recommended by INIFAP for maize management in Cohetzala and San Nicolas de los Ranchos (SNR), Puebla-Mexico.

Municipality	Practice/Innovation	Recommendation
Cohetzala	Sowing date	Between March-May
	Seed type	H-137, H-139, H-34, H-30, H-33, H-40, H-48, H-50, H-311, H-516, H-515, VS-536, H-507, H-509, V-524, VS-529 and VS-22
	Density (plant ha^{-1})	50-60 thousand plants
	Fertilization formula	120-60-00; 100-50-00; 180-80-60
	Fertilization date	It is applied in the sowing and second work
	Type and dose (herbicide ha^{-1})	Gesaprím 50 (1 kg); 500 FW (1.5 L); Gesaprim 50 (1 kg) and Hierbamina (1 L); (1 kg); Basagran 480 (0.5 L); Marvel (1 L); Fitoamina 2.4 D (1 L), Hierbamina 2.4 D (1 L); Esterón 2.4 D (1 L).
	Type and dose (insecticides ha^{-1})	Volaton al 2.5% (25 kg); Volaton 5% (12 kg); Furadan 5% (12 kg); Folimat 1 000 (0.5 L); Parathion methyl 50% (1 L); Malathion (1 L); Sevin 80 (1 kg); Sevin 80% P H (1 kg); Malathion 1 000 E (1 L); Diazinon 25% (1 L).
SNR	Sowing date	Between March-May
	Seed type	H-30, H-33, H-34, H-40, H-48, H-50 H-137, H-139, VS-22
	Density (plant ha^{-1})	50 thousand plants
	Fertilization formula	140-60-00 and 110-50-00
	Fertilization date	During planting and second labor
	Type and dose (herbicide ha^{-1})	Gesaprim 50 (1 kg), 500 FW (1.5 L); Gesaprim 50 (1 kg) plus Hierbamina (1 L).
	Type and dose (insecticides ha^{-1})	Volaton 2.5%, Furadan 5% o Volaton 5% (12-25 kg); Folimat 1 000 (0.5 L); Parathion (1 L) methyl 50% or Malathion (1 L) dissolved in 200 L of water per hectare.

INIFAP (2009).

The GETP calculation corresponded to agricultural practices (association and rotation of crops, soil conservation) and inputs (native seed and manure) not suitable for the INIFAP, but that corn growers applied them commonly. Each technology was assigned 20 units.

With the calculation of the IATR and the GETP, a typology of producers was created, grouping them according to their value in low (< to 33.33), medium (33.34-66.66) and high appropriation of technology (> to 66.66 units), which allowed transit from empirical abstractions to constructive and reflective ones, which were essential for the construction of knowledge (Garcia, 2006). Then the agroecological utopia was designed by grouping corn farmers by their yield. For this, the corn growers with the highest and lowest yields were chosen and the difference was assessed between three and the quotient was added to the lowest yield to create three ranges of types of producers: low (<33.33), medium (33.34-66.66) and high yield per hectare (> 66.66). This typology allowed us to analyze the dialogue of knowledge implied in the agroecological utopia.

Finally, the real and potential *per capita* corn consumption was estimated considering the real and potential yield (kg ha^{-1}), the harvested area and number of family members, assuming an intake of 500 kg (Warman, 2001). The potential consumption derived from considering that the less efficient producers would apply the technological pattern of efficient corn growers.

Agroecological utopianism

When calculating the IATR it was found that: a) the use of these innovations was on average low: 26.7 units in Cohetzala and 40.6 in San Nicolas; b) differentiated, with a range that goes from 22.1-37.3 units for producers from Cohetzala with low and medium IATR and for San Nicolas of 28.3-44.1, respectively, and c) there was no relationship between the IATR and yield, despite the fact that in Cohetzala there were 15.2 units of difference in the IATR between low (745 kg ha^{-1}) and medium (748 kg ha^{-1}) corn growers. In San Nicolas this difference between low and medium appropriation corn growers was 15.8 units, but the former obtained 1 359 kg ha^{-1} and the latter 1 343 kg ha^{-1}.

The discrepancy that exists between the use of radical innovations and yields is due to the fact that conventional management has restricted it to the use of agrochemicals, which does not coincide with the different ways of managing corn growers, which adapt it to the diversity of ecological niches local of Mexico. In addition, for rainfed corn growers, the corn harvest is a matter of survival, which is why they have only adopted-adapted some INIFAP recommendations that, when interwoven with their own technologies, result in a dialogue of knowledge and greater productivity.

Therefore, it was not by chance that when measuring the GETP it was found that: a) progressive innovations prevail over radical innovations in corn management: in Cohetzala the GETP surpassed the IATR by 42.6 units and in San Nicolas, by 20.7; b) the GETP was also differentiated: in Cohetzala the range fluctuated between 57.5-83 units for medium and high GETP milperos and in San Nicolas it was between 20-54-82 units for low, medium and high corn producers; and c) there was a direct relationship between GETP and returns. In Cohetzala these were 695-816 kg ha^{-1}, for those of medium and high GETP, and for San Nicolas 778-1 285-1 585 kg ha^{-1}, exposed in the same order.

From utopianism to agroecological utopia

Utopianism shows the relevance of progressive technologies in corn handling, but what was essential was that it allowed the construction of an agroecological utopia. Applying the proposed methodology, it was found: the highest and lowest yields (kg ha^{-1}) of the corn growers of Cohetzala were 400 and 1000 and those of San Nicolas were 500 and 2 200, the difference was 600 for Cohetzala and 1 700 for San Nicolas; the quotient was 200 and 567 for Cohetzala and San Nicolas; and ranges, related to the three types of corn growers according to their yields were, for Cohetzala: low < 600, medium between 601-800 and high > 800 kg ha^{-1} and for those of San Nicolas they were: low < 1 067 , medium 1 068-1 635 and high > 1 635.

The attributes of the types of producers were recorded in Table 2, where it is noted that: a) almost a third were efficient, with significantly higher yields than the non-efficient ones; and b) the values of the IATR and the GETP were reduced, perhaps due to the impact that both innovations have on the impulse of the productive forces, when they act together.

Table 2. Number of producers, IATR, GETP and yields (Kg ha^{-1}), according to their yield per hectare in Cohetzala and San Nicolas de los Ranchos (SNR), Puebla-México.

Municipality/indicator		Low		Medium		High		Average municipality	
		No.	(%)	No.	(%)	No.	(%)	No.	(%)
Cohetzala	Producers	14	23	27	45	19	32	60	100
	IATR	23.4		27.3		28.3		26.7	
	GETP	58.6		73.3		71.6		69.3	
	Yield	486 [a]		751 [b]		930 [c]		746	
SNR	Producers	27	35	28	36	22	29	77	100
	IATR	44.1		35.8		42.3		40.6	
	GETP	48.1		64.3		73.6		61.3	
	Yield	763 [a]		1438 [b]		1971 [c]		1347	

Elaboration with data obtained from the survey, 2009. Within each row (yield), different letters in the means indicate that there is a statistically significant difference between them (Tukey, $p< 0.05$).

When comparing the technological patterns applied by the corn growers (Table 3) with those of the INIFAP, it is noted that the latter promote epistemic violence in the management of the milpa since the institute did not recognize the peasant technologies, decisive in this management, while that the former promoted epistemic independence and the de-colonization of knowledge, by recognizing and valuing the peasant knowledge applied in the management of the milpa. Likewise, it is observed that in the former a dialogue of knowledge was applied, especially efficient producers, from which it derived its greater productivity, enabled by four technological processes that are broken down for analytical purposes, but that occur at the same time.

The first is encouraged by the biomimicry of the crop association, which consists of several ‘plant floors’, as in natural ecosystems, originating greater diversity of flora and fauna above-below the soil and inside-around the agroecosystem. In this diversity, C4 (corn) and C3 (pumpkin, beans, etc.) coexist with different needs for solar energy to convert inorganic compounds into organic ones, making the use of solar energy efficient. Also, the diversity of flora and fauna in-around the milpa promotes pollination and creates trophic networks that reduce the damage of pathogens to the milpa.

Table 3. Innovations applied in the management of the milpa, with respect to the total area planted (ha), according to the productivity of the milperos of Cohetzala and San Nicolas de los Ranchos, Puebla-Mexico.

Municipality	Data/innovation	Low	Medium	High	Average municipality
Cohetzala	Corn sown area (ha)	29.5	61	47	137.5
	Soil conservation (%)	14	36	23	27
	Creole seed (%)	100	100	100	98
	Crop association (%)	93	100	100	99
	Association with legumes (%)	83	66	100	81
	Association with pumpkin (%)	63	66	98	76
	Crop rotation (%)	27	46	45	41
	Manure application (kg ha^{-1})	1 434	1 677	1 775	1 644
	Fertilizer application (%)	83	93	100	93
	Herbicide application (%)	29	18	15	19
	Insecticide application (%)	0	9	19	11
San Nicolas de los Ranchos	Corn sown area (ha)	62.25	77	79.5	218.75
	Soil conservation (%)	81	69	61	70
	Creole seed (%)	97	100	100	99
	Crop association (%)	31	34	31	32
	Association with legumes (%)	3	32	26	30
	Association with pumpkin (%)	0	0	3	1
	Crop rotation (%)	48	64	84	67
	Manure application (kg ha^{-1})	550	590	1 383	803
	Fertilizer application (%)	96	79	96	90
	Herbicide application (%)	85	36	52	56
	Insecticide application (%)	43	14	25	26

Elaboration with data obtained from the survey, 2009.

At the same time, this diversity provides more biomass below the ground, resulting in a greater abundance and richness of microorganisms that decompose organic matter and recycle nutrients and energy. At the same time, in a polyculture the range of colors and odors released by the vegetation makes it difficult for insects to locate food (Paleologos and Flores (2014). The low use of insecticides by efficient milperos may be the result of this diversity of species, since it creates an ideal habitat for there to be a greater abundance and richness of arthropodofauna, resulting in a biological balance of the milpa system. INIFAP technological package considers certain elements of arthropodofauna as pests, proposing their extermination, disturbing this balance biological.

Walker (1992) reports that if there is redundancy of species in this biodiversity due to the role they play in the agroecosystem, a redundancy of relationships will be created that ensures few changes in the agroecosystems (stability) and if an extreme environmental change occurs, the agroecosystem has greater capacity to absorb shocks and to quickly regain its functionality (resilience). A resilient system subsists longer in time, that is, it is sustainable. The redundant species are represented by the weeds, classified by modern agriculture as weeds, raising their annihilation and with it the redundancy of relationships they promote.

The second agroecological process derives from the associated plants, enhancing the water-soil-plant-environment relationship: beans fix atmospheric nitrogen, an essential plant nutrient, corn serves as a guardian for beans, and pumpkin, with its wide foliage and creeping habit, safeguards the soil from erosion, encourages the filtration of water and prevents its evaporation and the growth of weeds during the first phenological cycles of corn and beans.

The third process springs from peasant innovations. The millenary adaptation of creole seeds to local ecological niches and their productive stability is due to their high variability, which is in permanent change (Flores and Sarandon 2014). Crop rotation improves soil properties, retains moisture and nutrients, provides nutrients and health to the soil (Mendoza, 2004). Soil conservation avoids the loss of nutrients and water, which enhance its productivity. Manure provides nutrients, improves structure and texture, increases aeration, penetration and water retention, stimulates the development of beneficial microorganisms for the plant and promotes carbon sequestration (Robert, 2002).

Finally, a process derives from the fusion of rural technologies and some modern ones, such as the application of nitrogen fertilizers. Nitrogen is essential for plant growth, in addition, it is essential for microbial growth and the degradation of organic matter. If it has a high nitrogen content, the microorganisms will have enough substrate to induce further mineralization, since the microflora will have its nitrogen needs fully satisfied (Ferrera and Alarcon, 2001). It is noteworthy that in Cohetzala and San Nicolas, 78.3 and 68.8% of the milperos applied only nitrogen fertilizers.

Data in Table 4 show that the types of milperos have similar living conditions: they are extreme smallholders with few means of production; their average expenditures are very low and heavily subsidized by remittances, especially in Cohetzala, production is intended for self-consumption and they deploy various survival strategies: the sale of labor power, the management of the cornfields, large and small livestock, the backyard and the collection of natural goods. However, the efficient ones were characterized because they diversified their tasks in the primary sector related to the management of the milpa, especially in Cohetzala, while the others have done so in the secondary and tertiary sectors.

Pluriactivity increases the income of rural households (De Grammont, 2009) and, at the same time, reduces agricultural income (Anseeuw and Laurent, 2007). Pluriactivity has turned agriculture into a marginal economic task for the family unit, obstructing the initiatives and capacities of the producers that nurture the dialogue of knowledge and with it, the key technological processes that occur in the milpa.

Finally, in the data in Table 4, the high percentage of corn destined for self-consumption stands out, which suggests that this good has the highest social use derived from human activity, since it is directly destined to the satisfaction of human needs.

Table 4. Socioeconomic traits and availability to means of production, according to the yield of the producers of Cohetzala and San Nicolas de los Ranchos, Puebla-Mexico.

	Municipalities/Indicators	Low	Medium	High	Average municipality
Cohetzala	Age	54.8	57.8	52.6	55.5
	Migrants/family (average)	2	3	2.4	2.6
	Remittances ($average/month/*per capita*)	475	607	474	534
	Avg spending ($/month/*per capita*)	927	1 132	1 001	1 043
	Corn self-consumption (%)	100	89	68	83
	Self-consumption and sale of corn (%)	0	11	32	17
	Primary pluriactives* (%)	43	67	95	70
	Secondary pluriactive** (%)	29	15	5	15
	Maicero*** (%)	28	18	0	15
	Corn sown area (average ha)	2.1	2.3	2.5	2.3
	Backyard area (average m^2)	409	515	317	427
	Collection of goods (%)	100	89	89	92
	Tractor possession (%)	14	15	5	7
	Yoke possession (%)	71	70	84	75
	Large cattle (no. heads/average)	4.5	6.1	5.8	5.6
	Small cattle (no. heads/average)	10.6	18.2	19.3	16.8
San Nicolas de los Ranchos	Age	58.5	52.4	52.1	54.5
	Migrants/family (prom.)	1.1	1.1	1	1.1
	Remittances ($average/month/*per capita*)	112	94	91	100
	Avg spending ($/month/*per capita*)	726	657	648	677
	Corn self-consumption (%)	78	36	9	43
	Self-consumption and sale of corn (%)	22	64	91	57
	Primary pluriactives* (%)	15	64	100	57
	Secondary pluriactive** (%)	70	25	0	34
	Maicero*** (%)	15	11	0	9
	Corn sown area (average ha)	2.3	2.8	3.6	2.8
	Backyard area (average m^2)	191	197	356	240
	Collection of goods (%)	96	93	100	95
	Tractor possession (%)	7	7	18	10
	Yoke possession (%)	43	54	77	57
	Large cattle (no. heads/average)	1.2	2.2	6.9	3.2
	Small cattle (no. heads/average)	9.8	12.4	23.3	14.6

Elaboration with data from the survey (2009). *= producers who grew corn and carried out other tasks in economic branches of the primary sector; **= they carried out other activities in the secondary and tertiary sectors; ***= includes producers who only planted corn.

Corn production and consumption

Data from the survey indicate that the family structure of the corn growers was 328 and 401 people for Cohetzala and San Nicolas respectively. When estimating the consumption of real corn, it was found that: a) 15 and 57% of the people of Cohetzala and San Nicolas, achieved food self-sufficiency by producing at least 500 kg per capita. If the technological pattern of efficient corn growers in Cohetzala is transferred to those of low and medium efficiency, the yields would grow, on average, 91 and 24%; therefore, 27% of people would achieve food self-sufficiency in Cohetzala. For San Nicolas, the yield would increase 150 and 38%, for corn producers with low and medium productive efficiency, allowing 81% of people to achieve food self-sufficiency.

These results coincide with those of other authors. Pretty *et al*. (2011), when evaluating 40 agricultural projects from 20 African countries during 2001-2010 where integrated pest control, soil conservation and agroforestry were applied. In 2010, the average yield multiplied by 2.13 and increased the total food production in 5.8 million tons per year, equivalent to 557 kg per family/year. For its part, the Campesino to Campesino Movement (Holt, 2008) increased corn yields from half a ton per hectare to three, by applying compost and rotations with legumes, as well as intercropping new crops in the Vicente Guerrero plots of the municipality of Españita-Tlaxcala-Mexico.

Conclusions

The results obtained confirm the hypotheses raised. Indeed, we find that: corn growers coexist with different levels of appropriation of radical and progressive technologies, and differentiated returns; productivity has its origin in the dialogue of knowledge, where the management of biodiversity present in the milpa has been and will be, fundamental to optimize unit yields, it was finally found that corn growers share technologies since the vast majority applied modern technologies and peasant women, with an evident prevalence of the latter; furthermore, by having similar general living conditions, it would make it easier for less efficient corn growers to appropriate the technological pattern applied by efficient milperos, assumed as an agroecological utopia. This, as demonstrated, can enhance the development of productive forces that sleep within the land and labor, because it is pregnant with what is objectively possible and are available among producers at the local level. In the agroecological utopia, a useful, socially necessary work prevails, which produces authentic goods, destined for the self-consumption of peasant families. This has been the role that the milpa has played since time immemorial.

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