



Is Oil Palm Expansion a Challenge to Agroecology? Smallholders Practising  
Industrial Farming in Mexico

Castellanos-Navarrete, A., & Jansen, K.

This article is made publically available in the institutional repository of Wageningen University and Research, under article 25fa of the Dutch Copyright Act, also known as the Amendment Taverne.

Article 25fa states that the author of a short scientific work funded either wholly or partially by Dutch public funds is entitled to make that work publicly available for no consideration following a reasonable period of time after the work was first published, provided that clear reference is made to the source of the first publication of the work.

For questions regarding the public availability of this article, please contact [openscience.library@wur.nl](mailto:openscience.library@wur.nl).

Please cite this publication as follows:

Castellanos-Navarrete, A., & Jansen, K. (2018). Is Oil Palm Expansion a Challenge to Agroecology? Smallholders Practising Industrial Farming in Mexico. *Journal of Agrarian Change*, 18(1), 132-155. <https://doi.org/10.1111/joac.12195>

# Is Oil Palm Expansion a Challenge to Agroecology? Smallholders Practising Industrial Farming in Mexico

ANTONIO CASTELLANOS-NAVARRETE AND KEES JANSEN

*Agroecology has become a powerful alternative paradigm for rural development. In contrast to conventional approaches, this paradigm shifts the emphasis from technology and markets to local knowledge, social justice and food sovereignty, to overcome rural poverty and environmental degradation. However, the spread of this approach faces several obstacles. This paper deals with one of these obstacles: the ‘preference’ of smallholders for industrial farming. We specifically analyse the widespread uptake up of oil palm by smallholders in Chiapas. Contrary to agro-ecological assumptions, oil palm proved favourable to smallholders in Chiapas because of historical and contemporary state–peasant relations and the advantageous economic circumstances within the oil palm sector. Based on this research, we identify four challenges for agroecology: (i) the existence of contradictory interests within the peasantry as a result of social differentiation; (ii) the role of the state in making conventional development models relatively favourable to smallholders; (iii) the prevalence of modernization ideologies in many rural areas; and (iv) the need for this paradigm to acknowledge smallholders’ agency also when engaged in industrial farming. These challenges need to be tackled for agroecology to offer viable alternatives in a context of agro-industrialization.*

**Keywords:** agrarian change, agroecology, Mexico, political ecology, smallholders

## 1. INTRODUCTION

For conventional development approaches, a major solution to rural poverty lies in technological modernization and increased participation of smallholders in markets. Old and new attempts to foster Green Revolutions illustrate this well. While this model may improve overall crop yields and productivity, it may also widen the income gap between rural classes and lead to negative, agrochemical-related social and environmental impacts (Jarosz 2012). In response to this model, agroecology has emerged as a powerful alternative, emphasizing participation, peasant knowledge, food sovereignty and social justice as core elements of rural development. In contrast with conventional approaches, agroecology considers that smallholders or ‘peasants’ who engage in industrial farming are too reliant on external technology such as agrochemicals and will be adversely incorporated into global markets (Chappell et al. 2013; Rosset and Altieri 1997). We observe, however, that several obstacles inhibit the spread of agroecology and that many smallholders seem to ‘prefer’ industrial farming over agro-ecological alternatives. In Chiapas, for instance, oil palm has become

Antonio Castellanos-Navarrete, Center for Multidisciplinary Research on Chiapas and the South Border (CIMSUR), National Autonomous University of Mexico (UNAM), Mexico, and Knowledge, Technology and Innovation Group, Wageningen University, The Netherlands. E-mail: [acastela@unam.mx](mailto:acastela@unam.mx). Kees Jansen, Knowledge, Technology and Innovation Group, Wageningen University, The Netherlands. E-mail: [kees.jansen@wur.nl](mailto:kees.jansen@wur.nl)

We thank Abril Aidee Ruiz Medina, Henk van Rikxoort and Carlos Miguel López Sierra for research assistance, Stephen Sherwood for comments and the Mexican Council for Science and Technology (CONACYT) for supporting this research. We also thank the three anonymous reviewers for their helpful suggestions.

the most rapidly expanding crop between 2003 and 2013 (SIAP–SAGARPA 2015) and has proven very popular with smallholders. Such an expansion does not conform to the agroecology approach that often upholds peasant farming or traditional production systems as the preferred development alternative (see Perfecto et al. 2009, 63–6). This study analyses the circumstances and motives behind the success of oil palm in Chiapas and attempts to derive useful lessons for the agro-ecological approach.

Local organizations that promote agroecology in Chiapas often explain the smallholders' shift to oil palm as stemming from manipulation and imposition. For instance, a leader from UNORCA, a member organization of *La Via Campesina*, stated at a forum held in Chiapas: '[...] these small producers are not guilty of making the wrong decision; instead, they are the victims of the actual system imposed upon them [...] They have been manipulated; they feel forced to use their land to produce those damned fuels [in the sense of oil palm as a biofuel crop]' (Ríos Ramírez 2008). This quote reflects the view of smallholders as victims of systemic imposition. Likewise, a report by the National Biodiversity Commission (CONABIO) in Mexico frames oil palm cultivation in the Lacandon rainforest as being against the interests of smallholder farmers and assumes that local producers have been deceived (CONABIO 2012, 34). Surprisingly, scholars and practitioners within the agro-ecological field, who normally see smallholders as actively shaping production systems, seem to grant them little agency in the case of agro-industrialization through oil palm planting.<sup>1</sup> These producers are often portrayed as caught in a cycle of indebtedness and input dependency in which there is little room to manoeuvre. In this paper, we discuss how the current process of agrarian change in Chiapas, characterized by significant smallholder participation in oil palm expansion, presents a challenge to existing agro-ecological views.

Agroecology has recently evolved from an approach that is interdisciplinary, recommendation oriented and focused on improving agricultural production to one that is transdisciplinary (integrating different scientific disciplines but also integrating other types of knowledge systems, such as indigenous knowledge), participatory and politically engaged. This shift reflects a change in focus from an agroecology that aims to bring about 'relatively small changes in practices within dominant production systems' (NRC 2010; cited by Tomich et al. 2011) to one that seeks to transform agro-food systems (Méndez et al. 2013; Ruiz Rosado 2006). Within the latter focus, the proposal is to attain low to zero external input agriculture, to incentivize local food markets and to promote a rights-based agenda for rural development, often articulated through the concept of food sovereignty (Altieri and Toledo 2011; Timmermann and Félix 2015). We think that a transformative agroecology is a very valuable alternative to the unwarranted technological and market optimism of conventional development paradigms, provided that it goes beyond some simplifying oppositions, such as that between agro-industrial and traditional or local farming. We argue that agroecology has some conceptual problems given its excessive reliance on systems analysis perspectives.

Systems analysis has been influential in agroecology (Astier et al. 2012; Toledo 1990), being drawn on to understand ecological processes in crop production (Castellanos-Navarrete et al. 2015; Tittonell 2014) as well as to study the detailed ecological knowledge of smallholders. The systems perspective is, however, less appropriate for conceptualizing social change (Jansen 2009). Our analysis of the shift of smallholders to oil palm production follows instead the field of critical agrarian studies in viewing rural producers as historical subjects enmeshed in complex, and often far-reaching, social relations. Such an approach is particularly fruitful for capturing the complexity of agrarian change and its unexpected outcomes. For instance, Worby (1995) shows how historical transformations in communal labour institutions served, surprisingly, as the basis for the adoption of high-input cotton production by smallholders in Zimbabwe, and Friedmann (1978) explains how family

<sup>1</sup> Agro-industrialization refers here to the employment of inputs and new standardized, mostly scientific, farming techniques, and to the production of crops that are processed by agro-industry.

farming displaced large-scale capitalist plantations across several countries during the emergence of the globalized wheat market in the nineteenth century. In our analysis of oil palm expansion from an agrarian change perspective, we pay particular attention to the role of the state (Vergara-Camus 2009; Wolford et al. 2013), to ideological considerations (Akram-Lodhi and Kay 2010) and to social differentiation triggered by commodity production (Gray and Dowd-Urbe 2013; Isakson 2009). We attempt to show how a politically engaged agroecology (Gonzalez de Molina 2013) could become stronger by borrowing concepts from critical agrarian studies and political ecology.

The next section presents the study regions and the research methods. Subsequently, we analyse who has planted oil palm in Chiapas and what types of producer are involved in oil palm production. We analyse how the state has shaped smallholder participation in the oil palm sector and assess the impact of market relations on participating smallholders. We also consider the knowledge and subjective outlook of oil palm producers. This is followed by a discussion of four challenges that oil palm expansion in Chiapas poses for current thinking in agroecology. We conclude by calling for a better understanding of smallholders' willingness to engage in industrial farming and its practical implications for agroecology.

## 2. STUDY REGIONS AND RESEARCH METHODS

This research was carried out in the two most important oil palm regions in Chiapas: coastal Soconusco (the Huixtla and Villa Comaltitlán municipalities) and the southern Lacandon rainforest (the Benemérito de las Américas and Marqués de Comillas municipalities). The study regions have in common high levels of rural poverty (over 60% of the population classified as poor) and a majority of households depending on agriculture for their livelihood (see Castellanos-Navarrete and Jansen 2015, Table 1). They differ, however, in their particular agrarian dynamics. Soconusco opened up to agriculture in the nineteenth century, when development postulates considered foreign capital to be the key to development. The state offered advantageous conditions for agrarian capital in Soconusco, leading to the emergence of large-scale plantations (García de León 1997, 180–3). The situation changed during the Cárdenas presidency (1934–40), when agrarian policies emphasized land redistribution to landless peasants (Reyes Ramos 1992, 59–61). More recently, population growth has led to land scarcity and land fragmentation, with off-farm income becoming important for many rural families (see Table 1 below). In the southern Lacandon rainforest, land distribution took place in the 1970s, and it was geared towards peasants (de Vos 2002, 167–71). The combination of initial economic differences between settlers and differential land distribution in the region (i.e. 20 hectares in *ejidos* and 50 hectares in New Population Centres) led to incipient land concentration. Intervention by the Mexican government also resulted in historical differences on market integration between study regions. Between 1880 and 1910, the government built infrastructure (roads, a railroad and a port) in Soconusco (Fletes Ocón 2009; García de León 1997, 205), which explains the current widespread cash-crop planting by smallholders. By contrast, in the southern Lacandon rainforest, producers lacked reliable transport routes to markets. Such conditions led to a preference for cattle, as it could be taken on foot to nearby urban centres. Even today, some communities do not have access to year-round passable roads. Differences in market integration also appeared for oil palm with most mills<sup>2</sup> located in Soconusco (Figure 1).

Regarding methods, we conducted 108 semi-structured interviews with government officials and technicians (6), private-sector informants (9), rural workers (7), oil palm producers (62) and their representatives (24). We also carried out a random survey of 250 oil palm producers, with respondents equally distributed between the study regions. We used government and oil palm organizations'

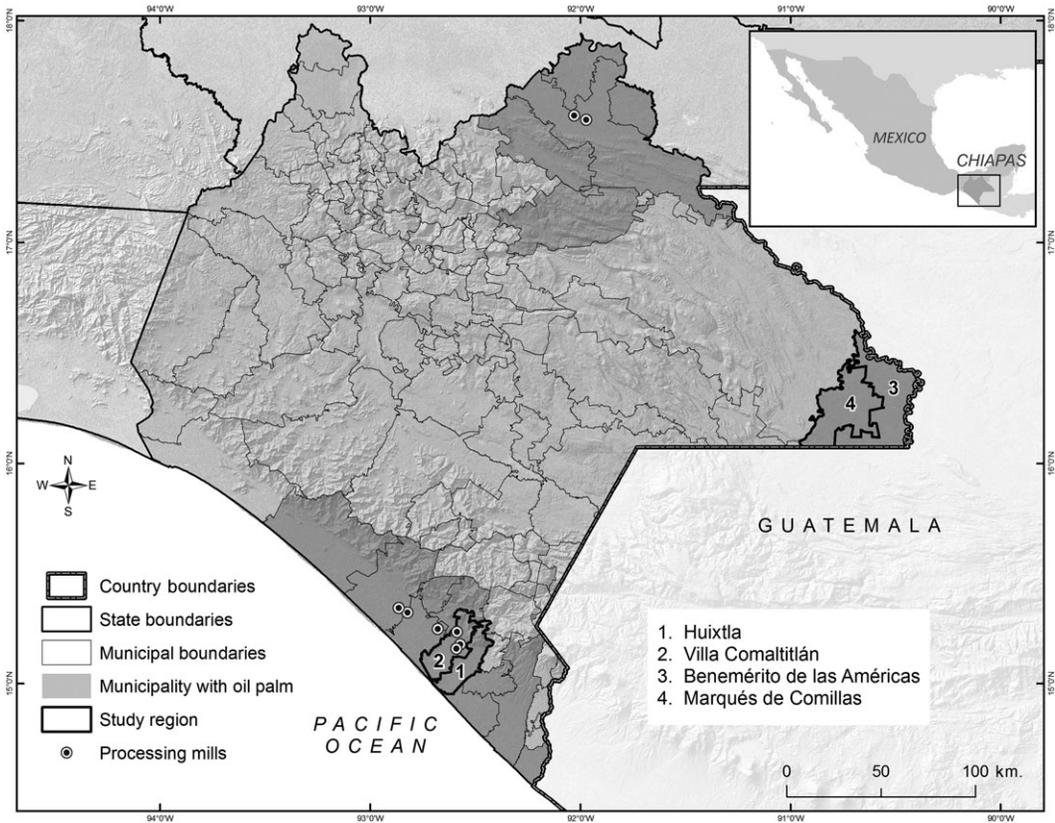
<sup>2</sup> Oil palm fruits are processed into crude palm oil in mills. Crude palm oil is refined into palm oil in central Mexico.

Table 1. Rural producers by type before their shift to oil palm

Types	n	Average farm size (ha)	Average heads of cattle	Main source of income (% of farms)				Average farm surface (%)					
				On-farm		Off-farm		On-farm		Off-farm			
				Maize	Cattle	Cash crops	Non-skilled <sup>a</sup>	Semi-skilled	Skilled	Other	Maize	Pasture	Cash crops
<b>Soconusco</b>													
<i>Social sector</i>													
Poor													
	20	4.8	0	45	0	20	25	0	0	10	47	0	5
Subsistence-oriented				21	0	43	18	0	0	18	7	19	73
Market-oriented	28	3.6	1										
Middle													
	21	8.8	12	14	29	19	5	24	0	10	35	28	10
Subsistence-oriented				14	27	32	0	9	0	18	2	39	52
Market-oriented	22	10.1	13										
Rich													
	8	27.1	16	12	25	38	0	0	12	12	6	21	11
Subsistence-oriented				5	50	40	0	0	0	5	5	45	45
Market-oriented	20	18.4	25										
Private sector	6	486.3	530	0	33	50	0	0	0	17	0	49	50
<b>Southern Lacandon rainforest</b>													
<i>Social sector</i>													
Poor													
	24	16.9	1	33	0	0	67	0	0	0	17	5	4
Subsistence-oriented				25	33	8	33	0	0	0	13	58	15
Market-oriented	12	18.1	7										
Middle													
	22	28.0	9	18	23	5	14	14	0	27	8	28	4
Subsistence-oriented				8	80	4	0	8	0	0	10	69	6
Market-oriented	25	24.4	20										
Rich													
	18	66.7	43	6	94	0	0	0	0	0	6	36	3
Subsistence-oriented				10	75	15	0	0	0	0	9	64	5
Market-oriented	20	97.4	73										
Private sector	4	272.4	300	0	50	25	0	0	25	0	0	40	0

Source: Survey of 250 oil palm growers in the two study regions.  
<sup>a</sup>Wage labour.

Figure 1 A map of the oil palm producing regions in Chiapas



censuses to select producers. Survey questions focused on oil palm production (including planting area, density, intercropping practices and estimated inputs such as fertilizers, herbicides and fuel) and farm characteristics before and after conversion to oil palm (including farm size, cattle ownership, land use and main sources of income). Quantitative survey data were analysed through descriptive statistics, while qualitative data were codified by theme and responses compared by type of actor (Saldaña 2012). During the 13-month period of fieldwork (2012–13), we recorded informal conversations and observations. We also collected a large number (60) of relevant historical and contemporary government documents.

The analysis classifies producers as belonging to private and social-sectors. The ‘private-sector’ refers to companies and investors (wealthy individuals who entered a particular region with the sole purpose of producing oil palm),<sup>3</sup> whereas the ‘social-sector’ refers to producers in *ejidos*: the so-called *ejidatarios*. *Ejididos* in Mexico are a land tenure form in which farmers have restricted rights to sell and rent and in which many decisions on the use and access of natural resources rest on the *ejidos*’ collective assembly. While we refer throughout the text to *ejidatarios* (i.e. social-sector producers), we sometimes use the term ‘smallholder’ for *ejidatarios* in Soconusco, given the small average farm size in this region. We also sometimes use the term ‘peasant’, as this term is often used in the agro-ecological literature. In this case, all three terms (i.e. *ejidatarios*, smallholders and peasants) refer to oil palm producers in the sense of ‘petty commodity producers’; that is, producers whose

<sup>3</sup> Besides companies and investors, there were also few small-scale private-sector producers in Soconusco.

reproduction depends on wider social relations shaped by capital, as opposed to definitions that stress their subsistence orientation (Bernstein 2010, 3–4). We categorize social-sector producers according to social class and to market orientation prior to oil palm cultivation in order to pinpoint the type of producer who shifted to oil palm production. Producers are classified as rich, middle and poor according to land access and main source of income, including the type of labour sold. We analytically differentiate farms according to market orientation. Farms are ‘market-oriented’ when they devote more than 50 per cent of their land to pasture and/or cash crops; they are ‘subsistence-oriented’ when they dedicate more than 50 per cent of their land to maize, non-agricultural land uses or rent it out as pasture. Maize can be considered a subsistence crop given its predominance in family consumption and its low market price. Only farms with more than 15 hectares of maize are classified as ‘market-oriented’, as producers with this area normally invested sufficient capital in maize production to reach a significant marketable surplus. While land use is not a wholly reliable indicator of market integration, we consider it the most feasible research strategy in the context of our survey.

### 3. WHO PLANTED OIL PALM IN CHIAPAS?

The characterization of different farm types helps to illuminate who planted oil palm in Chiapas. The private-sector consisted of companies and investors. In Soconusco, companies expanded over private-sector land purchasing on average 486 hectares, with 436 hectares planted with oil palm (Table 1). One of these companies was a private-sector mill that had established three medium-size plantations to ensure at least part of their supply. In the southern Lacandon rainforest, a small number of investors expanded on to *ejido* lands, often becoming *ejidatarios* in the process. Investors purchased on average 272 hectares of land, planting 117 hectares of oil palm. Their expansion was in some cases limited by *ejido* agreements, which prohibited land transactions with investors, as well as by the risks posed by local crime networks (see Castellanos-Navarrete and Jansen 2015).

Within the social-sector, there were clear differences between *ejidatarios* in Soconusco and those in the southern Lacandon rainforest as a result of the different agrarian histories. In Soconusco, *ejidatarios* who shifted to oil palm held on average 9.8 hectares of land (Table 1). Prior to oil palm, poor producers had an average of 4.1 hectares of land, with poor market-oriented families mostly oriented towards banana production. Middle-income and rich producers had sufficient land for cattle and, in some cases, sufficient capital for high-input sugar cane production. Lack of available land in this region combined with a relatively high level of market integration explains why cash crop production was, before oil palm, a common income strategy for small-scale producers. In the southern Lacandon rainforest, instead, social-sector producers had on average 42.8 hectares of land before their shift to oil palm. Land availability and undeveloped market linkages in this region meant that rural producers who turned to oil palm often relied on cattle, with very little involvement in cash crops. In this region, poor and middle-income producers saw advantages in shifting to oil palm as the benefits of cattle production were more readily captured by those owning large tracts of land.

The type of social-sector producer engaged in oil palm production differed regionally; however, in both study regions, oil palm became an option for poor *ejidatarios*<sup>4</sup> who depended on low-paid off-farm activities (Table 1). In both Soconusco and the southern Lacandon rainforest, poor families worked for richer farmers, engaged in petty trade or, in emergencies, sold basic assets such as land to other *ejidatarios* to procure cash. In Soconusco, for instance, a third of the poor families who later shifted to oil palm depended on wage labour, petty trading or fishing. In the southern Lacandon rainforest, poor subsistence producers depended more on wage labour than on maize. The reasons for *ejidatarios*’ dependence on off-farm activities varied per region (i.e. lack of land in Soconusco

<sup>4</sup> Landless peasants (*avciñados*), the poorest inhabitants in *ejidos*, did not participate as producers.

and lack of capital and labour in the southern Lacandon rainforest). In any case, the shift from wage labour to oil palm often meant an improvement in people's livelihoods. A *Zoque* peasant from the southern Lacandon rainforest voiced this as follows:

The change is that we work for ourselves now. My body never had rest before. But now with things changing I am happy with my work. When you work for someone else you have to come at the time he wants. Now if the sun is hot you can go and it is OK: we are our own bosses. I noticed a lot of change. A hard life has ended. I feel it is a bit better now. (Interview with 'poor subsistence' producer, 1 September 2012, La Nueva Unión).

For this producer, oil palm provided an exit strategy from labour exploitation by richer neighbours. Similar views were expressed in Soconusco:

When the [oil] palm came, we got away from the wage slavery, we are now '*patroncitos*' [small bosses] ... We used to earn 40, 50 pesos, for cleaning pastures with machetes, for weeding; some jobs that the rich had; others used to leave [migrate]. When the palm came, no more. This was a change that [oil] palm made. (Interview with a 'poor market-oriented' producer, 7 April 2013, Xochicalco Nuevo).

Oil palm secured the reproduction of these producers more readily than wage labour or migration.

Oil palm offered new opportunities to *ejidatarios* in a time in which maize producers experienced downward pressure on incomes as maize prices fell after neoliberal reforms and the North American Free Trade Agreement (Eakin et al. 2014). While many oil palm producers still produce some maize, its economic importance has become negligible when compared to oil palm (Table 2). In contrast with maize-dependent producers, *ejidatarios* with cattle or producing sugar cane were probably in the best economic position to shift to oil palm. Cattle owners, especially those with sufficient land, could rapidly access capital by selling some animals. In the southern Lacandon rainforest, many cattle owners shifted to oil palm as the soil quality had deteriorated for cattle production (Castellanos-Navarrete 2015, 113). While sugar cane producers had a profitable crop and some advantageous economic conditions such as the right to a pension, some of them considered oil palm to be more profitable as various mills, not one as in the case of sugar cane, competed for their produce. Some of these producers also had profitable off-farm income activities that eased the conversion from sugar cane or cattle into oil palm.

Contrary to views that hold oil palm production as being synonymous with large-scale farming (e.g. GRAIN 2006), we found a more complex process in Chiapas. The social-sector, constituted by a diverse group of *ejidatarios*, in terms of reproduction strategies and regional production conditions, was a significant actor in oil palm production. To analyse the diversity within the social-sector, we distinguished between poor, middle and rich producers, and between those with a subsistence outlook as compared to a market orientation. In line with political ecology studies concerned with social differentiation in industrial farming (Galt 2014, 67–87; Moseley 2005), we used these categories, together with a regional comparison, to uncover the complex agrarian dynamics underlying the shift to oil palm. Prior to oil palm, 54 per cent of the surveyed *ejidatarios* lived from selling crops or cattle while 41 per cent of the poor sold their labour to survive. Some *ejidatarios*, such as those in sugar cane production, already made use of hired labour, sometimes in complex labour arrangements resembling plantation work, before they took up oil palm. Our results point to the importance of prior involvement in markets – be it for labour or agricultural products – for many producers who later became oil palm producers. In this sense and in contrast with processes of proletarianization (often associated with industrial farming) or repeasantization (in which peasants strive to gain autonomy *vis-à-vis* the market; van der Ploeg 2009, 6–7), the shift to oil palm was for many a shift within the market. However, such a shift cannot be understood solely as an outcome

Table 2. Rural producers by type after their shift to oil palm

Types	n	Average farm size (ha)	Average heads of cattle	Main source of income (% of farms)				Average farm surface (%)									
				On-farm		Off-farm		On-farm		Off-farm							
				Oil palm	Maize	Cattle	Cash crops	Non-skilled <sup>a</sup>	Semi-skilled	Skilled	Other	Oil palm	Maize	Pasture	Cash crops		
<b>Soconusco</b>																	
<i>Social sector</i>																	
Poor																	
Subsistence-oriented	20	6.0	0	68	5	0	5	16	2	0	0	5	75	11	1	1	7
Market-oriented	28	3.6	0	100	0	0	0	0	0	0	0	0	89	1	1	8	
Middle																	
Subsistence-oriented	21	8.8	2	83	0	0	0	0	11	0	6	6	72	1	3	11	
Market-oriented	22	10.0	2	58	0	5	21	5	11	0	0	0	59	1	11	25	
Rich																	
Subsistence-oriented	8	26.2	6	40	0	0	40	0	0	20	0	0	39	9	8	22	
Market-oriented	20	18.9	3	68	0	0	32	0	0	0	0	0	48	4	15	29	
<i>Private sector</i>	6	486.3	350	50	0	17	17	0	0	0	17	0	92	0	8	0	
<b>Southern Lacandon rainforest</b>																	
<i>Social sector</i>																	
Poor																	
Subsistence-oriented	24	17.0	0	90	3	0	0	7	0	0	0	0	44	9	2	7	
Market-oriented	12	18.1	1	76	0	0	12	6	0	0	6	6	58	6	8	19	
Middle																	
Subsistence-oriented	22	30.0	2	83	0	0	0	0	11	0	6	6	43	5	15	9	
Market-oriented	25	25.1	3	100	0	0	0	0	0	0	0	0	44	6	23	9	
Rich																	
Subsistence-oriented	18	67.8	14	83	0	6	6	0	0	0	6	6	31	5	16	5	
Market-oriented	20	102.1	27	75	5	15	5	0	0	0	0	0	28	7	35	15	
<i>Private sector</i>	4	272.4	250	50	0	25	0	0	0	0	25	0	62	0	18	0	

Source: Survey of 250 oil palm growers in the two study regions.  
<sup>a</sup>Wage labour.

of producers' choices. We have already briefly mentioned the role of the state in agrarian change and the following sections describe in more detail the politics and policies of the Mexican government regarding oil palm industrialization.

#### 4. THE ROLE OF THE STATE IN OIL PALM EXPANSION

The first oil palm producer in Chiapas was a German migrant named Johann Bernstorff. According to his family, the then Undersecretary of Agriculture, Jesús Patiño Navarrete, donated the first oil palm seeds to Johann in 1952 (interview, 24 May 2013, Finca La Lima). Johann became interested in oil palm and acquired other varieties. Then, in 1957, he acquired a Dutch palm oil-processing mill. However, with low prices and little demand for palm oil, Johann made his living on coffee and kept oil palm as a 'hobby'. When in the 1980s the government began to support oil palm, it favoured the social-sector rather than large landowners such as Bernstorff. Government agronomists established oil palm nurseries in Soconusco, distributed free seedlings and granted small subsidies and credit to interested *ejidatarios*. State technicians also supervised planting in *ejidos* and occasionally brought in Caterpillar tractors to clear forests. While projects did not specifically rule out the private-sector, in practice *ejidatarios* were the most important beneficiaries, as confirmed in interviews with local growers. One couple, owners of a large private-sector oil palm property, expressed their views on state intervention in the oil palm sector as follows:

'They [the government] supported the *ejidatario* to become an [oil palm] fruit producer', the husband said, 'they also supported them at first to become processors, but it failed [...]. Because the vision of the state has always been to support the social-sector [...]. It was always a bit on the left, it has always supported the most ...' – the wife then completed her husband's sentence by adding 'the least protected, the most unprotected sectors'. (Interview, 24 May 2013, Villa Comaltitlán).

They were upset that, before their very eyes, the government distributed large amounts of oil palm seedlings to nearby communities while they received nothing from the state. Producers in *ejidos* also considered themselves as favoured, as stated by a large *ejido* producer: 'I have now 23,000 plants seeded, at 70 pesos each; when the hell do I buy them? Never and it is with government support that we have improved and the peasant has improved, it is not the businessman who has advanced, but the peasants, and for this we have to thank the governments both federal and state level' (interview, 24 October 2012, Benemérito de las Américas). Both large landowners and the social-sector indicated that *ejidatarios* were more favoured by the government.

The degree of state support to the social-sector is well illustrated by government attempts to incorporate the *ejidatarios* into the palm-oil agro-industrial chain. In 1985, the National Fruit Commission (CONAFRUT) leased an oil palm processing mill for 4 years to the Luis Espinosa 'El Arenal' community, with an option for purchase. The community established the mill and planted oil palm. Interestingly, the *ejidatarios* did not activate the purchase option within the agreed time limit (CONAFRUT 1992). The community probably thought that once established, the donation was likely to happen. If this was the case, they were not wrong. In 1992, the Chiapas government bought the mill from CONAFRUT<sup>5</sup> and passed it on to the community through funding provided by PRONASOL, a poverty alleviation programme (Gobierno del Estado 1992). While mismanagement finally led to the closure of the mill, the delivery of this and a second mill to the social-sector in 1996 reflects the level of government support to the social-sector in agro-industrialization.

<sup>5</sup> At that time, CONAFRUT no longer existed and arrangements were made with those in charge of its liquidation.

State support to the private-sector was of a different nature. The government in Chiapas mainly attracted private companies into oil palm processing without providing assistance for oil palm production. This is well illustrated in the following quote from a mill manager: 'This mill started without production. For three years we almost did not have any processing; we suffered quite a lot [...]. It was an arrangement with the government, with commitments from the industrialists and shareholders of the firm [with the government]' (interview, 21 October 2011, Palenque). Incentives to the private-sector in Chiapas typically included land and funding to establish mills and occasional support for fruit collection (interview with a SAGARPA<sup>6</sup> official, 4 November 2012, Tuxtla Gutiérrez; Fondo Chiapas 2009) but did not extend to incentives for plantations. This policy and the 'arrangement with the government' probably explain why the company cited above established a mill without a fruit supply and did not engage in production beyond a medium-size plantation area around the mill. The Chiapas government has historically appealed to the private-sector to set up palm-oil mills, promoting Soconusco as a region in which fruit was available for processing (Gobierno del Estado 1984, n.d.).

While the government targeted the social-sector to be the key beneficiary of state programmes, not all producers in the social-sector benefited equally. Between 2007 and 2012, the Institute for Productive Reconversion and Bioenergetics (IRBIO) distributed free oil palm seedlings and granted small subsidies according to area planted through their 'Productive Reconversion' programme. In this way, the Chiapas state favoured *ejidatarios* with greater access to land and capital. The wealthy *ejido* producer cited above, who spoke of the importance of government support, also pointed out the problems for those lacking capital:

Those that are [economically] broken, they do not make it, because you have to take care of it [the oil palm]. You have to weed it, you have to fertilize it, lots of things [...]. They [the poor producers] can sustain three, four hectares, maybe five, but he has to tie his pants [make an effort] because after planting, he has to go somewhere else to earn, for food [...]. When I started, I did not start on zero, I already had an old truck, a tractor, an old Ford, now I have a new one, I sold two old little Fords that I had and bought a new one. (Interview, 24 October 2012, Benemérito de las Américas).

This quote highlights the processes of social differentiation whereby *ejidatarios* with enough initial resources can expand their production while others can barely secure reproduction (for a similar process in Indonesia, see McCarthy 2010). Government support for oil palm cultivation was directed to the social-sector, but within this sector biased towards those with land and other resources.

In short, the government, especially at Chiapas state level but also at federal level, has played a central role in making the social-sector a key actor in oil palm production. The relationship between peasants, agrarian capital and the state is often a complex one (Cordoba and Jansen 2014) and takes different forms. In South-East Asia, the shift in state policies from developmentalism to neoliberalism created particularly favourable conditions for the private-sector in oil palm production alongside increased vulnerability for smallholders (McCarthy and Cramb 2009). Yet, this general trend has been reversed in some special circumstances. In Riau province in Indonesia, a group of socially committed government officials were able to support smallholders in oil palm production after the central government increased the budget for this region in order to counteract separatist political movements (McCarthy et al. 2012). In Chiapas, oil palm expansion has not taken place at the expense of the social-sector but, on the contrary, has favoured its participation. Although state programmes are biased towards better-off *ejidatarios*, they still permit poor rural families, who had previously lived from selling their labour, to participate in oil palm production. The next section

<sup>6</sup> Secretary of Agriculture, Cattle, Rural Development, Fisheries and Food.

dives into the historical processes that explain why the state supported peasants over other classes in this process of rural agro-industrialization in Chiapas.

## 5. STATE SUPPORT: PEASANTS VERSUS LANDOWNERS

Strong state support to oil palm producers in Chiapas has to be understood in the context of a long tradition in Mexico of building political power through concessions to social organizations. Starting with President Lázaro Cárdenas (1934–40), the government organized peasants, workers and ‘popular masses’ in large organizations, which received state resources in exchange for political support. Peasants became the ‘regime’s favourite sons’<sup>7</sup> (Warman 1973, 13) under a political mechanism that maintained the Institutional Revolutionary Party (PRI) in power for the next 71 years (1929–2000). While the rural private-sector was also organized in state-controlled organizations, its position was often much weaker than their social-sector counterparts (Mackinlay 2004).<sup>8</sup> Unlike peasants, landowners were the losers of the 1910 agrarian revolution and their interests were marginally represented within the government, particularly during the early PRI years. The alliance between peasants and the state was first cemented in many regions through the agrarian reform (a process that started relatively late in Chiapas). Between 1934 and 1976, the state distributed about 75,000,000 hectares of land to peasants in *ejidos* (Klooster 2003). Up until the end of the agrarian reform in 1992, private-sector opponents of government policies even risked land expropriation. In post-revolutionary Mexico, peasants were the symbol of national identity and social justice.

The historical coalition between peasants and the state explains the position of peasants in the oil palm sector in Chiapas and still leads to tensions between the social and private-sector when it comes to accessing government resources. While government support for oil palm production was largely allocated to social-sector organizations, several private companies were able to access state resources by forming *Sociedades de Producción Rural*, a form of legal cooperative in Mexico. For some *ejidatarios*, state support for the wealthy private-sector to produce oil palm was unacceptable. The well-mannered Don Chucho,<sup>9</sup> a peasant with a past of agrarian activism, stated ‘oil palm is for the poor’ and when ‘the wealthy saw that it was profitable they hugged the big programmes for oil palm’ (interview, 7 April 2013, Xochicalco Nuevo). The tension between the social and private-sectors was most visible in Soconusco, given its recent history of agrarian struggles, but many rural families in the southern Lacandon rainforest were also wary of investors, remembering their own lack of access to land in the past. Private-sector people were often well aware of such narratives. A plantation manager from Tapachula recalled a meeting with social-sector producers: ‘There are people who wanted that [state] support only goes to the social-sector. Maestro, I said, the constitution says I am Mexican and I have the right’ (interview, 2 August 2013, Tapachula). This private-sector manager felt it necessary to justify state support for their participation in oil palm production. In relation to oil palm expansion, old agrarian struggles reappeared, with the state again playing a central role.

For Don Chucho, the aspirations of large landowners were clear: ‘If they could, they would kill the people that do not do what they want’ or ‘if it were up to the wealthy, they would have us only as workers’. These quotes are a good reflection of the degree of agrarian tension between peasants and landowners in Soconusco. The agrarian reform, particularly pushed by Cárdenas in the 1930s, encouraged many landless families to claim land and invade *fincas* (known as *haciendas* in other parts of Latin America) in Soconusco. Don Chucho, a wage labourer in his youth, only gained access to land after many years of struggle. State support for such peasant struggles for land explains how the

<sup>7</sup> Warman used this expression ironically.

<sup>8</sup> An exception were cattle ranchers and their *Asociaciones Ganaderas* who received preferential treatment given their unequivocal support for the PRI (Mackinlay 2004).

<sup>9</sup> A pseudonym.

area titled as private-sector land in this region was reduced from absolute dominance in the nineteenth century to 44 per cent in 2007 (INEGI 2007). In the 1950s, the agrarian reform policy shifted from land redistribution to the distribution of unused state lands (Reyes Ramos 1992, 67). This policy resulted in the opening of the agricultural frontier in the southern Lacandon rainforest. The subsequent migration of peasants from regions where land was unavailable to this remote region, where they participate in oil palm production, reinforced the peasant–state alliance.

Landowners responded to what, for them, were adverse state policies and political isolation by launching land claims of their own, sometimes accompanied by violence. For instance, in the 1970s a group of large landowners created the *Mano Negra* (Black Hand) in Villa Comaltitlán: a violent organization that targeted peasant leaders who mobilized people to occupy land. A landowner and oil palm grower justified this strategy as follows: ‘We got organized to defend ourselves. We hired gunmen to frighten the *ejidatarios*, but we did not kill anybody. The government stood there with their hands in their pockets. We have never had a correct government. They are a bunch of crooks’ (interview, 27 May 2013, Villa Comaltitlán). Landowners justified the use of violence by referring to a state that failed to stop land occupations.<sup>10</sup> Peasants recalled a very different situation, one in which leaders were killed or tortured, sometimes along with their families, because of their struggles for land. Given this historical agrarian context, many peasants considered landowners’ attempts to access state support for oil palm production to be illegitimate.

As large landowners lost power in Soconusco, they were forced to establish a working relationship with peasants. The same landowner who had joined *Mano Negra* stated: ‘[...] Now we have an alliance with the people of *ejidos*. I came to break the ice with the *ejidatarios*. I gave candy to children, paid for the boys’ schooling. I gave fans to the clinics. Before they said that the landlord gave nothing away, that he was inaccessible, but I changed all that; [...] I changed the relations – to have a shield’ (interview, 27 May 2013, Villa Comaltitlán). For this large landowner, bad relations with peasants brought the threat of land occupations or even being *venadeado* (literally, ‘killed like a deer’). Good relations were cultivated as a defence measure, or what he called a ‘shield’. Without state support, the private-sector saw itself increasingly dependent on *ejidatarios*. A plantation manager recognized that ‘if the social-sector does not obtain support, this [expansion of oil palm] stalls’ (interview, 2 August 2013, Tapachula). Large producers in Chiapas needed the social-sector as otherwise the state would not subsidize the oil palm sector. Given their vulnerability, companies and large landowners had few options but to build alliances with the social-sector to secure access to state resources.

Today, the conditions that made peasants a key political force in Mexico (mass organizations, a high level of state intervention, land distribution and the one-party regime) have mostly disappeared. The official closure to the agrarian reform in 1992 marked the final shift from developmentalism to neoliberal politics. In this new neoliberal context, many peasants in Mexico face deteriorating economic circumstances in agriculture (e.g. Singelmann 1995). Nevertheless, peasants in Chiapas are still a ‘son’ of the new regime. In the case of our two study regions, the state historically favoured rural families with land first and support for production later, including support to enter oil palm production. While neoliberal policies have become the dominant paradigm in Mexican rural policy, the Chiapas government still partially adheres to developmentalist policies, probably as a defensive strategy following the 1994 *Zapatista* uprising. For *ejidatarios* in Soconusco and in the southern Lacandon rainforest, past agrarian struggles and post-revolutionary state policies are still a living memory, one that confirms their right to land and state support, and their opposition to claims by

<sup>10</sup> In some cases, landowners were able to derive some state support for land restitution. For instance, the family who owned the first oil palm plantation mustered support from the then governor Absalón Castellanos to reclaim his property invaded in 1986.

corporations and large landowners. *Ejidatarios* do not just welcome state support for oil palm but consider it to be their prerogative. The state thus shapes a process of agrarian change in which the social-sector considers state support for agro-industrialization not only as an opportunity but also as a right won through agrarian struggles and political negotiations.

## 6. THE 'TERMS OF INCORPORATION' IN OIL PALM PRODUCTION

In agroecology, industrial farming is often seen as detrimental to rural families. This raises the question as to why social-sector producers should enter oil palm production. The following quote reflects the view of an *ejidatario*, Don Chucho, in coastal Chiapas: 'We planted the [oil] palm; there was government support. At that moment, we were looking for something helpful in our *ejido*, we considered the different possibilities [at a community meeting] and judged that [oil palm] was our best option. And we were not wrong' (informal conversation, 4 April 2013, Xochicalco Nuevo). This quote reflects how this rural community consciously adopted oil palm as an alternative. Don Chucho recalled how they entered oil palm in 1991 and how he still regarded it as a good choice 22 years later. This view does not sit well with a critical agrarian change narrative that sees oil palm as necessarily leading to indebtedness and dependency. It questions the idea that industrial farming is neither economically profitable nor viable for peasants and small rural producers.

The oil palm sector has changed drastically in Chiapas over the course of three decades. Up until 1990, there was only one small processing mill adjoining the first oil palm plantation. The first *ejidatarios* producing oil palm found it very difficult to sell their produce. By 2014, there were eight processing mills in Chiapas: six in Soconusco (two of them owned by social-sector organizations) and two adjacent to the Lacandon rainforest (cf. Figure 1).<sup>11</sup> This development was due to the combination of macroeconomic circumstances and state intervention. Mexico's dependency on vegetable oil imports fuelled the development of the oil palm sector (according to Martínez 2010, Mexico imported 91% of its total vegetable oil consumption). Palm oil, the most important vegetable oil imported into Mexico between 2003 and 2013 (SIAVI 2014), became increasingly expensive as the commodity boom led to a fourfold price increase between 2000 and 2011 (Index Mundi 2014). Boosting national palm oil production was a way of reducing costs for the food industry. In these circumstances, the Chiapas government successfully incentivized the establishment of several palm oil mills. As a result of this, *ejidatarios* had more than one mill to choose from. Established mills were forced to compete for *ejidatarios*' produce by offering higher prices, farm gate collection and, occasionally, discounted fertilizers. In 2012, average net returns for the social-sector were US \$1,487 per hectare (Table 3), with a return for oil palm of US\$8,179 and US\$20,521 per year to the average *ejido* farm in Soconusco and the southern Lacandon rainforest, respectively. Economic returns are lower than those reported for Indonesia (Rist et al. 2010), but still considerable when compared to other crops.

The impact of a crop on rural livelihoods should not be measured by economic return alone. Prices can be highly volatile<sup>12</sup> and the type of linkages between rural producers and the processing industry also has to be taken into account. Oil palm only becomes productive after 3 years, during which there are significant expenses; once harvested, the produce must be processed within 48 hours. Because of these characteristics, the production of oil palm has been associated with producers' economic vulnerability. Producers may be tied to a single company in a long-term contract in order to ensure the rapid sale of their produce, and especially to access loans to cover initial production

<sup>11</sup> At the time of writing, a third processing mill was in construction in the Lacandon rainforest.

<sup>12</sup> The year 2012 was exceptionally good in terms of prices. In 2014, palm oil prices fell by 21 per cent (Index Mundi 2014).

Table 3. Net economic returns for mature oil palm (> 5 years old) in social-sector farms in 2012

	Incomes		Costs (US\$)						Net returns (US\$)
	Number of plots		Labour						
	Yields, 2012 (ha)	2012 FFB <sup>a</sup> price (US\$)	Inorganic fertilizers	Herbicides	Fuel	Weeding	Harvest		
Poor	32	17.2	2,021	16	16	160	49	54	1,828
Middle	50	15.6	1,833	21	15	230	64	52	1,482
Rich	27	13.6	1,598	11	9	684	83	40	733
Average		15.6	1,833	17	13	315	64	50	1,487

<sup>a</sup>FFB = Fresh Fruit Bunches of oil palm.

costs. In cases of harvest failure or market changes, producers may be unable to pay back their loans and thus become heavily indebted or even dispossessed of their land. This was not so common in Chiapas, where contracts and loans, binding producers to mills, only played a marginal role. State support, especially the provision of free oil palm seedlings and credit, permitted most *ejidatarios* to enter oil palm production as independent growers<sup>13</sup> and to sell their fruit to the highest bidder. Mills provided agrochemicals on credit but avoided excessive indebtedness, as they could not legally seize *ejido* land should the borrower default (see Castellanos-Navarrete and Jansen 2015). Under these circumstances, the public sector provided most of the credit to *ejidatarios* in oil palm production, often to organizations or groups of producers who could more easily renegotiate terms if necessary. State conditions for credit have been historically favourable for social-sector producers – for a long time, public credit was even considered to be an ‘unofficial’ subsidy (Mackinlay and de la Fuente 1996, 99) – and debts have often gone unpaid. To this day, government officials maintain a lax attitude towards peasants’ obligations to the state. For instance, when questioned what they did when a producer uprooted oil palm plants delivered and subsidized by the Chiapas government, an official responded: ‘The only thing we do is to arrive there and file a disaster report. [...] We haven’t adopted that drastic policy that says: You know what? You are out of all government support’ (interview with IRBIO official, 1 February 2012, Tuxtla Gutiérrez). This quote reflects how peasants can access state support with little fear of sanctions. These circumstances made *ejidatarios* in oil palm production less economically vulnerable than would otherwise have been the case.

There is a second reason why producers in Chiapas have been able to buffer possible economic pressure arising from their participation in oil palm production. The three key elements of peasant reproduction (land, labour and credit) are not fully dependent on markets. Land access in *ejidos* depends mainly on inheritance, and it cannot be considered as fully liberalized. In addition, oil palm producers, especially those in the southern Lacandon rainforest, have land available for other uses. Access to forests or swamps, along with small maize plots, which provide food (grains, game or fish) and, increasingly, income through payment for environmental services (paid by the government), reduce producers’ dependence on commodity markets. It is not through land but through labour that *ejidatarios* are more closely tied to markets. Most rural families are either buyers or sellers of labour, although many producers are able to mobilize labour from their families or neighbours in times of crisis. As argued before by Friedmann (1980), this partial commodification of key resources for livelihood making in Chiapas limits the reach of the ‘simple reproduction squeeze’ (i.e. the process by which peasants can become trapped in a cycle of indebtedness as commodity prices fall and/or production costs rise; Bernstein 1979, 427–9). The ability to resort to non-economic reproduction strategies such as shifting to food production for household consumption or resorting to family labour weakens the grip of economic pressure that producers might otherwise face in oil palm production.

In sum, participation in oil palm does not necessarily push *ejidatarios* into a cycle of debt. Whether or not this occurs depends on the specific ‘terms of incorporation’ (Borras et al. 2010) in which the state plays a key role. In the two study regions, social-sector participation in oil palm expansion took place under relatively advantageous terms of incorporation given state policies related to credit, land tenure and subsidies. While agro-industrialization can lead to highly negative outcomes for rural producers (Gruère and Sengupta 2011; Watts and Little 1994), the intervention of the state has often been crucial to ensure advantageous conditions of participation for poor producers (Carter et al. 1996). The lack of a simple reproduction squeeze makes it easier to explain why *ejidatarios* can be

<sup>13</sup> In some cases, social-sector organizations reached collective commercialization agreements with particular mills. Producers did not, however, always respect such agreements.

active agents in industrial farming. Their capacity to act was particularly evident in the following comment by an *ejidatario*:

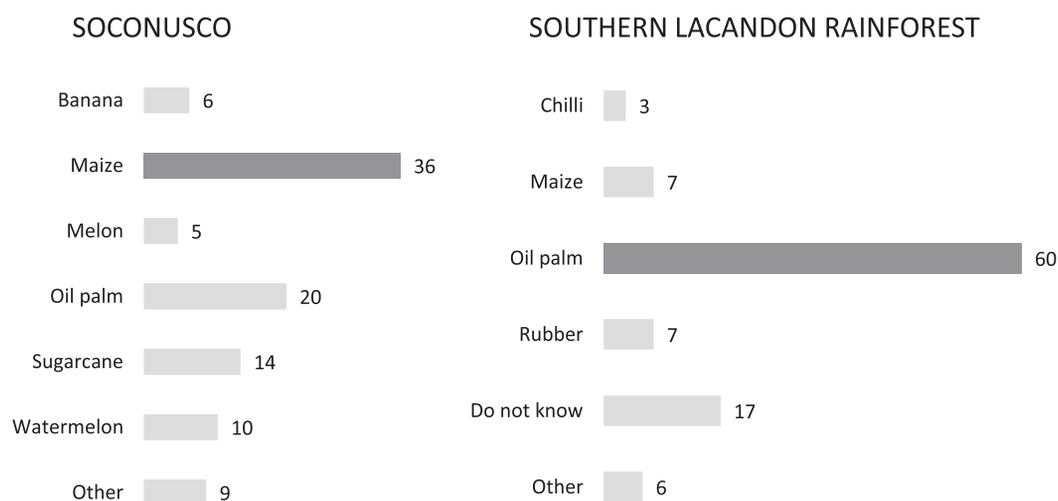
In [vegetable] oil we are not self-sufficient; because all that oil is imported. So then, to produce palm for oil is a business. I mean it is a business that has a long period ... that is going to have its long-term stability. As with any crop, at some point it will stagger, but you learn and by that time we should be ready for something else. (Informal conversation, 29 July 2013, Ejido Tzinacal).

This peasant was not alone in his assessment; many considered oil palm as something useful for the time being and aimed to profit from it as long as possible. They were well aware of possible threats to this sector posed by, for instance, pests or disease outbreaks or by possible collusion of economic players at the level of processing. The above quote does not mean that oil palm plots can be easily abandoned should circumstances change, but that these producers did not consider themselves to be captive to this crop through debts, contracts or its growth characteristics. We explore next, in more detail, the agency and rationale of *ejidatarios* engaged in oil palm production.

## 7. KNOWLEDGE AND AGRO-INDUSTRIALIZATION

Oil palm plots, including those of social-sector farmers in Chiapas, are a monotonous sight; rows and rows of palm trees planted at regular intervals in more or less straight lines. Only 3 per cent of producers combine oil palm with another tree crop, and 22 per cent temporarily intercrop oil palm with maize and bananas. The applied agrochemicals were mostly synthetic fertilizer and herbicides. Pests in oil palm are still rare in the region and *ejidatarios* only resorted to pesticides occasionally (interviews with oil palm producers). On average, *ejidatarios* added 30 kilograms of nitrogen, 20 kilograms of phosphorus and 28 kilograms of potassium per hectare each year. The social-sector applied on average 11.8 kilograms of herbicide (active ingredient) per hectare each year. Producer estimates indicated an unprecedented level of agrochemical usage in the southern Lacandon rainforest (Figure 2). This is largely accounted for by herbicides, since most palms were less than

Figure 2 Crops demanding the highest agrochemical usage according to oil palm producers



Source: Survey of 250 oil palm producers in the two study regions. Note: Data expressed as percentage of smallholders.

5 years old and still not large enough to shadow the forest floor and suppress weed growth. In Soconusco, producers estimated the use of agrochemicals in oil palm cultivation to be much lower, because of the greater maturity of the plantations and because other crops (even maize) are produced under high-input schemes. Regardless of the precise level of agrochemical usage, the simplicity of oil palm plots and the techniques employed in both regions reveal a strong agro-industrial rationale among oil palm producers.

A pertinent question concerns the extent to which this agro-industrial rationale was imposed on, rather than freely chosen or even developed by, social-sector producers. If imposed, this could occur through the so-called pesticide or agrochemical treadmill that operates at two levels: at the biophysical and at the institutional level. At the biophysical level, agrochemicals, particularly pesticides, are known to disrupt natural processes, leading to the need of ever-rising levels of agrochemical inputs (Weis 2010). While this is often the case in industrial farming, it is not yet so in oil palm production in Chiapas. Surveyed farmers produced oil palm with relatively low levels of agrochemical application (compared with, for example, vegetable farmers in Costa Rica; Galt 2008). Field observations and interviews indicated low pest incidence, limited to some palms affected by a few insects (e.g. *Rynchophorus palmarum*) and animals (i.e. moles in sandy soils, rats in former pastures), with no serious outbreaks reported. Unlike agro-industrial landscapes with large-scale monocultures elsewhere, oil palm in the study regions was part of a diversified landscape and mostly cultivated on diversified farms, especially in the southern Lacandon rainforest. Compared to large monocultures, heterogeneous landscapes normally contain a higher proportion of predatory insects that limit pest proliferation (Kremen and Miles 2012). Regardless of the specific reasons limiting pesticide applications, field research did not support the assumption that producers were forced into applying agrochemicals for biophysical reasons. Another question is the extent to which pesticides were imposed upon *ejidatarios* through institutional mechanisms.

At the institutional level, the two state programmes supporting the social-sector (i.e. the Productive Reconversion programme and the Humid Tropic programme) required the adoption of agro-industrial practices such as a high planting density that made long-term intercropping and agroforestry alternatives impossible. The Humid Tropic programme also relied on a technological package designed by the National Institute for Forestry, Agricultural and Livestock Research (INIFAP) that largely followed an agro-industrial production model (see Sandoval Esquivel n.d.). Technicians had to recommend the official technological package based on synthetic fertilizers and pesticides. Official recommendations ignored the possibility of employing agro-ecological techniques and their potential role in sustaining soil fertility or controlling pests. In this sense, there was a clear institutional bias in favour of an industrial farming model. Recommendations did, however, not translate into automatic compliance by *ejidatarios*. Oil palm producers rarely applied the level of inputs that were officially recommended. For instance, the amount of fertilizers applied was routinely inferior to the level recommended by INIFAP, as a scientist in this institution acknowledged with some frustration (informal conversation, 10 May 2013, Rosario Izapa). In interviews, *ejidatarios* explained this discrepancy by referring either to a lack of capital to buy inputs or to a lack of information about recommended practices. But the lack of compliance did not mean that producers rejected agro-industrial ideas.

Our findings suggest that many *ejidatarios* in the study regions willingly and knowingly followed the agro-industrial paradigm. During fieldwork, we found that many oil palm producers considered agro-industrial practices to be desirable or, at least, acceptable, as reflected in the following comment by an *ejido* producer in the southern Lacandon rainforest: 'If I had money, this [the floor] would be like a mirror [without weeds] to play marbles on wherever you want, and well fertilized, but you need to have [money], and it is not that I did not have any, but I got sick twice, everybody knows that I was very sick' (interview, 13 August 2012, La Victoria).

For this producer, the logic of an artificially smooth landscape was a desirable goal; he even felt it necessary to apologize for not having it. A positive attitude towards agro-industrialization was also evident in people's views of the first oil palm planter in Chiapas. While land struggles in Soconusco led peasants and former rural workers to scorn most landowners, they expressed respect for Johann Bernstorff, the landowner who initiated oil palm cultivation. His plantation was praised for being well organized, highly productive and as having a floor as 'clean' as a 'mirror'. The social-sector positively evaluated the agro-industrial paradigm followed by Bernstorff. The *ejidatarios* in the two study regions considered neatly weeded monocultures as a symbol of hard work.

The government's modernization agenda has without doubt influenced perceptions of what is adequate production and what is not. But this does not mean that agro-industrialization can be conceptualized as a set of external ideas that are uncritically followed by local people. The external modernization interventions combined well with a local work ethic based on physical labour and the capacity to transform nature, and with a local viewpoint that reinterpreted agro-industrialization as being equivalent to 'industriousness'. In other words, *ejidatarios* supported agro-industrialization for reasons of their own. Much of the underlying motivation was very practical, as in the following quotation from a wealthy *ejidatario* participating in environmental projects in the southern Lacandon rainforest:

[...] There is a need, really, to spray liquid [herbicide]. We are not just going to spray stupidly, because everything implies costs, it costs money. If it is a weed that can be uprooted, let's say, a weed with a root [versus one spreading laterally through stolons and rhizomes], then I say I am going to uproot it, there the weed dies. It never is going to regrow because I uprooted it ... but if we are pulling, who knows where the weed is [because it grows laterally], over there, we keep pulling, and a piece of weed remains there ... I think we will spray it. (Interview, 15 August 2012, López Mateos).

For this producer, the presence of persistent weeds justified the use of herbicides. Local knowledge depicted these herbicides as an effective technology for weed control and for helping producers to save both labour and money when compared to manual weeding.<sup>14</sup> For this reason, local people often derided those few producers who adopted agroecology or organic practices as 'fools' and mocked their techniques as ineffective or impractical. Likewise, peasant views rooted in the agro-industrial paradigm clashed with those of a group of state-related technicians in Soconusco who departed from the official technological package and promoted organic fertilization and the reduction of herbicide usage as a way of lowering production costs in oil palm production. Linking modernization to a specific social group seems unwarranted at this historical juncture (cf. Stone 2007). In Mexico, *ejido* producers have been participants in rural modernization projects for almost a century, starting with the Cárdenas' Cultural Revolution in the 1930s and later through Green Revolution efforts (see Cotter 2003). As a consequence, and while rural modernization efforts have often privileged private-sector producers (Hewitt de Alcántara 1978), *ejidatarios* in the study regions can be considered not only 'sons of the regime' but also 'sons of the Green Revolution' (or sons of rural modernization projects in general). In these circumstances, agro-industrialization cannot be regarded straightforwardly as external to the peasants' subjectivities, as agroecology often assumes. Both the implementation of agro-industrial or agro-ecological production is the outcome of a complex interaction between internal and external drivers to the peasantry.

<sup>14</sup> People knew that agrochemicals could cause health problems but were not deterred, regarding resistance to agrochemicals as proof of peasants' physical strength and vigour.

## 8. OIL PALM EXPANSION AS A CHALLENGE TO AGROECOLOGY

The above analysis of agro-industrialization in the oil palm sector in Chiapas presents a challenge to four notions prevalent in agroecology (at least in the agro-ecological literature that touches on social aspects). These interrelated notions concern types of knowledge (differences between local versus agro-industrial knowledge), social differentiation, dependence on inputs and peasant participation in oil palm as a form of deception.

With respect to knowledge, the revaluation of local knowledge by agroecology is a necessary response to development interventions that have dismissed local perceptions as a product of ignorance. Agroecology works on the premise that traditional smallholders possess a wealth of agro-ecological knowledge. For many scholars, traditional knowledge and complex farming techniques make smallholder practices clearly distinct from, or even antithetical to, industrial agriculture (e.g. Perfecto et al. 2009, 66). While agro-ecological studies make sophisticated and nuanced analyses of local knowledge (e.g. Barrera-Bassols and Zinck 2003), the messy process of knowledge development remains insufficiently addressed. Two aspects would require much more discussion: the role of agricultural 'performance' and the historical circumstances in which knowledge develops. Regarding performance, peasants gain knowledge through interaction with the environment; learning can take place not only when employing traditional farming techniques but also when using modern inputs such as herbicides. In this way, many producers can acquire a combination of agro-ecological and agro-industrial related knowledge. Also, the production of knowledge is a social activity, and it occurs as much through *campesino a campesino* (farmer-to-farmer) interaction as between smallholders and skilled technicians (Jansen and Vellema 2011; Toleubayev et al. 2010). A practice-based understanding of knowledge defies rigid categorizations such as that made between traditional peasants and agro-industrial minded technicians. Regarding knowledge development, and as pointed out by Nygren (1999), this does not occur in a vacuum but in particular historical circumstances. In this case, state efforts to modernize rural Mexico since the 1930s have strongly shaped local knowledge in *ejidos*. Just as ideology or power are not simply owned by particular social groups and imposed upon others, but constructed through social relations in concrete historical and material contexts (Eagleton 1991; Laclau and Mouffe 1985), it is important not to conceive a particular body of knowledge as the repertoire of a specific social group, but as built through social relations in particular contexts and, therefore, as hybrid and constantly in the making (see, e.g., Zimmerer 1996). The data presented above suggest that modernization ideologies cannot always be regarded as external to contemporary peasant subjectivities.

Turning to the second challenge, smallholders in agroecology tend to be conceptualized as a more or less coherent group, loosely articulated by tradition, ethnicity and local food production and in the process of being 'displaced' by modern food systems (Álvarez-Solis et al. 2012; Putnam et al. 2014). We agree that modern food systems can have very negative impacts on sustainable forms of peasant agriculture, but argue that peasants cannot be seen as neither located completely outside conventional forms of agriculture nor uniformly affected by it. To elucidate this further, we need to analyse systematically existing linkages between rural producers and commodity markets as well as related processes of social differentiation within the social-sector. Some scholars within agroecology certainly acknowledge the existing heterogeneity within the peasantry (e.g. Holt-Giménez and Altieri 2013), but the implications of internal class contradictions as a result of processes of accumulation from below (i.e. social differentiation within the peasant sector) are often overlooked. In Chiapas, many *ejidatarios* who shifted to oil palm were already dependent on markets for their reproduction (cf. Table 1). In this case, participation in oil palm did not mean a shift from self-sufficiency to exploitation, but a shift within the market. While it is too early to predict the consequences of this expansion for rural producers in the study regions, the impacts of agro-industrialization on rural

producers can be very diverse (Reardon et al. 2009), leading to multiple, and frequently contradictory, interests within the peasantry. Hence, paying more attention to social differentiation and the dynamics of peasant agriculture will strengthen agroecology's attempt to build more solid alternatives for rural development.

Third, the agroecology literature argues for low external input farming to avoid dependency. As the price of inputs rises and food prices fall, input dependence in industrial farming may lead to indebtedness of rural families and even dispossession (Rosset and Altieri 1997). Producers are then trapped in a 'treadmill of production' where, in order to remain competitive, they have to continually innovate (Galt 2014, 65). This observation has motivated advocacy for self-reliance and endogenous development (International Forum of Agroecology 2015). This is a politically relevant position in a context in which markets, especially speculative ones, impact negatively on the rural poor. It is also an ecologically relevant position given the environmental and health hazards caused by pesticides. However, this position might become problematic for two reasons. First, it assumes producers in industrial farming to be perfectly incorporated into markets, thereby ignoring processes of partial commodification and uneven development. *Ejido* land in Chiapas, for instance, is only partially commodified. Second, such a position ignores the possible role of the state in shaping the terms of incorporation (including, for example, the relative prices of agrochemicals, labour and output) in favour of rural producers. As well illustrated by the recent state support for food sovereignty in South America (McKay et al. 2014; Wittman and Blesh 2015), the state plays a crucial role in shaping market integration by rural producers (e.g. Grossman 1998). The case of oil palm expansion in Chiapas and elsewhere points to the need for agroecology to consider the concrete terms of small-holder incorporation at play in processes of agro-industrialization.

Fourth, while agroecology highlights the skills, knowledge and agency of peasants in traditional agriculture, it does not grant an equivalent level of agency to producers in industrial farming. Rural producers practising industrial farming are often portrayed as having been 'deceived' (or dominated by 'external interests'; CONABIO 2012), making them passive victims of agro-industrialization (see also Jansen 2015). Our findings above show that the social-sector in study regions knowingly and willingly engaged in oil palm production and in agro-industrial farming practices. *Ejidatarios* in Soconusco and in the southern Lacandon rainforest pressed themselves for state support rather than being duped by the state. Notions of knowledge as static, of industrial farming as external to peasants' subjectivities and of deception miss out the way in which peasants' agricultural knowledge, economic aspirations and politics might be compatible with agro-industrialization. For agroecology to overcome the industrial farming paradigm and be more responsive to rural needs, it has to acknowledge and understand the consciousness and agency of peasants embracing agro-industrialization.

## 9. CONCLUSIONS

The challenges that modernization and agro-industrialization pose for agroecology were poetically expressed by one *ejidatario*. When asked why everybody in Soconusco was turning to oil palm, he replied: 'because we [peasants] are full of illusions, hunger and vices' (interview, 19 January 2013, Colonia Hidalgo). His words reflected a desire to modernize and advance economically. Rather than a call to resist, his words spoke of peasants exercising some power to meet their needs and included a level of self-critique and acknowledgement of mistakes made rather than adhering to some archetypal purity. In this quote, *ejidatarios* involved in oil palm were not portrayed as passive victims. It is this agency and complexity that agroecology needs to bear in mind when drawing up development alternatives for peasant families.

In analysing oil palm expansion, we emphasized the importance of key ideas (i.e. the social differentiation of the peasantry, the role of the state, the terms of incorporation and rural ideology) from the field of agrarian studies in order to identify which producers shifted to oil palm in southern Mexico and why. The *ejidatarios* in Chiapas who shifted to oil palm were already incorporated into markets – by selling crops, cattle or their own labour. They accepted, or, sometimes, actively sought, agrochemicals and market incorporation to improve their livelihoods. This type of producer does not easily fit with agro-ecological conceptions of smallholders as producers of low-input local food. In Chiapas, *ejidatarios* opted for agro-industrialization as the terms of incorporation were more favourable than adverse. This shift also took place in a context of state support for the agrarian modernization of the peasantry under a land tenure system (*ejidos*) that constrained the full commoditization of land. This paper suggests that agroecology, either as a science or as a movement (Wezel et al. 2009), would be better able to build development alternatives if it were to bring in the theoretical tools and lessons provided by the field of critical agrarian studies.

In conclusion, oil palm expansion in Chiapas presents four challenges to agroecology. First, agroecology needs to address a peasant sector that adopts both agro-ecological and agro-industrial techniques. Second, it needs to acknowledge that rural producers are a heterogeneous sector encompassing a wide array of contradictory interests. In this sense, it is important for agroecology to question the assumption that the peasantry is automatically aligned with an agro-ecological viewpoint but may *potentially* hold such a worldview if properly approached. The third notion, which questions the idea that industrial farming is always detrimental to peasants, calls for a better understanding of industrial farming within agroecology and for more effective strategies for ensuring the uptake of sustainable practices in a context of agro-industrialization (see also Woodhouse 2010). And fourth, it is important to understand how agro-industrialization appeals to peasants by solving some of their problems. Our results do, however, leave many questions unanswered: Should agroecology provide better alternatives to producers already engaged in agro-industrialization? Should efforts be expanded to make oil palm production agro-ecological? And if not, why not? Or should agro-ecologists restrict their focus to traditional subsistence smallholders? Should the paradigm more readily embrace new technologies and markets, as some producers do? And which technologies or markets should be selected and why? These are difficult questions to answer, but are an important part of the debate over the development of a stronger agroecology.

## REFERENCES

- Akram-Lodhi, A.H. and C. Kay, 2010. 'Surveying the Agrarian Question (Part 2): Current Debates and Beyond'. *The Journal of Peasant Studies*, 37 (2): 255–284.
- Altieri, M.A. and V.M. Toledo, 2011. 'The Agroecological Revolution in Latin America: Rescuing Nature, Ensuring Food Sovereignty and Empowering Peasants'. *The Journal of Peasant Studies*, 38 (3): 587–612.
- Álvarez-Solis, D.A., N. León-Martínez, P.T. Díaz-Santana, J.A. Mendoza-Yúñez, Y. Pérez-Luna and R. Muñoz-Arroyo, 2012. 'Innovación agroecológica para la producción de cultivos básicos: respuesta de los productores campesinos a la crisis'. In *La otra innovación para el ambiente y la sociedad en la frontera sur de México*, eds E. Bello Baltazar, E.J. Naranjo Piñera and R. Vandame, 94–105. San Cristóbal de Las Casas: El Colegio de la Frontera Sur (ECOSUR).
- Astier, M., L. García-Barrios, Y. Galván-Miyoshi, C.E. González-Esquivel and O.R. Masera, 2012. 'Assessing the Sustainability of Small Farmer Natural Resource Management Systems: A Critical Analysis of the MESMIS Program (1995–2010)'. *Ecology and Society*, 17 (3): 25.
- Barrera-Bassols, N. and J.A. Zinck, 2003. 'Ethnopedology: A Worldwide View on the Soil Knowledge of Local People'. *Geoderma*, 111 (3): 171–195.
- Bernstein, H., 1979. 'African Peasantries: A Theoretical Framework'. *The Journal of Peasant Studies*, 6 (4): 420–443.
- Bernstein, H., 2010. *Class Dynamics of Agrarian Change*. Halifax, NS: Fernwood/Sterling, VA: Kumarian Press.
- Borras, S.M., Jr., P. McMichael and I. Scoones, 2010. 'The Politics of Biofuels, Land and Agrarian Change: Editors' Introduction'. *The Journal of Peasant Studies*, 37 (4): 575–592.

- Carter, M.R., B.L. Barham and D. Mesbah, 1996. 'Agricultural Export Booms and the Rural Poor in Chile, Guatemala, and Paraguay'. *Latin American Research Review*, 31 (1): 33–65.
- Castellanos-Navarrete, A., 2015. *Illusions, Hunger and Vices: Smallholders, Environmentalism and the Green Agrarian Question in Chiapas' Biofuel Rush*. PhD dissertation. Wageningen: Wageningen University.
- Castellanos-Navarrete, A. and K. Jansen, 2015. 'Oil Palm Expansions without Enclosure: Smallholders and Environmental Narratives'. *The Journal of Peasant Studies*, 42 (3–4): 791–816.
- Castellanos-Navarrete, A., P. Tittone, M.C. Rufino and K.E. Giller, 2015. 'Feeding, Crop Residue and Manure Management for Integrated Soil Fertility Management – A Case Study from Kenya'. *Agricultural Systems*, 134: 24–35.
- Chappell, M.J., H. Wittman, C.M. Bacon, B.G. Ferguson, L.G. Barrios, R.G. Barrios, D. Jaffee, J. Lima, V.E. Méndez, H. Morales, L. Soto-Pinto, J. Vandermeer and I. Perfecto, 2013. 'Food Sovereignty: An Alternative Paradigm for Poverty Reduction and Biodiversity Conservation in Latin America'. *F1000Research*, 2 (235): 17.
- CONABIO, 2012. *Programa Especial para la Conservación, Restauración y Aprovechamiento Sustentable de la Selva Lacandona: informe 2011*. México, D.F: Comisión Nacional para el Conocimiento y Uso de la Biodiversidad.
- CONAFRUT, 1992. *Convenio entre la Comisión Nacional de Fruticultura (CONAFRUT) y el Ejido Luis Espinosa 'El Arenal'*. Tuxtla Gutiérrez: Archivo Histórico del Gobierno del Estado.
- Cordoba, D. and K. Jansen, 2014. 'The Return of the State: Neocollectivism, Agrarian Politics and Images of Technological Progress in the MAS Era in Bolivia'. *Journal of Agrarian Change*, 14 (4): 480–500.
- Cotter, J., 2003. *Troubled Harvest: Agronomy and Revolution in Mexico, 1880–2002*. Westport, CT: Praeger.
- de Vos, J., 2002. *Una tierra para sembrar sueños: historia reciente de la Selva Lacandona, 1950–2000*. México, D.F: Fondo de Cultura Económica (FCE) and Centro de Investigaciones and Estudios Superiores en Antropología Social (CIESAS).
- Eagleton, T., 1991. *Ideology*. London: Verso.
- Eakin, H., J.C. Bausch and S. Sweeney, 2014. 'Agrarian Winners of Neoliberal Reform: The 'Maize Boom' of Sinaloa, Mexico'. *Journal of Agrarian Change*, 14 (1): 26–51.
- Fletes Ocón, H.B., 2009. 'La reinención de una vocación regional agroexportadora: el corredor costero de Chiapas'. *LiminaR*, 7 (2): 164–183.
- Fondo Chiapas, 2009. *Memorandum número SE/UAJ/153/09*. Tuxtla Gutiérrez: Archivo Histórico del Gobierno del Estado.
- Friedmann, H., 1978. 'World Market, State, and Family Farm: Social Bases of Household Production in the Era of Wage Labor'. *Comparative Studies in Society and History*, 20 (4): 545–586.
- Friedmann, H., 1980. 'Household Production and the National Economy: Concepts for the Analysis of Agrarian Formations'. *The Journal of Peasant Studies*, 7 (2): 158–184.
- Galt, R.E., 2008. 'Pesticides in Export and Domestic Agriculture: Reconsidering Market Orientation and Pesticide Use in Costa Rica'. *Geoforum*, 39 (3): 1378–1392.
- Galt, R.E., 2014. *Food Systems in an Unequal World: Pesticides, Vegetables and Agrarian Capitalism in Costa Rica*. Tucson, AR: University of Arizona Press.
- García de León, A., 1997. *Resistencia y utopía: memorial de agravios y crónicas de revueltas y profecías acaecidas en la Provincia de Chiapas durante los últimos quinientos años de su historia*. México, D.F: Ediciones ERA.
- Gobierno del Estado, 1984. *Oportunidad de inversión industrial en el Estado de Chiapas*. Coordinación General de Comercialización y Fomento Industrial del Estado de Chiapas (COFICH). Tuxtla Gutiérrez: Archivo Histórico del Gobierno del Estado de Chiapas.
- Gobierno del Estado, 1992. *Contrato de donación de planta extractora*. Tuxtla Gutiérrez: Archivo Histórico del Gobierno del Estado de Chiapas.
- Gobierno del Estado, n.d. *Solid Opportunity for Investment. Agricultural year: 1997, Secretariat of Economic Development, Industrial Development Office*. Tuxtla Gutiérrez: Archivo Histórico del Gobierno del Estado de Chiapas.
- Gonzalez de Molina, M., 2013. 'Agroecology and Politics. How To Get Sustainability? About the Necessity for a Political Agroecology'. *Agroecology and Sustainable Food Systems*, 37 (1): 45–59.
- GRAIN, 2006. *Sustainable Monoculture? No Thanks! Debunking Agribusiness Greenwash. Against the Grain*, June. Barcelona: GRAIN.
- Gray, L. and B. Dowd-Urbe, 2013. 'A Political Ecology of Socio-Economic Differentiation: Debt, Inputs and Liberalization Reforms in Southwestern Burkina Faso'. *The Journal of Peasant Studies*, 40 (4): 683–702.
- Grossman, L.S., 1998. *The Political Ecology of Bananas: Contract Farming, Peasants, and Agrarian Change in the Eastern Caribbean*. Chapel Hill, NC: The University of North Carolina Press.
- Gruère, G. and D. Sengupta, 2011. 'Bt Cotton and Farmer Suicides in India: An Evidence-Based Assessment'. *The Journal of Development Studies*, 47 (2): 316–337.
- Hewitt de Alcántara, C., 1978. *La modernización de la agricultura mexicana 1940–1970*. México, D.F: Siglo XXI.
- Holt-Giménez, E. and M.A. Altieri, 2013. 'Agroecology, Food Sovereignty, and the New Green Revolution'. *Agroecology and Sustainable Food Systems*, 37 (1): 90–102.

- Index Mundi, 2014. *Palm Oil and Nitrogen Fertiliser Prices Between the Year 2000 and the Year 2014*, <http://www.indexmundi.com> (accessed 19 December 2014).
- INEGI, 2007. *Censo agrícola, ganadero y forestal 2007*. Aguascalientes: Instituto Nacional de Estadística y Geografía.
- International Forum of Agroecology, 2015. *Declaration of the International Forum of Agroecology*. Mali: Nyéléni.
- Isakson, S.R., 2009. 'No hay ganancia en la milpa: The Agrarian Question, Food Sovereignty, and the On-Farm Conservation of Agrobiodiversity in the Guatemalan Highlands'. *The Journal of Peasant Studies*, 36 (4): 725–759.
- Jansen, K., 2009. 'Implicit Sociology, Interdisciplinarity and Systems Theories in Agricultural Science'. *Sociologia Ruralis*, 49 (2): 172–188.
- Jansen, K., 2015. 'The Debate on Food Sovereignty Theory: Agrarian Capitalism, Dispossession and Agroecology'. *The Journal of Peasant Studies*, 42 (1): 213–232.
- Jansen, K. and S. Vellema, 2011. 'What is Technography?' *NJAS – Wageningen Journal of Life Sciences*, 57 (3–4): 169–177.
- Jaros, L., 2012. 'Growing Inequality: Agricultural Revolutions and the Political Ecology of Rural Development'. *International Journal of Agricultural Sustainability*, 10 (2): 192–199.
- Klooster, D., 2003. 'Campesinos and Mexican Forest Policy during the Twentieth Century'. *Latin American Research Review*, 38 (2): 94–126.
- Kremen, C. and A. Miles, 2012. 'Ecosystem Services in Biologically Diversified Versus Conventional Farming Systems: Benefits, Externalities, and Trade-Offs'. *Ecology and Society*, 17 (4): 40.
- Laclau, E. and C. Mouffe, 1985. *Hegemony and Socialist Strategy: Towards a Radical Democratic Politics*. London: Verso.
- McCarthy, J.F., 2010. 'Processes of Inclusion and Adverse Incorporation: Oil Palm and Agrarian Change in Sumatra, Indonesia'. *The Journal of Peasant Studies*, 37 (4): 821–850.
- McCarthy, J.F. and R.A. Cramb, 2009. 'Policy Narratives, Landholder Engagement, and Oil Palm Expansion on the Malaysian and Indonesian Frontiers'. *The Geographical Journal*, 175 (2): 112–123.
- McCarthy, J.F., P. Gillespie and Z. Zen, 2012. 'Swimming Upstream: Local Indonesian Production Networks in 'Globalized' Palm Oil Production'. *World Development*, 40 (3): 555–569.
- McKay, B., R. Nehring and M. Walsh-Dillely, 2014. 'The "State" of Food Sovereignty in Latin America: Political Projects and Alternative Pathways in Venezuela, Ecuador and Bolivia'. *The Journal of Peasant Studies*, 41 (6): 1175–1200.
- Mackinlay, H., 2004. 'Los empresarios agrícolas y ganaderos y su relación con el Estado mexicano en la época del Partido Revolucionario Institucional'. *Polis*, 2 (04): 113–143.
- Mackinlay, H. and J. de la Fuente, 1996. 'Las reformas a la legislación y a la política crediticia relativas al medio rural'. In *La sociedad rural mexicana frente al nuevo milenio, volumen III: el acceso a los recursos naturales y el desarrollo sustentable*, eds H. Mackinlay and E. Boege, 81–115. México, D.F: Plaza y Valdés.
- Martínez, M.A.F., 2010. 'Dependencia en oleaginosas'. *El Economista*, 24 August.
- Méndez, V.E., C.M. Bacon and R. Cohen, 2013. 'Agroecology as a Transdisciplinary, Participatory, and Action-Oriented Approach'. *Agroecology and Sustainable Food Systems*, 37 (1): 3–18.
- Moseley, W.G., 2005. 'Global Cotton and Local Environmental Management: The Political Ecology of Rich and Poor Small-Hold Farmers in Southern Mali'. *The Geographical Journal*, 171 (1): 36–55.
- Nygren, A., 1999. 'Local Knowledge in the Environment–Development Discourse: From Dichotomies to Situated Knowledges'. *Critique of Anthropology*, 19 (3): 267–288.
- Perfecto, I., J.H. Vandermeer and A.L. Wright, 2009. *Nature's Matrix: Linking Agriculture, Conservation and Food Sovereignty*. London: Earthscan.
- Putnam, H., W. Godek, S. Kissmann, J.L. Pierre, S.H. Alvarado Dzul, H. Calix de Dios and S.R. Gliessman, 2014. 'Coupling Agroecology and PAR to Identify Appropriate Food Security and Sovereignty Strategies in Indigenous Communities'. *Agroecology and Sustainable Food Systems*, 38 (2): 165–198.
- Reardon, T., C.B. Barrett, J.A. Berdegue and J.F. Swinnen, 2009. 'Agrifood Industry Transformation and Small Farmers in Developing Countries'. *World Development*, 37 (11): 1717–1727.
- Reyes Ramos, M.E., 1992. *El reparto de tierras y la política agraria en Chiapas, 1914–1988*. México, D.F: Universidad Nacional Autónoma de México.
- Ríos Ramírez, C., 2008. 'La UNORCA ante la crisis global de alimentos y los agrocombustibles'. In *Foro: crisis alimentaria, agrocombustibles y agricultura campesina, 25 July 2008*. San Cristóbal de Las Casas: UNORCA Chiapas.
- Rist, L., L. Feintrenie and P. Levang, 2010. 'The Livelihood Impacts of Oil Palm: Smallholders in Indonesia'. *Biodiversity and Conservation*, 19 (4): 1009–1024.
- Rosset, P.M. and M.A. Altieri, 1997. 'Agroecology versus Input Substitution: A Fundamental Contradiction of Sustainable Agriculture'. *Society & Natural Resources*, 10 (3): 283–295.
- Ruiz Rosado, O., 2006. 'Agroecología: una disciplina que tiende a la transdisciplina'. *Interciencia: Revista de Ciencia y Tecnología de América*, 31 (2): 140–145.
- Saldaña, J., 2012. *The Coding Manual for Qualitative Researchers*. London: SAGE Publications.

- Sandoval Esquivel, A., n.d. 'Paquete tecnológico palma de aceite (*Alaéis guinnensis* Jacq.) [sic] – establecimiento y mantenimiento'. In *Programa estratégico para el desarrollo rural sustentable de la región sur-sureste de México: Trópico Húmedo 2011*. México, D.F: Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (SAGARPA).
- SIAP–SAGARPA, 2015. *Oil Palm Surfaces for the Period Between 2000 and 2014*. México, D.F: Servicio de Información Agroalimentaria y Pesquera (SIAP) de la Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (SAGARPA).
- SIAVI, 2014. *Capítulo 15, Partidas 1507, 1508, 1509, 1510, 1511, 1512, 1513, 1514 y 1515*. México, D.F: Sistema de Información Arancelaria Via Internet (SIAVI) de la Secretaría de Economía (SE).
- Singelmann, P. (ed.), 1995. *'Mexican Sugarcane Growers: Economic Restructuring and Political Options'*. San Diego, CA: Center for US-Mexico Studies, University of California San Diego.
- Stone, G.D., 2007. 'Agricultural Deskilling and the Spread of Genetically Modified Cotton in Warangal'. *Current Anthropology*, 48 (1): 67–103.
- Timmermann, C. and G.F. Félix, 2015. 'Agroecology as a Vehicle for Contributive Justice'. *Agriculture and Human Values*, 32 (3): 523–538.
- Tittonell, P., 2014. 'Ecological Intensification of Agriculture – Sustainable by Nature'. *Current Opinion in Environmental Sustainability*, 8: 53–61.
- Toledo, V.M., 1990. 'The Ecological Rationality of Peasant Production'. In *Agroecology and Small Farm Development*, eds M. A. Altieri and S.B. Hecht, 51–58. Boca Raton, FL: CRC Press.
- Toleubayev, K., K. Jansen and A. van Huis, 2010. 'Knowledge and Agrarian De-collectivisation in Kazakhstan'. *The Journal of Peasant Studies*, 37 (2): 353–377.
- Tomich, T.P., S. Brodt, H. Ferris, R. Galt, W.R. Horwath, E. Kebreab, J.H. Leveau, D. Liptzin, M. Lubell and P. Merel, 2011. 'Agroecology: A Review from a Global-Change Perspective'. *Annual Review of Environment and Resources*, 36: 193–222.
- van der Ploeg, J.D., 2009. *The New Peasantries: Struggles for Autonomy and Sustainability in an Era of Empire and Globalization*. London: Routledge.
- Vergara-Camus, L., 2009. 'The Politics of the MST: Autonomous Rural Communities, the State, and Electoral Politics'. *Latin American Perspectives*, 36 (4): 178–191.
- Warman, A., 1973. *Los campesinos: hijos predilectos del régimen*. México, D.F: Nuestro Tiempo.
- Watts, M.J. and P.D. Little, 1994. 'Life under Contract: Contract Farming, Agrarian Restructuring, and Flexible Accumulation'. In *Living under Contract: Contract Farming and Agrarian Transformation in Sub-Saharan Africa*, eds P.D. Little and M.J. Watts, 21–77. Madison, WI: The University of Wisconsin Press.
- Weis, T., 2010. 'The Accelerating Biophysical Contradictions of Industrial Capitalist Agriculture'. *Journal of Agrarian Change*, 10 (3): 315–341.
- Wezel, A., S. Bellon, T. Doré, C. Francis, D. Vallod and C. David, 2009. 'Agroecology as a Science, a Movement and a Practice: A Review'. *Agronomy for Sustainable Development*, 29 (4): 503–515.
- Wittman, H. and J. Blesh, 2015. 'Food Sovereignty and Fome Zero: Connecting Public Food Procurement Programmes to Sustainable Rural Development in Brazil'. *Journal of Agrarian Change*. DOI:10.1111/joac.12131.
- Wolford, W., S.M.J. Borras, R. Hall, I. Scoones and B. White, 2013. 'Governing Global Land Deals: The Role of the State in the Rush for Land'. *Development and Change*, 44 (2): 189–210.
- Woodhouse, P., 2010. 'Beyond Industrial Agriculture? Some Questions about Farm Size, Productivity and Sustainability'. *Journal of Agrarian Change*, 10 (3): 437–453.
- Worby, E., 1995. 'What Does Agrarian Wage-Labour Signify? Cotton, Commoditisation and Social Form in Gokwe, Zimbabwe'. *The Journal of Peasant Studies*, 23 (1): 1–29.
- Zimmerer, K.S., 1996. *Changing Fortunes: Biodiversity and Peasant Livelihood in the Peruvian Andes*. Berkeley, CA: University of California Press.