

The effects of war on cropping systems: A study of two zones in Nicaragua

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1 INTRODUCTION

This paper examines the effect of war on the cropping systems of two regions of Nicaragua. Nicaragua is a Central American country with a population of 4,252,382. It covers a surface area of 131,811 km² and with more than 10,000 km² of freshwater lakes it can be described as a country of lakes and volcanoes' (INEC,1992; Incer, 1963).

The paper begins with a review of the war in Nicaragua and then looks at the two regions, Jalapa and Pancasán. Interviews with local farmers and agricultural development personnel were conducted in both regions, and data is presented on changes in crops grown which took place during and after the war. Varietal diversity, varietal loss and sources of seed are discussed. Finally, the findings from these two regions are placed in the context of changes which took place in the country as a whole. The conclusion summarises the main findings of the paper and points to the need for more concerted attention to be paid to the effects of wars on farming systems at the time that the wars themselves are underway. This will help ensure that any policy responses are as well informed and effective as possible.

2 WAR IN NICARAGUA

During the 1970s, a revolutionary war was staged in Nicaragua between the Sandinista National Liberation Front (FSLN) and the Anastasio Somoza dictatorship. This started as a guerrilla war in the mountains but fighting eventually spread through popular insurrection to all main cities in the country. Finally, on 19th July 1979, a popular movement lead by FSLN managed to defeat the National Guard and Somoza dictatorship and established a revolutionary government (López, 1979).

With the coming to power of the FSLN, Nicaragua started to experience a series of profound military, political, economic and social changes: a new army was formed; farm workers, farmers and other popular sectors were organised; the properties of those allied with Somoza were confiscated; and banks and commerce were nationalised. Land was redistributed to the peasants, ushering in new forms of property and rural production relations. Large numbers of illiterate people were taught to read and write and a strong ideological campaign was waged against the traditional values of society which had developed under the Somoza regime (1933-79). The state was strengthened: public money was poured into education, health, housing, food, and agricultural production and strong links were developed with the socialist block.

However, only months after the revolutionary war had finished a new war broke out. The counter-revolutionary war of the 1980s arose from the resistance of different sectors of the population to the economic, social and political changes imposed by the FSLN. It was instigated by exiled members of the National Guard who had fled to neighbouring countries. With the assistance of the US Government and the Central Intelligence Agency (CIA), these groups established sanctuaries in Honduras, the northern neighbour of Nicaragua. From here they entered Nicaraguan territory in small groups and, over the next eight years, managed to develop into a formidable, irregular army. They were joined by supporters of the previous regime who had remained in Nicaragua and, later, by a significant number of peasants and indigenous peoples who rejected the new administrative policies and style of revolutionary power.

At the beginning of this second war the counter-revolutionary forces (Contras), inspired by recent memories of the successful FSLN insurrection, aimed to form an internal front in Nicaragua's cities. They did not, however, find adequate support in the cities. They therefore moved to the rural sector seeking support from the peasantry, especially in the remote agricultural regions (along the frontiers with Honduras and Costa Rica and in the interior of the country). In practical terms, the counter-revolutionary war started, developed and escalated in rural Nicaragua, the home of the Nicaraguan peasant (Reiman, 1987).

Peasant members of the counter-revolutionary forces attacked agricultural cooperatives and state farms as well as other peasants who had allied themselves to the Sandinista revolution. They also fought against the Sandinista Army which was defending strategic sites such as health centres, grain deposits and rural schools.

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The major fighting took place in areas of vital economic interest for the country: peasant populations in these areas produced most of the food grains (maize, beans and rice) and cattle upon which the country relied. These mountainous areas were also key for the production of coffee, Nicaragua's principal export crop. In total, the peasant areas under attack from the Contras produced 66% (by value) of the country's internal consumption products and 30% (by value) of export production (Nunez *et al.*, 1995). By 1988, 50% of the rural population was significantly affected by the war (CIERA, 1989).

How did the counter-revolutionary war of 1981-89 - this prolonged armed conflict among the peasants - affect them, their crops and production systems? In this article, we examine one war zone, Jalapa, in detail and draw comparisons with another war zone, Pancasán. In neither zone was an exhaustive study conducted. Instead a three-pronged approach to understanding the issues was adopted: (i) available documents — mostly grey literature — were reviewed; (ii) comments were invited from professionals who had worked in the agriculture sector in these areas during the war; and (iii) peasants from each area were interviewed to gather their opinions on the effects of war on their cropping systems.

3 THE JALAPA REGION; PEE- AND POST-WAR COMPARISONS

The municipality of Jalapa lies in the extreme north corner of the Department of Nueva Segovia. The township of Jalapa is situated in the centre of a valley, southwest of the Dipilto mountain range, 300 km north of Nicaragua's capital, Managua. The area consists of a flat valley surrounded by mountainous terrain which is difficult to access. The soils and climate (average temperature 23-24° C, annual rainfall of 1,400 mm during eight months) are suitable for the cultivation of coffee, food grains, and various other crops. Cattle are also kept. There are 40,016 people living in the Jalapa area, 71% of whom live in rural areas. The average population density is 64 person/km² (INEC, 1995).

From March 1982 until the end of 1987, Jalapa was the 'hot spot' of the counter-revolutionary war. The area was coveted by the Contras and was the target of the early 1982 plan entitled 'Silent war — Strategies of terror'. This developed into 'Plans of Sierra' during 1983-84 and later into other plans and operations, each one more brutal and damaging than the last.

'The counter-revolutionary forces could never occupy or enter Jalapa by force, but definitely made it impossible for the farmers to attend to their crops such as coffee, plantains, oranges or beans which were growing in little plantations arranged high on the hillsides. The regular ambushes, destruction of fragile bridges, mining of corn fields and walkways, burning of jeeps and tractors, and killing of technicians, peasant leaders and travellers all added up so that agricultural activities, even in the valley, couldn't be carried out at a normal pace.'

This description was provided by Porfirio Zepeda, a dedicated young agronomist who, in early 1982, found himself in the middle of a war when all he wanted to do was to work for the Ministry of Agriculture and help promote agricultural development in Jalapa.

As the war spread more widely in the territories along the 100 km frontier with Honduras, the local authorities started to move those families living in remote areas to rural settlements situated in the interior of the Jalapa valley. El Escambray, La Estancia, and Santa Cruz were built overnight to accommodate the displaced families. According to Leda Valenzuela, a sociologist who worked as the chief of the Territory in Jalapa, most of the displaced families who came to live, in the settlements were poor peasants with small land holdings, or simply families of landless daily wage earners. They grew coffee, maize and beans and took care of cattle or grew small-scale crops in their backyards.

There was massive displacement of peasants in the Jalapa valley. Around 6,000 peasants and rural workers fled to Honduras in fear of the war and around 1,000 families (7,000 persons) were mobilised to live in six rural settlements. These people were not only obliged to start a new life for themselves but also to participate in the 10,000 strong militia which, with the Sandinista Army, defended Jalapa (MIDINRA, 1983).

In a recent interview with a group of peasant families in the Jalapa valley, we found that about 50% of the residents of the rural settlements had been relocated from within the same area while the rest came from more far-flung regions. About 87% had arrived from war-affected zones, whereas 13% came from relatively peaceful areas, possibly looking for land to work. Fortunately, all were resettled with their families.

FSLN, and its influence on popular organisations in the area, had a profound effect on the Jalapa valley. A coordinated territorial plan was developed, the main components of which were:

- massive distribution of arms to peasants allied with FSLN;
- immediate distribution of good cultivable land - formerly the property of large landowners allied to the Somoza regime - to relocated families;
- prioritised technical assistance and supply of agricultural inputs through the Ministry of Agriculture and Land Reform (MIDINRA);
- the provision of reliable healthcare;
- assistance with meeting food needs by Social Security;
- a strong political presence and continued work of FSLN base committees to secure growth of the party;
- promotion of the work of popular organisations, especially UNAG (the National Association of Small and Medium Farmers); and
- the promotion of house construction by residents themselves.

'Because of the immensity of the emergency plan of Jalapa, the whole country converged on Jalapa: battalions of voluntary militias from all parts of the country, brigades of technicians and

professionals of education, agriculture and health, and members of the army all got tied up together in a coordinated local plan of defence and development, remembers Leda Valenzuela.

The MIDINRA technicians worked as the administrators of the agricultural production system. They organised the peasants into cooperatives, operated the Project for Food Grains Production of Jalapa (SPAVJ) and coordinated efforts with the state enterprises in charge of tobacco and cattle production.

'A detailed study was conducted on soil and water use, climate, land tenancy. Detailed plans were drawn out, highly mechanised systems of modern production of maize, rice and potatoes were put into use: tractors ploughing the land, aeroplanes spraying pesticides and mechanical harvesters bringing in the million of quintals of corn. The whole population was involved- some in defence, some in production, some lobbying in heated discussions in the cities when supplies fell short in Jalapa,' wrote Porferio Zepeda.

Unlike other areas of Nicaragua, the war did not cause Jalapa to be abandoned. Rather, this became a unique area in which the war and efforts to combat it became deeply mixed up.

4. CHANGES IN CROPPING SYSTEMS IN JALAPA

The authors visited Jalapa in mid-April 1997 and talked to 29 farmers, including 11 women. These farmers were asked to try to recall and compare the way they had been growing crops since 1989: before the war broke out, when they were moved into settled cooperatives during the war and, finally, after the war was over. The interviews provided insights into broad changes in farmers' cropping systems. Pre-war the important crops in the Jalapa area were coffee, tobacco, maize and beans.

Of these, coffee and tobacco lost their importance during the war (see Table 1).

Coffee

The change in the importance of coffee is easily understood. Coffee is normally grown on the upper slopes of the hillsides in this area, under the shade of naturally occurring big trees (a traditional Nicaraguan system).

'The access to these plantations during the war was not only difficult because of the distance and bad roads, but the chances that one would be attacked or kidnapped by the Contras was also very high. So almost no one maintained their coffee plantations. The only time we ventured to go in was during the harvest when the brigades and the militia would get organised to bring out the grains,' remembers Antonio Ballardes, a native of Jalapa. *'The coffee plantations are still there, but they are lost to the pests and weeds: it will be a hard work to recover them'.*

In a recent training workshop with the agricultural promoters of the Coffee Growers' Enterprise (PRODECOOP) it was confirmed that failure to carry out the normal cultural practices such as pruning, gleaning of berries and weeding had led to a high incidence of pests and disease; coffee rust and coffee berry borer were more prevalent in Jalapa than in many other parts of the country (CATIE, 1997). There are, however, signs that coffee is being taken up again as a priority crop by some local farmers' associations with the support of national NGOs. The intention is to promote the production and export of organic coffee as, in most of the coffee plantations, no chemical fertilisers or pesticides have been used for the last eight years or so (PRODECOOP, 1996). One way of turning the effects of the war to the advantage of small farmers may have been found.

Table 1. Changes in cropping pattern in Jalapa, Nueva Segovia (1975-95)
The views of peasants of the area

Crops grown and harvested in the area	% of interviewed peasants involved in the crops (n=29)		
	Before the war (1975-80)	During the war (1980-90)	After the war (1990-95)
Coffee	48% *	12%	20%
Tobacco	62% *	12%	50%**
Potato	0%	24%	0%
Cattle	12% *	0%	0%
Rice	12%	24%	0%
Chilies	12%	0%	0%
Cooking bananas	12%	0%	0%
Peanuts	0%	0%	12%
Cocoa	0%	0%	12%
Maize	75%	100%	100%
Beans	75%	100%	100%

* Peasants involved either as hired labour or owners

** Peasants under contract to tobacco companies

Tobacco

The case of tobacco is quite different. Local tobacco varieties (*Chilcagre* and *Copan*) had been grown in the area since pre-Colombian times, with people using the leaves for making cigars which were sold at village shops. In the 1940s, Virginia tobacco (Burley) was introduced to the area by an international cigarette manufacturing company (TANIC), and in the 1960s exiled Cubans settled in the area and promoted the production of dark tobacco (*tabaco negro*) for manufacturing cigars. Along with them came the merciless technology of soil sterilisants and excessive use of synthetic pesticides. Tobacco provided a classic example of the way in which modern agriculture is conducted: local farmers were converted into obedient farm hands, carrying out the orders dictated by the company technicians.

'The exodus of these companies and their technicians with the arrival of the FSLN had a serious effect on the crop, resulting in a decrease in area and loss of productivity notes Leda Valenzuela. 'Moreover, because of the economic blockade imposed by the United States, the traditional market for Nicaraguan tobacco, losses were high on the international market. So we had to shift to cultivate maize here.'

The decline of tobacco during the war was, then, no surprise. What is amazing, though, is how quickly the Cuban exiles have made their comeback since the end of the war and the FSLN's defeat in the national elections of 1990. Tobacco is on its way up again.

'Well, we do what we can. We haven't had any credit for producing maize, rice and beans since 1990. My only possibility is to rent my land to the tobacco companies. They plough the land with heavy tractors, put a lot of fertilisers and lots of poison, this is bad for the nutrient of the soil, but it is the only possibility I have now to make a living', laments Antonio Ballardes of Jalapa.

Food crops

During 1984-85, at the height of the war, the peasants of Jalapa organised into 43 cooperatives. Farm workers of different state enterprises worked hard to produce sufficient com, rice and beans and jalapa became known as *'the granary of Nicaragua'*. The increase in production of food grains in this area was the result of a number of factors:

- new peasant owners of fertile land put this to good use producing crops with which they were familiar on land which had formerly been used for cash crops such as tobacco;
- there was an abundant and easy available supply of credit from banks to finance inputs;
- timely input supply was guaranteed by the Ministry of Agriculture and the coordinating unit of the food production project;
- investments were made in local infrastructure, such as storage silos, warehouses, workshops etc;

- the different bodies and local authorities with responsibilities in the Jalapa area worked together in a coordinated and collaborative effort; and
- a guaranteed support price for food grains was established.

Large quantities of fertilisers and synthetic pesticides were used during the war period and real production costs were masked by subsidies. The order of the day was to produce food for the defence of the country, and not necessarily to show net economic gains. At this time (1984-85), the Jalapa region accounted for 40% of national production (MIDINRA, 1985).

The state of food grain production in Jalapa in the post-war period reflects another reality. Although fanners have not given up the production of basic food grains, output has fallen considerably (for example, 410,000 quintals of maize were produced in 1987-88 as opposed to 136,000 quintals in 1991-92 and 49,000 quintals of beans were produced in 1987-88 compared to 15,000 quintals in 1991-92 (MAG, 1995).¹ This situation may be a result of: lack of credit to support these crops in the post-war period; the liberalisation of markets resulting in a fall in maize prices; or a lack of support on the part of state agencies towards the promotion of food grains in the area.²

Cattle production

During the war the cattle population dropped in all the areas of the country, including Jalapa. Talking to the peasants of the area revealed some of the many reasons for this decline. Pre-war the bulk of the cattle in the area were in the hands of a few big landowners who were associated with the Somoza dictatorship. After the victory of the FSLN these landowners feared that their farms would be confiscated, which drove them to accelerate the slaughter of cattle without thought of herd maintenance. In addition, counter-revolutionary forces stole cattle - taking them across the border into Honduras — or intoxicated them through putting urea in the feeding troughs in order to reduce their enemies' food supply.

Some peasants also owned cattle but many of these were left behind in farmers' haste to leave the war zones. Many of these animals were subsequently slaughtered by militia brigades, the army or the Contras. The absence of directed development plans to recover the cattle population and high interest rates for bank loans (close to 30% p.a. for medium-term loans) are some of the reasons why cattle rearing has not yet recovered in this area in the post-war period.³

Other crops

Some peasants who were interviewed mentioned chillies as an important pre-war crop. They argued that low prices and marketing difficulties during the war had had an adverse effect on production. No one mentioned chillies as being important in current production systems. Nevertheless, all Nicaraguan restaurants have on their menus a meat steak called *'Jalapeño'* which is supposed to be prepared with a sauce of chillies grown in Jalapa: we wonder who produces Jalapeño chillies now?

When we "were in the area we did see truckloads of cooking bananas being taken to Managua, but the peasants who were interviewed did not mention bananas as an important crop. It is possible that Jalapa's bananas are grown only by a few specialised farmers or cooperatives.

Cultivation of potatoes was introduced to Jalapa during the war period. Potatoes were grown as a cash crop to improve the income of cooperative members. Seeds and inputs were supplied through the Ministry of Agriculture at a heavily subsidised rate. Now that things have changed in Jalapa it may no longer be possible for farmers to maintain their potato production which entails heavy use of inputs and the use of high cost seed. Pest and disease problems, such as aphids and early blight, are particularly acute in the Jalapa area due to the relatively low altitude (680 m above mean sea level).⁴

In the post-war period a number of new crops, such as groundnuts and cocoa, have been introduced to Jalapa. This has largely been through the efforts of development projects seeking a more diversified, and hence more sustainable, agriculture. We were also informed of a local association of forest owners which has been promoted by development projects. The members of this association meet to take decisions on the maintenance of the timber trees which they have planted on their land. The timber trees are considered by them to be a highly valuable product (PPM, 1995).

In sum, then, significant change in cropping systems took place in the war and during the subsequent years. Population movement, changes in land ownership and substantial government support led to important increases in food crop production in the war years, while the cultivation of cash and luxury crops suffered. In the post-war period there has been more change. Crop diversification has been promoted but inputs and government support are not so readily available. The cultivation of crops which are heavily dependent on these has therefore been reduced. Old landowners are beginning to return and food production has declined dramatically, partly in response to lower prices.

5 CHANGES IN CULTIVAR USE IN JALAPA

It would be very surprising if, after all the turmoil of massive peasant migration, widespread introduction of modern technologies, and enormous changes in land ownership and forms of production, the range of cultivars used in Jalapa had remained the same. From conversations with peasants and agricultural technicians in the region it was evident that a good number of improved cultivars of maize and beans were introduced to the area during the war. At the same time some traditional cultivars were lost.

According to Porfirio Zepeda:

The promotion of improved varieties of maize, rice and beans as part of the technological package promoted by the team of the Ministry of Agriculture, the state farms and the basic grains production

project, and also by the banks as a condition for the credits to all the farmers, limited use and experimentation with local varieties. The peasants of Teotecacinte [the northern most part of the valley on the border with Honduras] used to talk about an indeterminate bean variety which climbed on the maize stalks and produced grains of different colours — red, white and brown — and up to 50 quintals per manzana.⁵ Someone brought a bunch of seeds of these beans from Murrah [another valley located 50 km from Jalapa]. But the harvest was completely lost due to fungal diseases on the plain land; maybe these seeds were only suitable for the hill slopes. The situation with maize was same. The peasants from El Carboñ, El Junco, and Teotecacinte talked about all types of coloured maize cultivars for different dates of sowing and different purposes. But the state extension programme had no room for these cultivars. Neither was there any space for promoting local crops like pumpkins and green squash.'

At this stage, it is difficult to determine whether the lost cultivars can be recovered. However, the general opinion of farmers in the area is that the losses are not that serious and that it will be possible to recover most of the cultivars from those who did somehow manage to save and continue growing them. If this is to be done, a systematic search of the area, especially just across the border into Honduras, will need to take place. Farmers in Honduras, who were not displaced, have always shared their genetic material with their friends on the Nicaraguan side of the border.

During 1984-88 REGEN (the National Plant Genetic Resources Unit) a newly formed unit of the National Agricultural University (UNA, Managua) conducted several trips to Jalapa and surrounding areas. These visits took place even during the "worst days of the war. Several entries of maize, beans, rice, pumpkins, paprika, cassava and cactus fruit were collected from different parts of Jalapa. They are now stored in the REGEN germplasm collections. This genebank could serve as another possible source from which some of the lost cultivars could be retrieved (see Table 2).

6 CHANGES IN LAND OWNERSHIP AND PRODUCTION IN JALAPA

Before we can look at the changes in seed source, it is necessary to examine changes that occurred in land ownership, forms of production, and the socioeconomic context in Jalapa. Together these probably contributed more to the change of seed types and seed sources in Jalapa than did the war itself.

Jalapa had been an area of great agricultural potential, but the Somoza dictatorship and its allies (Cuban exiles) had taken possession of almost all the good fertile and plain land in the valley. Slowly the poor peasants were pushed into the mountains and onto small, marginal holdings. Most were converted into landless labourers working for a meagre salary.

Table 2. Changes in cultivars in Jalapa

Crops	Cultivars introduced	Cultivars lost	Possible sources for recovery
Maize	NB-100 NB-6 NB-12 HS-5	Coloured maize Local cultivars	Farmers REGEN
Beans	Revolution-81 Revolution-79	Local climbing cultivars	Farmers REGEN
Potatoes	Desiree Cardinal		
Tobacco		Chilcagre Copán	Farmers in other regions
Chilies		Jalapeño	Farmers Market

In the early days, farm workers were usually provided with food in addition to their salaries. If they had permission to cultivate a small plot of land for family consumption, many landlords would supply them with small quantities of seeds. Otherwise they would get their seeds from the market or from relatives up on the mountain who had access to farming land. The culture of seed conservation did not express itself strongly in the families of farm workers. In contrast, the small landholders operating on the marginal, mountainous lands maintained their seed supplies by storage, exchanges with neighbours and through the market.

With the triumph of the revolution and execution of the land reform, the majority of the peasantry of Jalapa — the farm workers as well as the small peasants from the war-affected mountain areas — gained access to good fertile land, not as individual owners but as members of Sandinista Agricultural Cooperatives (CAS). These cooperatives were formed under the guidance and vigilance of MIDINRA. Land previously held by large landowners was distributed to these cooperatives and to state farms, and production plans for these were drawn up by zonal technical teams who administered Jalapa's food grains production project. Farm workers and cooperative members may have participated in plan preparation to a very limited extent. Seed supply for food grains production was guaranteed by the state agricultural extension service in conjunction with state owned seed farms.

The end of the war in 1989, followed quickly by the departure from power of FSLN at a national level (FSLN scored a resounding victory in Jalapa) and the entry of a democratic neoliberal government in Managua, heralded an era in which support for the agricultural sector in general, and for the peasant economy in particular, fell to an all-time low. The implementation of economic policies guided by the IMF and the World Bank — measures such as market liberalisation, a reduction of state subsidies, the removal of support

prices, drastic reduction of the state agricultural extension service, high interest rates and reduced availability of loans for food grain production - affected the peasants in Jalapa as it affected the peasants in all Nicaragua's rural communities.

The inability of the cooperatives to negotiate loans for production, and the strong desire of members to become private farmers with true decision-making power, resulted in the dissolution of many cooperatives in Jalapa. Peasants became individual landowners once more. In some cases they chose to cooperate on matters pertaining to credit and service provision, in others they did not. Many of those now in possession of good land, but without the capital to produce, ended up selling their land to the returning landlords. After a revolution and years of state paternalism, peasants suddenly found themselves thrown into the free market, negotiating their survival.

7 CHANGES IN SEED SOURCES IN JALAPA

In their new situation, farmers needed to find seeds to plant and money with which to purchase the seeds. Pre-war, farmers had used various local cultivars which they had obtained from local markets or other farmers. During the war years farmers had had access to modern varieties (mostly open pollinated, some composite and a very few hybrids) through the state extension services. In the post-war period they ended up with degenerated modern cultivars which were once more obtained from the market or other farmers.

The availability of quality seeds - be they local or modern - had been good before the war and was maintained during the war period by energetic state intervention. It has, however, fallen drastically in the post-war period. This is mostly due to the fact that the state has reduced its seed production efforts. There has been inadequate compensation by farmers, other public institutions or NGOs in terms of producing and preserving seeds. When it comes to cost, the price of

local cultivars has probably remained steady while the price of seeds for modern varieties has gone up considerably due to the shortage. The price differential between the two is therefore considerable: 17 cordobas/mz for recycled maize seed as opposed to 70.2 cordobas/mz for seed of modern varieties in 1995 (MAG, 1995).⁶

Table 3 summarises the changes that have taken place in seed supply in Jalapa over this period. It was generated in group discussions with local farmers and reflects the majority opinion of the group, including the researchers.

These patterns of change are not unique to Jalapa. As a consequence of the change, the 1995 national production survey shows that most of the area for maize (90.8%) and beans (96.5%) is planted with recycled seed (local cultivars and degenerated modern varieties). Only the remaining small fractions were planted with improved or certified seeds (MAG, 1995).

8 THE PANCASÁN REGION: PRE- AND POST-WAR COMPARISONS

We now move on to look at the region of Pancasan, by way of comparison with Jalapa. The community of Pancasan, within the municipality of Matiguas, is located 70 km north-east of the city of Matagalpa, 200 km from Nicaragua. It is a mountainous area (500-700 m above sea level) with occasional flat land bordering the three rivulets that pass through.

Pancasán has a long history of guerrilla activity. It was here that the first battle staged between the guerrilla column of FSLN and the National Guards was waged in 1967. At this time all the good land in Pancasán was in the hands of three landlords who grew coffee and raised cattle. The farm workers and peasants of the area occupied marginal lands usually cultivating basic grains for family consumption on the hill slopes and medicinal plants, fruits and herbs around their homes. They also kept pigs.

Within a few years of the FSLN coming to power the landlords left the Pancasán region. Land was immediately distributed to the landless farm workers and the small farmers who came down from the mountains (either running away from the war or simply looking for good land). Three agricultural cooperatives were formed with the dual purpose of agricultural production and defence of the area (Contra attacks had begun soon after the landlords left). Between 1981-88 the cooperatives suffered various attacks resulting in the destruction of crops and infrastructure and the loss of many lives.

The Ministry of Agriculture and Land Reform (MIDINRA), in coordination with other state authorities, oversaw the implementation of the production plans in this area too. As Pancasán was not categorised as a strategic region, far fewer resources and less effort was invested here as compared with Jalapa. Indeed, during the war period it was mostly international and national NGOs which were responsible for establishing development projects. These have had a strong influence on the way in which farming has evolved in Pancasán.

As in Jalapa, when the war was over the cooperatives disintegrated and members became small farmers in their own right. Currently 92% of families living in this area have their own plots ranging in size from 2.5 - 25 manzanas. However, the influence of changes in tenure during the war period - when families started to live in close proximity to each other but far away from their cultivable land - still have a considerable influence on the cropping systems in the area.

9 CHANGES IN THE CROPPING SYSTEM IN PANCASÁN

Similar interviews to those conducted in Jalapa were conducted with 25 farmers, including six women, in Pancasán. These revealed that, during the war, coffee and cattle production both declined in importance (although a similar number of farmers were involved in

Table 3. Changes in seed supply situation for food grains in Jalapa (1975-95)

Period	Cultivars	Source	Availability	Cost
Before the war (1975-80)	Local	Market	Good	Average
	Local/Modern	Landlords	Good	Free
	Local	Farmers	Good	Exchange
	Modern	Market	Low	High
During the war (1980-90)	Modern	State	Good	Free*
After the war (1990-95)	Local	Farmers	Low	Average
	Recycled modern	Market	Good	Average
		Farmers	Low	Average
	Modern	Market	Low	High

* Although seeds were given as part of bank loans, loans were frequently treated as grants during this period.

**Table 4. Changes in cropping patterns in Pancasán, Matagalpa (1975–95)
The views of peasants of the area**

Crops grown and harvested in the area	% of interviewed peasants involved (N=25)		
	Before the war (1975–80)	During the war (1980–90)	After the war (1990–95)
Coffee	40% ¹	40%	20% (organic)
Timber	10% ¹	0%	0%
Cattle	50% ¹	20%	20%
Vegetables	0%	80% ²	50% ³
Pigs	20%	30%	20%
Root crops	10%	10%	20%
Cooking bananas	0%	40% ²	40% ³
Cocoa	0%	0%	20%
Maize	60% ²	100% ³	100% ³
Beans	60% ²	100% ³	100% ³

¹ Peasants involved in the production as hired labour or owners

² Production for family consumption only

³ Production for family consumption and for market

their production, both yields and the area planted fell) (Table 4). The reasons behind the decline were probably similar to those presented for Jalapa. Indeed, the whole country probably had a reasonably similar experience with coffee and cattle during the war years.

Coffee

Since the war, coffee production in Pancasán has been revived with the formation of a local association of organic coffee producers promoted by NGOs. Good quality seeds of appropriate varieties have been introduced by the NGOs and organic coffee production is becoming increasingly important. Since coffee can be grown under shade in combination with timber and fruit trees, this crop fits in very well with the farmers' and the NGOs' vision of a sustainable agricultural system.

Maize and beans

During the war, the new peasant landowners in Pancasán became extensively involved in maize and bean production, not only for family consumption, but also for the market. Maize and bean output rose considerably between 1981 and 1985, even though Pancasán is not considered to be very suitable for the production of these crops. It has poor soil and excessive rains for the first two growing seasons of the year. This means that it is only during the third growing season, a period of lighter showers from December till February, that farmers can produce a good harvest of maize or beans on the hill slopes. In recent years NGOs have been promoting the use of appropriate varieties and improved agronomic and storage practices in an effort to improve crop yields (ADDAC, 1995). Nevertheless, returns remain poor and soil loss under cultivation of these crops is high. However farmers in the area, mostly immigrants from the dry tropics, continue to grow these crops as a part of their ancestral culture.

Other crops

Cooking bananas were not an important crop for small farmers before the war. They were introduced by NGOs in 1985–86 as a substitute for maize as they were thought to be better adapted to local conditions. Since their introduction some of the problems of production — phytosanitary problems associated with poor banana planting material and contaminated soil — have been alleviated and, of late, bananas have become a very attractive cash crop, permitting farmers to obtain a steady income throughout the year (ADDAC, 1997).

The distribution of good quality planting material of local and introduced varieties of root crops (cassava, taro) has recently increased farmers' interest in these crops (which are more suited to this area than maize and beans). Persistence on the part of staff from the NGO development projects and experimenting farmers (especially widowed women) has helped many to overcome and learn from early failures with root crops. Such experimentation has also resulted in the development of commercial production of some vegetables, such as cabbage and tomato, which are in strong demand by the local community.⁷

Finally, although this was not mentioned by farmers during the interviews, Julio Lopez, who worked as a trainer and researcher for a NGO project in this area during the war, notes that:

'Many small farmers living in the mountains would grow useful plants around their houses, in the backyard, using the patio system. These plants served medicinal, food, and ornamental purposes. When these farmers departed for the rural settlements, they left all these plants behind. The mountain gardens went to weed and the women who were in charge of caring or recovering them couldn't make a trip to their patio because of the dangers posed by the Contras. Even if they did

recover and plant some materials in their new homes, the tiny yards of these closely-spaced dwellings did not provide suitable sites for the plants and they could certainly not keep plants safe from attack by pigs, chickens or vandals.'

Because of this relocation and subsequent change in living conditions, it is possible that the rural families of Pancasán lost unknown quantities of very useful plant species that had taken them generations to locate, nurture and grow. The role of these plants in the national economy may be considered insignificant but in the popular culture and rural economy of subsistence, their value cannot be underestimated.

In sum, then, cropping systems in Pancasán have changed in a number of ways. These changes have been strongly influenced by NGOs which have promoted organic coffee cultivation, supplied more appropriate varieties of maize and beans, helped to overcome problems with root crops and introduced important new cash crops such as cooking bananas.

10 CHANGES IN CULTIVAR USE AND SEED SOURCES IN PANCASÁN

The war influenced the crop and cultivar diversity in Pancasan in a variety of ways. While some of the traditional cultivars of maize, beans and household plants were lost, the state extension system, and later the NGOs, managed to introduce many cultivars of maize, beans, green manure crops and a number of fruits and other useful trees. Table 5 presents a summary of those cultivars introduced during the war and those lost and indicates possible sources for recovering material.

In the post-war period, during the 1990s, the peasants of Pancasán and Jalapa have gone through the same traumatic experiences with the dramatic decline in government seed supply. However, the peasants of Pancasán appear to be somewhat better off than those in Jalapa (see Table 6). There are various reasons for this.

First, NGOs in Pancasán introduced storage silos as early as 1989-90. These have improved the storage of both grains and seed materials. Second, the climate in Pancasán allows maize or beans to be grown during the third season of the year (December—February). This is important as it means that there is a good supply of seed for the major growing season which follows just a few months after.⁸ Third, NGO development projects in Pancasan have started to train farmers in artisanal seed production of maize and beans and have promoted seed exchanges between different communities.⁹ After the harvest in the third growing season (December-February) farmers from Pancasan deliver good quality bean seed to farmers from San Pablo, a drier area 30 km to the west. The farmers of San Pablo produce beans during the first two growing seasons (June-October) and return the same quantity of good quality seed to Pancasan. Finally, the successful promotion of plantains, organic coffee and rootcrops has opened up an additional source of cash income for farmers. This can be used for purchasing maize and bean seeds at planting time (ADDAC, 1995).

Capitalising on these advantages, the farmers of Pancasán not only satisfied their own needs in 1996, but were also able to sell maize seed and cassava and taro planting material to farmers elsewhere.¹⁰ This

Table 5. Changes in cultivars in Pancasán

Crops	Cultivars introduced	Cultivars lost	Possible sources for recovery
Maize	NB-100 NB-6 NB-12	Coloured maize local	REGEN
Bean	Revolution-81 Revolution-79 DOR-316 H-45	Light brown beans Climbing beans	REGEN
Plantains	Platano enano		
Cocoa	Various clones		
Household Medicinal		Various species	CNMPT*
Green manure	Velvet Bean Cannavalia Dolichus		

* National Centre for Traditional Popular Medicinal Plants

Table 6. Changes in seed supply situation for food grains in Pancasán (1975–95)

Period	Cultivars	Source	Availability	Cost
Before war (1975–80)	Local	Market	Good	Average
	Modern	Market	Low	High
	Local/Modern	Landlords	Good	Free
	Local	Farmers	Good	Exchange
During war (1980–90)	Modern	State NGOs	Good Good	Free* Low
	Recycled modern	Farmers	Good	Low
After war (1990–95)	Local	Farmers	Low	Average
	Recycled modern	Market Farmers	Good Good	Average Average
	Modern	Market	Low	High

* Through bank loans which were treated as grants

achievement provides strong support for the participatory development activities of local NGOs.

11 NATIONAL PRODUCTION DURING THE WAR: A GLIMPSE OF TRENDS

These two brief case studies have provided us with insights into the broad effects of the 'war in two particular Nicaraguan regions. To place these in context we now summarise national crop production trends during the war years (Table 7). These paint a similar picture to the data from Jalapa and Pancasán: coffee, beef and milk production tumbled and, after some initial decline, production of vital subsistence crops (rice, maize beans) steadily rose.

12 INSIGHTS INTO THE EFFECTS OF THE WAR ON NICARAGUA'S CROPPING SYSTEMS

This article has discussed some of the effects of the war period on cropping systems, cultivar use and seed sources in two regions of Nicaragua. The following summarises the arguments presented:

- (i) The Contra war affected the cropping patterns, cultivar diversity and seed supply situation in a significant way in both the areas studied.
- (ii) During the war food grain production took precedence over export crops and cattle. Government policies oriented farmers towards survival and defence and brought changes in land

Table 7. Production of the principal crops in Nicaragua during 1978–85

Years	Coffee ¹	Maize ²	Beans ²	Rice ²	Beef ³	Milk ⁴
1978–79	1.26	6.1	1.8	1.2	116	99
1979–80	1.22	3.1	0.6	1.3	103	39
1980–81	1.28	3.9	0.6	1.4	78	39
1981–82	1.32	4.1	0.9	2.0	92	38
1982–83	1.56	4.0	1.0	2.1	98	26
1983–84	1.06	4.7	1.2	2.2	91	40
1984–85	1.11	4.6	1.3	1.9	98	42
1985–86	0.76	6.0	1.5	2.8	95	40

¹ In million of 60 kg bags

² In million of quintals (100 lbs)

³ In thousands of lbs

⁴ In thousands of gallons

Source: Biondi-Morra (1990)

- tenure to favour small farmers and landless peasants.
- (iii) While creating new paradigms for agricultural development in response to the war, the state-sponsored development programmes promoted changes towards less diverse production systems. Post-war NGO-guided participatory development programmes have opened up more room for successful crop diversification.
 - (iv) Many local varieties of food grains seem to have disappeared from the agricultural scene due to massive peasant migration and the disruption of normal communication channels in the war zones. This trend was probably exacerbated by the simultaneous introduction of improved modern varieties by the state extension service free of charge. The nationalisation of commerce, including food grain and seed supply, also made a contribution. State industries took little care to promote a different range of cultivars; they were more concerned with guaranteeing a steady supply of at least some seed/grain. Farmers thus had little choice as to what they would grow. However, the timely action of the National Genetic Resource Programme, which made priority collections in the war-affected areas, may have managed to save many cultivars.
 - (v) The fact that good quality seed was provided to farmers during the prolonged conflict, through paternalistic, state-subsidised programmes, eroded peasant capacity to preserve and maintain their own seed supply. This, in turn, has weakened their ability to survive in the post-war free market era, in which state support has disappeared overnight. However, ensuring seed quality and supply has been a key component of NGO participatory development training programmes implemented since 1986. These have helped to restore the capacity of farmers to produce, preserve and maintain their seed supplies,
 - (vi) In the early years of conflict no serious or systematic efforts were made to understand the dynamics of crops and cultivars in relation to peasant migration and changes in land tenure and forms of production. Agricultural production planning was dominated by technological concerns and little attention was paid to understanding sociological or anthropological factors. Only during the last years of the war (1986-97) was there a shift in the attitude of central planners. This shift was partly due to NGO efforts to create a consciousness of the interactions and effects of these factors. However, by then it was probably too late to alter strategy significantly or to repair any damage done.

Hopefully, one day there will be no war on this planet and hence no need to study the effect of wars on cropping systems. But in the meantime, while wars continue to occur, studies such as this should be carried out not retrospectively but in real time and in a participatory way. This will help to create a framework of understanding at a time when something can still be done to prevent or reduce the damage of war on

cropping systems and cultivar diversity. This, in turn, should build up the capacity of local people to survive wars.

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ENDNOTES

1. One quintal is 100lbs.
2. Unanimous opinion of the group of farmers interviewed in May 1997.
3. Opinion of the peasants of Jalapa interviewed in May 1997.
4. Interview with technicians of INTA, Jalapa, May 1997.
5. One manzana is equivalent to 0.7 hectares.
6. The current exchange rate is 9-4 cordobas (the Nicaraguan unit of currency) to US\$1.
7. Opinions of farmers expressed in the interviews, May 1997.
8. The major growing season is, in fact, not a good time for planting in Pancasán for climatic reasons. Nevertheless, everyone still plants maize during this season
9. Interview with farmers of Pancasán, May 1997.
10. Interview with farmers, May 1997.

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