

Economic benefits of a transition to ecological agriculture

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The heavy rains caused by El Niño in 1995/1996 had a devastating effect on that season's production and harvest on the Licheski family farm in São Mateus do Sul, Paraná, Brazil. The losses made it impossible to restart production at the rate that they had managed to maintain until then. Had it not been for the income from the sale of *erva mate* (*Ilex paraguariensis*, the plant commonly used as herbal tea in this region) and their eight cows, the Licheski family would have gone bankrupt and been forced to give up farming.

José and Silvia Licheski both come from farming families. They were married in 1983 when they established a system similar to that of their parents, who had managed conventional farms relying on mechanisation and use of agrochemicals, with the aim of intensive production for local markets. The Licheski family specialised in the intensive cultivation of potatoes, maize and beans as companion crops, as well as the native *erva mate* plant. They also raised eight cows, and had a small vegetable garden for their own consumption. The economic and technical reasoning behind the system was aimed at increasing their income through larger scale production by using agrochemicals as well as increasing the cultivated area. For example, they began growing potatoes in 1987 on two hectares, and by 1990-1991 they had fifteen hectares. With this scale of production, the family's income was dependent on the market conditions for only a few products, with the prices always changing. "We would make a profit from one harvest, break even

with another, and then lose out on the next" said Mr. Licheski. Under such circumstances, it was impossible to save, and the income generated one year was spent on the next production cycle.

The change began in 1995-1996. The family, now with three children, decided to work only on the areas they could manage and afford to cultivate themselves, gradually abandoning the use of agrochemicals and motor-mechanised techniques, and making the transition towards a system based on agroecological principles. The knowledge inherited by José Licheski from his family about seed production, use of green manures and cultivating potatoes organically for domestic consumption contributed greatly to this process.

From specialisation to diversification

Looking at the system in 2001, only five years after the process was begun, many changes and benefits could already be seen. The family home, the chicken coop, the vegetable garden, the shed and the majority of the crops are found in the main 2.7 hectare plot. In this area, the family cultivates more than 60 plant species, including vegetables, fruits and medicinal plants. The chickens and other small animals are fed food scraps and leftovers from the home and vegetable garden. Poultry are also treated with medicinal plants. The annual crops of potato, maize, beans, wheat, rice and cassava are always rotated in space and time, using green manures and biofertilizers as well as a mix of manure, ashes, rock and lime phosphate. As he has no cattle or pigs, José Licheski either buys manure from neighbours or trades it for other products. In another 2.5 hectares plot, the *erva mate* is grown in a natural agroforestry system, where more than 35 useful species are found, including local wild fruits, medicinal plants and firewood. The family selectively prunes the natural regeneration of the forested system, to favour the production of the *erva mate* and medicinal plants, but encouraging the preservation of the area.

Labour on the farm is provided by the family and also through the local community system of exchange, where relatives and neighbours agree to assist, provide services or work on each others' land as needed. They now use a horse, with a plough, harrow, cultivator and planter, a maize thresher and a *matraca*, an articulated manual planter. All weeding is done by hand.

Economics of diversification

The large number of different species grown on the farm, as well as contributing to fertility of the system itself, is important in that the family does not rely on only one or two income sources but has a variety of crops and products to sell. Four main groups of products contribute as much as 68 percent of the family's income –potatoes, vegetables from the garden, cassava and products from the agroforestry area- while other activities are also important for generating cash income and other non-cash benefits, such as food for the family or products such as composts and wastes that can be used as animal feed. This contrasts with the economy of many other farms in the region who only rely on beans/maize or potato plantations. The different uses and value of each product also stabilises the economy of the system. The sale of seeds in particular has become a significant source of income for farmers. Seeds are sold or exchanged on the local market, where demand is high because farmers do not usually produce their own. The local markets where products are sold are also an important factor in the



José Licheski selecting maize ears from a local variety.

Table 1

	Licheski family farm (a)	Conventional animal traction (b)	% a / b	Conventional mechanised (c)	% a / c
Beans	2,770	1,488	+86	1,020	+171
Maize	6,000	3,720	+61	4,200	+43
Potato	10,000	14,750	-47	15,300	-53
Rice	4,917	2,975	+65	1,896	+159
Cassava	24,020	15,000	+60	20,700	+16

N.B. Figures for (b) and (c) are averages reported by Department of Rural Economy of the state of Paraná, for the 2000-2001 yield.

family economy. Some maize is sold to middlemen, but all the other produce is sold directly to consumers. Many of these clients have been buying from the Licheski family for years, showing their confidence in the quality of the products. The clients include restaurants, co-operatives and families in the municipality. This local market and community, where the Licheski family live, is important as it is where the sale or exchange of products, including *erva mate*, eggs, seeds, vegetables and chickens takes place. This is different to many other farms who rely on selling their produce at low prices to wholesalers or middlemen. In addition, the Licheskis often receive higher prices for their organic products.

By having a range of products to sell, having many loyal clients, and generating the inputs needed to maintain the fertility of the agroecosystem by themselves through good management and recycling, the family is now much less dependent on external inputs, and is protected to some extent from market fluctuations. In all, this means that they have achieved some degree of self-sufficiency. The expenses of the system in cash are only 14.5 percent of the cash profit derived from the farm. Only 2.5 percent of this surplus is spent on domestic supplies (including food). This means that up to 80 percent of the income generated by the family is savings or profit, to be used as necessary for household maintenance, leisure, goods or small investments.

Low costs and high value added

The yields of the main crops in the agroecological system were higher when compared to figures obtained from the Department of Rural Economy of the state of Paraná, for conventional mechanised farming systems in Paraná. They ranged from an increase in yield of 16 percent for cassava to 171 percent increase in the yield of beans. The only exception was potatoes, which yielded less. According to Mr. Licheski, this was due to the planting material – there were no varieties available which were adapted to the organic system under local conditions. High physical yields together with very low unit costs made the agroecological system highly profitable. The costs of production were only about 5.5 percent of the gross product. This proves the system's capacity for efficient use of internal resources (labour, seeds, composts and soil fertility management), so keeping the costs of external goods and services to a minimum. This farm management strategy shows the value added to the external inputs through family labour, which works out at 1640 percent. For maize, for every one *Real* (R\$) spent on the production process, the family makes R\$ 38.12, compared to R\$ 1.27 in the conventional animal traction system and only R\$ 0.57 in the mechanised system (see Table 1). Even in the case of potatoes, with lower yields but also lower costs, the agroecological farming system proved to be more profitable, adding between 8 to 28 times more value to the product by area unit than in conventional mechanised systems and animal traction systems respectively. These technical and economic results show that the income of the family farm is equivalent to 92 percent of the value added. As a result, the Licheski family's financial situation has remained stable.

Economics of synergy

The sustainability of the agroecological system is based on what could be called the economics of synergy – the close integration of external and internal factors. The production system is based on recycling of internal resources. For example crop wastes are used in soil fertility management, and the production of bio-pesticides on farm results in much lower costs for chemical fertilisers and pesticides. Outside of the farm, good relations with the local community, neighbours and extended family means that labour costs are lower, and less is spent on buying and maintaining equipment. As a whole, the input costs of this system are therefore considerably lower than of a conventional mechanised system, and comparative profits are considerably higher.

The success of the agroecological innovations leading to this largely self-reliant system, have in turn promoted changes of attitudes within the family and community. The increased technical and economic integration of productive activities has meant a change in how decisions are made on the farm – for example, now the family as a unit plans which crops to plant, and how to use the profits. In addition, the knowledge and skills of the female family members as well as the children are much more appreciated. At the community level, the Licheski family have been sharing their experiences and new knowledge, encouraging others to look after their natural resources, and take part in the local economy for everyone's benefit – by selling, buying or exchanging goods and services locally. José has participated in the Regional Forum for Rural Workers, attending courses and meetings, and contributing to policy proposals related to the transition to agroecology for family farms. Silvia served in the local Pastoral Health Unit, attending the communities and participating in various events. Her knowledge of health issues and medicinal plants has also been an asset to the family economy and well-being.

The future

The family plans to continue the process of transition to ecological farming, and to intensify production in the coming years, expanding the land area used productively. This will also mean they will have to deal with some of the challenges and difficulties they identified in a recent evaluation. This expansion will mean that more labour will be needed on the farm, and more equipment. They also plan to reintroduce pigs and cattle, and will look for potato varieties suitable for organic production in the region. All these expansion activities may need to be financed with a loan. The family has already proved the viability of this system under their conditions, and with their know-how and the information available to them, they are willing to incorporate innovations and adapt to changes to build on the success of their transition process.

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