SAFE-World Project/Initiative Summary

Country: Brazil

Project / Initiative Title: Zero tillage / Conservation Farming - Parana

Nos. farmers: 200,000 Hectares: 10,500,000

Agro-Ecological Zone: III

Improvement types

1x	2	3x	4x	5x	6x	7x	8	9

A. Key Impacts

A1 – Productivity

	Before / Without	After / With	% change
Maize	3000 kg / ha	5000 kg / ha	67
Soy bean	2800 kg / ha	4700 kg / ha	68

A2 – Impacts on natural capital

?? Infiltration rates improved – increased groundwater re-charge
?? Erosion reduced (90%)
?? Increased carbon sink in soils
?? Conservation of biodiversity
?? Winter feed for animals and wild fauna

A3 – Impacts on local community (social capital)

200,000 farmers in Friends of Land Clubs (in 8,000 groups)
Groups at many different levels (local, municipal, multi-municipal, river basin, state)

A4 – Impacts on households and individuals (human capital)

?? Improved incomes
?? Labour demands reduced with ZT
?? Incomes up

A5 – Key changes in farm / regional system

Reduced fossil fuel consumption (down 40-70%)
Herbicides –dessicant herbicides with low toxicity

B. Types of Sustainable Agriculture Improvements

Type 1: Better use of available renewable natural capital
Type 2: Intensification of single sub-component of farm system
Type 3: Diversify by adding new productive natural capital and regenerative components
Type 4: Better use of non-renewable inputs and technologies
Type 5: Social and participatory processes leading to group action for making better use of natural capital

Type 6: Human capital building through training-learning programmes
Type 7: Access to Finance
Type 8: Add value by processing to reduce losses and increase returns
Type 9: Add value by direct or organised marketing of produce to consumers

	Yes / No	Narrative
Type 1	x	Zero till
Type 2		
Type 3	x	
Type 4	x	More efficient use of inputs
Type 5	x	Formation of farmer microcatchment groups or associations
Type 6	x	
Type 7	x	
Type 8		
Type 9		

D. Contact Point for Project/Initiative

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E. Project Narrative

See : www.agri.com.br/febrapde/qdc for more information

Zero-Tillage Farming in Southern Brazil

New partnerships between state research and extension institutions, local governments and rural communities have led to substantial benefits in the three southern states of Santa Caterina, Paraná and Rio Grande do Sol. Sustainable agriculture based on zero-tillage, green manues and cover crops has been adopted on some 11 million hectares, and the benefits include: long term increase of water availability (ground water and streams); soil fertility and production; decrease of production risk due to adverse climactic conditions; short and long term decrease of costs; long term decrease of the use of external inputs; and better water quality (less pollution).

The major on-farm impacts have been on crop yields, soil quality and moisture retention, and labour demand. Maize yields have risen from 3 to 5t/ha and soybeans from 2.8 to 4.7t/ha. Soils are darker in colour, moist and biologically active. The reduced need for most weeding and ploughing has meant significant labour savings for small farmers.

EPAGRI in Santa Catarina, Brazil

The state government extension and research service, EPAGRI (Empresa de Pesquisa Agropecuria e Difuso de Technologia de Santa Catarina), works with farmers in the southern Brazilian State of Santa Catarina, from the flat coastal areas in the east to the rolling highlands and mountains of the centre and west. It is involved in working at a microwatershed level with local farmers to develop low-input and productive systems of agriculture. Each member of staff works in about four microwatersheds of about 150 families for a period of two years, playing an important social as well as technical role. Farmer experimentation is encouraged, and there is a large amount of decision-making at the level of these local extensionists.

The technological focus is on soil and water conservation at the microwatershed level using contour grass barriers, contour ploughing and green manures. Farmers use some inorganic fertilizers and herbicides, but there has been particular success with green manures and cover crops. Some 60 species have been tested with farmers, including both leguminous plants such as velvetbean, jackbean, lablab, cowpeas, many vetches and crotalarias, and non-legumes such as oats and turnips. For farmers, these involve no cash costs, except for the purchase of seed. These are intercropped or planted during fallow periods, and are used in cropping systems with maize, onions, cassava, wheat, grapes, tomatoes, soybeans, tobacco and orchards. Farmers use animal-drawn tools to knock over and cut up the green manure / cover crop, leaving it on the surface. With another farmer-designed, animal-drawn instrument, they then clear a narrow furrow in the resulting mulch into which the next crop is planted. As a result, many farmers no longer plough.

Many farmers have used subsidies to construct housing for pigs and chickens. Manures are now concentrated, fermented in pits and then applied to the fields. This has reduced pollution of waterways, as well as cut the dependency on inorganic fertilizers.

The major on-farm impacts have been on crop yields, soil quality and moisture retention, and labour demand. Maize yields have risen since 1987 from 3 to 5 t / ha and soybeans from 2.8 to 4.7 t / ha. Soils are darker in colour, spongy to the step, moist and full of earthworms. The reduced need for most weeding and ploughing has meant great labour savings for small farmers. From this work, it has become clear that maintaining soil cover is more important in preventing erosion than terraces or conservation barriers. It is also considerably cheaper for farmers to sustain.

EPAGRI has reached some 38,000 farmers in 60 microwatersheds since 1991. They have helped more than 11,000 farmers develop farm plans, supplied 4300t of green manure seed and supported the construction of 1540 piggeries. Perhaps the most important impact, however, has been on the local municipalities. EPAGRI has worked to involved them fully in the process of participatory technology development and extension, and now many municipalities employ their own agronomists to help in the process.

Brazil: Zero-Tillage in large scale farms in Paraná and Rio Grande de Sol

Zero- or No-Till (*plantio direto*) has seen extraordinary spread amongst some 200,000 farmers in the two southern states of Paraná and Rio Grande de Sol. These have been organised into 2100 microbacias in Paraná, and 455 in Rio Grande do Sol. The total area under ZT in 1999 was 10.5 million hectares – up from about 700,000 ha in 1990. These farmers are organised into some 8000 Friends of Land Clubs, which are organised at many different levels – local, municipal, multi-municipal, river basin and state.

The model of ZT is unlike that adopted in industrialised countries, particularly in the USA, as green manures, cover crops and legumes have been incorporated into rotations, so reducing the system's

requirement for herbicides for weed control. The major on-farm impacts have been on crop yields, soil quality and moisture retention, and labour demand, and reduced fossil fuel use (a 40-70% drop). Maize yields have improved by 67% from 3 to 5 t/ha in a decade, and soya by 68% from 2.8 to 4.7 t/ha. A great deal of recent interest has focused on the substantial public benefit being produced by these farms through sequestration of carbon in organic matter in soils. This new carbon sink is helping to mitigate the drivers of climate change.

The key conceptual change in these ZT programmes has been the transition from soil conservation thinking (based on physical conservation measures) to soil restoration and improvement (based on biological measures). Maintaining soil cover is much more important than preventing erosion through terraces or barriers. It is this that has led to benefits both for farmers and the wider environment. And as John Landers (1999) has put it: *"ZT has been a major factor in changing the top-down nature of crop services to farmers towards a participatory on-farm approach".*

Sources: Maury Sade, Alicides José Molinari, Simon Hocombe, Francis Shaxson, John Landers, Christian Pieri; Lander, 1999