Towards large-scale adoption of no-tillage in central Mexico: a participatory, multi-institutional approach to technology development and diffusion

Learning together: Farmers Jaime Rojo and Santiago Enriquez discuss residue decomposition with Lucien Séguy of CIRAD-Brazil, Penjamo, Mexico, December 2000.

Introduction

Conservation tillage (CT) has been adopted in Mexico on less than 500,000 ha (only 3% of the national cropped area), in contrast with Brazil, Argentina, or Paraguay (Derpsh, 1998). Reasons include:

- Uncoordinated efforts by the various institutions involved.
- Use of top-down, rigid transfer approaches.
- Technology not adequately tailored to farmer conditions and constraints.
- Limited access to CT drills.
- Insufficient training of farmers and technicians.
- Virtually no technical assistance for farmers.

The El Bajío region

Located chiefly in the central Mexican states of Guanajuato and Michoacán, *El Bajío* is a midaltitude (1,600-1,800 masl) region of intensive agriculture. It features dam and tube well irrigation, a semi-arid climate (600 to 800 mm annual precipitation), deep Vertisols, excellent access to markets, mostly smallholders (average holding 5-15 ha), and crop rotations dominated by cereals (summer: sorghum, maize; winter: wheat, barley).

Cereal cropping is highly productive: sorghum and maize yield 8-12 t/ha, wheat 5-7 t/ha. Use of external inputs is intensive – farmers apply 300 kg N/ha /cycle — but costs are rising, profits are being squeezed, water resources are dwindling rapidly. Farmers have been left to themselves to face these challenges. They have tried reduced or no-tillage, among other options, but are having difficulties combining direct-seeding with proper residue management to reap all CT benefits.

The ASOSID project

Launched in July 2001, the project "Sustainable Agriculture based on Direct Seeding" (*Agricultura Sostenible Basada En La Siembra Directa* , or ASOSID) is a 5-year research and development effort designed to help at least 8,000 farmers to adapt and adopt on some 40,000 hectares (about 10% of El Bajío) technologies based on direct seeding, thereby contributing to economically and ecologically sustainable agriculture.

The **inter-institutional platform** assembled for the project includes:

- Farmers and their associations (irrigation districts, groups of tubewell users, marketing groups),
- Federal and state government agencies.
- The FIRA[1] -operated National Center for the Development of No-tillage Technology, located in the region.
- Regional, national, and international research institutions.
- Private companies — most notably the Monsanto group and its network of seed and input distributors, who dominate the seed market — and CT equipment manufacturers.

Decision-making is highly participatory, using bilateral or multilateral fora (Fig. 1). Political coordination accrues to the Minister of Agriculture of the State Government of Guanajuato; operational coordination to CIRAD and CIMMYT; and thematic coordinators are currently being assigned by participating institutions for each key component of the project. In the near future, a **Steering Committee** will handle strategic decisions and a **Farmers' Committee** will make farmers' leadership more visible and effective.

Activities

Technical assistance. A full-time team of extension agents in charge of providing quality technical assistance to farmers. Training of other technicians in the region so that they can adapt their recommendations to direct-seeding.
Farmer experimentation. Establishment of a network of 100 farmer-experimenters testing and adapting new technologies in their own fields and sharing their experiences with other farmers, in collaboration with researchers and technicians. Development of methodologies and tools for on-farm experimentation under farmer control.
Agronomic research. Establishment and monitoring of a 10-year trial on-station to improve and characterize direct-seeding cropping systems. Three main factors: irrigation management (conventional, aspersion, drip), fertilization regimes (high, intermediate, low), and crop rotations (cereal only, oleaginous – cereal, legume-cereal). Other aspects: genotypes adapted to direct seeding, forage systems, monitoring of farmers' fields, modeling of long-term trends in cropping systems, GIS.

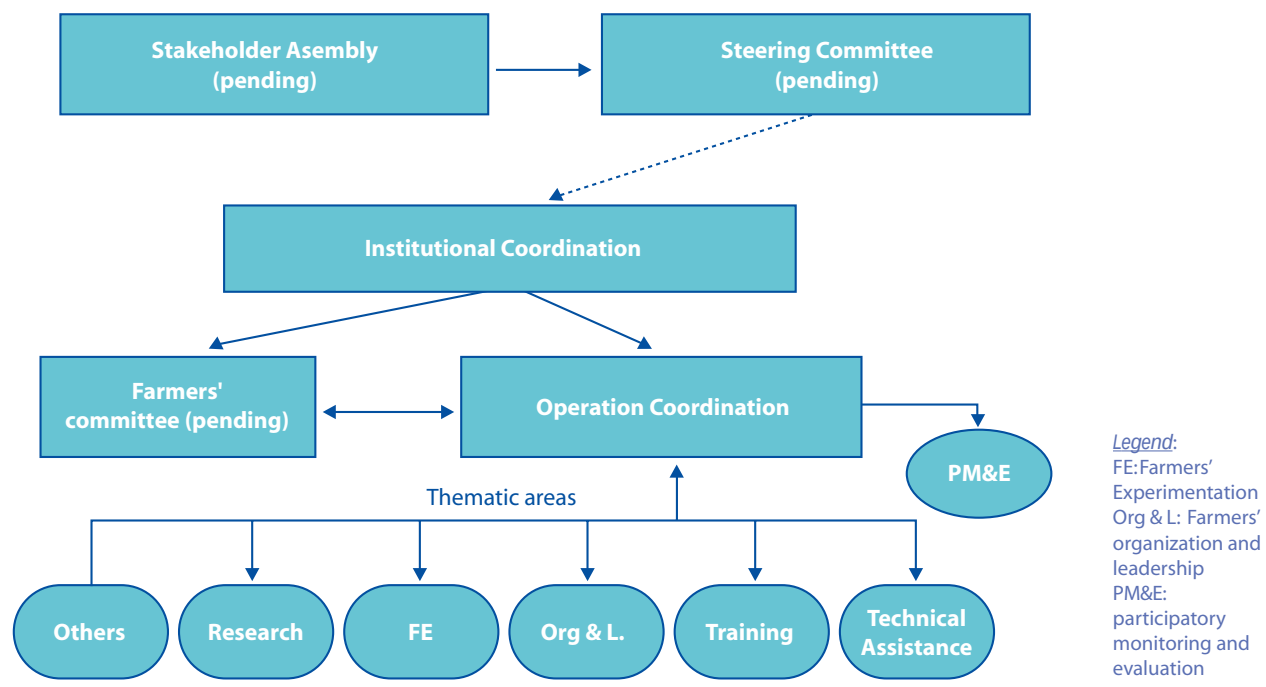

Figure 1. Provisional organization of the ASOSID project in Guanajuato, Mexico.

1 FIRA: National trust fund dependent on the Bank of Mexico, in charge of providing credit to the agricultural Sector and of developing and promoting new technologies.

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Maize field under no-till, Penjamo, Mexico, July 2001.

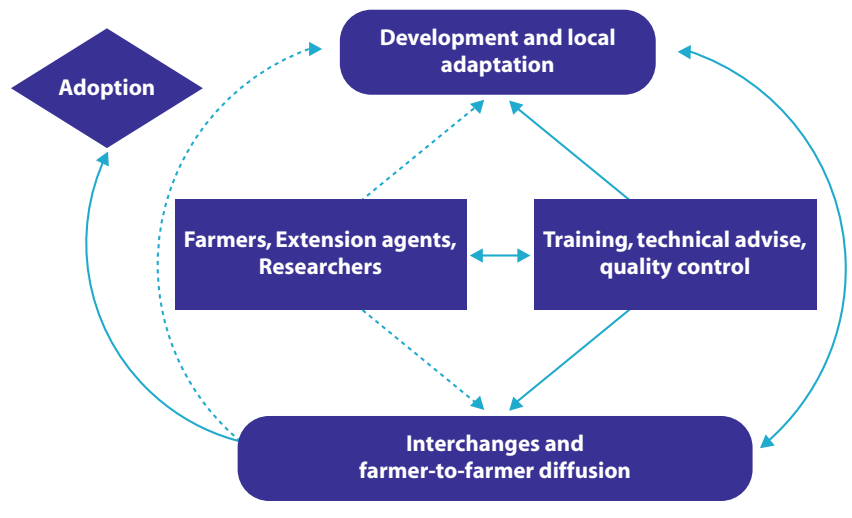

Figure 2. Technology in the ASOSID project will be developed using a participatory technology development approach, adapted from methodologies proposed among others by ETC (1992). Main features include tight interaction among farmers, extension agents, and researchers in developing, testing, and promoting technologies simultaneously under controlled conditions. Farmer-to-farmer exchanges and diffusion are also key mechanisms, as well as training and other technical support to farmers.

Socio-economic research. Dynamics of evolution of production units in a changing context (agrarian reform, globalization, etc.). Water management strategies and influence of new agricultural policies on it.
Farmer organization and leadership. Consolidation of existing farmer organizations, as well as help with the emergence of farmer leadership in the project.
Training. Will mainly involve field extensionists and farmers and address technologies (direct seeding, crop rotations, irrigation systems, fertilization, integrated weed control); theory and concepts (agroecology and sustainable agriculture, soil biology, agricultural economics); approaches, tools and methods (farmers' organization, farmer experimentation, farmer-to-farmer diffusion, data collection and analysis, cost/benefit analysis); and regional topics (marketing channels for new crops, information on governmental projects and subsidies, diversification of production systems away from pure cereals). There will be learning by doing, interchanges and local; regional or international study tours; formal training in the classroom.

Farmer Roman Pimentel presenting direct seeding results to peers and technicians, Huanimaro, Mexico, April 2001.

Project Strengths

- Direct-seeding technology exists and drills are available.
- Strong political and institutional will to support the project; the agricultural crisis has raised awareness of the need to innovate; the new federal administration is looking to have impact.
- Many progressive farmers are seeking sustainable ways to boost agricultural productivity.

Challenges

- The project is complex.
- Initial quality and motivation of participants varies; there are few experienced and well-trained professionals.
- Inter-personal and inter-institutional relationships require smoothing.
- Difficulties of participants suppressing own routines, norms and inertias to accept those defined collectively.
- Funding.

Recommended reading

Ashby, J., A. Braun, T. Gracia. M. Guerrero, L.A. Hernández, C.A. Quirós, J.I. Roa, 2000: *Investing in Farmers as Researchers. Experience with Local Agricultural Research Committees in Latin America*. CIAT, Cali, Colombie, 199 p.
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Jourdain, Triomphe and Arreola, 2001: Differential adoption of direct-seeding in Guanajuato (Mexico): a baseline diagnostic. Proceedings, 1st World Congress on Conservation Agriculture, Madrid, 1-5 October 2001, ECAF, Madrid, Spain.