

CONSERVATION AGRICULTURE: Feeding the World without Consuming Natural Resources

Conservation agriculture would seem like a natural choice for subsistence farmers in developing countries, but few practice it. What's holding them back?

Bucking Tradition

“We’re not talking about small changes. Conservation agriculture represents a total departure from conventional farming,” says Patrick Wall, agronomist and coordinator of CIMMYT’s global program on conservation agriculture.

Conservation agriculture can be described as the retention of crop residues and use of rotations and, sometimes, green manure cover crops.

The learning curve for conservation agriculture can be steep, especially for farmers with limited access to information outside their own communities. Subsistence farmers will not risk using a new practice unless they are sure it addresses their problems. CIMMYT agronomist Peter Hobbs, who has worked with resource-conserving technologies in South Asia, understands farmers’ skepticism. “At a site in Haryana State, India,” he recalls, “a neighbor who saw his friend using zero-tillage brought a bag of wheat to his house, saying, ‘You have destroyed your land. Here is some food you will be needing to feed your family.’ But once the neighbor saw the harvest, he also wanted to experiment with zero-tillage.”

This story illustrates that farmers who buy into a conservation practice also become its most convincing advocates. In Bolivia, where Wall and his colleagues promoted conservation agriculture, farmer-to-farmer interactions were crucial. “We didn’t convince farmers to go into zero-tillage — other farmers did that. We brought in farmers from around the region to tell local farmers about their experiences and success,” he says. “Later, once the local farmers had acquired experience, we worked with them to develop a manual called *By Farmers for Farmers*.”

Participatory Routes to Success

For conservation agriculture to work, a diverse group—researchers, farmers, input supply companies, extensionists, and farm implement manufacturers—must share ideas and products. “Many public research and extension institutions were not set up to participate in such innovation networks,” says CIMMYT economist Javier Ekboir. “They want to follow the traditional process of testing all aspects of a technology before passing it to extension and farmers.”

“Rather than being the prime movers of change, researchers must come in behind it and solve the problems that emerge, supporting continuous adaptation and follow-up,” says Wall.

Successful promotion of conservation agriculture has also depended on individuals or organizations who ensure that farmers receive the information and support to assess conservation agriculture and adopt it, if they desire. “These catalytic agents sometimes are local scientists or extension workers who move forward without support from their own organizations. They bring participatory research methods, promote the exchange of information, provide access to products from advanced research institutes, and mobilize funding,” says Ekboir.

Finally, Hobbs observes that access to affordable, suitable, locally manufactured equipment for seeding directly into residues is crucial for conservation agriculture to spread. “Without it, farmers can’t even begin to experiment,” he says.

For more information on adapting zero-tillage to the needs of smallholders in developing countries, see [CIMMYT’s 2000-2001 World Wheat Overview and Outlook](#).

See also:

CIMMYT’s Work in Conservation Agriculture

Accomplishments

Conservation agriculture means many things to many people, but a key tenet is sustainability. In almost all cases, this means managing mulches to conserve soil organic matter. Other cropping systems that

conserve other vital resources—water, fuel—or reduce greenhouse gas emissions represent a move toward sustainability. CIMMYT has supported the spread of conservation agriculture in various ways. This brief selection of examples gives an idea:

- In the late 1970s and early 1980s, CIMMYT agronomists taught developing country researchers about zero-tillage systems in a course at CIMMYT headquarters.
- Since the early 1980s, CIMMYT and local researchers have fostered participatory approaches and expanded partnerships that led zero-tillage to be used in wheat production on some 207,000 hectares in South Asia by 2002. The practice saves 75% or more fuel, obtains better yields, uses about half the herbicide, and requires at least 10% less water—equivalent to 1 million liters less on a hectare of land.
- During 1994–2001, CIMMYT helped promote zero-tillage and crop rotations in Bolivia by working with local partners to organize a network of research institutions, farmer associations, and progressive farmers. By 2000, farmers were using the new practices on 300,000 hectares in the eastern lowlands.
- In 1994, CIMMYT formed a network to help Malawian and Zimbabwean maize farmers make their poor soils more productive. The network recently expanded its efforts to Mozambique and Zambia and will now cover policy issues relating to soil fertility.

Hopes and Hard Work

As coordinator of research on conservation agriculture at CIMMYT, Wall will work with partners worldwide, including CIMMYT wheat agronomist Kenneth Sayre, an expert in the cultivation of cereals on raised soil beds and agricultural machinery for conservation agriculture. In Mexico, a project initiated in 2001 by agronomist Bernard Triomphe will foster wide adoption of conservation agriculture in the Bajío region, where intensive, irrigated maize-sorghum cropping faces a serious water shortage. The work is supported by the French research agency CIRAD (Centre de coopération internationale en recherche agronomique pour le développement) and involves Mexican institutions and farmers.

“In South Asia,” says Wall, “we have to find ways to increase the amount of crop residue left on the soil surface. In the rice-wheat system, we have to manage rice using resource-conserving principles like those being adopted for wheat, and expand into other cropping systems.”

As for sub-Saharan Africa, Wall considers the very dry areas particularly worrisome. “Drought is a major problem, but water-use efficiency—the ratio of rainfall converted into crop production—is also important. Well over 50% of the rainfall runs off fields. Finally, unless farmers begin to leave residues to restore soil organic matter, agriculture there will not be sustainable.”

Wall concludes that zero-tillage is functioning well in a broad range of conditions, but says researchers still don't know how to make it work in a few spots. “One is under dry conditions where you can't produce enough crop residues,” he explains. “Another is where there are drainage problems, and zero-tillage can make them worse. Finally, it's tough to get the system going in very degraded areas with a long history of conventional tillage.”

How can we stop scorched-earth Policies in agriculture?



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