Our Concept of Resource Management and Its Technical Development <Part 4>

The Potential of Conservation Agriculture for Building Healthy Soil: A Case Study from Laikipia, Kenya

Soil management is key to sustainable agricultural production. Have you ever heard of an approach called conservation agriculture (CA)? FAO defines CA according to three principles. The first is minimum mechanical soil disturbance (no-tillage or reduced tillage); the second is permanent soil cover (cover crops or organic mulch); and the third is diversification of plant species (crop rotation, mixed cropping, and the integration of livestock). These three elements interact with one another, and practicing all three in combination is considered to improve the soil's physical, chemical, and biological properties in an integrated manner.

Since the 1990s, FAO and other international organizations have promoted the introduction of CA through agricultural development projects in many countries, particularly in arid and semi-arid regions. More recently, CA has also attracted attention for its potential as a measure for climate change adaptation and mitigation. The author first learned about this approach in 2018 and has remained interested in it as a means of achieving sustainable agricultural intensification. In the same year, while enrolled in a master's program, the author joined a Pan-African NGO that promotes CA. This article presents experiences from field research conducted in the Laikipia region of central Kenya while working at the NGO.



Farmers field in Laikipia, intercropping maize and beans

In semi-arid Laikipia, farmers practice mixed crop-livestock farming centered on maize. In this farming system, securing sufficient soil cover is the first barrier to adopting CA. Because crop residues are used as livestock feed, there is a shortage of material for soil cover. Farmers who continued to practice CA found ways to reconcile it with livestock production, such as introducing cover crops or forage grasses, or leaving a certain amount of crop residue in their fields. Another major practical challenge was access to appropriate farm implements. No-till jab planters, hand rippers, shallow weeders, and other implements for small-scale farmers had been introduced through projects, but they were generally difficult to obtain locally. Farmers therefore responded by working with local blacksmiths to produce implements or by making and modifying them themselves.

Various locally adapted techniques and farmer innovations were observed in this region, where CA projects have been implemented continuously since 2004. It was also considered that these efforts had been supported by a collaborative framework among stakeholders known as an innovation platform (IP).

The author also interviewed farmers who had discontinued CA several years after adopting it (dis-adopters). The main constraints were securing sufficient soil cover material and obtaining appropriate farm implements, and the findings also highlighted a strong need for ongoing technical training and information. These constraints and needs should be given adequate consideration during project design and implementation. The survey also found a tendency among farmers practicing CA to increase their use of inputs such as pesticides and chemical fertilizers. If these inputs are a prerequisite for continuing CA, the approach may not be suitable for resource-constrained small-scale farmers. This point requires caution and further investigation.

Unlike North and South America, where no-till farming expanded commercially alongside large-scale mechanization, CA in Africa has been promoted through projects targeting a diverse range of small-scale farmers. As the Laikipia case demonstrates, establishing CA requires adaptation to the existing farming system in each locality, as well as the corresponding modification of technologies. In this process, mechanisms for generating suitable technologies, as well as project designs that support them, will also be important.