

Adoption of Conservation Agriculture in Tunisia: Approches and Strategies Implemented

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Background

Conservation agriculture is based on the elimination of tillage and soil protection by crop residues or cover crops. Its Development worldwide is linked to its positive impacts in limiting soil degradation as well as environment preservation, while gradually improving production and reducing production costs.

Based on the experience available worldwide, the French Agency of Development (AFD) and the French Fund for World Environment (FFEM) engaged in Tunisia since 1999 a process of support to the development of conservation agriculture. This process was conducted in four successive steps which can be summarized as follows:

- 1) Initiation phase during the 1999-2000 cropping season, as tests and experiments of No Tillage and cover crops under a project supported by AFD and with technical support from the French International Center of Agronomic Research for Development (CIRAD).
- 2) Program of experimentation and research for development on three seasons (2000-2004) under the Integrated Agronomic and Rural Development Project (PDARI) in Kef and Siliana regions with a scientific support from the Tunisian Institution of Agricultural Research and Higher Education (IRESA), the Technical Center of Cereals (CTC) and the Graduate School of Agriculture of Kef (ESAK).
- 3) Project funded by FFEM (2002-2006): “Program for the Development of agro- ecology and carbon storage in tropical and Mediterranean agriculture – no tillage support” nearby farmers in rainfed agriculture in the north of Tunisia.
- 4) Project to support the development of conservation agriculture (PADAC), (2007-2012) ensuring the continuation of previous actions to consolidate the results, support the dissemination and explore new options allowed by conservation agriculture.

PADAC objectives were: (i) To support the development of conservation agriculture with an outreach program to small and medium farms, taking into consideration the agricultural practices of different types of farms, from modern mechanically well equipped to smaller without equipment's or using animal traction, (ii) To enhance the development of conservation agriculture in large farms through knowledge sharing, technical advice and exchange of experiences developed by professional associations, (iii) To accumulate scientific and technical observations likely to analyze and explain the long-term changes, with the establishment of an observatory to monitor the project's impact in terms of reducing land degradation. Thereby PADAC provided implementation of: (i) an Extension program within the competence of the Technical Center of Cereals (CTC - Current National Institute for Field Crops (INGC)); (ii) a Research program with the Graduate School of Agriculture of Kef (ESAK); and (iii) support to the professional association created by farmers practicing conservation agriculture (APAD).

In order to facilitate the implementation of these activities with the needed effectiveness, autonomy management was adopted by each program under agreed procedures and these structures should be coordinated to maximize their efforts and synergies, and intensify collaboration with other stakeholders.

Throughout the process, intervention approaches have been designed to combine both simple comparison tests between conventional practice and no tillage, scientific trials incorporating crop sequences, economic evaluation and extension opportunities at the request of farmers.

These approaches were based on the principle of effective involvement and participation of farmers in research and development activities, extension and dissemination of experiences acquired through no tillage practices according to the concept of " research-action in farm , for and with farmers " as well as strengthening their capacities. They targeted from 2002 large cereal farms and planned to then touch the medium and small farms while expanding the scale of intervention to cover landscape units (watersheds).

In terms of relevance, it should be noted that the design and the implementation approach of interventions supported by FEEM and AFD that have marked the process of supporting the development of conservation agriculture since 1999 enroll consistently in strategies aimed to limit land degradation according to sustainable development principles (environmental integrity, economic efficiency, social equity and control of natural resources management by local communities).

Conservation agriculture, thanks to the practice of direct seeding is a strategic challenge for Tunisia to develop agriculture on new basis, adapted to an environment characterized by an advanced soil resources degradation, depletion and loss of quality of water resources in the majority of agro - ecological zones of the country. These phenomena are further amplified by the effects induced by climate change (erratic rainfall, increased frequency of extreme events such as droughts and torrential rains).

In this context, conservation agriculture should emerge as one of the pillars of agricultural development policy in Tunisia in terms of its potential, proven in many countries, to ensure: (i) improved agricultural soil protection, improving soil fertility and maintaining their potential of production ; (ii) enhanced water use efficiency; (iii) reduced labor time, by elimination of plowing, and avoid delays in sowing and yield losses related and generating an improvement in labor productivity; and (iv) improved economic results (decreased investment in machinery, decrease of fixed costs and in long-term variable costs, decrease of gross product) .

Results

Stakeholders involved in the process have adopted and implemented a strategy and approach of action mobilizing and involving motivated and interested farmers by new technologies, targeting those who have material and intellectual capacity to engage in a process of research and development, enhance their farms productivity and contribute to their dissemination. Targeting was oriented to involve farmers who can positively influence their neighborhood and facilitate changes in attitudes and behavior next to the practice of conservation agriculture and thus circumvent the reluctance of governments towards thereof.

The approach has been to carry out experiments and trials in farms, combining scientific experiments, observations on pilot farms and field experiments (promoting extension) , using proven No Till seeders (with an after-sales service) and providing an of proximity technical support.

The adopted research approach has allowed the opportunity to put into practice an innovative agricultural research and development model adapted to the Tunisian agriculture context. Results have confirmed the relevance of the practice of no tillage ecologically, environmentally and economically in the Tunisian context.

Actually, there are data and concrete results on conservation agriculture, confirmed in the field by a network of reference farms spread in all field crops regions of Tunisia. These results focus on the direct impacts of conservation agriculture to limit more effectively erosion and avoid agricultural land degradation, maintain stable or increase yields, reduce production costs, improve access to fields in wet clay soils, and create favorable conditions for a better adaptation to climate hazards and a better valorization of rainfall. These results were a reference of the Tunisian experience on conservation agriculture at international level.

The combined research, experimentation and advisory support made at the extension clusters have contributed to the development of capacity and expertise of farmers. They have created and consolidated a dynamic exchange and positive competition among farmers and strengthening their commitment to the process of development and extension of the practice of no till. This dynamic is evident in the field and reflects the growing interest in conservation agriculture by neighbor farmers of extension clusters.

Dynamic exchange between targeted and engaged farmers in conservation agriculture was essential in the replication and dissemination thereof.

Moreover, the private sector, through the providers of no till seeders, played a leading role in the transfer, development and diffusion of conservation agriculture. The experience of COTUGRAIN, Company importing no till seeders to Tunisia since 2000, reflects the importance of this role. Indeed, the company has specialized on importing a Brazilian brand of no till seeder (SEMEATO) considered one of the most suitable on the international market.

In addition to this commercial role, the company has actively participated in the dissemination of the technique of no till in organizing demonstrations, putting at the disposal of some farmers no till seeders for rent and conducting free tests at small scale with motivated and interested farmers. In addition to the sale of seeders, that company provides after-sales service, technical support for its customers.

This way of working has allowed: 1) Production of results and scientific and economic experiments in a real situation that can be operated to develop a transversal and multidisciplinary study that was actually initiated in the framework of national and international meetings; 2) ensuring a adoption and diffusion of conservation agriculture in a difficult environment where political development of agriculture is fundamentally oriented to conventional techniques and practices (deep anchoring of tradition of plowing), and where strategies against land degradation are based on conventional techniques of soil and water conservation. There is now a need expressed by regional structures of the Ministry of Agriculture and major projects working in the field of supporting development and management of natural resources to inscribe development of conservation agriculture in their interventions.

To the balance of achievements and achievements to date, we can consider that the support to the development of conservation agriculture process, reached overall objectives that could reasonably be expected in a very unfavorable context to the promotion of this technic. Current and potential positive impacts of this process are important. PADAC was particularly successful in enhancing the development of this practice in large farms, in consolidating and extending the achievements.

In contrast, and despite the substantial efforts made by stakeholders directly involved in supporting this process, some aspects of the objectives have not been successful as expected. These are mainly the following aspects:

Inefficiencies in some areas were amplified by constraints and deficiencies that can be summarized in the following points: (i) The support to the development of conservation agriculture process was conducted without effective involvement and participation of administration of Agriculture which played a passive role, despite the importance of its regulatory function; (ii) There was no real operational strategy for involving socio-professional organizations and strengthening their capacities to enable them to be real reliable and credible partners in this process.

Conclusions and recommendations

Results and achievements to date in the support for the development of conservation agriculture process provide a favorable and supportive platform to continue and consolidate the process supported primarily by the FFEM / AFD. It is to move this process to a higher level to actually subscribe conservation agriculture, in the policies and sectorial strategies for agricultural development and sustainable management of natural resources.

Conservation agriculture should also be integrated into programs of research-development and vulgarization in order to provide practical solutions to constraints faced by farmers to effectively limit erosion maintain soil fertility and improve their potential of production. This anchoring necessarily needs better technical mastery of conservation agriculture and a true extension of its application to a larger scale. It also needs to train high-level skills in various areas of CA in order to be able to advocate a new vision of agricultural development based on this concept.

In this context, the implementation of the following recommendations would be very useful: For Research and development: (i) Continue the process of research action in a global context to support the implementation of a strategy to promote conservation agriculture as an essential component of sustainable development (scientific research , capacity building, vulgarization of proximity, equipment) ; (ii) Taking into account the constraints/problems faced by farmers and the results of their practical experience by studying and analyzing their scientific validity and identifying ways to their consolidation and dissemination; (iii) Establish technical packages accessible by different users capitalizing on achievements of research development actions and the experiences of farmers and develop communication tools to their disseminate; (iv) Subscribe conservation agriculture as a strategic priority in research development projects and different natural resource management and agricultural development programs. For capitalization and dissemination: (i) Strengthen the role and capacity of extension establishments to enable it to play a larger and more efficient dynamic role on establishing and managing the implementation of a strategy to promote the conservation agriculture under partnerships with various institutions; (ii) Insert conservation agriculture in a larger planning framework and management of natural resources; (iii) Integrate conservation agriculture in the range of managements and of agricultural land conservation technology and as eligible for subsidy actions, including seeders acquisition, biomass production and carbon sequestration; (iv) Establish a strategy and action plan to help farmers implementing operational local organizations to develop AC process (acquisition and management of equipment's, share information , awareness and dissemination) . This should be done in close collaboration with other actors.

As Prospects, the post- revolution context provides real opportunities in a favorable institutional environment to rethink agricultural policy and sectorial strategies derived by integrating the development of AC. This integration should be one of the pillars of this policy given the importance of obtained results and achievements to date. The very favorable position expressed by IRESA reflects this positive change. Indeed, IRESA expressed the willingness and commitment to support and strengthen the efforts to date, including putting the AC among the priorities for research and development and contributing to public policy makers. There are currently a large expertise and knowledge in conservation agriculture among key players who have contributed directly to the development of conservation agriculture (INGC , ESAK , farmers ...) that can be valued. There is a strong belief in

the advantages of the CA by many farmers (extension clusters) on limiting land degradation and loss of fertility and a great motivation to help extend this practice.

Based on the current achievements, it is essential to continue to support the process of adoption of CA in the context of a global strategy of supporting the development of AC: (i) intensifying research and development in order to establish technical packages dealing with various aspects of this practice in the Tunisian context; and (ii) creating the necessary conditions for medium and small farmers to access this technology. One of the constraints mentioned in the extension of the practice is the high cost of no till seeders and unavailability, on the Tunisian market, of suited and affordable seeders to small farms. Once opportunities operated and constraints to the extension of CA removed, the different sizes of farms will be reached by development programs and the practice of CA will continue to widespread, and even faster if Administration establishes some encouragements (equipment subsidies, credit facilities, etc.).

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