

CONSERVATION AGRICULTURE IN TUNISIA

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ABSTRACT

Conservation agriculture (CA) is based on No-Tillage (NT) which requires a permanent mulching as a crop residue or a cover crop and an adapted rotation. This kind of cropping system was introduced in Tunisia since 1999/00 through a public research program. Two public institutions (ESAK: Ecole Supérieure d'Agriculture du Kef ; CTC: Centre Technique des Céréales) and a private company have been working in a synergic way that made NT known and practiced by a large number of farmers, especially in the northern part of Tunisia.

ESAK and CTC were respectively a graduate teaching/research school of agriculture and an extension center. ESAK was running a NT research program, and CTC took care of an extension NT program. However, the private company is an equipment supplier that assists farmers in applying NT once they got their direct drill.

Results of eight years experiments encouraged large farm scale managers to adopt NT and look forward to carbon agriculture. This is not any more a dream, but a truth since the CA/NT is the right technology that helps farmers to sequester carbon and improve their soil fertility. The fact that the soil is no more disturbed by plowing, the rate of dry matter mineralization decreases, and the CO₂ release into the atmosphere too. So, Tunisian farmers may benefit from carbon sequestration in the near future and get paid out of carbon funds, as long as they improve their understanding and practice of NT.

Key words: Conservation agriculture, No Tillage, Dry matter, Carbon sequestration

No tillage is defined as the planting of crops in previously unprepared soil by opening a narrow slot, trench or Band only of sufficient width and depth to obtain proper seed coverage. No other soil preparations performed. The soil must be covered by crop residues from previous cash crops or green manure cover crops and the most of the crop residues must be distributed at the soil surface after seeding.

One of the main driving forces for No Tillage NT adoption is the control of soil erosion.

The idea to try techniques of conservation agriculture in Tunisia is not new.

The first step in this context was done in the years between the 70s and the 80s with an American machine for seeding (Tye).

But the real adoption of this technique was in the 99.

THE INTRODUCTION OF THE CONSERVATION AGRICULTURE IN TUNISIA (1999-2000):

The AFD (Agence Française de Développement) – which has directed many projects with the CIRAD (Lucien Segyu) in tropical regions – has considered the no-tillage as a good alternative to resolve many problems like:

- runoff
- high cost of production
- limited yield
- soil erosion
- store water runoff
- enhance infiltration on hill slopes
- sediment transport

On March 99, a group of Tunisian agronomists were invited to participate on one debate organized in Paris by the CIRAD.

In June 99, the AFD has decided with the French ministry of strange affairs and the CIRAD to introduce one agro-ecological project in Tunisia. The choice of Tunisia to promote like this project was done because about the AFD, Tunisia is a privileged point of application of Conservation Agriculture in Mediterranean regions.

On 99-00, the no-tillage was done in 11 farms on the superficies of 27 Ha. The seeding was done by an old American machine (Tye) which was introduced on the 70s by an American project.

The AFD has encouraged this introduction of the new technology by inviting JEAN CLAUDE QUILLET – French expert on CA -.

JEAN CLAUDE QUILLET has come two times to help the group of scientist in October and November 99.

He has come again in January, March and April 2000, to assist the project.

Although the bad climatic conditions on 2000 and the less pluviometer quantities, the yields under no-tillage systems were encouraging to adopt this method.

THE PDARI 2001-2002

2001-2002 was the second year of experimentation.

Up to this date agronomists and persons who directed of the project have started to talk to farmers about the CA.

At the same time agronomists were looking for one seeding machine. Finally, they decided to import one SEMEATO machine from Brazil by one Tunisian private company (COTUGRAIN). COTUGRAIN has done many free tests on many farms especially on the north of the country.

Results on 2001-2002:

Farm of Abdelaziz Ben Hamouda, Mateur, sub-humid region (650 mm/year), Durum wheat (Karim variety)

	No-tillage	Conventional seeding
Yield Qx/Ha	19	22
Yield nb of ball of hay/Ha	46	61
Specific weight Kg/hl	81,2	80,7
Weight of thousand grain	55,3	54,8

Farm of Adnane Abdrabbah, Le Krib, semi-arid region, Durum wheat (Karim variety)

	No-tillage (2 nd year)	Conventional seeding
Yield Qx/Ha	9	6,5
Yield nb of ball of hay/Ha	17	9
Specific weight Kg/hl	81,9	80,6
Weight of thousand grain	44,9	36,7

Constituent of yield on this farm

Durum wheat	No-tillage	Conventional seeding
Nb of tall/plant	1,9	1,4
Nb of épi/m ²	188	173
Nb of grain/m ²	17	15
Length of stem (cm)	49,8	42,2
Nb of épi (cm)	3,7	3,4

Farm of Adnane Abdrabbah, Le Krib, semi-arid region, peas

	No-tillage	Conventional seeding
Yield Qx/hA	7,5	9,1

Farm of Adnane Abdrabbah, Le Krib, semi-arid region, Oats

	No-tillage	Conventional seeding
Yield Qx/hA	10,33	6,9

The CTC and ESAK who made these studies have fended that these results are encouraging to continue their studies concerning No-tillage practice.

A specific project from 2001 to 2005

The AFD has still financed this project due to the FFEM (Fonds Français pour l'Environnement Mondial).

The FFEM has contributed to this project because it considers that on adopting the CA we contribute to reduce the climatic change effects by the **sequestration of carbon on the soil**.

The FFEM has financed the CTC (CENTRE TECHNIQUE DES CEREALES) by 609 euros for two years 2001-2002 and 2002-2003;

This project has like aims to:

- continue the experimentation which CTC and ESAK have started with small farmers
- try the no-tillage on large farms (10 Ha and more)
- the contribution to resolve problems of sediment transport and erosion

Tunisian authority still think that agronomist have to give more results before trying to develop this method by a big number of farmers.

The CIRAD has supported the CTC to work on the best conditions.

Farmers have appreciated this new method.

The private company has encouraged agronomist and farmers to adopt no-tillage.

The FFEM has continued to finance the project to reduce climatic change effects two years again 2003-2004 and 2004 – 2005.

Results:

As a result:

- ameliorate the organic matter on soils

The evolution of organic matter and the volume of residues on no-tillage and on the conventional system (Farm of Adnane Abdrabbah, Le Krib)

		01-02	02-03	03-04	04-05	05-06	06-07
Weight of residue (T/Ha)	NT	2,5	1,13	1,07	2,1	2,5	2,8
OM (%)	NT	1,9	1,9	1,5	1,5	1,9	2
	CS	1,79	2,1	1,66	1,66	2,27	2,29

Source: CTC

- economic advantages

The variation of economics parameters between NT and CS

	Durum wheat			Oats			Faber		
	NT	CS	% variation	NT	CS	% variation	NT	CS	% variation
Mechanisation cost (TD)	99	110	-10	140	171	-18	60	67	-9
Inputs cost (TD)	201	175	15	185	162	14	146	110	33
Production cost (TD)	319	302	6	349	362	-4	219	185	18
PBT (TD)	929	748	24	790	858	-8	843	587	44
Brut Marge/Ha	610	446	37	441	496	-11	625	402	56
Production cost / Ql produced (TD)	13	15	-13	2	2	5	13	16	-17

Source: CTC

The PADAC from 2007 to 2011

The PADAC (Projet d'Appui au Développement de l'Agriculture de Conservation) has started on 2007, it's financed by the FFEM.

The FFEM encourage this project because about it the Conservation Agriculture is the best method to sequester carbon on soil and to participate on reducing the impact of climatic change.

On this project, three institutes collaborate together to promote the CA in Tunisia, these institutes are: CTC, ESAK and APAD (Association Pour l'Agriculture Durable).

The APAD is an NGO (Non Governmental Organisation) created by a group of Tunisians farmers who are interested by CA and environmental problems. They are looking for a durable system of production.

Their common aim is to share their experiences, to help each other, to resolve their similar problems together also to improve their productions and their knowledge.

In this project, each institute collaborates with his partner to find a NT system adapted with Tunisian conditions.

In this project, the CTC help APAD to develop NT in Tunisia.

The CTC makes experimental tests looking for:

- crop which can cover soil during the summer
- success the weeds and pests control
- erosion control
- improve organic matter on soil
- reduce the cost of production

The group of agronomists on ESAK makes search to:

- study the relation between NT and water economy
- sequester carbon on soil
- maintain of biodiversity
- increase the yield

First steps done by APAD on 2007-2008

Only on one year APAD has participated on:

- the National seminary of starting the PADAC (Bizerte, Tunisia, 16-17 May 2007)
- the SIAMAP (Tunis, October 2007)
- green ifriquya (Tunis, November 2007)
- expert group meeting: sustainable development in north Africa: experiences and lessons (Tunis, 18-21 November 2007)
- recent trends in conservation agriculture under Mediterranean conditions (Zaragoza, Spain, 31 march to 4 April 2008)
- festival du non labour (France, 27 August 2008)
- INNOVAGRI (France, septembre 2008)
- SIAT (October 2008)
- National information day to inform farmers about the result of the study and experimentation on no-tillage

APAD organise usually meeting and information days about NT, fertilisation, weeds and pests control.

The Agronomist - who work with APAD - visit frequently farmers to help them and know their problems.

APAD try with scientist to resolve farmers problems.

CONCLUSION

The ecological contrasting factors for spreading NT in Tunisia are low precipitation with biomass production, poor soil and soil at risk of erosion.

The socio economic contrasting factors demand for crop residues as forage for livestock, poorly developed infrastructure (market, credit and extension service), distinct market preference or one crop and high demand on the farm management.

Since 99 the number of farmers who practice no-tillage, the number of machine specialized to this technology and its special extension have increased more and more.

Today more than 6000 Ha are cultivate on NT by more than 78 farmers and we dispose of more than 40 machine specialized.

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