Conservation Agriculture in South America

The adoption of the NO TILL System and Biotechnology

The MOSHPPA Model
(Modern Sustainable Highly Productive and Profitable Agricultural Model)

World Agriculture and Green Growth Conference
Paris, December 2010

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We, the Argentinean and the CAAPAS (American Farmers), understood that the simultaneous achievement of a proper level of Productivity, Profit and Sustainability (and even Improvement of the resources involved in the farming process) ……..

“should be considered as a must if in the future we are going to keep the capacity to play our important role as world’s food producers and providers”

Source: Roberto Peiretti 2009
Reviewing

“The Past of Agriculture”
On the past, agriculture (farming) took place based on an “unbalanced soil and agro-ecosystem management” that we nowadays call “Conventional Till (Mainly Plough Based) Agriculture”.

Mainly due to this, the historical development of the agricultural process to some extent rather than a Farming Evolution Process, can be considered as a …….
...... “Farming Involution Process”
(4000 years of Ag. History in three pictures)

Source: Roberto Peiretti 2009
Clearly soil tillage and denudation was, and keeps been, one of the main causes of the “human induced” soil (and some other agro-ecosystem components like water, etc.) degradation process around the globe.

In many cases like these, we are losing 10 tons of soils (or even more up to 50) per each ton of grain/oilseeds produced. A cost that farmers, societies and the whole humanity cannot keep paying any longer.
Focusing at the Present Global Agricultural Scenario
The worldwide map for risk of soil erosion indicates us the urgent necessity to modify the soil management across the world.

- **Areas of serious concern (>22 t*ha\(^{-1}\)*y\(^{-1}\))**
- **Areas of some concern (11-21.9 t*ha\(^{-1}\)*y\(^{-1}\))**
- **Stable terrain (<10.9 t*ha\(^{-1}\)*y\(^{-1}\))**
- **Non vegetated land**

We can understand that the "soil tillage based agricultural approach" was used in the past and for thousands of years, but, we cannot easily accept that at the present time "Farming and Farming Intensification" kept been pillared on it.

Source: Roberto Peiretti 2009
...... Unfortunately, around 90% of the total cultivated area around the globe, remains based on an “unbalanced and aggressive human agro-ecosystems relationship” (tillage and minery approach).

In certain cases this “wrong human behavior” can be understood and even justified .....
.... the Dilemma of “been conscious of doing things in a wrong way” under the pressure and “unavoidable need” of getting the essential for life;
but, ........in some others cases

the “wrong behavior” can not be easily

understood and/or justified !!
Fortunately, in several parts of the world the farming operation started to change towards a positive evolution basically by means of **QUITING TILLAGE**

Source: Roberto Peiretti 2004
Looking at The Future Scenarios
(as related to human population, to food and to agric. products demand).
The Future Demand

The combination between the future population growth and the global economic growth, (plus the bio-fuel issue), will STRONGLY enlarge the global demand for agricultural products. Probably doubling it (or even more) within the next twenty to fifty years”

We must recognize that it represents a challenge for all of us ….
Dr. Norman Borlaug (Novel Peace Prize Laureate 1970 and father of the “Green Revolution” that has so enormously contributed to mitigate human hunger on Earth”, considered all this combined challenges and established what probably is going to be …
“The Biggest Human Challenges of the XXI Century” that states:

“Humanity will have to develop the ability to satisfy the human needs (food demand as the first priority) but at the same time conserving the resources”

Source: Dr N Borlaug Personal Communication 2005
As those gifts that life rarely offer us, I have the personal joy (and even privilege) of presenting him my ideas and discuss them with him. I have learned so much from Dr. Norman Borlaug.

Source: Roberto Peiretti 2005
Some projections are saying that the increase in future production will be coming from a combination of area expansion and yield (Novitas SA - Argentina)

In the past, demand growth has been met through yield growth. However, the strong demand growth ahead will create a need for substantial acreage expansion.
In front on these realities....

“The Argentinean and CAAPAS (American farmers) already started to develop a

“New Agricultural Farming System”

We will next review the path we followed for this purpose .....
Our goals were centered on increasing productivity (and total production) along with a better profit but now both obtained within the “limits” imposed by sustainability, (MOSHPPA model principles)

To achieve these simultaneous goals we needed to introduce a

Deep Paradigmatic Change to the Way we Understand and Carry Out the Agricultural Process
The “Complete Avoidance of Soil Tillage” and the achievement of a “Soil Covered by MOG – Plant Material Other than Grains” along with the adoption of the principle of “Soil Nutrition rather than crop fertilization”, and a proper “Rotational Sequence of Crops”; can be considered as the “key pillars and factors” that allowed us to evolve towards a Better Farming System.
The achievement of a HIGHLY PRODUCTIVE, PROFITABLE and SUSTAINABLE Farming Operation …… largely depends on the interactions between…

Source: AAPRESID 2003
Some of the strategies utilized to improve the CROP ENVIRONMENT

- Soil covered by stubble (MOG) and a Crop Fertilization Strategy (based on the Soil Nutrition Concept rather than in the soil fertilization one) and Carbon Management Strategy
- Water Management.
- Crop Rotation and Sanitation and other managerial strategies.

Source: Roberto Peiretti 2009
We must change our mind and become fully aware that soils can be compared to a “Marvelous Natural Lab, able to Sustain and to Contain Life”. Also that a “Healthier Soil Condition” is one of the Main Pillars to achieve the MOSHPPA GOALS and a highly better general functioning of the agroecosystem.

Source: Roberto Peiretti 2009
The Need to Gain Carbon into Soil
Tillage flashes flames of fire burning OM and C!
By any mean we ought to avoid tillage;
Taking a close up of my soils after 30 years of No Till.

Gaining Carbon

Source: Roberto Peiretti 2006
Gaining Carbon

Source: Roberto Peiretti 2008
“The Biological Plow another Conceptual innovation”

“Pivot Like Rooted Crops” and “Meso-fauna”

can act as a

“Biological Plough”

further improving

“The No Till Soil Environment”
“The Biological Plough at work”
Soil Biodiversity and Biological porosity
Close Up of biological porosity

Source: Roberto Peiretti 2009
Further Improving the “Crop Environment”

- Soil covered by stubble (MOG) and a Crop Fertilization Strategy based on the Soil Nutrition Concept rather than in the soil fertilization one.
- Carbon Management Strategy
- Water Management
- Crop Rotation and Sanitation, and other strategic managerial issues

Source: Roberto Peiretti 2009
Moving even forward at improving the “Crop Environment”

• Soil covered by stubble (MOG) and a Crop Fertilization Strategy based on the Soil Nutrition Concept rather than in the soil fertilization one. Carbon Management Strategy.

• Water Management.

• Crop Rotation and Sanitation, and other strategic managerial issues.
Soybean planted into last year's corn stubble.
... In another example
(No Tilled Wheat in corn-soybean stubble)
Let’s now quickly revise some cases (crops) examples at work for the Argentinean Adoption of the New Farming Paradigm and its impact on Productivity, Profit and Sustainability
Argentinean Corn (Maize) Management and Yield Evolution No Tilling (GMO) BT – RR Corn
Corn No Tilled into soy stubble of previous season
Corn planted into Soy of previous year

Source: Roberto Peiretti 2006
14 Tons per Ha No Tilled Corn

Source: Roberto Peiretti 2009
Harvesting 14 tons of grain in soils been No Tilled for the last 25 years.

Source: Roberto Peiretti 2006
Country Level

Argentina - Corn-Maize (Cultivated and Harvested area - Production and Productivity)
Wheat under NO TILL
Under No Till and MOSHPA model principles, we were able to obtain more than 4 tons of wheat grain per hectare with only 30 millimeters of rain during the crop cycle.

The No Till System is truly helping us to manage the water.
The drillers and planters ought to allow us to get the desired plant population almost under any planting condition.
If we take the right decisions, the crop result and harvest will reward us.
At the Country Level, the utilization of these principles allowed us to achieve significant benefits.
No Tilling RR (GMO) Soybean.

The Results
Biotechnological Soy (RR) planted into black oat as a cover crop
No Tilled Soybean 4,5 up to 6 Tons per hectare
Source: Roberto Peiretti 2010
Yield equals to five metric tons of soybean per hectare in this case.

Source: Roberto Peiretti 2006
ARGENTINA

Adoption Patterns for No Till and for Biotechnology. The impact on yield and total country production

We are certifying this process from AAPRESID (The Certified Agriculture Program)

Source: Roberto Peiretti 2010
Argentina Biotecnology Adoption in Agriculture

Fuente: Argenbio 2006
E Trigo
We were able to triple the country total production in around fifteen years. Large Productivity Increase relieving the pressure for the expansion need.
Other American countries that belongs to CAAPAS had followed a similar pattern and have already adapted and adopted very successfully the No Till and MOSHPPA Model Principles.
(Fuente: 1992 CRIA, 93 INCADE/GTZ, 94/95/96/97/98/99 /00/01/02/03 Estimación CAPECO-MAG)
I was lucky enough and have “the privilege” of present to, and even discuss and validate this Paradigmatic New Farming System with very “emblematic people” …
An “emblematic talk” with HRH Prince Charles when I participated of an Essex University organized meeting at Saint James’s Palace in London 2001

Source: Roberto Peiretti 2002
Also I offered and discuss these ideas and realities with Her Majesty Queen Beatrice and other members of the Royal Family when they visited Argentina a couple of years ago.
Recently, I brought this experiences and technologies into Russia and Ukraine and discuss with them at the maximum Agric. political levels.

Source: Roberto Peiretti 2009
Besides, I also had the opportunity to discuss and validate our model at FAO in Rome as well as in meetings held at universities like Harvard in USA, Essex in UK etc; but..... still the most valuable validation is our own reality as farmers and agronomist’s having the system at work in more than 100 millions hectares ;}
It is important to stress that to be able to evolve our farming system, efficiency should be increased by an innovative attitude.

The "main barriers" to a broader farm no till adoption are:
- Cultural prejudices
- Risk associated with changes
- Fear to the unknown economic cost or the change.

Roberto Peiretti AAPRESID/CAAPAS
Also, at the present time and with the evidences we already have, we can consider that the No Till and the MOSHPA Model Principles are not only useful to..

“increase PRODUCTIVITY and PROFIT avoiding further degradation”

but also useful to

“repair some of the damages caused on the past”

which after all means to reach a

BEYOND SUSTAINABILITY STAGE

Source: Roberto Peiretti 2009
1998 Starting Point
Convent Plough based
Agriculture

2004 Goal Achieved by applying No Till and MOSHPA Model Principles

Source: Roberto Peiretti 2005
No Till, and the MOSHPA principles can reach and help all types of farmers at improving productivity, sustainability and the economy of their operations no matter the operative scale.

- Small Scale mostly Subsistence Agriculture
- Large Scale mostly Commercial Agriculture
Finally, I feel it is also important to add that .....
If we achieve the goal of “Developing the capacity to provide enough food for all humanity in a sustainable way”, undoubtedly we will have a happier life and at the same time we will be constructing a better future for our children.

Thank You for your Kind Attention ¡¡