

**SUCCESS STORIES, CHALLENGES AND EXPERIENCE  
ACCUMULATED IN THE APPLICATION  
OF CONSERVATION TILLAGE TECHNOLOGIES  
IN FARMER FIELD SCHOOLS**



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# **SUCCESS STORIES, CHALLENGES AND EXPERIENCE ACCUMULATED IN THE APPLICATION OF CONSERVATION TILLAGE TECHNOLOGIES IN FARMER FIELD SCHOOLS**

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**Authors:**

**Andrei Zbancă** doctor of economics  
**Grigore Baltag** doctor of economics  
**Ion Bacean** doctor of agricultural sciences  
**Nicolai Cazmalî** doctor of agricultural sciences

**Publication coordinator:**

**Dumitru Stratan** director "Inspiro Consulting", Ltd., doctor of economics

**Reviewers:**

**Teodor Rusu** doctor of agronomy, university professor  
**Aurelia Litvin** habilitated doctor of economics, university professor

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## Introduction

This publication is produced and financed within the Inclusive Rural Economic and Climate Resilience Programme (IRECRP), implemented by the Consolidated IFAD Programme Implementation Unit (CPIU IFAD). The program was designed to support the rural population in order to increase incomes and economic and climate resilience. One of the aims of the Program is to improve the capacity of agricultural producers to adapt to climate change by promoting and expanding resilient agricultural approaches.

IRECRP's "Climate Change Resilience and Value Chain Development" aims to address adaptation priorities in the agricultural sector, focusing on demonstrating the potential for adaptation, developing the capacity of agricultural producers and providing investment opportunities to promote the implementation of conservation agriculture. Particular attention in the Component is given to the promotion of high-performance technologies in the field of agriculture and sustainable soil management, with a positive impact on ecosystems.

Within the Component, investment grants were offered in order to increase the capacities of agricultural producers to adapt to climate change, but also as a support for the development of value chains. The program provided support under the Component: 10 farmer field schools (FFS) in the field of conservation agriculture (CA) and one farmer field school (FFS) in the field of organic farming (OF) were created.

The purpose of establishing FFSs is to promote conservation tillage principles and technologies (CTT) or practices in organic farming, as well as ongoing training of agricultural producers during the IRECRP Implementation.

Each FFS allocated agricultural land for a demonstration plot, where field crops were grown only on the basis of the application of CTT (No-Till, Mini-Till or Strip-Till) or on the basis of organic farming. Each FFS also allocated land for a control plot, used only on the basis of conventional tillage technology, in order to compare the agricultural performance and soil properties recorded on the demonstration plot.

In order to technically equip the FFSs, depending on their profile, CPIU IFAD contributed with financial resources in the form of a grant to the procurement of specific equipment in the application of CTT or equipment used in organic farming, accordingly.

Additionally, CPIU IFAD has hired experts to provide advice and technical assistance to FFS in the field of CTT application (since 2016) and economic efficiency analysis in the implementation of CTT (since 2017).

Moreover, starting with 2017, CPIU IFAD provided support for sampling and determination of physical, physical-mechanical, chemical and biological properties of the soil of demonstration plots with the application of CTT and of control plots where conventional work technology is applied. It also provided the elaboration of annual reports of analysis and description of the results of laboratory investigations.

In order to support the organization of training within the FFS for the promotion and dissemination of the principles of application of CTT and OF among agricultural producers, since 2017, CPIU IFAD has hired a service provider to provide logistical support in organizing trainings. The total number of participants trained in the FFS was 3,350 people in the 87 training sessions organized.

## The State Commission for Variety Testing

### Implementing the system of conservation agriculture is a solution for conventional agriculture



The State Commission for Variety Testing (SCVT) was founded in 1940, and over the years it has undergone a series of reforms. The role of SCVT is to correctly identify the varieties and hybrids that will best realize their production and quality potential in the cultivation areas and would capitalize on the climatic potential of the area. The institution tests varieties and hybrids according to well-defined methodologies, processes the obtained statistical data and prepares proposals to change the current range of varieties and hybrids.



Fields for testing and varieties homology

The headquarters of SCVT is in Chisinau, and the testing of varieties and hybrids takes place in 14 experimental state plots. The institution annually updates and edits the publication of "Catalog of Plant Varieties of Republic of Moldova", which serves as a basis for agricultural enterprises in the cultivation of agricultural crops.

The State Commission owns 892 ha of agricultural land in 15 areas. In these areas, located in all the pedo-climatic zones of the republic, 4 centers and 11 experimental sectors were created.

Pavel Sochircă, the Deputy Director of Production at SCVT informs that one of the 15 state experimental centers, with good experience in agriculture and currently operating is the Grigorievca Center.

*„Within the center, there has been created a modern technical-material base (combines, tractors, agricultural aggregates and warehouses for production storage) which ensures the timely performance of agricultural works. The experience in the activity of the center from Grigorevca village, Causeni demonstrated the difficulties of conventional agriculture due to climatic conditions (especially the pronounced drought from July to September). Proceeding from these rather risky aspects of the given area, the center decided to implement the conservation agriculture system because it wants to minimize the risks”, says Pavel Sochircă.*



**Training activities for agricultural producers in order to promote conservation agriculture**

Since 2015, the center has taken a decisive and important step by applying the conservation system of mini-till agriculture. In this context, the creation of the Farmer Field School was a beneficial thing for the center by organizing the demonstration and control plots.

At the same time, the center received assistance and consultations from national experts in technology, economics and soil analysis, which demonstrated through concrete experi-

ences and complex analyzes conducted during the years 2017-2020, that the direction of conservation agriculture is correct and brings only benefits, both economical and sustainable for the production of field crops.

Currently, Grigorievca Experimental Center is processing 104.85 ha. The mini-till conservation system is applied on 20% of the total area, because the pilot phase provides for the testing and analysis of the recorded results, and later the application for the entire cultivated area.

In 2017, the State Commission participated in the Rural Economic and Climate Resilience Programme funded by the International Fund for Agricultural Development (IFAD). The institution was selected for the implementation of the Farmer Field School Program. The demonstration plot was organized on an area of 19.73 ha and the control plot – on 19.56 ha cultivated with agricultural crops.



**Mini-till sowing of cereal crops**

*„Investments in the acquisition of modern agricultural equipment were vital for the center, in the implementation of mini-till tillage, which could not be done with its own resources. Within the project, a tractor, a scarifier and a cereals seed drill for No-till and Mini-Till were purchased”, informs Pavel Sochircă.*

The experimental center can confirm with certainty that the application of conservation agriculture in the village of Grigorievca is a correct and necessary decision, because it has positive advantages, and namely:

- Increasing the organic mass in the soil and improving the soil structure, which is very important for sustainable agriculture under the conditions of global warming. At the same time, the vegetal cover residues allow the increase of the humus content in the soil; the performed soil analyzes showed this slow tendency;
- Increasing the yields of agricultural crops per unit area, which was also obtained by the center;
- Reducing production costs and increasing economic efficiency.

*„During 4 years of implementation of the activities within the Farmer Field School, the registered results were monitored and evaluated, which confirmed once again that the application of mini-till agriculture depends on the sustainable future of agricultural land management and ensures the following confirmed economic results:*

- *Increasing the yield on the demonstration plot by 15% compared to the control plot;*
- *The income from sales per hectare on the demonstration plot is 16.5% higher than on the control plot;*
- *The direct expenses per hectare on the demonstration plot are 21% lower than on the control plot”,* says the Deputy Director on production activity within SCVT, Pavel Sochircă.

Along with the positive economic effects, the practice of mini-till agriculture allows the exploitation of agricultural machinery more rationally and efficiently, which has the following advantages:

- reduction of fuel consumption by 26%;
- reducing the number of mechanized operations and the degree of wear of agricultural machinery.

The staff of the State Commission for Variety Testing mentions that an important thing learned along the way is the continuous implementation of innovations and experiments in order to modernize conservation technology. The foundation of the Farmer Field School and the implemented activities allowed the Experimental Center to create relationships and partnerships both between farmers and with institutions and experts in the field of conservation agriculture.

For the next 2-3 years the State Commission for Testing Varieties is interested in the continuous development of production and for this it settles the following objectives:

1. Continuous modernization of conservation technologies through the gradual transition to no-till agriculture;
2. Minimizing natural and technological risks by investing in modern agriculture.

At the same time, in order to minimize natural risks, the State Commission has formulated long-term strategic development objectives: Creating the opportunity to irrigate fields and ensure intensive technologies for agricultural crop production and the application of the system of conservation agriculture based on three principles: minimum soil disturbance, proper crop rotation and covering the soil with plant residues.



**Fields cultivated by using mini-till system of agriculture**

## T.C. "Roua Piersicului" Ltd.

**The process of implementing conservation agriculture is a complex one and requires time and trust.**

Conservation agriculture has proven to be a successful alternative for T.C. „Roua Piersicului” Ltd. From Tochile-Răducani, Leova.



The company was founded in 2005 and currently manages 2450 hectares on which it grows cereals and technical crops. The company has great ambitions for the practiced agricultural business, based on the creation of a sustainable company in the agro-industrial sector by ensuring direct correlation with the implementation of technologies that allow the optimization of the production process. In our case, the technologies underlying the company's development are conservation agriculture and digitalization of processes.



**The company nominated with the best corn harvest in 2018**

*“Our company practices modern technology of field crop production, based on the widespread use of digitalization of the production and decision-making process, by applying a high agro-technological discipline. The area in which we operate is characterized by difficult conditions for the cultivation of field crops and these aspects have become more visible and pronounced in the current context of global warming. These risky conditions of activity of the Company forced us to review the approach to the conventional agriculture system and opt for the application of the conservation agriculture system”, says Ion Adam, the leader of “Roua Piersicului” Ltd.*

The farmer states that the company he manages has a modern technical and material base that allows him to carry out field work of any complexity. The company implements two technologies for storing agricultural production: (I) *storage in bulk on the floor* – storage capacity 6,000 tons and (II) *storage in silo bags* – 20,000 tons.



**Feeding the fertilizer spreader for fertilization**

The application of the conservation mini-till system in the company has started since 2014. In 2017, the company benefited from the financing of the Inclusive Rural Economic and Climate Resilience Programme financed by the International Fund for Agricultural Development (IFAD) which provided for the foundation of the Farmer Field School, where the demonstration plot was organized on 38.2 ha and the control plot – on 24 ha cultivated with agricultural crops.

*„It is the first program of this kind implemented by the company, destined to implement a strategic direction of agricultural activity, namely the conservation agriculture system. The investment made in the project allowed the modernization of the technique for conservation agriculture to be accelerated. Within the program I bought: cereals seeders for mini-till, scarifier and fertilizer distributor. It is a very important technique for our activity”,* mentions Ion Adam.

Also, the IRECR Program was a complex of practical and applied activities within the FFS, which included: training of the company's staff and farmers in the field of conservation agriculture; providing mechanized services to farmers in neighboring areas, facilitating the evaluation and monitoring of the results of the application of conservation agriculture, which have contributed to the evaluation of positive changes as a result of the application of conservation agriculture.



**Sowing of row crops on the soil covered by plant residues**

*„By implementing conservation agriculture we have obtained a number of benefits. We have managed to streamline the use of production resources, namely: seeds, fertilizers, plant protection products and, which is most important, of fuels. Production costs have been optimized and even reduced and improvements in the profitability and economic efficiency of agricultural activity have been achieved. An essential factor in the efficient use of resources in high-performance agriculture is the combination of CA technologies: mini-till, strip-till, no-till”,* considers the entrepreneur, Ion Adam.

An important thing, implemented by the IFAD VI Program within the FFS is the consultancy and assistance benefited in conservation technology, economics and soil analysis. The evaluation and monitoring of the results in the conservation agriculture system are positive and this conclusion is motivated by the performed analyzes and the reasoned calculations:



**Soil covered with plant residues and sowing remains**

- The average yield on the demonstration plot is 10% higher than the yield on the control plot, and the respective sales income is by 12% higher;
- The direct costs per hectare on the demonstration plot are lower than on the control plot (phytosanitary preparations more by 15% and fertilizers less by 20%);
- The gross profit per hectare on the demonstration plot is 37.5% higher compared to the control plot.

The way of exploiting the agricultural technique in the system of conservation agriculture also offers only positive advantages, which have been confirmed by the resultant analyzes and which consists in:

- reduction of the number of mechanized operations, due to the simultaneous execution (combination of several operations in a single work – no-till direct seeders);
- reduction of fuel consumption by 30%;
- reduction of the wear degree of agricultural machinery;
- more rational and efficient use of production factors.

The complex chemical and structural analyzes of the soil carried out during the years 2017-2020 with the support of the IFAD IV Program allowed to confirm once again that the decision of gradual transition to conservation agriculture adopted by "Roua Persicului" Ltd. is correct. The farmer states that he has achieved important results:

- improving soil quality by structuring it, a factor that influences the reduction of soil erosion;
- balancing the fertilization system and differentiated application of fertilizers depending on the results of the analysis.



**Analysis and testing in the field is important in CA thanks to IFAD experts**

Minimizing natural hazards in the context of climate resilience is the best opportunity to ensure the sustainability of crop cultivation, and namely:

- ensuring the flow of organic matter and preserving moisture in the soil are extremely important for the area where the company operates, they minimize the risks;
- implementation of the conservation agriculture system reduces the risks caused by climatic conditions, especially by the drought frequently encountered in the southern part of the country.

*“We have learned one important thing: the need to apply innovations and experiments to modernize technology (including conservation agriculture) is the key to success in sustainable agriculture. The implementation of the activities within FFS, allowed us to form relations and partnerships both between agricultural enterprises and with institutions and experts in the field of conservation agriculture”,* mentions Ion Adam.

In the next period, „Roua Persicului” Ltd. is going to continue the collaboration with the Institute of Pedology, Agrochemistry and Soil Protection „N. Dimo”, in view of the annual soil analysis, in order to monitor and evaluate the soil quality, in making the correct and optimal decisions for fertilization and tillage.

Ion Adam states that the process of implementing conservation agriculture is a complex one and requires time and confidence in what you do. Respectively, in order to obtain and model the optimal technology for the pedo-climatic zone in which the production is located, it is necessary to test and implement 2-3 conservation technologies and different agricultural operations at the same time.

For the next few years, the company plans to expand the cultivated areas with the application of conservation technologies.

*“We intend to implement practical testing and application of experiments for the continuous modernization of conservation technologies. We want to improve the economic and financial situation of the company by minimizing production costs and streamlining technological processes. For this purpose, we will optimize the crop rotation and the introduction of sidereal crops and field cover”* says Ion Adam.

The company plans, in the long term, to invest in the creation of the 2 km route of irrigation of the fields on the Prut River and the irrigation of 1,000 hectares of land to ensure intensive cultivation technologies of field crops and of those with added value. „Roua Persicului” Ltd. wants to diversify the production, and in the future it intends to plant hetero-oil crops on the surface of 300 hectares. Another idea for the future is the digitization of production processes in order to ensure efficient and qualitative management of operational agrotechnical decisions.

## T.C. „Hiliuțianul” Ltd.

### The collaboration with IFAD was for us a school for learning and improving conservation agriculture

*„Resilience to climate change has forced us to identify viable solutions to save agriculture in the locality”, says Igor Tcaci, the administrator of the company “Hiliuțianul” Ltd.*

The farmer says that „Hiliuțianul” represents the people who take care of the future generations.

*“We are oriented towards an appreciated quality production. Qualitative agricultural production ensures healthy consumers and the environment. Conservation agriculture is not only a solution and a lifeline for the producer, but also a well-being of future generations and soil health”, mentions Igor Tcaci.*



The company was founded in 1999 in Hiliuți, Rîșcani. „Hiliuțianul” Ltd. manages about 1050 ha and has 47 employees. The experience gained during the period of its activity has allowed the company to specialize in the cultivation of field crops, fruits and raising pigs for meat.

The company is a beneficiary of the IFAD Program. Within the program, the Farmer Field School was created for which two demonstration plots with a total area of 40 ha and two control plots with a total area of 42 ha were selected. These were intended for comparative experiments of the results obtained from the implementation of minimum tillage technologies, with those in conventional agriculture, for the period 2017-2020.

*“ During the reference period, we sowed agricultural crops on the selected plots in accordance with the determined crop rotation, the parameters were established in the maps and technological sheets prepared by the experts.*

*The crop rotation expected during the reference period of the FFS’s activity was determined by the experts, according to the following aspects:*

- *Saturation with grain and perennial legumes;*
- *Observance of the ratio between weeding crops and those sown compactly;*
- *Cultivation of crops recommended for the chernozem of Balti region”, reports Igor Tcaci.*

The premises and challenges identified by the company in the application of conservation agriculture are divided by the farmer into advantages and disadvantages.

*„The advantages would be: humus formation and accumulation, biota accumulation, soil structuring; loosening, the furrow turning phase – causing the processes of mineralization of organic matter and the accumulation of carbon in the soil; direct sowing on plant residues –*

*keeping moisture and avoiding wind erosion, water loss – minimal; ensuring the fertile layer of 30-50 cm with uniform and relatively optimal agrophysical, hydrophysical and agrochemical values”, informs the farmer.*

The disadvantages of applying conservation agriculture would be the increase in weeding, light and heavy soils are compacted and a second pass with loosening is needed, as a result costs increase, plant residues on the surface cause diseases and pests. „*Together with our partners, IFAD, we have estimated a budget of \$ 116,000 for the procurement of the necessary agricultural machinery and equipment.*



**Sugar beet on the demonstration plot**



**Demonstration plot sown with sunflower**

*The results of the conservative tillage technology for us were amazing, but also appreciated: the harvest does not increase significantly and has an unstable character of the degree*

*of increase; unit costs are significantly reduced; the structure of the soil visibly improves, the rate of incorporated mineral fertilizers is reduced. At the same time, we noticed the reduction of erosions under the action of the wind*”, says Igor Tcaci. The farmer mentions that the experience obtained in the exploitation of the agricultural technique refers to: The implementation of the conservation system is expected to be done gradually, so that the necessary agricultural equipment is new (milling machines, seeders, cultivators, scarifiers, etc.) and intended for conservation tillage technology.



**CASE Puma 155 tractor unit**



**Scarifier for soil tillage**

“Hiliuțianul” Ltd. obtained the improvement of the soil quality by:

- Reduction of mechanical pressure on the ground;
- Improving the movement of water in the ground and air;
- Increasing water reserves in the soil;
- Reducing the mineralization of nitrogen in the soil, and as a result, reducing the loss of carbon dioxide in the atmosphere;
- Stimulation of biological activity in the soil;
- Reducing the sensitivity of plants to high temperatures;

The administrator of the company says that the experience of the Field School has shown them that the application of innovations and experiments for the modernization of technology in CA establishes: the application of agricultural equipment that performs several technological operations (loosening, leveling, sowing, fertilizer introduction and rolling); application of liquid mineral fertilizers simultaneously with sowing; application of mechanical weed control methods (spring harrow; rotary harrow, cultivators, etc.). „*During the activity of the Field School we exchanged our experience with European partners, farmers from Ukraine, the Russian Federation, etc., and the implementation allowed us to form sustainable relationships and partnerships with agricultural producers, institutions and experts in the field of conservation agriculture*”, emphasizes Igor Tcaci.

The lessons learned by the farmer in the activity implemented with the support of IFAD are valuable. “*For us, the collaboration with IFAD within the FFS was a school for learning and improving conservation agriculture through our own experiments and results*”, Igor Tcaci emphasizes.

## „Porumbeni” Phytotechnics Institute



INSTITUTUL DE  
FITOTEHNIE

*“The conservation agriculture system is the future of agricultural business. At the same time, there is an insufficiency of practical and applied information for the implementation of conservation agriculture. Based on these aspects, the Institute decided to switch to mini-till agriculture in order to share the land, where to experiment and form own approach and technology”, says Anatol Spivacenco, the Deputy Director of Science at the Institute of Phytotechnics” Porumbeni”.*

PI “Porumbeni” is an applied scientific research institution in the field of agriculture, a member of the Academy of Sciences of Moldova, structurally subordinated to the Ministry of Agriculture, Food Industry and Environment. The institution was founded in 1973. Agricultural production is located in the village of Pașcani, Criuleni. The institution has a rich collection of varieties and hybrids, which includes 146 hybrids and 55 varieties of corn, sorghum – 10 hybrids and 1 variety; it is the originator of 5 varieties of aromatic and medicinal plants (milk thistle, flax, mustard, coriander)

The basic objective of the Institute is the creation and implementation in production of corn and sorghum hybrids endowed with high adaptability to changes in environmental conditions, attested in the last decade, as well as hybrids that would meet the advanced requirements of agricultural producers, both according to the direction of use, as well as by the maturation group.



The improvement process in combination with the applied research on the entire period of activity of the Institute resulted in the creation and approval of 146 competitive corn hybrids, approved in: Moldova, Romania, the Russian Federation, Ukraine, Belarus, Kazakhstan.

A success of the Institution is the fact that seed production has an integrated value chain from production to conditioning and packaging of seeds for farmers. The institution has a

line equipped with equipment for conditioning corn seeds on various superior biological categories. Corn seed conditioning includes cleaning of impurities, drying, sorting and sizing, fractional packing and sorting / hybrids.



*„The motivation to move to the system of conservation agriculture in the Institute arose from the need for change, based on the results obtained by farmers in recent decades, improving soil quality and conserving biodiversity / humidity, minimizing production costs by reducing consumption of means of production, but also reducing the risks in terms of the negative effects of global warming and climate resilience”, says Anatol Spivacenco.*



**Conservation tillage covering the soil with plant residues**

The application of conservation agriculture systems in the institution began in 2015. In 2017, the company participated in IRECRP and was selected for the creation of FFS, where the demonstration plot was organized on 17 ha and the control plot – on 17 ha cultivated with agricultural crops . Within the Program PI "Porumbeni" implemented the investment project in the amount of 1,835 thousand lei.

From the project resources there were purchased: no-till grain seed drills, no-till weeding seed drill and corn and sunflower header.

*„The practical experience gained in the years of implementation of mini-till agriculture allows us to conclude that it was a correct and efficient decision taken by the Institute. The complex research and analysis carried out within the FFS with the considerable support of the IFAD Program, have demonstrated positive results related to the optimization of production costs by applying the conservative system of agriculture, namely:*

- *The average yield on the demonstration plot is 7% higher than the yield on the control plot;*



**Soil compaction analysis – an important indicator in CA**

- *Sales revenue per hectare on the demonstration plot is 10% higher than on the control plot;*
- *Direct costs per hectare of the demonstration plot are 15% lower than of the control plot.*

*At the same time, the most saving and positive results are registered in the exploitation of agricultural machinery in the system of conservation agriculture, which allows obtaining the following advantages:*

- *reduction of fuel consumption by 20%;*
- *reduction of the number of mechanized operations;*
- *reduction of the wear degree of agricultural machinery”, says Anatol Spivacenco.*

PI „Porumbeni” is a research institution that is interested in applying its own innovations and experiments for the modernization of technology in the system of conservation agriculture, and also in exchanging experiences with other companies that have positive results in this field.

The development strategy of the Institute provides for complex investments, which have as objective the implementation of investments for the creation of the water accumulation basin, in order to irrigate the fields, with its pumping from the Ighel river and the irrigation of 100-200 hectares of land to ensure intensive production technologies of corn and sorghum seeds; application of the conservation agriculture system based on three principles: minimum soil disturbance, correct crop rotation and soil cover with crop residues and cover crops and continuous improvement of quality management and implementation of the international quality management certification system ISO-9000.



## „Nacubi-Agro” Ltd.

**The application of the conservation agriculture system must come in tandem with the protection of the soil and the environment**



**Analysis of winter wheat development**

The administrator of "Nacubi-Agro" Ltd., Ion Curjos, states that the application of the conservation agriculture system must take place in tandem with the protection of the soil and the environment, these being the basic pillars of the development of sustainable and efficient agriculture.



**Adjusting the combine for tillage**

"Nacubi-Agro" Ltd. was founded in 2002 and is focused on the production and marketing of agricultural production (especially field crops). The company's agricultural lands are located in Larga Nouă and Cucoara localities, Cahul district, an area with unfavorable conditions in terms of average rainfall and terrible summer droughts.

The company is an agricultural enterprise that practices modern technology for the pro-