Technology Fact Sheet

Sector	**Agricultural Soils**
Technology name	**The No-Till soil cultivation system with preliminary positive recovery of the post-arable layer and use of vetch as intermediary crop for green fertilizer**[i] Budoi G., Penescu A. Agrotehnica. Sistemul „Fără Lucrări" (Semănat Direct). Bucureşti: Cereş, 1996, p. 335-336. Mihai Rusu. Tratat de Agrochimie. Îngrăşăminte verzi. Bucureşti: Cereş, 2005, p. 487-488.
CO2 Emissions in „Agricultural Soils" sector, tons CO2	**In 2010 – 3 000 787 t or 2.07 t/ha** (sown area – 1 451 500 ha, fallow lands = 1 820 510-1 451 500 = 369 010 ha; on fallow lands the emissions were well balanced or slightly positive)
General description of the technology	The existing soil cultivation systems entail intensive physical, chemical and biological degradation of soil. The classical soil cultivation system generated the phenomena of soil features degradation. Excessive plowing favored dehumification, damage of the soil structure, increased compaction, danger of erosion. It became necessary to develop new tillage systems known as "soil conservation works systems, SCWS". Mini-till and No-Till systems turned out to be the most effective. It is proposed to improve these two systems by including vetch as successive crop for green fertilizer. A crop of vetch (about 6 t / ha of dry weight containing 4% of nitrogen), and roots (about 4t/ha dry weight containing 2% of nitrogen) accumulates about 10 tons of organic matter in soil, which ensures synthesis of about 2.5 t / ha of humus containing about 200kg of nitrogen. This amount of humus is sufficient to create a positive carbon and nitrogen balance in soil during 2 years. The No-till soil cultivation system means that the sowing is done directly on the stubble field or field containing vegetal waste of the previous crop. The main mechanism for No-Till is the sowing machine. The main element of the sowing machine is the cutter. Recently, the cutters are combined with corrugated disc type blades in combination with chisel type blades. Gradually, the topsoil will become biogenic, well structured, loose, will contribute to a favorable air-fluid and nutrients regime and will increase the plants resistance to drought.
How the technology will be implemented and disseminated across the sector?	No - Till soil cultivation system can be implemented, primarily on cca 200 thousand ha arable lands in the South of Moldova. These lands feature a more favorable texture for this technology. Before implementing the No-Till technology, it is recommended to implement the preliminary positive recovery of the arable layer structure on the area planned to be used for this technology. For this purpose, the field should be used as occupied field, sown with autumn and spring vetch. Two harvests of this crop incorporated in soil as green fertilizer will cardinally recover the physical, chemical and biological condition of the arable layer of the soil and ensure successful implementation of the technology. No-Till is an agricultural technology which protects the soil and improves the ecologic condition of agricultural ecosystems. Being used in combination with a successive crop as green fertilizer (vetch), it provides for a well balanced or positive content of carbon in soil.
Implementation barriers	The main implementation barriers for the No-Till land cultivation system are: mentality of population; the initial unfavorable condition of the arable layer of the soil; the high cost of the No-Till sewer; the need to strictly stick to the technological process, what is not in the habit of Moldovan farmers.
CO2 reduction as a result of technology implementation , tons CO2	No- Till system used in combination with vetch as successive crop for green fertilizer (10t/ha of dry mass forming cca 2.5 t/ha of humus and stocks cca 1.45 t/ha carbon in soil) reduces CO2 emissions by **5.08 t/ha**, ensures a positive carbon balance in soil over 2 years, reduces annual CO2 emissions from soil by **2.54 t/ha**.
Impact – Impact of the technology on the country development priorities	

Impact of the technology on the country social priorities	Harvests of 4-5 t/ha grain units ensure the welfare of population, decrease migration, create prerequisites for implementation of various social projects.
Impact of the technology on the country economic priorities	The technology ensures crops of 4-5 t/ha grain units **(on average 4.5 t/ha)**, at a cost of **1125 dollars**. It provides for the food security of the country and agricultural products export needs.
Impact of the technology on the country environmental priorities	It ensures a long term maintenance of soils fertility – the main production means of the country, protects the farmlands from desertification which leads to impoverishment of population and migration, provides economic prerequisites for replacement of the existing subsistence agriculture with sustainable agriculture based primarily on employment of natural processes, biological and renewable resources, and only secondarily, purchased resources.
Other impact	Other impact are : Reduction of amount of fuel used for field works by practically 2 times; • Gradual restoration of the humus content, favorable structure and fertility of the soil arable layer; • Decrease of non-productive losses of water from soil due to mulching which contributes to combating pedological drought; • Partial or total stop of the soil erosion (the stubble field and mulching favor reduction of leaks and accumulation of water from precipitations in the soil); • Establishment of a positive balance of humus and carbon in soil, total reduction of GHG emissions from agricultural soils. • Increase of soils productivity by 30-40 percent.
Costs	
Investment costs	Minimal investment costs for an area of 400ha agricultural lands is cca **340 thousand dollars** (V. Cerbari. No-Till – soil protecting land cultivation system. In the magazine Moldova's Agriculture, nr. 8-9, 2011, p. 9-14.) for 10 years, or **34 thousand dollars** for one year, or $**85**/ha/year.
Operation and maintenance costs	Annual operation and maintenance costs for 400ha are $225 thousand / year or $**560** /ha/year (V. Cerbari. No-Till – soil protecting land cultivation system. In the magazine Moldova's Agriculture, nr. 8-9, 2011, p. 9-14.).
CO2 reduction cost	Reduction of 2.54 t/ha/year. Cost of CO2reduction = 2.54 t/ha/year x 30$ = $76,2/ha/year or $15.24 mln / year on the area of 200000 ha.
Technology lifetime	Technology lifetime is not limited. No-Till system can not be alternated with other mechanical soil cultivation system in the following.
Other	No-Till soil cultivation system is cost efficient for large agricultural enterprises. For a crop of 4.5t/ha/year grain units the cost of production is $**1125** /ha/year, expenditures are – 560+85= 645 $/ha/year. Profit =1125-645 = **$480/ha/year**

[i] This fact sheet has been extracted from TNA Report - Technology Needs Assessment for climate change mitigation - Republic of Moldova. You can access the complete report from the TNA project website **http://tech-action.org/**