Technology Fact Sheet

Sector	**Agricultural Soils**
Technology name	**Classic tillage. Including a vetch field (two yields per year –autumn and spring), as a „green fertilizer field" into a 5 fields crop rotation (two crops of vetch incorporated in soil as green fertilizer on each field once in 5 years).**[i] Neonila Nicolaev, B. Boincean. Agrotehnica. Bălţi, 2006. P. 225-230. Mihai Rusu. Tratat de Agrochimie. Îngrăşăminte verzi. Bucureşti: Cereş, 2005, p. 487-488.
CO2 Emissions in „Agricultural Soils" sector, tons CO2	**Year 2010 – 3 000 787 t or 2.07 t/ha** (sown area – 1 451 500 ha, fallow land= 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	Because of some specifics of certain crops cultivation (sugar beets and fodder beets, vegetables etc.), the classic soil tillage system can be replaced by a tillage system contributing to soil conservation only on 80 % of arable lands. Keeping this in mind, it is suggested to use a crop rotation with five fields with „one field of vetch used as green fertilizer" on the 20% of lands remaining under the classic soil tillage system (Annex 8). One crop of vetch provides 6 t/ha of dry mass of airy parts with a 4% nitrogen content and 4 t/ha of dry mass of roots with a2% nitrogen content. Cca 10 t/ha of organic matter is accumulated in soil and provides for the synthesis of 2.5 t/ha of humus containing cca 200kg of nitrogen. Two crops of vetch (autumn and spring) per one agricultural year accumulate cca **20 t/ha** of dry organic matter in soil ensuring synthesis and accumulation of **5 t/ha** of humus (or **2.9 t/ha** of carbon equivalent to CO2 emissions reduced during 5 years of **10.15 t/ha** or 2,03 t/ha/year). This amount of humus is sufficient to create a positive balance of carbon and nitrogen in soil over 5 years. The topsoil becomes structured, loose, providing for the favorable air, water and nutrients regime for plants.
How the technology will be implemented and disseminated across the sector?	The technology can be successfully implemented on cca 20-25 percent (cca 400thousand ha) o farmlands which, for various reasons, can not be used for implementing **land conservation tillage systems.** The vetch should be sown on the „occupied field", and incorporated in soil twice a year (cca 20t/ha of organic matter that maintains a good balance nitrogen and carbon over the next 4 years when the field is used for cultivation of main crops). In order to implement this complex technology, it is necessary to create a vetch seeds production facility. Autumn vetch should be sown in late August or early September, while spring vetch – late April or early May.
Implementation barriers	1. Rural population mentality about everything that is grown should be used and just incorporated in soil. 2. Lack of vetch seeds production facility. 3. Lack of economic incentives system to encourage agricultural producers to use green fertilizer which protect the quality and fertility of soils in the long term (in Canada farms who use green fertilizers are subsidized with 100-150 dollars/ ha/year). 4. Lack of a state, financially secured program in this sense.
CO2 reduction as a result of technology implementation , tons CO2	The technology provides for reduction of 2.03 t/ha/year or **812 thousand tons** of CO2 on the area of 400 000 ha planned to be used for implementation of this technology.
Impact – Impact of the technology on the country development priorities	
Impact of the technology on the country social priorities	Improves the welfare of the rural population, makes it possible to implement various social projects. 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.
Impact of the technology on the country economic priorities	The total increase in yields over the entire period of action of the vetch green mass (4 years after incorporation in soil) is **4t/ha** grain units, which in monetary terms is –**$ 1000 /ha** or **$200 /ha/year.**
Impact of the technology on the country environmental priorities	The process of land degradation is stopped, humus and carbon balance in soil improves, as well as the soil biota status, the soil's resistance to pollution and drought increases. The ecological status of farmlands improves.
Other impact	Agricultural products production process becomes more environmentally friendly, the internal, conserved resources: the soil, water, biodiversity, etc. of the farm are used in a more rational manner.
Costs	
Investment costs	Investment costs are the same as the cost in conventional agriculture (Annex 3, tab. 2-3) – **$222 once in 10 years or $22,2 / ha/year.** For areas of 200 000 ha - **$44.4 mln** once in 10 years or **$**4.44 mln **/year** (for purchasing of the necessary equipment).
Operation and maintenance costs	Operation and maintenance costs for 1 ha in 5 years are**: (4 years x $390 /ha/year) + (1ha x $128 /ha/year x 2crops) = $1816.** For 1ha/year the costs are: **$1816 : 5 = $363 /ha/year** or **$145.2 mln.** for 400 000 ha farmlands planned to be used for implementation of this technology.
CO2 reduction cost	CO2 emissions reduction - **812 thousand tons** on 400 000 ha. The cost of CO2 reduction = 812000 t X $ 30 = $24.36 mln /year. Emissions reduction cost per 1ha = 2.03 t x $30 = $60.9 /ha/year
Technology lifetime	The proposed technology (field occupied with vetch as green fertilizer) can be used under any soil tillage systems.
Other	The annual crop of grain ensured by this technology is cca 4t/ha over 4 years. The cost of grain on 1ha over 4 years = 4t/ha x 4 x **$**250 **= $4000 /ha.** Total annual costs = 22+396+ 51 = **$**469 **/ha/year. Total annual benefit = ($4000 /ha : 5 years) – $469 /ha/year = $800 /ha/year - $469 /ha/year = $331 /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/**