

## Technology Fact Sheet

Sector	<b>Agricultural Soils</b>
Technology name	<b>Replacing the moldboard plow with harrow with heavy discs (Annex 3) for tillage up to 20cm deep without application of organic fertilizers<sup>i</sup></b> Gheorghe Budoï, Aurelian Penescu. Agrotehnica. București: Cereș, 1996. P. 306-308.
CO2 Emissions in „Agricultural Soils” sector, tons CO2	<b>Year 2010 – 3 000 787 t or 2.07 t/ha</b> (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	As a substitute for moldboard plow harrows with heavy discs are used (Annex 4). Their active parts are equipped with concave-shaped discs, placed obliquely towards forwarding direction and inclined to the vertical plane. Penetrate into the soil up to 18-20 cm, cut and crush the soil, turning it partially. The disks contribute greatly to the soil structure damage, so, it should not be used excessively, however, when needed it should be used at the time of optimal humidity. As a result of disc tillage only, the soil gets considerably weeds infested, in particular because the weeds propagate by rhizomes and these are fragmented during tillage.
How the technology will be implemented and disseminated across the sector?	There are no problems in implementation and dissemination of this technology in the sector. The technology can be implemented on approximately 200 000 ha in alternation with plowing. Tillage with heavy discs harrow in alternation with plowing is advantageous in terms of fuel economy and obtaining yields practically equal to those obtained as a result of classical technology.
Implementation barriers	Do not exist. As long as this technology contributes to soil structure deterioration (Annex 6), it is recommended to be implemented on areas not larger than 200 000 ha in alternation with other tillage systems protecting the soil.
CO2 reduction as a result of technology implementation, tons CO2	According to researchers Boaghii I., Bulat L., 2003, cited by B. Boincean in the paper – Soil Tillage – Trends and Perspectives. In: Akademos Magazine, nr. 3(22), 2011, p.64, over 20 years of tillage with heavy disks harrowing carbon losses from the 0-40cm layer of soil have reduced by 2.7 t/ha or 0,13t/ha annually in comparison with classical tillage of soil by plowing (Annex 5). This reduced amount of carbon (0,13t/ha/year) equals to CO2 emissions annual reduction by 0.45t/ha/year (0.13t/ha/year x 3.5).
<b>Impact – Impact of the technology on the country development priorities</b>	
Impact of the technology on the country social priorities	Ensures minimal welfare of rural population
Impact of the technology on the country economic priorities	Largely ensures food security of the country and provides for the agricultural products export needs.
Impact of the technology on the country environmental priorities	Leads to a very small reduction of CO2 emissions from agricultural soils however largely contributes to the deterioration of the soil’s natural structure as compared to classical basic tillage of the soil.
Other impact	Intensive destruction of the topsoil natural structure entails to smaller resistance to secondary compaction, high risk of weed infestation.
<b>Costs</b>	
Investment costs	For 1ha – <b>\$194 once in 10 years or \$19.4 ha/year</b> . For 200 000 ha - <b>\$38.8 mln once in 10 years or \$ 3. 88 mln /year</b> ( for purchasing of the necessary equipment, Annex 3, tab. 4-5)

Operation and maintenance costs	For 1 ha – <b>\$348 /ha/year</b> . For 200 000ha = <b>\$69,6 mln /year</b> <b>(Annex 3, tab. 4-5)</b>
CO <sub>2</sub> reduction cost	CO <sub>2</sub> reduction – <b>0.45 t/ha</b> , on cca 200 000ha where the technology is used– 0.45 t/ha 200 000 = <b>90 thousand tons</b> . CO <sub>2</sub> reduction cost = 90 000 tx 30 \$/t = <b>\$2,7 mln /year</b>
Technology lifetime	In Moldova this technology exists on cca 200 000 ha and will exist permanently because of fragmentation of farmlands, poverty and cost of this technology which is 2-3 times lower than plowing.
Other	Annual yield of grain ensured by this technology is cca 3t/ha. The cost of grain harvested from 1ha = 3t/ha. \$250 = <b>\$750 /ha/year</b> . Total annual costs = 19+365 = \$384 /year. <b>Total benefit = 750-384 = 366 \$/ha/year.</b>

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<sup>i</sup> 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/>