

Technology Fact Sheet for Adaptation



Technologies in the arable farming

A.3. System of wheat intensification using conservation tillage ⁱ	
1. Introduction	Conservation Agriculture (CA) is based on the integrated management of soil, water and agricultural resources to achieve the objective of economically, ecologically and socially sustainable agricultural production. There are three main principles: • permanent soil cover; • minimal soil disturbance; and • crop rotation.
2. Technology characteristics	Conservation tillage refers to a number of strategies and techniques for establishing crops in a previous crop's residues, which are purposely left on the soil. Conservation tillage practices typically leave about one-third of crop residue on the soil surface. This slows water movement, which reduces the amount of soil erosion. Tillage operations are reduced for cropping and chemical fallow is applied.
3. Country specific applicability and potential	In 2010, Soil- Agrochemical laboratory of Agriculture Research Institute of Mongolia carried out research on 579,300 ha of agricultural land and the results showed that 60.6 % of the agricultural land suffered medium level soil erosion and 4.5 % was of slight soil erosion. Mongolia has piloted zero tillage several times. One of them was through the FAO project in 2000-2002, which demonstrated that conservation agriculture is a technically viable alternative to the current crop production practices in Mongolia and provides prospects for future sustainability. Weed control is still a challenge for conservation agriculture. 2,4-D herbicide is applied at the tillering stage. On fallow, Roundup is sprayed twice. However long term impacts should be considered and studied. Proper application rate should be defined. Yield data show that conservation agriculture provides more reliable yields during periods of drought. Conservation agriculture facilitates the capture of snow and retention of soil moisture; thus providing better conditions for plant development. In addition, biological activity in the soil and phosphorus availability is enhanced. Grain quality on

	conservation agriculture plots is comparable with that of traditionally planted cereals ¹ .
4. Status of technology in country	This technology has been piloted since 1990. At less than 30% of the total agriculture land, the technology is being applied at certain extent.
5. Benefits and impact on the country development ✓ Economic (- Job creation; - Investment) ✓ Social (- Income generation; - Education; - Health) ✓ Environmental	Conservation agriculture can save labour and fuel; although investment will need to be made into machinery and chemical weed control. As local and imported seed drills can be modified, this technology can be introduced without heavy investment into new machinery. As local modifications worked as well as the imported Brazilian parts, these could be mass-produced, which would increase savings and availability of parts to farmers. It should be noted that care needs to be exercised in the correct assembly and adjustment of the furrow-opener parts. Wheat yield on chemical fallow is higher and profit would be increased by about 70 USD per ha and cost of 1 Metric tons of wheat is reduced by 25 USD. The research showed that average wheat yields have been 17300 kg/ha in the last 10 years due to application of reduced tillage which led to yield increase of 200 kg/ha. If this technology is applied to all 300,000 ha of agricultural land, the total increase would be about 80,000 metric tons of wheat. Farmers income would be increased. Wheat production increases would lead to better food security in the country and wheat exports. Soil humus would be increased by 0.16 % in soil layer of 10 cm, wind erosion will decrease by 75-80 % and vegetation cover would be maintained. Agricultural land would be conserved and return to natural status with vegetation cover.
6. Climate change adaptation benefits	The technology will help to maintain soil fertility and reduce soil erosion. Fallow can also help retention of soil moisture too.
7. Financial Requirements and Costs	The total required funding: Current price of Roundup for weed control is about 10 USD per liter. Mongolia needs about 2.1 million USD for 400,000 ha of cereals and forages and 300,000 ha of fallow.

¹Silke Hickmann, Conservation agriculture in northern Kazakhstan and Mongolia, FAO Agricultural and food engineering working document, 2006, www.fao.org/ag/ca/doc/J8349e.pdf

	Importation of sprayer techniques and its parts would cost about 2.5 million USD, seeding machines is about 3 million USD. The total cost would be 7.6 million USD. The technology requires at least 5 – 7 years to be applied nationwide.
8. Institutional and organizational requirements	Training –Awareness creation, training and research need to be continued to ensure the successful extensive introduction of these technologies. Government support – Farmers should receive support from the government in Mongolia. This would include credit for renovation and updating of machinery and equipment and support for the purchase of herbicides and fertilizers. It is foreseen that the advantages of this technology will increase after an initial transition period, ensuring more profitable farming. Seeding equipment, herbicide sprayer- machines, new types of herbicides, and professional expertise are required.

ⁱ This fact sheet has been extracted from TNA Report – Technology Needs Assessment For Climate Change Adaptation– Mongolia. You can access the complete report from the TNA project website <http://tech-action.org/>