Technology Fact Sheet for Adaptation

Technologies in the arable farming

A.2. Vegetable production system using drip irrigation and water saving methods [i]	
1. Introduction	Drip irrigation is based on the constant application of a specific and focused quantity of water to soil crops. The system uses pipes, valves and small drippers or emitters transporting water from the source (i.e. wells, tanks and or reservoirs) to the root area and applying it under particular quantity and pressure specifications. The system should maintain adequate levels of soil moisture in the rooting areas, fostering the best use of available nutrients and a suitable environment for healthy plant roots systems. Managing the exact (or almost) moisture requirement for each plant, the system significantly reduces water wastage and promotes efficient use.
2. Technology characteristics	A drip irrigation system typically consists of: • Pumps or pressurized water system • Filtration systems • Nutrient application systems • Backwash Controller • Pressure Control Valve (Pressure Regulator) • Pipes (including main pipe line and tubes) • Control Valves and Safety Valves • Poly fittings and Accessories (to make connections) • Emitters A wide range of components and system design options is available. Drip tape varies greatly in its specifications, depending on the manufacturer and its use. Drip tape is a type of thin walled dripperline used in drip irrigation[1]. The wetting pattern of water in the soil from the drip irrigation tape must reach plant roots. Emitter spacing depends on the crop root system and soil properties. Drip irrigation zones can be identified based on factors such as topography, field length, soil texture, optimal tape run length, and filter capacity. Many irrigation system suppliers use computer programs to analyze these factors and design drip systems. Once the zones are defined and the drip system is designed, it is possible to schedule irrigations to meet the unique needs of the crop in each zone. Recent automatic system technology has been particularly useful to help control flows and pressure, and to identify potential leaks thereby reducing labor requirements. System design must take into account the effect of the land topography on water pressure and flow requirements. A plan for water distribution uniformity should be made by carefully

[1] http://en.wikipedia.org/wiki/Drip_tape

	considering the tape, irrigation lengths, topography, and the need for periodic flushing of the tape. The design should also include vacuum relief valves into the system.
3. Country specific applicability and potential	Mongolia has been piloting drip irrigation systems since 1997 and the applicability of this technology has been confirmed. This technology is very suitable for growing vegetables, berries and bushes in Mongolia. Drip irrigation systems help farmers reduce water consumption of vegetables and berries. Initial cost of equipments will be high, however operating cost of irrigation can be saved due to this water saving technology. Small farms and families can use several small scale drip irrigation systems for 0.5 ha and need a storage room for keeping equipments in winter. The storage space requirement is small and it can be solved by farmers and households.
4. Status of technology in country	Currently, about 100 ha of agriculture land has installed drip irrigation systems with support from international projects.
5. Benefits and impact on the country development ✓ Economic (- Job creation; - Investment) ✓ Social (- Income generation; - Education; - Health) ✓ Environmental	The introduction of drip irrigation systems can save water and labor and does not create new jobs. When vegetable harvests increase and stabilizes at the national level, food security of population can be improved. Drip irrigation systems can save water and increase crop and vegetable production. The labor use for irrigation can be reduced by 25 person day or 200 USD per ha and in total 1.6 million USD for all 8000 ha each year. Assuming that crop production would increase 15% from the level in 2011, total yield can increase by 15,000 metric tons. If 1 kg of vegetable costs 0.5 cents, total revenue of increased harvest will be about 7.5 million USD per year. Compared to surface irrigation, which can provide 60 per cent water-use efficiency and sprinklers systems which can provide 75 per cent efficiency, drip irrigation can provide as much as 90 per cent water-use efficiency. Using drip irrigation systems requires clean water free of mud and filters require frequent cleaning. There is no other specific skill or expertise requirement for maintenance.
6. Climate change adaptation benefits	Drip irrigation technology can support farmers to adapt to climate change by providing efficient use of water supply. Particularly in areas subject to climate change impacts such as seasonal droughts, drip irrigation reduces demand for water and reduces water evaporation losses (as evaporation increases at higher temperatures). Scheduled water application will provide the necessary water resources direct to the plant when required. Furthermore, fertilizer application is more efficient since it can be applied directly through the pipes. As is the case with a sprinkler system, drip irrigation is more

	appropriate where there is (or is expected to be) limited or irregular water supply for agricultural use. However, the drip technology uses even less water than sprinkler irrigation, since water can be applied directly to the crops according to plant requirements. Furthermore, the drip system is not affected by wind or rain (as is the sprinkler technology).
7. Financial Requirements and Costs	**The total required funding:** Drip irrigation systems cost 800 - 2500 USD per ha depending on the specific type of technology, automatic devices, and materials used as well as the amount of labor required. If 6000 ha land of vegetables and 2000 ha of berry planting use the technology, the total cost will be 100 million USD. One system can be used for 10-15 years. Currently, about 100 ha of agricultural land has installed drip irrigation systems with support from international projects. In the future, the 'Agriculture Support Fund of Mongolia' can provide subsides or loans to promote drip irrigation systems. A revolving fund of 4 million USD per year can be supported by the Government's 'Agriculture Support Fund of Mongolia' and international donors in order to provide the necessary equipments and system. It can take 5-8 years for the technology to be applied in wide range of farms in Mongolia.
8. Institutional and organizational requirements	A whole range of institutional conditions must be understood before drip irrigation technology selection can be made. These include land tenure issues, water rights, and financial incentives by government and taxation. Large-scale irrigation schemes usually form part of national policy and could be harnessed to support national employment initiatives. Where the drip irrigation type is not available nationally, foreign imports or government-supported stimulation of national manufacture will be required alongside investment in training for design, installation and maintenance. Coordination with public or private authorities in charge of water management will be crucial and could be facilitated through the establishment of a committee of irrigation users. At the local level, social organization for the participatory monitoring of water resources and quality could provide a key monitoring tool. Whichever method is selected, developing regulations for the distribution and allocation of water would provide an important mechanism for conflict resolution.

[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/**