

Technology Fact Sheet for Adaptation



Technologies in the arable farming

A.1. Crop growing under plastic mulchesⁱ

1. Introduction	Plastic mulch is a product used to suppress <u>weeds</u> and conserve <u>water</u> in <u>crop production</u> and <u>landscaping</u>. Mongolia is experiencing water shortages and an increasingly dry climate due to climate change. Therefore, it needs technologies to reduce water consumption, decrease labor intensity and increase production. Potato, water melon, cucumber, tomato, peppers and other crops can be planted in plastic mulch.
2. Technology characteristics	Crops grow through slits or holes in thin plastic sheeting. Plastic mulch is often used in conjunction with <u>drip irrigation</u>. Some research has been done using different colors of mulch to monitor its effects on crop growth. This method is predominant in large-scale vegetable growing, with millions of acres cultivated under plastic mulch worldwide each year. Disposal of plastic mulch is cited as an environmental problem; however, technologies exist to provide for the recycling of used/disposed plastic mulch into viable plastic resins for re-use in the plastics manufacturing industry.
3. Country specific applicability and potential	Evaporation from potato and vegetable fields can be prevented, the vegetables and fruit plants can be kept warm; irrigation water and labor expenses can be reduced; and weeds can be controlled. As a result harvest can be increased by 35-40% with this technology. After potato and other vegetable seedlings are transplanted, they will be covered with plastic film. When the plant comes out from the ground, holes will be cut in the plastic cover so that only plants will be seen on the ground. Drip irrigation will be done under the coverage through pipes. Today Mongolia has 6500 ha of vegetable and 3000 ha of irrigated potato fields. If the technology is applied in all fields, 5 to 7 years are required for the technology full implementation depending on availability of plastic materials. Plastic materials should be able to endure at least 2-3 years and farmers need to store plastic materials properly during winter. 170,000 farmers who grow potato and vegetables can benefit from the technology nationwide. A re-processing factory can be run by 2-3 people if workers have been trained.
4. Status of technology in country	Today the technology is used by a small number of Mongolian farmers to grow crops such as peppers, water melon cucumber and tomato. So awareness raising and extensive training needs to be done among farmers. Some farmers are using the technology the Government has supported

	farmers to purchase 23,000 m² plastic materials using soft loans. However, using plastic mulch is limited in the country because supply system of equipment and materials and manufacturing are not established, costs are high and knowledge and skills of farmers remains relatively low. There are excellent companies who produce this type of technology products. Jain Irrigation Systems (often known as Jain Irrigation, JISL, or simply Jains) is a multinational organization with global presence in 120 countries based in Jalgaon, Maharashtra, India. JISL employs over 7,500 workers, having 24 manufacturing plants, manufactures a number of products, including drip and sprinklerirrigation systems and components, integrated irrigation automation systems, Also, there are companies selling custom made drip irrigation system and agricultural products in Israel.
5. Benefits and impact on the country development ✓ Economic (- Job creation; - Investment) ✓ Social (- Income generation; - Education; - Health) ✓ Environmental	This technology is not aimed at creating jobs. However, if factories manufacturing plastic materials and equipments are set up in the country, jobs can be created. In 2011, vegetables were planted on 7,200 ha of land and the average yield was 12,500 kg/ha. If yields increase by 35% or 4500 kg/ha, the total harvest of vegetables will go up by 28.6 metric tons from 6500 ha planting area. Today 1 kg of vegetables costs 650 <i>tugrugs</i> on average, the above additional vegetable harvest will bring 18.2 billion <i>tugrugs</i> of additional income to farmers. Every year the water use for irrigation is 3200 m³ per ha. The total volume of water used for irrigation is estimated at 20.8 million m³. With the technology applied to agricultural land, irrigation water use will be halved and become 10.4 million m³. The water saving nature of the technology can help increase farmers' income and improve their livelihoods and eventually health conditions. Introduction of the technology can encourage the rural population to save water and raise awareness about the importance of the technology. Establishment of small scale processing factories requires professional workers. Early harvest of vegetables for consumption will increase and it can help to reduce malnutrition and micro nutrient deficiencies among children. There are two ways to reduce negative impact on the environment. - Biodegradable plastic mulches can be used. - In order to dispose of the plastic properly, small scale recycling factories can be established in <i>aimags</i> and big <i>soums</i> of agricultural areas.
6. Climate change adaptation benefits	The use of plastic mulches along with the use of drip irrigation has several benefits: - Extend planting dates - Soil moisture retention: Due to warming water demand by crops will

	be increased. Plastic mulches reduce the amount of water lost from the soil due to evaporation and less water will be needed for irrigation. Plastic mulches also help evenly distribute moisture to the soil which reduces crop stress. - Plastic mulches limit weed growth. - The use of drip irrigation in conjunction with plastic mulch reduces leaching of nitrogen and other nutrients compared to using furrow irrigation. Drip irrigation applies less water with fertilizers injected and thus fertilizers are applied to the root zone as needed. This also reduces the amount of fertilizer needed for adequate growth when compared to broadcast fertilization. - Improved crop quality: fruit are prevented from contacting the soil which leads to reduced fruit rot and keeps the fruit and vegetables clean. - Reduction in soil compaction: The plastic mulch covering the soil decreases the crusting effect of rain and sunlight.
7. Financial Requirements and Costs	Plastic cover for 1 ha can cost about 200 USD when using imported materials. 8000 ha of vegetables such as carrots and onion planted in rows do not need to use plastic coverage. Therefore plastic coverage to cover the remaining 6500 ha area will cost about 1.3 million USD for at least 3 years. If biodegradable plastic is procured, the price might be higher. Each processing factory costs about 18,000-25,000 USD. Establishment of factories in all aimags, cities and agricultural soums will require about 1.4-2.0 million USD from enterprises. Importers and factory owners also need financial support in the form of long-term low-interest loans. The total required funding: Total expense 1.3 million + 2.0 million = 3.3 million USD International assistance – 0.5 million USD for small low-income farmers Agriculture Fund of the Government- 0.5 million USD as loan Enterprises and individuals - 2.0 million + 0.3 million USD as a loans , total 2.3 million USD

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/>