

#### **1.4. Action Plan for Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology.**

The adaptation working group of Agriculture sector has prioritised this technology due to its efficiency in solving environmental issues caused by the concentration of manure in villages of Moldova. The environmental solution is complemented by actions contributing to improvement of soil characteristics, through implementation of sustainable practices combating soil erosion. Proposed technology has synergetic effect: it is an efficient climate change adaptation technology, at the same time contributing to reduction of GHG in the Agriculture sector of Moldova. Diffusion of this technology will address environmental, agriculture and health care issues, but also will bring developments in the villages of Moldova.

##### **1.4.1. General description of technology**

This technology helps maintain a stable content of organic matter in the soil. The content of nutrients increases, and the soil structure improves. The arable layer becomes looser, more resistant to compaction, better provided with reserves of water accessible to plants. This increases crop resistance to drought.

The technology implies the return of the biophile elements contained in dung, urine and vegetal waste of cattle bedding, in the biological circuit. One ton of manure with bedding at 50-55% humidity contains about 15-18 kg of nitrogen, phosphorus and potassium.

Currently there are no large farms and cattle herd is concentrated in rural households. To use manure as fertilizer, municipalities have to organize the collection, storage, fermentation and storage of manure on special platforms. Technologies for processing and introduction of manure in the soil are provided with specially developed recommendations.<sup>17</sup>

Realistically possible reserves of manure collection in the country do not exceed 2 - 3 million tons, which would be sufficient to fertilize only 200 thousand ha of agricultural lands annually, provided this amount is indeed collected (regretfully the amount collected is ten times smaller). The amount of manure possible to collect is 9 times lower than required.

This technology will ensure long-term preservation of soil fertility - the main means of production of the country, will protect agricultural land from desertification processes which lead to impoverishment of population and migration. It will improve the sanitary condition of rural environment.

Environmental benefits. This technology stops the accelerated degradation of soils, it reduces the risk of nitrate pollution of water in wells in villages, improves sanitary conditions in the villages and health of the population.

Social benefits. The social - economic effect of this technology implementation will be the following: it will increase the turnover and quality of agricultural production on arable soils, well-being of rural population, decrease migration, and increase the earnings for social infrastructure development.

##### **1.4.2 Targets for Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology**

- Implementing sustainable agriculture on the area of 200,000 ha, based on households' own resources, by applying to agricultural soils of 50 t / ha manure with bedding once in five years on one field in a 5 fields crop rotation scheme (an area of 40,000 ha annually).
- Restoring the soil quality over an area of 200, 000 ha in 3 parts of Moldova: North, Central, and South over 20 years by creating a balance of organic matter, carbon and nitrogen in the soil as a result of systemic use of manure as fertilizer (forming a rational relationship between the field crops and livestock breeding sectors).
- Liquidating the risk of worsening the environmental, sanitary-epidemiological condition and polluting the ground waters and streams by implementing a proper organic waste management in rural areas based on the use of organic waste as fertilizer for arable soils.
- Increase the production capacity of soils in an area of 200,000 thousand due to improving the physical, chemical and biological characteristics of anthropically degraded soils as a result of organic systemic fertilization with manure.

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<sup>17</sup>Organic Fertilizer User Guide. Ch Pontos, 2012.115p.

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- Widespread dissemination of technology with consideration of specific pedo-climatic zones and the experience to date with the use of manure as fertilizer.

### **1.4.3. Enabling business environment of *Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology.***

- Development of regulatory documents on collection, processing, storage and application of manure in the soil as organic fertilizer, and stipulate the responsibilities of municipalities for the sanitary-epidemiological conditions in villages and for this technology implementation. It is necessary to reanimate the practice of using organic fertilizers to improve the environment inside villages, preventing ground waters and stream pollution, long-term maintenance of the soil quality.
- Building of individual and communal platforms for manure collection, preparation and storing. To create the core of the manure production system.
- Intensifying the land consolidation process. Sustainable and profitable agriculture is possible in bigger farms.
- Implementation of soil protective crop rotation. To protect the quality of soils.
- Development of a financial incentive fund for the agricultural producers implementing soil protection technology.
- Organization and management by the Ministry of Agriculture of the implementation of soil protective technologies through the legislative framework. To ensure long term maintenance of soil fertility
- Improving the state system of control and monitoring the quality of soils. Improving the national system of pedological and agrochemical research.
- Support from the state for the provision of equipment necessary to implement the soils protective technologies. Low interest loans and longer grace period.

### **Service providers and services provision of *Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology.***

- Ministry of Agriculture and Food Industry (MAFI) and Ministry of Environment (ME) develop the Regulations on use or organize in rural areas, organization and coordination of the nationwide implementation of the technology.
- Science department of the MAFI develop informational marketing.
- MAFI protect the local producers on the market.
- Agricultural producers, MAFI ensuring quality of agricultural products through monitoring.
- MAFI provides capacity building for business consulting centres for agricultural producers.
- Ministry of Finance, Commercial banks give Loans with low interest rates and longer grace period for farmers.

### **1.4.4. Barriers to technology diffusion**

#### **Economic and financial**

- Lack of the Law or Regulations on organic waste.
- Lack of possibilities to finance capital expenditures for building communal platform utilities.
- Absence of financial incentives and punishments for promoting soil improvement technologies.

#### **Policy, legal and regulatory**

- Lack of the Law or Regulations on organic waste.
- Lack of responsibility of the local public administration.
- Lack of support from local administration for manure collecting activities
- Lack of support from local administration for communal platform building.

#### **Institutional capacity**

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- Insufficient institutional and organizational capacity of the government, professionals and businesses in agriculture.
- Excessive fragmentation of land as a result of land reform and the need for land consolidation
- Lack of standards and codes, poor quality products, lack of operation and maintenance.

### Market imperfection

- Undeveloped market
- There is no system for manure collection, production and the manure market is not developed.

### Network failure

- Lack of co-ordination among different interest groups
- Weak connections between actors.

### Information and awareness

- Poor knowledge of rural population about the role of soil in sustainable agriculture.
- Limited knowledge about the importance of the organic: inorganic fertilizer ratio.

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Table 1.4.1. Proposed Action Plan for *Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology.*

S. No	Measure	Why the measure / action is needed	Who shall implement the measure (governmental agency, private sector)	How to implement (How it should be done?)	Timeline (0-5 years, 5-10 years, or 10-20 years)	Cost of the measure and funding sources (internal, international financing)	Success indicators, risks
1	Develop appropriate law or regulation with stipulation of assignments and responsibilities of all actors involved in collection, preparation, storage, transportation and incorporation of manure into the soil.	Existing laws do not stipulate the responsibilities for collecting, processing, storage and incorporation of manure into the soil. Implementation of this measure will contribute to effective management and better quality of technology works.	Ministry of Agriculture and Food (MAFI) jointly with the Ministry of Environment (ME).	Development and implementation of legislation (a law or regulation) will make it binding for the central and local public administration and farmers to organize integrated manure management.	A law or regulation has to be developed prior to 2015 (during three years).	Financing from the budget of agencies subordinated to MAFI and ME, or from grants.  7, 000 mdl for each legislative initiative.	It will increase the responsibility of the governing bodies and farmers for proper use of manure ecologically and economically wise.
2	Promote tax incentives for farmers practicing sustainable production.	A policy providing for lower taxes for farmers who implement the technology will help to spread the technology faster and successfully.	MAFI and ME jointly with the local administrations.	By developing a special law or regulation approved by the Government which provides for tax incentives for farmers who implement the technology.	By 2015	Budget of agencies subordinated to MAFI and ME, grants.  13,000 mdl as exemption from income tax per each platform ;  7,000 mdl per legislative initiative.	It will accelerate the widespread dissemination of technology, leading to loosening of the soil arable layer, increasing its capacity for water, nutrient enrichment.
3	Introduce fiscal and	This measure is	Ministry of	By assigning this	By 2005y.	It is proposed to pay	It will regulate the

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	regulatory measures for reduction of manure wastes and promotion of manure utilization.	necessary to discipline those who pollute the environment with organic agricultural waste and other origin sources.	Environment	responsibility to local government and tax authorities.		up to 10,000 mdl from each platform to the local budget (municipality).	production and proper management of waste.
4	Provision in the Ecologic Fund of funds for the construction of collective or inter-communal platform for collection, preparation and storage of manure, and to purchase necessary equipment using the sources from donors coming as grants.	To pool the financial resources needed for initial funding of the integrated system for collection, preparation, storage and incorporation of manure into the soil at community level.	Ministry of the Environment jointly with the MAFI.	By allocating part of the State Environmental Fund resources to solve the environmental problem created by manure in rural areas.	Continuously, until complete resolution of the problem, and implementation of integrated self-financing manure management system.	Building a communal platform and purchasing the necessary equipment require capital investments amounting to 370,000 euro, other costs will be paid back from selling manure as fertilizer.	Long term preservation of arable soil quality, creating a well-balanced content of organic matter in soil, increased by 30% of soil productivity, elimination of manure related environmental and sanitary-epidemiological problems in rural areas. The soil will be more resistant to drought.
5	Cadastre Agency intensifying land consolidation process.	To build a system of profitable, environmentally safe modern agriculture (conservative) on consolidated lands.	Agency for Land Relations and Cadastre (ALRC) jointly with local public administration.	By cooperation with private land owners.	10-20 years	Continuation of "Land consolidation" project (WB, FAO, and other international funds	Farms with an area greater than 200 ha suitable to implement modern agriculture and soil protection systems.

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						with total of 200,000 euro. Budgetary allocations 100,000 mdl.	
6	Accountability assessment by introducing some specific provisions in the Land Code and the Law on Environmental Protection.	It is necessary to assess the accountability of agricultural businesses, primarily lessors, for degradation of soils and to stipulate the procedure of damage evaluation and recovery.	State Ecological Inspectorate, ALRC	By periodic monitoring of the arable soil quality.	Once in 10 years, or at the request of the interested party.	According to existing tariffs for soil surveys. Funding by the Agency for Land Relations and Cadastre and Ecological Inspectorate.	The accountability of agricultural businesses, primarily lessors, for maintaining good quality of soils, will increase.
7.	Assigning the responsibility by inserting certain provisions in the Land Code and the Law on Environmental Protection.	To periodically monitor the quality and ecological status of soils.	State Ecological Inspectorate.	By periodic monitoring of the arable soil quality.	Periodically, at the request of interested parties or in case of damage caused to soil by illegitimate human activity.	According to existing state tariffs. This measure is part of ALRC function responsibilities..	It will raise the responsibility of general population for maintaining soil quality.
8.	Assure an efficient coordination between the main	To plan properly quantitatively and qualitatively various	Agronomic services at the district level and large	By calculating necessary quantities of organic fertilizers,	15-20 years	The cost of the measure is included in the costs required	Effective organic fertilization of crops, based on calculations

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	actors of organic and green fertilizers chain.	types of organic fertilization of crop systems.	agricultural enterprises.	manure reserves and surface lands where manure will be replaced with green manure		for agronomic service organization at the district level and large agricultural enterprises.	made with consideration of the need in organic fertilizers and possible reserves of manure.
9.	Establish regulatory and organizational framework to promote effective management of communal platforms.	Ensuring self-management and self-financing of the platform after the first year of operation will incentivize the staff to increase productivity and quality of the final product.	Local Public Administration.	By concluding contracts between the municipality, manure producers, the platform staff and farmers who will use the final product as fertilizer.  Local municipalities to build up staff servicing the platforms.	5-10 years first phase, 10-20 years – the second phase	Self-financing, starting with the second year after putting the communal platform into operation, provided there is necessary equipment and staff.	It will increase the quantity and quality of manure fermented on the platform.
10.	Raising the awareness of the local public administration and population about the problem of manure from an environmental, economic, social and	It will raise the interest of local governments and farmers for manure as fertilizer. The population will become aware about manure as a hazardous source of	The agronomists in the District Directorates of Agriculture, consultants of the National Agency for Rural Development (ACSA), invited lecturers	By creating rural consultancy centres within the municipalities	Starting with 2015	100,000 mdl annually from ACSA sources for awareness and financial resources of municipalities.	Improved knowledge of the local population about the features of conservation agriculture and the role of manure as fertilizer for the implementation of this system of agriculture

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	sanitary perspective.	environmental pollution					
11.	Promote Programmes for providing training and education on soil management.	Ministry of Agriculture and Food Industry (MAFI) together with the Ministry of Environment (ME).	The introduction of these programs in the faculties of agricultural education plans and Curricula. At SAUM create training courses in agriculture leaders.	By developing appropriate programs and organizing staff training courses at SAUM.	By 2015 y.	Budget financing institutions under MAFI and ME, grants on amount of 200,000 mdl annually.	Development of agricultural professionals able to properly manage the state of soil quality to their use as a means of production in agriculture.