# Technology Fact Sheet

| **Sector** | **Agriculture** |
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| Adaptation needs | Climate change which is a feature of the last three decades, causes not only high temperatures (annual, seasonal), but also other frequent natural extreme events (droughts, floods, etc.). The past 62 years (1945-2007) featured: 12.7% annual droughts with reduced crop productivity levels to 16.9%, spring droughts with respectively 24.6% and 32.8%, and summer droughts: 20.9% and 14.8%. The annual average losses (62 years) are estimated at 220 million Lei at prices of 2009-2011. In the years when extreme phenomena occurred (2003, 2007) the amount of losses can be estimated at $ 130-170 million. |
| Technology Name | **Technologies for breeding hybrids with high adaptation potential to meteoindicators.**[i] |
| How this technology contributes to adaptation | For each crop (following the analysis of biological systems) "weak indicators" of modern genotypes to changing the existing and projected meteorological parameters have been identified. For winter crops (wheat, barley, canola, etc.) - resistance to frost and winter, spring crops - drought and extremely high temperatures during critical stages of development of agricultural plants, resistance to (tolerance of) the new pest species and diseases. Modification of improvement programs (aimed at developing such features in new genotypes) after their implementation will enable agriculture to reduce losses of these crops yields. |
| Background/Notes, Short description of the technology.... | The technologies aimed at improving varieties and hybrids with a high potential to adapt to climate change include the following steps:<br>• analysis (assessment) of the adaptive level of approved varieties (hybrids) and identify "weaknesses" in the studied genotypes;<br>• supplementing the collections with original material having blocks of genes needed to further include them into the improvement (selection) programs;<br>• testing and selection of new genotypes created naturally and artificially (cold rooms, fitotrones, etc)<br>• inquiring into the level of compliance with bio-economic and ecological capacities in selected genotypes, assessing the new varieties potential for reproduction of seeds and implementation in real production conditions. |
| Implementation assumptions, How the technology will be implemented and spread across the subsector? | Implementation of newly created varieties (hybrids) in real production conditions can be accomplished through traditional methods:<br>• producing the seeds of newly created varieties on the premises of research institutions (seeds of the highest categories (basic, super-elite seeds)<br>• testing under the system of the State Commission for testing and registration of new genotypes with the registration of the most promising ones;<br>• continuous multiplication (after the registration of varieties) of seeds at the seed farms specialized conditions (elite seeds, I-III reproductions, hybrid seeds (F1) );<br>• Use of new varieties (hybrids) seeds in farming to produce agricultural commodities. |

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| Costs | The final amount of expenditures for technology improvement programs depends on a number of factors and can be estimated at:<br><br>- total of 470 thousand (?) euro, including for wheat and sun-flower - 319 thousand euro<br><br>• wheat and winter barley - 234 600 euro;<br>• sun-flower – 77.4 thousand euro;<br>• corn – 75.2 thousand euro;<br>• sugar beet – 56.4 thousand euro;<br>• soybeans and beans – 27.8 thousand euro |
| Country social development priorities | Implementation of varieties (hybrids) with high adaptive potential in Moldovan agriculture would offset, as a consequence, about 60-70% of crop losses, reducing the fluctuation of amounts of agricultural production in favorable years and years with extreme climate conditions (now sometimes by 5 - 7 times). Stability of amounts of commodities would stimulate the practice of multiannual commercial contracts, would quiet down the fluctuation of prices (now sometimes by 2-3 times), thus making the agribusiness more stable and profitable (with low risk). The following can be projected as consequences: processing enterprises, improved rural infrastructure, etc.<br><br>The process of implementing programs aimed at improving varieties with high adaptive potential from 5.8 to 6.1 thousand new jobs will be created, including:<br><br>• in research institutions – 45-50 jobs;<br>• in seed farms – 400-450 jobs;<br>• in farms (level II) – 4.0-4.5 thousand jobs;<br>• at processing enterprises in rural sector – 0.8-1.0 thousand jobs |
| Country economic priorities-economic benefits | Reducing the fluctuation of agricultural commodities amounts, as well as of risk, is a key condition for financial and economic situation stabilization in rural areas, accumulation of equity, and for attracting credit resources, including foreign investment. Implementation of modern growing and processing technologies in agribusiness can serve as the next step to building upon the scientific and technical progress in the rural sector. |
| Country environmental development priorities.... | Economic wellbeing of rural businesses, increased capital investment in new businesses (for agricultural production processing, new branches of industrial enterprises, service companies, etc.) will form the need (demand) for different highly skilled specialists, and thus stimulate intensive development of rural infrastructure (energy supply, business communications, roads etc). |
| Social benefits | Strengthening rural businesses, increasing the tax base will drive stimulate growth of local budgets, as well as financial opportunities to improve rural infrastructure (schools, hospitals, cultural objects, etc.). Creating new jobs will decrease the motivation for massive migration of rural population, as well as the sustainability of the demographic decline. |
| Other considerations and priorities (such as | Increased amounts of agricultural raw materials, the possibility to process it in rural conditions will ensure the opportunity to sell bigger quantities of high value added products, thus contributing to the increase of profitability of agribusiness and |

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| market potential) | sustainability of financial situation of agricultural enterprises. |
| Capital (per facility) | Strengthening of technical and material resources required to implement programs improving varieties (hybrids) with perfect adaptive potential, will have the following financial and capital expenditures:<br>• for research institutes – 231.4 thousand euro;<br>• for agricultural enterprises specialized in production of seeds – 21.6 thousand euro. |
| Operational and Maintenance costs (per facility) | Implementation of the program aimed at improving new varieties (hybrids) adapted to climate change require the following operating costs (annual)<br>• to purchase reagents and the original genetic material from the world collections - 13.0 thousand euro;<br>• remuneration of scientific staff labor - 53.0 thousand euro. |
| Up scaling potential | In case of successful implementation of the program (technology) aimed at improving the varieties (hybrids) of crops with high potential to adapt to changing climatic parameters, implementation is possible within the existing seed systems on the following areas:<br>• autumn wheat and barley crop - 150-180 thousand ha, 40-45% of the occupied areas<br>• maize – 195-200 thousand ha (50-52%);<br>• sun-flower – 180-190 thousand ha (65-70%);<br>• sugar beet – 15-16.0 thousand ha (62-65%);<br>• soybeans and beans – 38-40 thousand ha (65-67%). |

[i] This fact sheet has been extracted from TNA Report - Technology Needs Assessment for climate change adaptation - Republic of Moldova. You can access the complete report from the TNA project website **http://tech-action.org/**