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Review Article

# An Overview of Strategies and Policies for Sustainable Sunflower Cropping in Moldova

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## Introduction

It is well known that sunflower is one of the most prominent plant cultures in the world. More than 40 years of scientific research dedicated to the study of sunflower have highlighted the economic potential of the plant as well as other remarkable traits and effects of sunflower on social-development in Moldova. Originating in South America, sunflower was brought to Europe by Columbus in the 16<sup>th</sup> century. It cemented itself into global agricultural practice due to the discovery of sunflower oil extraction in the 19<sup>th</sup> century. Currently, according to the volume of extracted oil and cultivated surfaces, sunflower is the 4<sup>th</sup> largest oil plant in the world, after soy, palm and rapeseed. According to the Food and Agriculture Organization of the United Nations, sunflower occupies an area of over 21 million hectares worldwide. The largest areas are found in Europe (52.11%), followed by Asia (19.63%), South America (16.49%), North America (6.95%) and Africa (4.82 %). In the Republic of Moldova, sunflower is the major crop from which high-quality edible oil is extracted. Considering the scientific, economic and social importance of sunflower cropping, it is important to contemplate on the future development in context of the duality of sustainability and intensiveness of agriculture, increase of harvest and protection of soil and environment. It is well known that along with the expansion of agriculture, for more than 5,000 years, human activity, involuntarily, has had an impact on the environment. The industrial revolution and the intensive development of agriculture over the last 150 years have led to dramatic and accelerated change in land use, urbanization and land abandonment. These changes have led to the disappearance of many traditional agricultural practices and methods, which have contributed to the maintenance of biodiversity-rich natural areas. The aforementioned is valid for the Republic of Moldova that is dealing with a dramatic and excessive exploitation of sunflower. According to expert recommendations, in order to meet ecological standards in respect to soil quality and agrophytocenoses protection, sunflower must occupy a maximum of 10% of all sown arable land annually. Currently in Moldova, there is a trend to increase sunflower cropped areas due to the permanently growing demand for seeds and oil, as well as favourable market prices. The consequences of such a trend is the encouragement of unsustainable exploitation of natural resources. A comprehensive analysis of statistical data has shown that the rapid liberalization of Moldova's agricultural economy after its independence and the transition to a market economy has created a favourable environment for farmers and the private sector. Firstly, the export market has expanded considerably with the emergence of new opportunities for sunflower seeds and oil – an opportunity capitalized by Moldovan processors who expanded sunflower production. Secondly, domestic demand for sunflower as a consumer product has also increased. According to data on overall agricultural land use in Moldova, the area of arable land varied over the years from the maximum in 1987 (1 847 000 ha) to the minimum in 2011 (1 447 000 ha). A general and continuous diminishing trend has been observed. Thus, the average value of arable land between 1980 and 1990 was 1 801 000 ha. Between 1990-2000 this value was 1 631 400 ha, almost 170 000 ha less, and between 2000-2010 the area of sown land was 1 519 400 ha. Between 2010-2019, arable land was reduced to 1 499 100 ha. In this respect we can conclude that the privatization and division of land (in the immediate period after Moldova obtained its independence), and later - the massive and chaotic development of urbanism and construction, has contributed to the significant reduction of arable land. About 400 000 ha of arable land has been lost. Contrary to the trend of overall arable land decline, sunflower cultivated areas were permanently increasing. Thus, from 120 000 to 140 000 ha have been sown between 1980 and 1990, to an average of 324,600 ha for the last 10 years. The largest areas with sunflower were sown in 2017 (385 000 ha), the share of this crop in the total sown areas being 25.1%, practically 2.5 times more than recommended standards for this oil plant in Moldova. Until 2000 the limits of growing and cultivating sunflower were respected by producers, the share of culture (7.59-9.96%) being up to 10%, in the last 10 years these norms are vehemently neglected, the share of the culture increased from 16.62% to 21.61%. The increase of sunflower cropping is not an isolated event for Moldova, it is a global phenomenon. In the last decade land sown with sunflower increased by 20%. Although, these areas have increased due to the expansion of sunflower cultivation in new geographical areas, such as China, which is becoming a leading country in terms of cultivated areas. In addition, it is worthwhile to mention that global development strategies for sunflower cultivation envision, in the near future, the reduction of the growth rate. The general tendency being the stabilization of the areas sown with sunflower in order to respect technological restrictions (weight in the structure of crops, attack of phytopathogens) in cultivation of new, biotechnological hybrids, developed by international megacompanies and distributed in most sunflower-growing countries of the world. Thus, starting with 2013 (18-21 q/ha) there are sufficiently large harvests, except for 2015 (15 q/ha). The largest harvest was recorded in 2019 (23 q/ha). These harvests are similar to those registered in 1980-1990 when only hybrids of local origin were cultivated. However, according to the average harvest, the one registered in the last 10 years (17.7 q/ha) does not rise to the level of that registered in the first 10 years when the hybrids were introduced as replacements (18.6 q/ha). In the 20 years that followed independence, in Moldova sunflower harvest decreased considerably, averaging 12.4 - 12.0 q/ha. The lowest registered harvest was in 2007 (7 q/ha). About the aforementioned, a parallel must be established between the data from the first decade of analysis (1980-1990) and the last decade (2010-2019). During 1975-1995 Moldova's strategy for this agricultural segment was dominated by the improvement and creation of hybrids with high productivity that had the potential to contribute to the essential increase of harvests. The search for genetic resources, creation and selection of the germplasm that has a higher production capacity and development of sunflower cultivation technologies in various parts of Moldova has dominated public strategies and policies over the years. Over six decades of systemic research following these strategies and policies has led to the creation of hybrids with high productivity, resistant to biotic and abiotic stressors, as well as the development and transfer of modern technologies for sunflower cultivation in the country. These scientific achievements have affected sunflower cultivation in the country, while best practices have been transposed by Ukraine, Belarus, Russia, etc. Along with the spread of sunflower hybrids in private international companies, Moldova accelerated its rapid implementation of sunflower technologies. This is especially valid in the last 5 years, when most sunflower lands have been sown with foreign hybrids. The yield of Moldovan farmers in sunflower cultivation has increased largely due to the use of high-yielding hybrids with high productivity, resistant to biotic factors, supplemented with inputs, particularly pesticides and fertilizers provided by foreign



companies. The large yield obtained in recent years, as mentioned above, reveal the duality of factors that contribute and constrain sustained yield growth. A significant number of farmers adopted improved sunflower hybrids quickly, while a well-developed system of hybrid seed distribution has been created. Currently, sunflower is an economically advantageous crop that occupies a substantial area that exceeds recommended limits for this crop in its rotation. This significant expansion leads to considerable intensification of land use with sunflower and soil degradation. Sunflower has high productivity because it uses large amounts of nutrients and fertilizers. In order to obtain a ton of sunflower seeds, 40-50 kg of nitrogen, 18-22 kg of phosphorus and 70-80 kg of potassium is extracted from soil. Restoration of nutrient reserves is limited and each harvest brings the soil closer to depletion. Furthermore, the aforementioned expansion leads to the accumulation and increase in the frequency and aggressiveness of various pathogens and the danger of epiphytes. Thus, with each agricultural cycle, strategies for sustainable sunflower cropping are becoming more and existential in order to ensure expected harvests, maintain ecological balance and soil fertility. All these factors raise major challenges for the Moldovan sunflower agricultural sector, which must be addressed to move forward. For the successful achievement of sustainable development, Moldovan decision-making structures responsible for the development and planning of sunflower cropping strategies and policies must address two important issues: the balance between the objectives of the fundamental sunflower research programs (genetics, breeding, etc.) and technological

management (agrotechnics, nutrition, protection, etc.) and the balance between actual research and management of crops (zoning of surfaces, zoning of hybrids, etc.). For the development of sound strategies for cultivation and obtaining expected yields of sunflower, management of agroclimatic diversity is inherent and crucial. Scientific research into sunflower should not only address the issue at hand, but also identify environmental target factors and their share of influence on culture, as well as determine variable and invariable components of sunflower productivity, based on integrated studies, which identify the factors that inhibit yield potential of hybrids. Achieving the later, will allow the reconfiguration of optimal and vulnerable Moldovan territories for sunflower cultivation [1-2].

## References

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