

## GRAPEVINE ASSORTMENT – COMPONENT OF FOOD SECURITY AND SAFETY

### SORTIMENTUL VITICOL – COMPONENT AL SECURITĂȚII ȘI SIGURANȚEI ALIMENTARE

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**Abstract.** *The degree of viticulture contribution in ensuring the food security and safety is considerably determined by the potential of genetic diversity of assortment. In the paper is presented the evolution of grapevine assortment in Republic of Moldova in terms of ecological-geographic origin of varieties, some agrobiologic characteristics. To ensure the branch sustainability in conditions of northern extremity of industrial viticulture, the concept of genetic improvement of assortment is oriented at creation of varieties, inclusive seedless with multiple biological resistance. In conditions of climatic and socio-economic challenges, in order to ensuring food security, we note as necessary the development and implementation of programs for exploration, conservation and evaluation of genetic resources diversity - a basis for increasing the competitiveness and resistance of varieties. Through the intelligent correlation of classical breeding methods with the molecular biology, but also on new methodological and instrumental basis under development, we see an opportunity of grapevine genome fructification.*

**Key words:** grapevine, assortment, genetic resources, biological resistance, food security and safety

**Rezumat.** *Gradul de contribuție al viticulturii în asigurarea securității și siguranței alimentare este considerabil determinat de potențialul diversității genetice a sortimentului. În acest context în lucrare este prezentată evoluția sortimentului viticol în Republica Moldova sub aspectul originii ecologo-geografice, a unor caractere agrobiologie ale soiurilor. Pentru asigurarea sustenabilității ramurii în condițiile extremei nordice a viticulturii industriale, concepția de ameliorare genetică a sortimentului este în continuare orientată la crearea soiurilor de utilizare diversă, inclusiv cu grad diferit de apirenei și rezistențe biologice multiple. În condițiile provocărilor climatice și socio-economice, cu scopul asigurării securității alimentare, remarcăm ca necesare elaborarea și realizarea unor programe de explorare, conservare și evaluare a diversității resurselor genetice, ca fundament pentru sporirea competitivității, rezistenței soiurilor. În acest context, prin conjugarea inteligentă a metodelor clasice a ameliorării genetice cu potențialul biologiei moleculare, dar și pe noi baze metodologice și instrumentale în curs de elaborare, vedem oportunitatea fructificării genomului viței de vie.*

**Cuvinte cheie:** vița de vie, resurse genetice, sortiment, rezistență biologică, siguranța și securitatea alimentară.

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## INTRODUCTION

According to the Rome Declaration of World Food Summit “Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO, 1996). Food security is determined to a greater extent by the performance of agriculture, derived from the contribution of fundamental researches, correlated with the applicative ones, also by the performance of branches related to the food sector. The efforts of society should be oriented to reducing the key risk factors for ensuring in the future the food security: the growing pressure of agriculture and applied phyto-technologies on soil, global climate change, dependence of agriculture on fossil fuel sources, the use of foods as fuel etc. (Hanning, 2012; Hera, 2013; Strategy, 2014).

In terms of contribution to food security, vitiviniculture is one of the important branches of the country's food sector and of the national economy as a whole by the significant share of revenues to the budget, providing the population with food products with enhanced nutritional and curative value, engaging the workforce etc. (Anuarul statistic, 2015). In the context of climate and social challenges, new approaches are needed for further improvement of assortment in order to create an efficient, durable vitiviniculture. The main role should be played by the varieties with a high degree of adaptation and increased genetic resistance to pathogens – the basis of balanced, sustainable and diversified farming system, ensuring the protection of natural resources, health and life of consumers (Legea no. 115/09.06.2005), i.e. sustainability of agriculture and allow the application of modern technologies for crop production that are friendly for the environment, hence for the human genome (Savin, 2014), thus also contributing to food safety.

Therefore, each variety and assortment as a whole become the important components in food security and safety, and their future amelioration must be based on the potential of genetic resources, including indigenous varieties and the most valuable new creations (Strategy, 2014; Savin 2014 ; Audeguin, 2015).

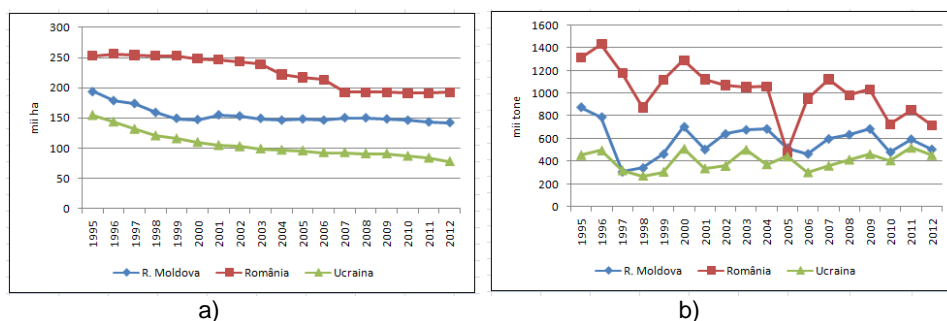
## MATERIAL AND METHOD

The evolution of wine-growing branch in the Republic of Moldova, comparative analysis with neighboring countries was presented based on statistical data provided by the International Organisation of Vine and Wine (OIV) (<http://www.oiv.int/oiv/info/enstatoivextracts2>) and includes the following parameters: total area of vineyards, global grapes production, export of table grapes and wine.

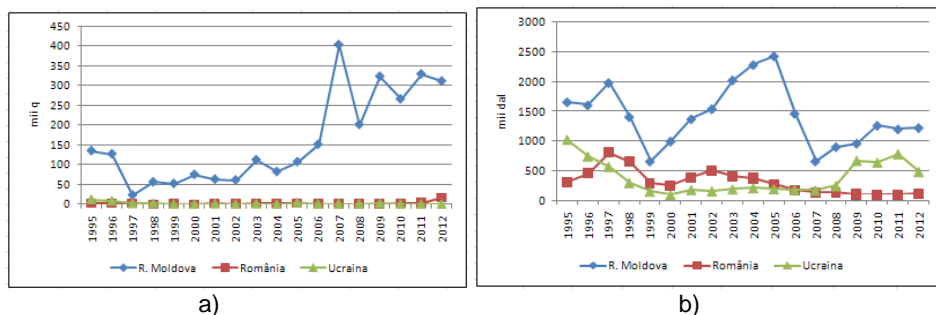
Based on literature (Dobrovolskii, 1947 Romanov *et al*, 1968; Pelyakh, 1970; Savin, 2012. Catalogue of Varieties, 2016) is presented the grapevine assortment formed in the republic over the past 70 years: ecological and geographical origin (Negrul', 1946), resistance to low temperatures.

## RESULTS AND DISCUSSIONS

Development of wine-growing branch in Moldova grew upward in the '70s - 90s of last century, the republic reached in 1984 the 6th place in the world according the plantations surfaces and global production. The next stage, characterized by substantial social and economic changes of the early century XXI brings a decrease in surfaces and total grapes production, which in the last 15 years varied between 137-150 thousand hectares and 480-685 thousand tons respectively. In the regional context, by total area of plantations and production of grapes (Statistica O.I.V., <http://www.oiv.int/oiv/info/enstatoivextracts2>) the share of our republic is comparable to neighboring countries (Romania and Ukraine) (fig. 1), and by export of table grapes and wine exports has a dominant position in region (fig. 2).



**Fig. 1** Evolution of total area of vineyards (a) and global grapes production (b) in regional context (Statistica OIV, <http://www.oiv.int/oiv/info/enstatoivextracts2>)



**Fig. 2** Evolution of export of table grapes (a) and wines (b) in regional context (Statistica OIV, <http://www.oiv.int/oiv/info/enstatoivextracts2>)

Since ancient times the viticulture in region was based on local assortment, and with the invasion in Europe of phylloxera and diseases, introduction of American species and hybrids, great changes have occurred in the assortment. According to the 1945 census of vineyards (Dobrovolskii, 1947), direct producer hybrids occupied in Bessarabia approx. 91% of the total area of vineyards. The remaining surfaces were with noble *V.vinifera* L. varieties, of which approx. 84% - west European varieties (mainly Aligote, Cabernet Sauvignon, Gamay group, Muscat Belai, Chasselas) and

only 16% - old autochthonous varieties. In the coming years the presence of old autochthonous varieties in assortment have been diminished both by number and by occupied area. A permanent presence have only varieties Coarnă neagră, Fetească albă, Rară neagră and Tămâioasă. In the last assortment (Catalogul soiurilor de plante, 2016) have been reintroduced varieties Fetească regală and Fetească neagră.

Completion, modernization of assortment over the next years was aimed to increasing grapes quality and productivity of plantations. Until 1980 in assortment were presented only *V.vinifera* varieties, the main share (approx. 60%) was owned by the *V.vinifera* varieties of Western origin (*Proles occidentalis* Negr.). Vulnerability of *V.vinifera* to wintering has grown with the transition of viticulture to the unprotected farming culture on the high stem. It was obvious necessity to accomplish the assortment with resistant varieties, especially for table grapes. The program of genetic improvement of assortment, developed in the early 60s (Zhuravel' and Savin, 1972) resulted in the first new varieties with multiple resistances - Moldova, Pamiati Negrulea, Codreanca (Black Magic) and others, created at the National Institute of Vine and Wine (Chisinau), who now have a significant share in assortment (tab. 1), in the volume of exported production, hence a contribution to the budget and direct to the food security.

Table 1

**Evolution of grapevine assortment in Republic of Moldova according the ecological-geographical origin and varieties resistance (number of varieties)**

Indicator	Year of adoption or period of operation of assortment						
	1980	1984	1985-1990	1991-1995	1996-2000	2001-2007	2008-2015
Ecological – geographical origin							
<i>Proles occidentalis</i> Negr.	13	16	14	13	13	13	17
<i>Proles pontica</i> Negr.	5	5	5	5	5	5	8
<i>Proles orientalis</i> Negr.	8	9	8	8	8	8	13
New intraspecific <i>V.vinifera</i> varieties	5	6	6	7	7	7	11
New interspecific varieties	2	2	10	22	27	27	40
Resistance to low temperatures							
1 – very sensible	7	7	7	8	8	8	11
3 – sensible	4	4	4	5	5	5	7
5 – medium resistance	20	20	25	28	30	37	38
7 – increased resistance	2	2	5	13	17	22	16
9 – advanced resistance	0	0	0	1	2	4	0

A valuable potential in assortment possess the group of seedless varieties, created in institute as a result of the breeding program initiated in 1970-1972 and that cover the entire period of maturation: very early (Apiren roz timpuriu), medium (Kish-mish lucistâi, Apiren roz, Apiren alb), medium - late (Apiren negru de Grozești) and late (Kiș-miș moldovenesc). Various direction for use of grapes of these varieties: for fresh consumption and for technological processing (raisins, jams, marmalades, stewed, marinated etc.), combined with the increased

of advanced resistance of the majority of them to the unfavorable abiotic factors and pathogens, increase intake in the foundation a sustainable viticulture.

The further development of the assortment is determined by climate change, which generally affects agriculture, and in the case of viticulture restricts favorable areas for certain varieties, require modification of technologies of plant cultivation, diminishing harvests to extinction (Jones and Davis, 2000; Hera, 2013; Audeguin, 2015). Meteorological year 2016 transmits a message to be taken into consideration - branch security can be ensured only if there are cultivated varieties with plasticity, adaptability to long term challenges. To meet the new climate and social challenges, for the reduction of application of chemicals, creation of new varieties through intra- and interspecific crossing is a sustainable response, and the durability of resistance must be associated the with pedo-climatic adaptability (Audeguin *et al.*, 2015). The evolution of molecular biology allows accelerating breeding process by applying new NGS, AmpSec techniques (Kilian and Graner, 2012; Yang *et al.*, 2016; Pessina *et al.*, 2016).

So, in condition of multiple climate and social challenges become current strategic the tasks of biodiversity accumulation, conservation of genetic resources, their evaluation, including genetic research on the mechanisms of resistance to drought, severe temperatures (both negative and positive), pathogens, to create new varieties adapted to climate change for specific areal of each zone - in our case for the Carpathian-Danubian-Pontic areal. Is welcome the objective mentioned in Strategy (2014) - the necessity to create state farms specializing in conservation and propagation of native varieties and breeds. Any negligence of genetic resources by the state represents an attempt on the food security both for the present and for the future generations. The Fund of genetic resources requires constant attention of researchers to create a "critical mass" of genitors: quality / productivity, resistance to abiotic and biotic unfavorable factors of environment, adaptability.

In projecting the foundation of industrial plantations will consider interleaving of varieties with different levels of resistance, which will serve as natural barriers to epiphytias of pathogens. The location of these varieties on the areas where are certified in the depth underground drinking water wells, near the localities will create an ecological belt, enabling ambient "friendly" technologies - fewer chemical treatments, minimum technological pressing, so organic production. Also, these varieties create the premises of a new food industry: fresh consumption, storage, raisins, jams, marinades, juice, etc., creating new jobs.

## CONCLUSIONS

1. The contribution of wine-growing branch to ensure sustainable food security and safety will be ensured under biodiversity accumulation, conservation, evaluation and utilization of genetic resources of grapevines and achieving of breeding programs - activities funded by the state.

2. New varieties with multiple biological resistance are the foundation of future assortments, ensuring quality / productivity of plantations, allow the

implementation of environment and human genome friendly technologies, and ultimately ensure the sustainability of the sector - as competitiveness and security.

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