GENETIC DIVERSITY OF LOCAL GRAPE VARIETIES AND POSSIBILITIES OF THEIR APPLICATION IN BREEDING

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Abstract

In this study, the genetic diversity of local grape varieties (Husayni, Toyfi, Kattakurgan, Kara Kishmish, Rizamat) widespread in Uzbekistan was studied and their potential for use in the selection process was analyzed. Using molecular markers (SSR, AFLP, SNP), the genetic distance between varieties was determined, and their similarities and differences were noted. The results showed that although local varieties have high yield and quality characteristics, they have a relatively low level of disease resistance. It was confirmed that resistance genes are more common in foreign varieties. The possibility of creating new genetic combinations and increasing selection efficiency by crossing these two groups was scientifically substantiated. Also, the preservation of genetic resources of local varieties, their passporting and their introduction into international selection programs were assessed as an important factor for the sustainable development of the Uzbek viticulture sector.

Keywords: Grape varieties, genetic diversity, local gene pool, molecular marker, selection, hybridization, disease resistance, agrobiological properties.

INTRODUCTION

Uzbekistan has long been one of the regions with a developed culture of viticulture and winemaking, and due to the favorable climatic conditions of our country, grape growing has formed as one of the main branches of agriculture. Today, grape varieties are widely planted in almost all regions of our Republic, among which local varieties - Husayni, Toyfi, Kattakurgan, Kara Kishmish, Rizamat and many other species - occupy a special place. These varieties are distinguished by their high yield, fruit quality, taste and popularity among consumers. At the same time, their adaptation to various agroclimatic conditions during the historical formation process also serves as an important source for selection.

In recent years, the use of genetic resources in viticulture, that is, in-depth study of the genetic diversity of existing varieties and its application in selection, has become particularly relevant worldwide. Because one of the important issues facing modern agriculture is the creation of high-yielding and resistant varieties in the face of climate change, the spread of new diseases and pests. Although local grape varieties have rich potential as a genetic resource, most of them have a low level of disease resistance. Therefore, combining local varieties with foreign

varieties, that is, creating new genetic combinations by crossing them, increases the efficiency of selection.

In assessing genetic diversity, it is not enough to limit oneself to traditional observation and morphological characters. Modern biotechnological approaches, in particular, molecular markers (SSR, AFLP, SNP), genomic analyses and tissue culture methods, have made it possible to determine the level of genetic differentiation of grape varieties. This allows breeders not only to create new varieties more quickly, but also to form a genetic passport of existing varieties, compare them at the international level and maintain the gene pool on a scientific basis.

In the conditions of Uzbekistan, in-depth study of grape varieties, determination of their genetic diversity and assessment of the possibilities of their use in selection are important not only from a scientific but also from a practical point of view. Because the preservation of local varieties protects the national gene pool, and their combination with foreign varieties leads to the creation of new forms of economic importance. As a result, the possibilities of creating new grape varieties with high yield, quality, disease resistance and export potential expand.

Thus, the relevance of this research topic is that by scientifically identifying the genetic diversity of local grape varieties and effectively using them in selection, it is possible to ensure the sustainable development of the Uzbek viticulture sector. This is important not only from the point of view of meeting the domestic needs of the country, but also from the point of view of producing competitive products in the international market, strengthening food security, and preserving the genetic resources of viticulture for future generations.

MAIN PART

Studies conducted in Uzbekistan have shown that local grape varieties are very rich in genetic diversity and are an invaluable genetic resource for selection. The results obtained based on molecular markers (SSR, RAPD, AFLP and SNP) used to study genetic diversity showed significant genetic differentiation among local varieties. For example, although the Husayni and Toif varieties belong to a close genetic group, significant differences were observed in some of their morphological characteristics, including fruit shape, sugar content and duration of the growing season. The Kara Kishmish and Kattakurgan varieties, on the other hand, were located in a different group and were distinguished by their high yield and early ripening. This means that local varieties also have rich genetic diversity within themselves, which provides great opportunities for creating various combinations during the selection process.

Genetic distance was determined, that is, some varieties were genetically very close, while others were much further apart. This made it possible to predict in advance which varieties would be most effective when crossed during breeding. For example, the genetic distance between the Hussani and Moldovan varieties was large enough to allow for highly diverse

combinations to be obtained as a result of their hybridization. At the same time, it was observed that it is more effective to obtain new genetic combinations that improve resistance and yield by combining local varieties with foreign varieties than by crossing them with similar varieties. The results of agrobiological observations showed that, although local varieties have high yields and fruit quality indicators, their resistance to diseases is relatively low. For example, the Toif variety, although famous for its sweetness and large fruits, was noted to be highly susceptible to diseases such as oidium and mildew. On the contrary, some foreign varieties have a high resistance level, but they did not give stable results in terms of fruit quality and yield in local climatic conditions. Therefore, it is advisable to use high quality traits of local varieties in the selection process, and resistance genes of foreign varieties.

Molecular genetic analyses have shown that most local varieties have a low incidence of disease resistance genes. However, they have been shown to have strong development of economically important traits such as high yield, sweetness, early maturity, and transport resistance. Therefore, by crossing local varieties with foreign resistant varieties, it is possible to combine both traits in hybrid forms. This approach provides an opportunity to create new varieties with high yield and disease resistance. In particular, accurate measurement of genetic diversity using SSR markers has made it possible to conduct the selection process on a scientific basis.

Compared with international experience, Uzbek local varieties are distinguished by their richness in genetic diversity. For example, studies conducted in Italy, France and Spain show that many of their varieties form very close genetic groups and the level of genetic diversity is relatively low. In Uzbekistan, varieties formed under the influence of different climatic conditions have a wider genetic differentiation, which is a great advantage for selection. Therefore, the preservation of the genetic resources of local varieties and their use in international selection processes is of great scientific and practical importance.

The issue of preserving genetic diversity is also of great importance. In the process of globalization, many farms are trying to plant more high-yielding foreign varieties, as a result of which some local varieties are at risk of extinction. This reduces the possibility of enriching the national gene pool. Therefore, it is necessary to preserve the genetic resources of local varieties, collect them in genetic banks and passport them on the basis of scientific research. Otherwise, the risk of losing unique traits that may be important for selection in the future increases.

In general, the results of the conducted research show that local grape varieties are an important genetic resource for selection, and their diversity opens up wide opportunities for creating new varieties. Local varieties have high quality characteristics, while foreign varieties are distinguished by their level of resistance. It has been scientifically proven that by crossing them, new varieties with high yield, disease resistance, adaptability to climatic conditions and

export potential can be created. Molecular markers and biotechnological approaches accelerate the selection process, and in-depth study of genetic diversity serves to increase the efficiency of selection. Therefore, in-depth study of local grape varieties on a scientific basis and their widespread use in selection are important factors in the sustainable development of the Uzbek viticulture sector.

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