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THE CHOICE OF GRAPE VARIETY: THE ROLE OF GENETIC IMPROVEMENT

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The current insistent demand for grapes with qualitative characteristics and enological properties that respond to market requirements has stimulated and intensified the research into genetic improvement. Therefore, within the framework of the Regional Viticultural Program, the Istituto di Coltivazioni Arboree of the University of Milan has identified four ways to improve grape quality: clonal selection, the introduction of new international grape varieties, the rediscovery of old local grape varieties, and genetic improvement by crossbreeding and hybridization.

Some of these, for example clonal selection (the use of which has already been well-established) have been reinterpreted. For others, such as improvement by crossbreeding, grape varieties typical to the Oltrepò Pavese have been used together with other varieties capable of correcting any possible qualitative deficit in the grapes.

Clonal selection

Until now, in Italy, the concepts governing clonal selection have not been appropriate to current requirements. A typical example could be Pinot Noir. In some cases, for the clones selected in Italy, greater attention has been paid to grape yield, while for others only the health of the plant has been considered important. In fact, the latter, although indeed of great importance, is not a determining factor. It has been considered that these clones can be used anywhere. But we know that, in order to get results, the selection of Pinot Noir, like that of any grape variety, must be made only in those areas that present particular characteristics. Only after long experimentation is it possible to introduce clones approved for one area of production in another area with the guarantee of achieving good results.

For the most part, consideration has not been given either to the enological purpose (red wine or the basis for sparkling wines *méthode traditionnelle*) or to the population characteristics. Furthermore, these clones have almost never been used to produce wine, even though this would have provided us with some useful information.

This type of analysis has identified the need to modify the clonal selection. Therefore, it was decided, for suitable red grape varieties (Pinot Noir, Croatina, etc.) to use a clonal selection according to type, while for white grape varieties the main emphasis has been put on exploring the aromatic component. The aim of this was to provide the producer with clones with a well-differentiated range of aromas, above all for grape varieties such as Chardonnay and Riesling Italico.

Clonal selection according to type in Pinot Noir

After consideration of studies carried out abroad, in particular in France, five categories of bunch size were defined: Fin (A), Franc (B), Sancerre (C), Wadensvil (D) and Champenoise (E) (Figure 1), each with its own typical characteristics (TABLE 1).

In fact, the categories of small bunches (Fin and Franc), that have very interesting qualitative characteristics, are used in Burgundy, France, for the production of the great French wines. The second category refers to Swiss and German selections, and also to those from the Champagne area, that have been selected for their high yields and good sugar levels. However, quality is poor. Consequently, research into presumed clones was carried out locally. This research no longer considered the characteristics established by classical clonal selection but rather were

based on well-defined typologies. These types were compared with almost all the clones approved in countries producing Pinot Noir (France, Germany, Austria, Switzerland) in order to evaluate the level of selection pressure achieved by our choice of clones and the improvements made to the reference types.

The following phase was microvinification, i.e. we produced experimental batches of wine using each local type, evaluated the improvement obtained and considered the possibility of making wine using the best clones for each type.

The results of this type of selection are very encouraging. From what we can see from the data concerning microvinification, there is a discernable agreement between the types of bunches and the characteristics of the wines obtained. The differences are: the natural sugar quantity (therefore, the degree of alcohol), the pH, the ratio of malic acid to tartaric acid (the latter is usually higher in the fine types), and anthocyanin content (a very important characteristic for preparing Pinot Noir vinified as a red wine).

The aromatic profile of fine types is also important, while this is practically absent in types with a high yield.

Clonal selection according to aromas

This study was carried out in a similar way as the clonal selection according to type. Instead of categories according to bunch size, we examined aromatic types. In fact, some of the clones that will be approved have aromatic nuances that are very well defined, even up to a very marked taste of muscat. These clones that have such an intense aroma can be successfully used to personalize wines with a modest aromatic profile, or wines made from red grapes vinified as white wines but without any particular personality. Other clones that genetically have few aromas can be used in white wines, in particular in those areas where the *terroir* favors a more intense aroma (lower hill slopes).

Introduction of new varieties

Among the grape varieties of the Oltrepò Pavese, as far as those with red grapes are concerned (in fact, almost all red grape varieties are grown here), grapes at different stages of maturation are to be found. This does not hold true for the white grape varieties used to produce dry white wines, for which only Riesling Italico is used.

If there is not a big choice for the areas made up of medium-high hill slopes, there is no choice at all on the lower slopes, where late grape varieties can adapt better to the climatic conditions, although in effect this latter area is more suitable for the production of red wines, given the current type of demand, concentrating only on these wines makes producers less competitive on the market.

Because of this, and to provide a wider choice of grape varieties also for red grapes, varieties from, in particular, areas of France and Spain with high temperatures have been introduced. The adaptability and vegetative, productive and qualitative response of these varieties is now being evaluated to collect as quickly as possible the information necessary for a rapid expansion of their use.

Besides evaluating the response in the vineyards themselves, single-variety vinification is also being carried out since this is the only reliable way to judge adaptability.

Rediscovering old local grape varieties

This could be considered to be just a temporary trend but it could enrich the spectrum of grape varieties in the Oltrepò Pavese. Some vine-growers (perhaps the shrewdest among them!) have tried to produce wines from old local grape varieties and have had fair success and good profits. This must be a cause for reflection about the possible advantages of growing these varieties. If in the past these old local grape varieties were not taken into consideration because

of a poor knowledge of enology, with the techniques currently available, today they could offer product diversification with new possibilities of finding a place on the market. Obviously, generalizations can not be made, but we need to carefully evaluate the characteristics of the numerous local grape varieties to be found in the Oltrepò.

If a quality profile both from an enological and a commercial point of view can be established, and if careful attention is given to the marketing image, it is clear that these local grape varieties could be considered as a way to improve quality at a low cost. These local grape varieties already represent part of the ampelographic heritage of the Oltrepò Pavese. This means that studies of adaptability so necessary for imported grape varieties are not required for these already well-known local types.

A better use of these varieties could be made aimed at genetic improvement by crossbreeding in order to create new ones.

Genetic improvement by crossbreeding

This technique has allowed vine-growers in some countries, e.g. Germany, to radically change their ampelographic profile. In fact, 29% of the surface area currently used for vine-growing in Germany is used to grow Müller Thurgau, a grape variety obtained by crossbreeding Rhein Riesling with Grüner Sylvaner, two very well known and widespread old local grape varieties. In particular, in Italy, the large number of grape varieties found and the traditional resistance to change have meant that not much research on this issue has been carried out.

Today, the greater awareness of the significant influence of the relationship between grape variety and environment on the final characteristics of the product has stimulated new research in this direction. In fact, genetic improvement by crossbreeding allows us to identify grape varieties that can integrate perfectly with the environment and heighten their qualitative characteristics.

Table 1 – Characteristics of different type of Pinot noir in Valle Versa (PV) – (1983-1986).

A.G.= average grape cluster; A.B.= average berry; Tit.=titratable; Med. = medium.

Type	A.G. weight (g)	A.B. weight (g)	Sugar (%)	Tit. acidity (‰)	pH	Malic acid (‰)	Tartaric acid (‰)	Antocyanins
Fine A	80.0	0.82	17.53	9.55	3.06	3.73	6.12	-
Fine B	99.9	0.87	16.26	9.48	3.03	4.02	5.90	286.7
Med. C	106.9	0.91	15.50	9.81	3.02	3.58	5.87	318.7
Big D	126.9	0.91	13.70	10.30	3.03	3.89	5.65	259.9
Big E	136.5	0.94	14.16	10.07	3.04	3.97	5.50	-

Fig. 1 – Grape and leaf morphological characteristics of the five different biotypes of Pinot noir found in Valle Versa (PV).

