

# AMARONE: UPDATING TIPICITY

Masi vinification techniques for enhancing  
the tipicity of its wines

TECHNICAL SEMINAR  
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## INTRODUCTION

by Sandro Boscaini

The details may safely be left to the technicians; it is their job to define the parameters, and carry out the continuous development and quality updating necessary for winemaking. It's quite understood these days that *technical quality* is indispensable not only to success on the market, but also even to getting onto the market in the first place. And in the field of technical quality we Europeans find ourselves in fierce competition with the New World, where excellent price/quality ratios and reduced operating costs favour the local wine industry.

In fact, our real competitive advantage comes from elements that are above and beyond considerations of pure technical quality and which express themselves as *perceived quality*, derived from the historical and cultural richness of a territory. Here the unbreakable links of our wine with its territory mean that it is not only a pleasing drink but also a cultural expression of the place that makes it.

If this is the broadest definition of quality our wines must have unique and recognisable organoleptic qualities in them to link them to their territory. In other words, they must have what we call *tipicity*.

Bringing out *tipicity* in wines is particularly difficult in a moment when viticultural and oenological techniques have become strongly invasive and widespread in their use. So the care that our technicians take to enhance *tipicity* in whatever process they are using, enhancing the characteristics of the territory, its grapes and its particular winemaking processes so that the final product can be clearly seen to belong to the particular place, the particular denomination, and a winemaking tradition together with a company's tradition, is fundamental. A brand must be able to guarantee the characteristics that it communicates to the consumer, not only in the sense of providing a technically accomplished product, but also in the sense of providing the familiarity and recognisability of a product from a particular territory and from a unique winemaking and cultural heritage.

To fulfil this aim, the Masi Technical Group has spent years identifying the different expressions of viticulture and winemaking in the Venetian territories. Its current task, after bringing the tradition of a historic wine like Amarone up to date, is to make sure that modern winemaking techniques enhance rather than obscure the *tipicity* of the wine by making it easier to collocate in its tradition and making it more widely enjoyable for today's consumer.

This Seminar examines the most important moment of the vinification process, maceration, followed by the beginning of fermentation. This is when the mystery is performed and grape juice is turned into a more complex and elegant drink. In the case of Amarone this stage is particularly important for the creation of the character of the wine and begins when the grapes begin their long journey through the appassimento process.

We will also look at the research into maceration with its first concrete results and then move on in the second part of the Seminar to mention the research still in progress on biological and microbiological aspects of the fermentation process.

Masi would particularly like to thank Prof. Dellaglio, professor of agricultural and food microbiology in the faculty of Mathematical, Chemical and Physical Sciences at the University of Verona for his valuable collaboration with Masi Technical Group.

While we are talking about territorial values, I would like to take the opportunity to remember a friend who, for the first time in twenty years or so of these Seminars, is no longer sitting in front of me: Prof. Pietro Berni. All of us: myself, my technicians, and the entire winemaking world not just in Verona but also in the entire Veneto, owe a great deal of thanks to Prof. Berni for his valuable intuitions and for his insistence on the preservation of local identity. I am sure that all my colleagues who share a love of our winemaking heritage will join with me in this heartfelt tribute.

## **DEVELOPING THE POTENTIAL OF GRAPES TO ENDOW WINE WITH TIPICITY THROUGH THE VINIFICATION PROCESS**

by Lanfranco Paronetto

### **1. PREMISE**

In an ever shrinking and ever more competitive world the development of quality is necessary in every field. It becomes a target that we must accept, in the attempt to bring out potential, to enhance every detail in production, and to make the most of the raw material and the opportunities we have.

In winemaking quality is often mixed up with complicated and more or less rhetorical arguments where it is paraded as the principal or even the only solution to the recurrent problems of the sector, but defining exactly what quality is becomes bogged down in a situation where everyone has his own definition and objectivity is lost.

Despite cultural attributes that suggest the opposite, quality has no universal definition, does not exist in any absolute sense, and can only be defined in relation to an objective. Today more than ever, quality requires careful thought, taking into account different technical, financial and operational considerations, and identifying the road to find it.

The most important factors are:

- The definition of quality and its parameters in relation to tipicity and to “terroir”.
- Research and development into perfecting procedures to enhance quality and “terroir” and the enhancement of a company style.
- Paying attention to what the consumer wants.

While the first point about quality has few concrete examples among other producers, there are some producers who have begun to think how best to express the values of a terroir and how to translate these values into vinous characteristics. This is why serious research is necessary into the meaning of quality using scientific experiments to judge cause and effect, which is the only way to obtain meaningful data in the end, with continuous experimentation.

Results must then be cross-checked against winery practices in a constant striving for the perfection of the basic processes, and improvements through the use of new techniques, new products and new equipment. We have chosen maceration, out of all the various phenomena of vinification, as an important point at which red wines can be made better.

## 2. MACERATION, A TYPICAL RED WINE PHENOMENON

Vinification “*in rosso*” involves two phenomena above all, almost always concurrent and interdependent: maceration and fermentation:

**Maceration** involves the extraction and mixing into the must of substances contained in the solid parts of the grape (skin, pips and finally the stalks) which contribute to the constitution of the substratum and are responsible firstly for the basic difference with white wine, secondly for the differences between red wines, and thirdly for differences between the vintages.

These substances are mostly phenolic compounds, the anthocyanins and the tannins responsible for the colour in red wines and the general structure of a wine. They are also polysaccharide macromolecules, aromatic substances and mineral traces. The relative strengths and proportions of these components vary according to the make-up of the grape and its ripeness.

Grapes also contain less desirable constituents from the point of view of successful maceration. Consequently, a “good” maceration is the result of extracting or mixing “only” or “mostly” the more desirable constituents and it is inevitably a compromise which involves the balance of opposing forces.

Maceration involves:

- The extraction and mixing of various substances. It is helped by the degradation of vegetal tissues, above all grape skins, by natural occurring or added pectolitic enzymes and by mechanical abrasion or crushing.
- The combination of the must/wine with extracted substances. This affects the relative proportions of substances present in the various phases of maceration.
- Adhesion of extracted substances on solid particles in the must (lees and yeast). This is the phenomenon of reabsorption and the subsequent slight decrease of extracted substances in the must.

- Modification of extracted substances. The reaction of extracted substances with alcohol or with other products formed during the process, together with a modification of the reductive state of the must, leads to an important phase where substances are stabilised or lost according to a series of reactions caused by natural conditions or by oenological intervention.

All developments vary in intensity according to time elapsed, temperature, concentration of sulphur dioxide during pumping over or *delestage*, the presence of oxygen in the must, and the effect of the movements caused by the winemaking equipment involved.

**Fermentation** consists of the transformation of sugar into alcohol by the yeasts, which also contribute to the final result with the transformation of other substances, often themselves included. Since it is difficult to be sure of the result of using naturally occurring yeasts, for some years now we have preferred to use cultivated yeasts selected for their metabolism and efficiency of developing the desired aromas and tastes.

There are, however, continuous experiments going on into the use of native yeasts, either by themselves or combined with cultivated yeasts. This too seems to be a valid route to increased tipicity.

Going back to maceration: according to the quality of the grapes, their ripeness, the vintage, and the type of wine being produced, the development of the maceration process can be described in the following ways:

#### 2.1 – Short maceration

This is the classic method for modern red wines with dark purple red colours, fresh and attractive aromas; they are full bodied, soft but weighty, stripped of any astringency or sharp tastes, but with the correct dose of acidity. The parameters of quality and consequently the operations needed to reach it vary according to the type of grapes used. Ripeness affects phenolic contents in general and the colour in particular.

Potential alcoholic content should not be less than 12% vol. Maceration is often helped by the use of pectolithic and cellulose enzymes which help the breakdown of vegetal cellular walls and thus the development of colour and varietal aromas in the wine.

## 2.2 – Long maceration

Length of maceration is not so much the consideration. The important thing is to macerate for long enough to bring out the full potential of the grape in a context of producing high quality wines.

In fact, very often a lengthy maceration is also a risky one, with a high probability of creating problems with excessively astringent wines, or with defects in aroma with the development of unpleasant or reductive bouquets or unattractive grassiness. These are obviously undesirable.

Long macerations must therefore be used carefully, and only with the best and ripest grapes. Only then can they be used to develop wines of great character and personality. Grape ripeness is crucial, especially to check the phenolic content, but in any case the sugar content should correspond to at least 13 to 13.5 degrees of potential alcohol.

## 2.3 – Carbonic maceration

This type of maceration uses the reactions that occur when the whole grape is deprived of oxygen. Immersed in sulphur dioxide the vegetal cells change their metabolism from aerobic to anaerobic. This causes the grapes to lose all by 2% of ethanol, most importantly it breaks down the malic acid and pectins, it causes the release of phenolic substances and colouring substances from the skins, and reduces free amino acids in favour of proteins. Temperature is all important in this process and carbonic maceration will not work at less than 25°C. Standard practice is to carry out anaerobic maceration for 10 days at 30°C.

## 2.4 – Cold pre-fermentation maceration

This is a relatively new technique aimed at enhancing the expression and intensity of the varietal aromas of the grape without compromising finesse and tasting attractiveness. It can be better called “liquid maceration” (without alcohol) and lasts as long as necessary to allow the early dissolution of certain selected substances from the grape in water. In order to inhibit fermentation this process happens with must and lees kept below 10°C.

*Macerazione Prefermentativa a Freddo* (MPF) or cold pre-fermentation maceration permits the rapid dissolution of molecules that create grassy or vegetal aromas and is therefore extremely useful in the vinification of wines with these potentially defective

characteristics. Attempts to correct these characteristics after they have formed risk being counter-productive. It is nonetheless true that, as a general rule, wines made with the MPF method develop the intensely fruity characteristics that are highly desirable for the young red wines that form the major segment of the international market today.

## 2.5 – Thermomaceration

An old fashioned technique still in use with some producers for some types of wine. Heating to about 65-75°C degrades cellular structure in the grapes and precipitates the phenomena associated with extraction.

The heating process can be applied to the entire crush or just to the must, and either way it prevents the development of oxidative enzymes and natural flor giving excellent conditions for mono-varietal fermentation with cultivated yeasts.

The other advantages are that the maceration process lasts only a few hours, fermentation is quicker and colours are generally good. However, the disadvantages often outweigh the advantages: heating involves extra costs, the tannic structure of the wine can be out of balance, there is a risk of “cooked” flavours in the wine, and the clarification process is technically more difficult.

For these reasons this type of maceration is often improved by combining it with a partial maceration carried out in the standard way.

## 3. MACERATION DURING VINIFICATION OF VALPOLICELLA AND AMARONE.

Amarone is a wine with unique characteristics thanks to a series of factors.

- Particular grapes cultivated in a particular region, composed of:
  - o Native grapes (Corvina, Rondinella) which have their own particular aroma, structure and taste.
  - o The appassimento process, which concentrates the constituents of the grapes and causes particular changes, above all in aromas, by modifying the grape structure. Particularly important here is the effect of the “noble rot” that attacks the grapes during appassimento, especially that type of botrytis that causes the effect we call “*infavatura*”.
- Vinification during the winter months, which means:

- Cold pre-fermentation maceration using grapes that are already different in structure to the normal fresh grapes.
- Slow fermentations, made with cultured yeasts specifically prepared for the job by specialised institutes. Research today tends to favour selecting yeasts from the naturally occurring self selecting samples found at the beginning of the fermentation process.

The type of grapes used for Amarone and the appassimento process used to make it are a unique and special combination. The winemaking processes that transform grape to wine are the subject of much analysis, in order to make equally special and exclusive wines.

The **maceration** process used varies according to the characteristics of the grapes and the final outcome desired. For Valpolicella the grapes used, Corvina and Rondinella, are naturally low in tannin and there is little point in having any prolonged maceration and thereby running the risk of creating unpleasant vegetal tastes in the wine.

Amarone uses the same grapes as Valpolicella, but it is important to remember that the nature of these grapes has been changed by the appassimento process. Also because of the time taken by appassimento, vinification for Amarone naturally happens in the coldest months of the year: January and February, with quite different climatic conditions.

Thus it is that traditional winemaking methods and time-scale of production for Amarone have involved the quite unconscious application of **pre-fermentation cold maceration**, favouring the extraction of fruit aromas, especially the cherry aromas typical of the Corvina and Rondinella grapes. This makes for better defined and more intense bouquets.

Furthermore, the danger of undesirable grassy aromas in quality wines for laying down remains limited, thanks to the fact that appassimento reduces their presence both in the grape skins and the stalks where they are naturally found. Even if some parts of the stalks remain in the must they have little effect, while the skins actually contribute positively to the sweet raisined tastes of wines which we call “*reciotato*”, or recioto-like.

After the pre-fermentation maceration comes the **long maceration combined with fermentation** using cultivated yeasts. This phase completes the extraction of

anthocyanins and begins the establishment of the colour content through the reaction of the anthocyanins with the tannins. It also brings greater aromatic complexity with the aid of alcohol and the processes involving the yeasts in the fermentation.

Here too the nature of the grapes themselves and the changes that have happened to them during appassimento have the effect of preventing the extraction of harsh and astringent tannins, leaving the producer time to judge the correct length of maceration according to the other variable parameters, such as: temperature, pumping over, *delestage*, punching down the cap, or any other technique that is deemed useful.

To carry out these mechanical operations of mixing the must with the lees to maximise the extraction process, various mechanical pieces of equipment have been devised. They are what we, incorrectly, call “fomenters”. They should in fact be called “macerators”, given that their function is to optimise this particular part of the fermentation process.

The development of winemaking equipment is a very innovative part of the process with input from many producers, but it is the producers themselves whose job it is to compare the results obtained by such equipment and tabulate the effect on values such as tipicity or terroir.

Some of the results from equipment in use at the Masi Experimental Winery are available for public assessment.

To complete the picture of what happens during maceration and fermentation there are some **microbiological considerations** to be taken into account. The native yeasts that develop during the course of pre-fermentation cold maceration and which multiply well at temperatures between 10-15°C belong to the *Saccharomyces uvarum* species. They have a different metabolism to the *Saccharomyces cerevisiae* species found in more standard vinification, both because of the aromas produced (superior alcohol and esters) and because of the synthesis and break-up of organic acids, the production of glycerol and other substances.

The selection of cultivated yeasts will therefore be different for the production of Valpolicella compared to Amarone, where it is better to use *Saccharomyces uvarum*. If this yeast is then sourced in Valpolicella, perhaps in the vineyards and nurseries belonging to Masi, it could be even more relevant to the territory and its resources. But it is the quality of the final result that matters, and for the moment it seems that a “Valpolicella yeast”, however desirable, is not yet strictly necessary.

#### **4. DEVELOPING TIPICITY AT MASI: BRINGING TRADITION UP TO DATE**

International research is directed at various specific viticultural and oenological practices, those which are best designed to bring out the generic potential of the grapes.

But for any further quality development what is needed is further research into the definition of exactly what characteristics best underline the tipicity of a wine and the uniqueness of a terroir while at the same time experiments need to be carried out to find the best ways of achieving those characteristics and perfecting them.

Masi's solution is to use the Masi Technical Group to assess the possible techniques that will develop links with tradition and territory while also adding style and quality to Masi wines. The wines are from Valpolicella and in the tradition of Valpolicella, but above all they are Masi wines.

Thus it is that practical experience in the Masi experimental winery has led to the formulation of various protocols for vinification for the various wines produced, each one of them containing adjustments for vintage variation, and all with the aim of getting ever closer to the desired quality standards. Masi is happy with the results it gets today, but constantly strives to define the tipicity pertaining to both wines of the Verona area and wines of the Veneto region, through new techniques, new products and more innovative equipment.

The Masi Technical Group continues to work (and employ others to work) on new ways to improve tradition, and to adapt it to the new challenges of the international market on the one hand, while on the other preserving its authenticity and genuine originality.

*This is a summary of Prof. Dellaglio's speech about the very first results obtained from research into micro-organisms in the MASI vineyards. The theme will be fully developed at the next Vinitaly Seminar in 2008 when the first concrete conclusions will be available.*

## **DEVELOPMENT OF MICROFLOR ON GRAPES FROM APPASSIMENTO TO VINIFICATION**

Prof. Franco Dellaglio

Every producing situation is unique, with climate and operating conditions that make it unrepeatable. This is particularly true for wine producers, since the natural world with its soil and weather variants play such an important role in the process. Amarone is an excellent paradigm here because of the role played by natural conditions throughout its production process. Masi Amarone, in fact, acquires a unique quality profile from the actions of the native microflor present in its production process.

The aim of the research is to assess the **quantity/quality variables and the development of native microflor** during the production process and to compare the results from laboratory situations with those coming from the MASI experimental cellars. We shall examine the development of microflor up until the end of the alcoholic fermentation stage and the end of the malolactic fermentation stage in order to **identify the native micro-organisms that occur in the MASI vineyards** and to consider their possible uses.

**Method** These aims will be achieved using both substrata of specific growth for the various microbiological components and innovative molecular approaches such as PCR-DGGE, PCR-RFLP and PFGE. Particular scientific and technological attention will be paid to the possible synergies between native micro-organisms and the standard commercial starters in current use in many wineries.

**First results** show that MASI grapes dried in the appassimento method contain a good diversity of microbes, at least as far as the yeasts are concerned, and that the dried grape pips have *Botritis cinerea*. Preliminary data permit us to suppose that the unique character of MASI Amarone is a function of the native microflor present in the vineyards of production.

This ambitious project organised by Masi Agricola SpA is expected to last 3-4 years in combined data collection and applied practice. It will identify the unique character of MASI vineyards using data drawn from the type of vinification technology currently being studied at the company research centre that favours the development of selected micro-organisms that have a demonstrable effect on wine production.

**WINES FOR THE TASTING**

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**COMPARATIVE EXPERIMENTATION OF DIFFERENT VINIFICATION  
TECHNOLOGIES**

**n. 1 CORVINA 2004**

Fermentation tank with convex plate apparatus for turning over the must designed by Masi Technical Group.

**n. 2 CORVINA 2004**

Two-stage fermentation tank designed by Masi Technical Group.

**n. 3 CORVINA 2004**

Fermentation tank with stainless steel stick for breaking up the cap designed by Masi Technical Group.

**n. 4 CORVINA 2005**

Fermentation tank with convex plate apparatus for turning over the must designed by Masi Technical Group.

**n. 5 CORVINA 2005**

Two-stage fermentation tank designed by Masi Technical Group.

**n. 6 CORVINA 2005**

Fermentation tank with stainless steel stick for breaking up the cap designed by Masi Technical Group.

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