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American Grapevine Culture and Research in Berisso, Argentina

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ABSTRACT

The "Riverbank wine of Berisso", made from american grapevine (*Vitis labrusca* var. Isabella), is a typical local product, original from an area deeply forgotten of the Pampa riverbank: the Berisso district (latitude 34°53′ South, longitude 57°54′ West), close to Buenos Aires city, one of the counties most affected by the big Argentinian economic crisis at the end of 2001. The value that distinguishes this product and its permanence throughout different historic moments is the know-how characteristic of a certain group: the wine producers from Berisso. That know-how is repeatedly transferred from generation to generation orally and practically, the productive techniques enabling the vineyard maintenance and its subsequent processing of wine. Recently, in Argentina the possibility of making abandoned regions dynamic is being taken into consideration in order to rescue the food production typical of the area and this process is based on local initiatives. This kind of action is associated with the changes in the food consumption pattern observed in the common urban consumers, where the revaluation of the beliefs related to rural customs, to the rescue of tradition, and to natural behavior is becoming increasingly important. The case of the riverbank wine of Berisso is an example that allowed the Facultad de Ciencias Agrarias y Forestales de la Universidad Nacional de La Plata, in the context of its basic functions – teaching, research and extension – to begin an integrated work anticipating some trends in Argentina already observed in other developed countries. Historical and sanitary aspects, phases of primary and industrial production, commercialization, comsumption and challenges to face about the case of the riverbank wine of Berisso are described in this review.

Keywords: Riverbank wine, vineyard management, *Vitis labrusca*, wine producers

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INTRODUCTION

A case analysis was carried out on a particular kind of wine (called riverbank wine and made with grapes of the *Vitis labrusca* var. *Isabella* strain) that is produced in an area deeply forgotten of the Pampa riverbank, the Berisso district. Berisso constitutes, together with other counties close to Buenos Aires city, one of the counties most affected by the big Argentinian economic crisis at the end of 2001: Unemployment (18.4%), difficulties to get food, social urban violence, among others, causing a great loss of hope for the young people that could only expect social government help as they have not had the opportunity to be included in the system and their possibilities of getting access to education have been limited.

Nowadays, producers who know how to make this wine and other typical products highly appreciated in the area remain and they have involved themselves in the activity of recovering the old skill of "wine producer," together with technicians of the Facultad de Ciencias Agrarias y Forestales de la Universidad Nacional de La Plata, 15 km away from the vineyards. Recently, in Argentina the possibility of making abandoned regions dynamic is being taken into consideration (even those included in the Pampa area) in order to rescue the food production typical of the area and this process is based on local initiatives (Posada and Velarde 2000). This kind of action is associated with the changes in the food consumption pattern observed in the common urban consumers, where the revaluation of the beliefs related to rural customs, to the rescue of tradition, and to

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Invited Review

natural behavior is becoming increasingly important.

Berisso has an area of 137.59 km^2, with a population of 74.374 (Censo de Población 2001) and only 3% of the inhabitants live in the rural area. The county boundaries are Ensenada to the northeast, delimited by the port and YPF (Yacimientos Petrolíferos Fiscales) refinery, to the southwest by La Plata County, delimited by 122nd Ave. and with the rural area by Provincial route 11, and to the southeast by Magdalena County in all this area. It has around 14.000 ha, 4.573 of which are apt for perennial cultivation (Consejo Federal de Inversiones (CFI) 2000). There are about 65 producers in the county who work in the field and who share the vineyard activity together with others like forestation, reed commercialization and horticulture. According to CFI (2000), 88% of the cases studied drew their income from other activities, thus they can be classified as "part-time" producers.

Grape (*Vitis labrusca* var. Isabella) cultivation is performed mostly in the low area (flooding area). In the high area the crops are new, not more than 10 years old. According to recent estimates from a group of grape producers from Berisso there are 25 grape ha planted. The grape is for consumption or for wine production. The grape for consumption is sold in Berisso greengroceries and sometimes in La Plata Regional Market (Velarde *et al*. 2006). The average yield is 5 kg/plant or 10.000 kg/ha. This is still under the mean value expected for this variety (10 to 15 kg/plant). Currently, the produced amounts of wine are very heterogeneous, ranging from 500 to 15.000 liters per family. The production of the "Riverbank wine of Berisso" is adapted to the local edaphoclimatic conditions. The production areas corresponding to the place where the farms are settled are in agreement with the conditions suitable for its development, from an ecological point of view (soil nature, proximity to the river, weather features, etc.).

The "Riverbank wine of Berisso" is a typical local product, original from an area of limited production and its quality and characteristics are mainly due to its geographical origin and cultural practices. History explains the importance of this product for producers and consumers. The case of the riverbank wine of Berisso is an example that allowed the Facultad de Ciencias Agrarias y Forestales de la Universidad Nacional de La Plata, in the context of its basic functions – teaching, research and extension – to begin an integrated work anticipating some trends in Argentina already observed in other developed countries (France, Spain, Italy, etc.).

One of the main problems faced was that some producers did not have the necessary know-how to restart wine production. When they began to plant and to become part of the activity, they faced several problems just for being "beginners" or amateurs in wine production. Among these problems were those related to the lack of production techniques as regards both the primary production of grape and wine production.

The Faculty proposed the producers of riverbank wine of Berisso to constitute a learning group. University people would work on increasing reflection and action capacities from know-how diagnoses, detection of critical points, search for local solutions, training and research, and pilot marketing experiences.

There were two axes to the technical proposal:

- Working from an agro-ecological paradigm, through which there is a good use of the local resources and the rescue of traditional knowledge, both factors which could achieve sustainability of the productive systems in the area.
- Distinctive quality as it is a typical product with nutritional and symbolic components.

In 1999, the incorporation of the Facultad de Ciencias Agrarias y Forestales, through direct participation, meant a different dynamic for Berisso. The first observed change was the creation of a working group constituted by producers and university staff, who began a series of meetings from April 1999. When the group was formed, the producers hardly knew each other, only some of them had contact and practically there was not enough interaction so as to define common objectives and to allow cooperation among them. When periodic meetings began, a working team was formed with producers who became progressively organized, and at the same time there was a technical group from the Faculty who joined the process, working in the activities previously mentioned. Both, producers and people from the University, have interacted continually throughout all these years (Velarde *et al.* 2009a, 2009b).

The members of this change process were at first wine producers and members (researchers and students) of the Facultad de Ciencias Agrarias y Forestales. Throughout the reactivation process, other institutions joined: Ministerio de Asuntos Agrarios and Ministerio de Desarrollo Humano (Buenos Aires Province), Ministerio Nacional de Desarrollo Social, Instituto Nacional de Tecnología Agropecuaria (INTA), Facultad de Ciencias Exactas (Universidad Nacional de La Plata), Secretaría de Producción from Municipalidad de Berisso.

The work methodology combined mathematics, stadistics and social sciences. The **intangible** or **immaterial** qualities of the riverbank wine were studied analyzing data from primary information sources. These data were collected making interviews to old and current producers, consumers, traders and a search based on a standardized questionnaire to current consumers (Velarde *et al*. 2008).

The direct work in the area allowed direct extrapolations of European experiences to be overcome. We considered the possibility of including small agricultural producers in the reactivation process of a centennial product or heritage product like the riverbank wine. Our aim was framed and modeled by the scope of consumption, new marketing methods, informal markets, and the recovery of a hand-crafted agricultural industry in the context of economic, social and political crisis.

What encouraged producers and consumers to produce and consume again this kind of product at the local level?

Bérard and Marchenay (2004) explained this increasing interest towards local specialties through a series of factors. The authors mention, firstly, a modification in the time and space relationship which results in a separation from the sociological notion of *place*, which Mauss (1980) associates to an idea of a culture located in time and space. Then, our "supermarket" societies are characterized by a separation of the consumer from the way of production. What we eat is food and we do not know its composition, methods and places of production. In other words, according to Fischler (1995) foods are UEOs (unidentified edible objects).

Another cause mentioned by the cited authors is the increasing importance of returning to the concept of heritage, which is explained by the nostalgia of a disappearing world and which embraces living things, including food. In relation to this nostalgia, Warnier (1994) explains the origin of the search for authenticity which is found in local products. According to the author, in homes where nothing seems to be needed, there is a hidden lack: that of the ancient object, of the inheritance, of noble materials close to nature which can remedy the feeling of rootlessness. Bromberger and Chevallier (1999) add that the origin of preference for "handmade" products is placed in a context of globalization and planet uniformity. These days a generalized loss of identity is observed, therefore the search for roots, tradition and authenticity is needed.

Heritage is common memory and also a record of past events and experiences and maybe, above all, the capacity of projection to the future (Casabianca and Link 2004). The characteristics of heritage may be associated to appropriation and common management by a social group identified with the territory. In our case, heritage is made up by direct heirs to tradition (old European immigrants' children and grandchildren) or new producers (from provinces out of the Pampa or from Bolivia) who once settled in the area, and

who try to find a way of subsisting and improving their social position within the Berisso community by living on the production of a typical product: The riverbank wine.

Historical aspects

As we mentioned before, wine production in these fields results from a tradition inherited by producers' ancestors arriving from Italy, Spain or Portugal at the end of the 19th century.

We will analyze some background for a better understanding of the wine production evolution in Berisso without trying to make a thorough historical research.

In 1910 Argentina was already a unified country that had solved the main problems of the 19th century, and Buenos Aires was the luxurious port city of a country in its heyday. Argentina was the world barn exporting meat and wheat mainly. Importing capital, together with the arrival of immigrants, strengthened railways and meat processing industries. Riverbank wine production began in Berisso as an activity for self-supply, but over the course of time, it became completely commercial and then it was the core of a dynamic local market, especially when Berisso and the neighboring counties had the greatest industrial activity (1935-1955). Limited, at the beginning, to the consumption of the immigrant community, the riverbank wine and other fruit and vegetables were then adopted and valued by the local inhabitants, creoles and immigrants. The production of riverbank wine kept its popularity in Berisso from about 1914 until 1955, when it began its steep decline.

In 1940, Berisso showed an economic and spatial configuration corresponding to the import substitution model in force at the national level. At that moment the meat processing industry, still strong, coexisted with the textile industry, chemical industries, fuel refineries, and an important shipyard. The influence of this secondary sector in the local economy implied, indeed, a new profile of population settlement. Thus, the urban population became predominant in number and in importance due to the social services (education, public health, etc.) rendered. On the other hand, the rural area of the county began declining and this got worse decade after decade. This double process, urban growth and rural decrease impacted the level of production of local farms, leaving a market space to other productive regions close to Buenos Aires city. Consequently, the local production standards were notably affected as the latest available technological advances were not incorporated. On the other hand, the urban job offers produced a flow of rural emigration that resulted in population aging, in the acquisition of non-flooded lands near La Plata by rural producers from Berisso and in the difficulty with generational transition. As a consequence of all this, there was little innovation initiative in the local production.

According to data by the Regulating Plan of Berisso (1958), in 1954 wine production was 10.000 hectoliters, being reduced in 1958 to 4.000 hectoliters, and there were 22 wineries and implantation of 307 grape ha in the county. Until the 1960s the riverbank wine was a very popular product in the producing area and even in the most popular neighborhoods of Buenos Aires and nearby districts.

By the end of the 1970s, Berisso suffered a serious social crisis that accompanied the economic crisis, which was evidenced because of the exhaustion of the import substitute period. The clearest expression of this process was the closing-down of companies, increasing unemployment, the deterioration of public services, and a fall in the standards of living of the local population.

This situation led to the substitution of grape plantation that could not function properly and of premises for wine processing and storage that could not be correctly maintained. The decrease in consumption, the deterioration of available resources (plantations and premises) and the low productive levels led the production of these vineyards into a deep crisis, fully confirmed at the end of the 1970s (Posada and Velarde 2000).

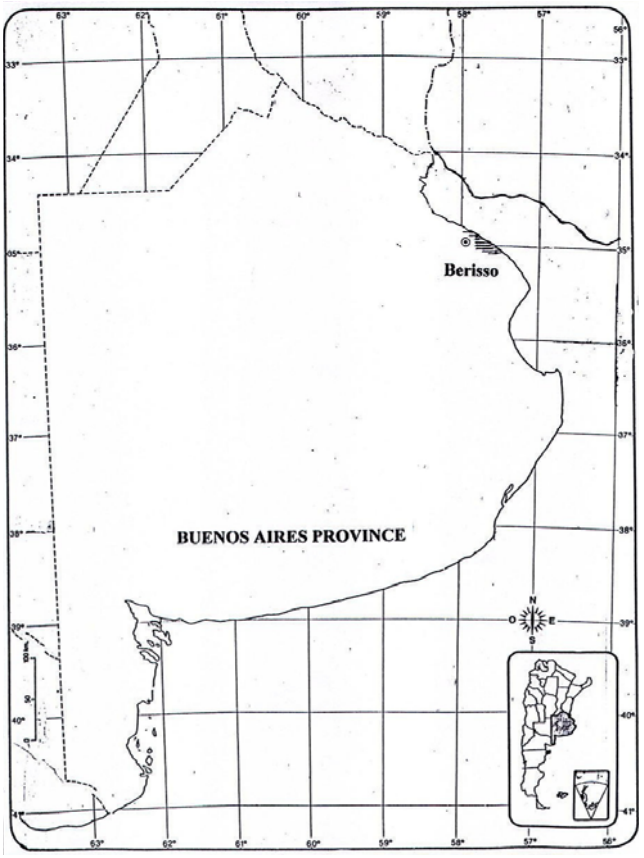

Fig. 1 Buenos Aires Province (Berisso).

By 1980, the wine production industry in Berisso was agonizing; it was no longer profitable. The causes summed up previously that contributed to the almost disappearance of the riverbank wine of Berisso are as follows: the replacement of agricultural projects by an industrial model and, with it the reliance on paid jobs and loss of the importance of the county's agricultural activity and its subsequent lack of maintenance of rural infrastructure. Also, there was a loss of wine quality and excessive controls of the Instituto Nacional de Vitivinicultura (INV) with wine guidelines for other country regions. However, some producers continued to produce small quantities of wine which were locally consumed or sold through a reduced circuit of local marketing and this decreasing trend continued until almost disappearing in 1988 with hardly 6.000 annual liters and around 6 planted hectares.

The value that distinguishes this product and its permanence throughout different historic moments is the know-how characteristic of a certain group, in this case, the wine producers from Berisso. That know-how is repeatedly transferred from generation to generation orally and practically, year after year, the productive techniques enabling the vineyard maintenance and its subsequent processing of wine.

PRIMARY PRODUCTION PHASE

Study area

Berisso (**Fig. 1**) is located in Buenos Aires province, Argentina (latitude 34°53′ South, longitude 57°54′ West). The region is classified as subtropical and humid, with average temperatures between 14 and 18°C and an annual rainfall of 910 mm. The area consists of coastal plains, with altitudes between 0 and 5 m. The prevailing natural vegetation in this wetland zone (Malvárez 1999) is coastal forest. Old vineyards are located in the alluvial plain of La Plata River, which is a modern unit of fluvial accumulation. Soils are Fluvisols (FAO 1998), with the horizon sequence of (Oi) A-Cg1-2Cg2-3Cg3-; they evolved under hydromorphic condi-

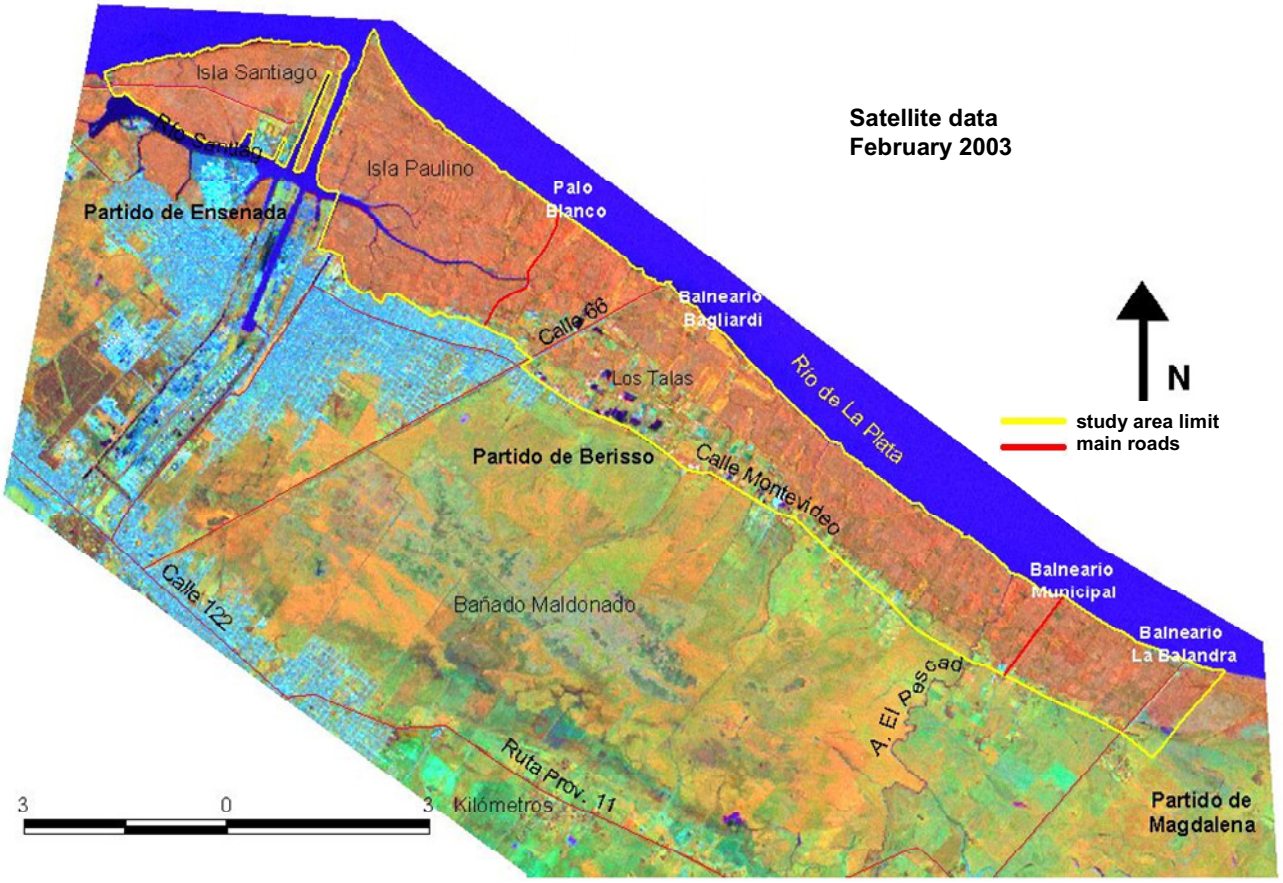

Fig. 2 Study area.

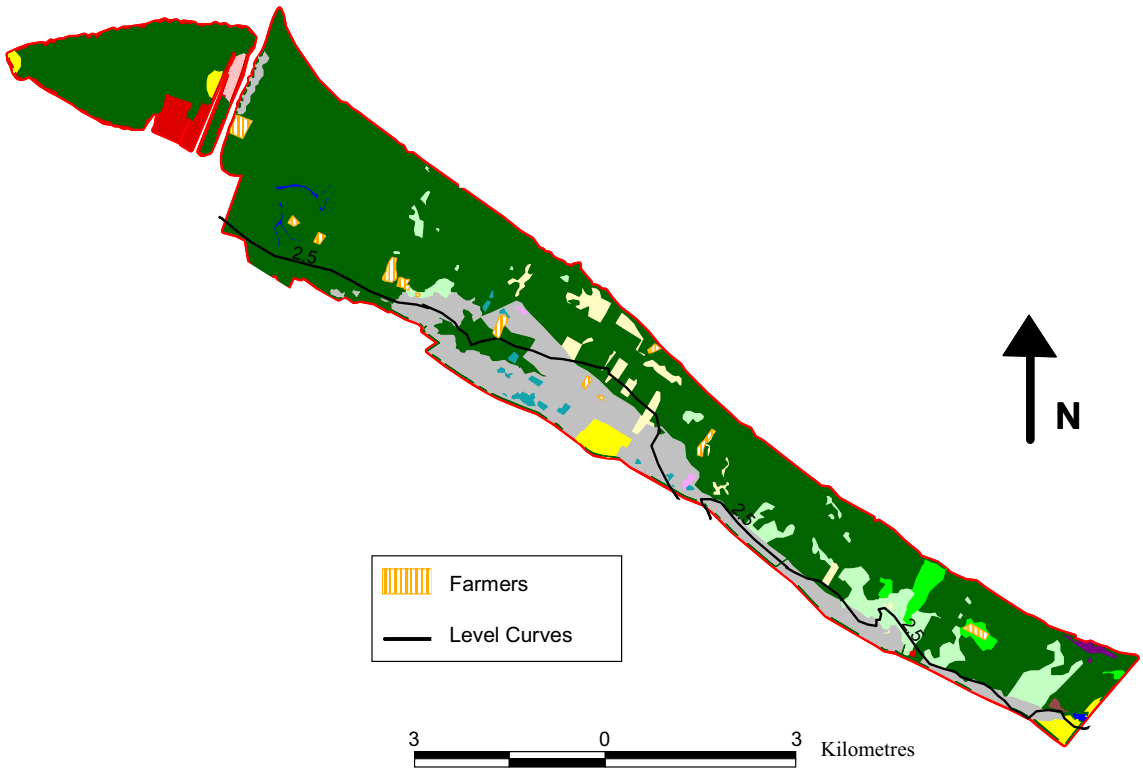

Fig. 3 Farmers localization (http://www.ucalp.edu.ar/proyectos.html).

tions, accentuated by a water table close to the surface (Martínez *et al*. 2000). The newly established vineyards are located on a shelly ridge composed of accumulations of mollusk valves, both whole and broken up. Soils are Rendzic Leptosol (FAO 1998) with an A-horizon of 20-40 cm. and high content of well-humidified organic matter, under which there exists an AC or C-horizon made up of layers of small shells (Martínez *et al*. 2000).

Location of vineyards

The farms of wine producers that currently form part of the Berisso Riverbank Cooperative (**Figs. 2, 3**) were located by means of cartographic, plot maps and air photos. From such

information, it can be said that the spatial distribution of vineyards corresponds mainly to the area characterized as scrubland corresponding to the area of influence of the Riverbank wine production. As was already mentioned, this area is low so it is subjected to periodical rises of the level of the La Plata River. This indicates a particular ecological condition which determined a special design and management of the vineyards adapted to that condition. In that area, the farms are not grouped in a certain location but distributed without a clear pattern.

We also find vineyards in the higher orchards area, where nowadays grape cultivation is expanding.

Vineyard management

1. Historic practices of primary production

The practices of primary production are based on crop adaptation to edaphoclimatic peculiarities of the wetlands, arbor as grapevine conduction system, natural fertilization, cultural management of training to avoid late frosts and bud and vine shoot tying to avoid losses due to predominant winds. Chemical treatments based on low toxicity products and a special personal diligence of producers in the physical and manual daily work results in high quality raw material.

Most immigrants were owners or tenants of estate land, either national, provincial or from the town hall. The cultivation area ranged between 5 and 20 ha. The grape surface did not exceed 16 ha though the average was 1.5 ha and generally shared the land with other crops (mainly straw, plum, forestation and horticulture).

The beginning of wine production and other agricultural activities in the area is based on soil systematization by building embankments (barriers built parallel to La Plata River) to avoid incoming water by periodic river flooding. A drainage system was built for grapevine cultivation in those areas where it was not possible to avoid incoming water.

Pruning is the most valuable management practice according to the people we interviewed, preserving the generational transfer and the experience transmitted from parents to children. Children, when very young (8 or 10 years old), began different activities in the vineyards such as harvesting, bud tying, and debudding.

"My father was a very careful man, a good observer. He had already viewed many things that no one could see. For example, wine is a very delicate thing" (Aurelio, former wine merchant, 84 years old).

Another very important aspect mentioned in the interviews was bud tying due to the predominant winds and the protection of vineyards from fungal diseases. They performed applications with a manual knapsack sprayer of Bordeaux broth, prepared with copper sulfate and slaked lime, one part copper sulfate and two parts lime. The number of applications was variable, with three applications throughout the cycle being the most representative. Labor was exclusively a family activity during primary production, employing jobless people during harvest time. Family working culture and physical effort are other aspects that stand out in handicraft production, aspects related to the origin of immigrants and the culture of time.

"...They did what they had to do: they bent, pick, spade, machete and plough…" (Aurelio, former wine merchant, 84 years old).

Current description of the grape productive systems

1. Strain

The American grapes, from Eastern North America, include several species adapted to the most diverse climatic and soil conditions. Generally they are used as graft holder for *Vitis vinifera* (European grape) and constitute a valuable germplasm for its improvement. Within this group the species *labrusca* has yielded some crops for juice production, fresh consumption and wine production.

Identifying the variety was important work for the subsequent territorial certification of the wine. Initially, methods based on the study of morphological characteristics, "ampelography", were used. This was by direct observation of the plant, its structures and visible organs (shape, size and plant color, leaves, bunches, etc.) and relevant agronomical features (Galet 1979). However, these characteristics can be altered by diseases and can vary depending on the growing stage or environmental conditions. Alternatively, the geographic dispersion of the same genotype or culture may bring about its renaming, i.e. several names for the same genotype (homonymy) (Vignani *et al*. 1996; Cervera *et al.* 1998). Taking this into account, identification of the chemical, isoenzymatic and nucleic composition was carried out. With these features the genetic differences between individuals could be directly identified, thus obtaining a "molecular profile" or "fingerprinting" characteristic for the Isabella variety independently from the growing conditions of the plants (Morell *et al.* 1995).

We can conclude that wine production in Berisso developed from the variety "Isabella", a hybrid among native American species and *V. vinifera* (Winkler 1965).

2. Plantation density

Since it is a well-developed grape species of vegetal strength, currently it is planted at low densities from around 1.900 to 2.700 per ha. The plantation layout is 1.5 m between plants and from 2.4 to 3 m between rows.

3. Irrigation system

Traditionally, an arbor irrigation system has been used since it is appropriate for this area and for this variety. The arbor was implemented to prevent water from reaching bunches during the increasing river level (**Fig. 4**). Experiments on different ways of directing the grapevines are being studied in the area, such as high trellis or "liras" which adapt to the environmental conditions (periodic flooding), that are more efficient in capturing light energy, easier to handle (direction, tying, etc.) and less exposed to wind (**Fig. 5**).

4. Drainage system

In lowlands the vineyards have a drainage system in common, which conditions the design of the plantation plot. This system allows the river water to be evacuated after an increase in the river level and enables the soil to rapidly recover its aerobic condition. It consists of two kinds of channels, the biggest called "*collectors*" and the smallest called "*zanjillos*". The *collectors* limit the grape plots and their function is to receive water from the *zanjillos* and to evacuate it out of the system. Their dimensions are 1.5–2 m in width and 0.7–1 m in depth. During most part of the year, these channels contain water. The *zanjillos* are placed within the cultivation plot. Their function is to drain excess water from the soil pores thereby allowing air to permeate the soil and to avoid long periods of anaerobiosis. These are 40-50 cm wide and 40-60 cm deep. Within the plots, the *zanjillos* are placed every 6 m, and this enables two grape rows to be placed between two *zanjillos*. Each grape row is placed at 3 m from one another and at 1.5 m from the *zanjillos* (**Figs. 6, 7**). The highland vineyards lack a drainage system.

5. Tree curtains

Species adapted to local conditions such as elms and willows are used, and their location and/or characteristics will depend on the pursued objectives (controlling winds which break buds, airing the vineyard, preventing damage caused by frosts, etc.). The predominant winds that produce damage by bud breakage and by cold air (advective frosts) blow

Fig. 4 Arbor conduction system. **Fig. 5** Young plants in high trellis. **Fig. 6** Flooded "zanjillos". **Fig. 7** Drainage effect in low lands. **Fig. 8** Typical training. **Fig. 9** Harvest. **Fig. 10** Bunch choice and cleaning. **Fig. 11** Milling. **Fig. 12** Downy mildew caused by *Plasmopara viticola.* **Fig. 13** Anthracnose. **Fig. 14** Grapevine leaf spot caused by *Pseudocercospora vitis.* **Fig. 15** Small butterfly larvae on berries. **Fig. 16** *Crenulaspidiotus lahillei* in grapevine trunks. **Fig. 17** Grape phylloxera on leaf. **Fig. 18** Fermentation during microvinification of Isabella musts. **Fig. 19** Wine commercialization in the Celebration of the Riverbank wine. **Fig. 20** Riverbank Wine Workshop (farmers, development agents, researches). **Fig. 21** Collective winery building.

from the south–southwest, therefore planting curtains in that area of the plot decreases the effect of the winds.

6. Soil coverage

The productive vineyard systems from the Berisso riverbank are characterized by the presence of an abundant spontaneous vegetation coverage that grows between grapevines and covers the soil surface almost completely all-year round. The prevalence and characteristics of spontaneous vegetable species in the vineyards differ according to the agro-ecological features of the area where they are located. There are plantations in low lands which are flooded by the river so the environmental humidity is higher and others in higher lands which are not flooded and therefore the humidity is lower. In the vineyard coverage close to the river, the variety of species (number of species) is around 71, out of which 4 of them prevail in the coverage.

Within the vegetable species characterizing the lowland area by their high coverage percentage during the productive cycle, we can find *Ranunculus repens* L. (family *Ranunculaceae*), *Eryngium* sp. (family *Apiaceae* (*Umbelliferaceae*)), *Iris pseudacorus* L. (family *Iridaceae*), and *Trifolium repens* L. (family *Fabaceae* (*Leguminaceae*)). In general all have wide leaves and in the case of *Eryngium* sp. and *I. pseudacorus*, the plants can reach 1 m in height. All of them have flowers, with yellow prevailing. There is evidence that certain families like *Umbelliferaceae*, *Leguminaceae* and *Asteraceae* play a very important role in the biotic regulation, keeping populations of natural enemies and causing deterrent effects on herbivorous (Altieri and Letourneau 1984). Such families are found in these systems and are present throughout the entire productive cycle (Bonicatto and Marasas 2005).

In the highest area far from the river, the variety of species is around 67, out of which two prevail in the coverage (Bonicatto *et al.* 2006). These are *Cynodon dactylon* L. Pers. and *Paspalum dilatatum* Poir., both belonging to the *Poaceae* (*Graminae*) family. These species have green flowers and reach 1 m in height in the vineyard coverage.

In general, the dominant species in the vineyard coverage, both in the lowland and highland areas, are maintained throughout the whole productive cycle. The management of these species is by means of mechanical weeding (trimming) in order to make the grape cultural practices easy. In some cases, to recover abandoned vineyards in the lowland area where the coverage consists mainly of iris (*Iris* sp.), total herbicides are used in order to allow the settlement of a not-so-aggressive vegetation. The highland areas with a high population of *Cynodon dactylon* are controlled with graminicides. Thereafter, management is carried out by cutting.

7. Training

Dry training

a) For training: In low, floodable areas, plants that have already reached a certain height (around 0.8 m) are planted to prevent the increase of the river level from affecting buds. This height is usually reached when the plant is two years old if the plant is multiplied in flower pots or one year old if it is of layering. Therefore, prior to planting, the first training is carried out at the above-mentioned height. The following year training is carried out at 40 cm above the previous training and this is repeated until the fourth year when the plant reaches the height of the grapevine trellis wire (around 2 m). In this fourth year two arms, which are oriented to the wire are left, thus forming a V-shape arm from which the fruit-bearing vine shoot will grow.

b) For pruning: Mixed training Guyot type. The elements of this training are the shoot (vine shoot trimmed at two buds) and the charger cane (at 4, 5 or 6 buds). The amount of chargers and shoots left per plant (which defines the quality of training) depends on the plant strength, determined empirically by the trainer taking into account the stem diameter, vine shoot diameter and length, strain production, etc.

The trainer's objective is that the chargers shall not be too far from the main trunk and thus the amount of old wood is not increased. This can be achieved in two ways: i) Two main arms on and towards the principal wire. On these arms we find shoots and chargers which are oriented perpendicularly to both sides. ii) Instead of two main arms oriented on the wire, 3 or 4 arms are left forming a kind of open glass from where shoots and chargers grow, without a determined orientation like the previous one (**Fig. 8**).

Green training

This is carried out in order to improve the sanitary and/or physiological conditions of the plant. As the strain grows and develops (from October to February) the following activities are performed:

a) Debudding and/or *desnietado*: It consists of removing unproductive or misoriented buds which are consuming photoassimilates. In the case of *desnietado* (removal of *feminelas* or early buds), it is performed in the bunch area in order to improve the aeration and sunlight there and to decrease the risks of fungal diseases. These activities are carried out by qualified staff, in this case the producer, since it must be taken into account which buds will be the vine shoots of the next dry training.

b) Removing leaves: This consists of the removal of an amount of adult leaves in order to: i) air the strain canopy so as to decrease the risks of diseases and to improve the effectiveness of sanitary controls; ii) force ripening while improving the bunch exposure to the sun. This practice would have, if used by most producers of the zone, a beneficial effect on bunch ripening if performed 20 to 30 days after whole blooming, removing the oldest leaves which are older than two and a half months old (those which are backwards in the bunch) and which already consume more than they produce. Another favorable moment for bunch ripening would be removing the leaves on the bunch area 3 weeks before the grape harvest, thus allowing better exposure of the bunch to the sun. This increase in sunlight should be gradual so that the bunch can acclimatize to it.

c) *Despunte* or tipping: It consists of removing the end and last internodes of the growing *pámpanos* or grape sprout, or of cutting the bud when reaching the third wire in order to keep the strain at certain shapes and vegetative conditions. At least 8 or 10 leaves are left above the highest bunch of the *pámpano* to tip. In this way a certain leaf surface that produces the necessary photoassimilates is guaranteed for maintaining the strain and the correct ripening of the bunches.

8. Tying

With basket willow: After pruning, the strain trunk is tied to the guide (cane), the main arms to the main wire and the chargers to the first wire, thus being the woody part of the plant well-tied to the grapevine structure (we must bear in mind that the grape is a climbing plant and therefore requires a structure for its support).

With bull-rush (*Scirpus* spp.): As the buds grow they are tied to the following wires in order to decrease the risk of being broken due to the wind. For this purpose rush strips, previously cut and dried, are used.

9. Hanging bunches

It is a specific practice of grape production for consumption and it consists of arranging bunches as they grow so that they can hang from the grapevine facilitating their development and subsequent harvest.

10. Fertilization

It is worth mentioning that fertilization with macronutrients is only necessary in orchards located in highland areas where there is not periodical flooding. Fertilization does not depend on a previous diagnosis made by a professional but on the producers' intuition.

11. Frost control

Passive methods: The plot and curtain layout is of great importance for the protection against frosts. Therefore, the orientation of the rows and forestry curtains both enable the escape of cold air and avoid its entrance. It is also recommended to keep the grass cut especially for plants between one or two years old. Late training is another feasible practice to implement.

Active methods: Wood heaters distributed alternatively all over the vineyard, every two rows, about 33 heaters per hectare (It is better many small and well distributed sources rather than few big ones). This method is used by a wine producer of highland areas.

Determining the moment of harvest

It is determined for those bunches that the producer decides to harvest based on his/her experience and organoleptic tests. The refractometric method has been recently incorporated and this measures the soluble solids in °Brix.

Harvest

It is carried out by using any cutting device. Care must be taken so as not to spoil bunches that once harvested are stored in wooden crates of appropriate dimensions (the crate depth should not exceed 30 cm) and covered by paper. It is very important to avoid bunch squashing (**Fig. 9**).

Bunch choice and cleaning

After harvest and before collecting grapes for crushing, bunches with appropriate characteristics for wine production are chosen by eliminating the berries which are in poor condition (**Fig. 10**).

Crushing

Once the harvest is complete, crushing begins. Bunches should not remain in crates longer than 48 h without being crushed (**Fig. 11**).

New technologies adopted by wine producers

Some of the recently incorporated practices resulting from the interaction between wine producers and university researchers are:

- *Agamic reproduction of grapevines* by means of plantlets made in flowerpots or furrows.
- *Direction on trellis*: low and high (this way of direction allows increasing the plantation density and better light exposure to increase sugar content and consequently to improve alcoholic graduation).
- *Chemical treatments*: synthesis products are used since they are more effective and easy to prepare.
- *Weed control*: this is intended for those producers with little labor force who need to control weeds chemically, replacing mechanical control by the use of total or selective herbicides.
- *Pruning*: new pruning systems are tested (H-shape pruning), in the training pruning the guide which will be the main stem in future is directed in advance (1 or 2 years). Usually the stem height is gradually increased (4 years). Pruning is still one of the strongest factors in the vineyard performance and it is also an unavoidable practice carried out only by the producer.
- *Bud tipping*: this is carried out when the bud reaches the height of the vine main wire in order to favor the development of early buds which will form the main arms.
- *Tipping of buds when reaching the third wire*: this is a traditional practice in the area questioned not only by the specialists participating in the training courses but also in the studied literature. Thus, it is being analyzed whether it is convenient or not.
- *Thinning ("raleo")*: innovation particularly interesting for the zone due to its climatic conditions of low heliophany. This practice would improve, among other things, the sugar content in the berry.
- *Application of a contact fungicide after harvest*: innovation which enables the strain, by means of keeping the area photosynthetically active, to store sources during autumn with the resulting ripening of buds in vine shoots.

- In primary production prevails an integration of practices characterized by the use of low inputs.

The special characteristics of the most traditional vineyards of the lowland area led to study why these could last long, with low dependence on external inputs. In order to study this, researchers from the University together with producers began analysing the production systems. For this purpose, a systems approach was used which allows identifying the limits of the system under study, its components and interactions as well as input and output of both energy and matter. As a result, it was observed that vineyards favor organic matter cycling due to both crop management and coverage and this would result in a healthy soil. Also it was noted that the sediment deposited by the river in the lowland vineyards gives enough nutrients to balance the nutrient loss during harvest. This allows the vineyards to keep the soil nutrients. In addition, it was observed that the presence of such diversity of vegetable species in the coverage may explain the low incidence of pests present in these crops.

Abbona *et al*. (2007) analyzed how vineyard management impacts the conservation of natural resources noting that these are better preserved in lowland vineyards than in highland systems.

Lowland vineyard producers developed an environmentally proper management. This crop grows in difficult ecological conditions, but despite this, the producers could develop a model that takes environment factors (nutrient cycling, biotic regulation) into consideration. However, the new vineyard producers of the highland area did not develop this adaptive capacity well. They replicate the management of a different ecological area (lowland zone) which, for the new environmental situation, presents certain disadvantages in the long term. This is being reconsidered together with the producers in order to improve the detected weaknesses.

SANITARY ASPECTS

Diseases

In Berisso, grape diseases are mainly produced by fungi, a limiting factor of production. Due to favorable climatic conditions – average temperatures between 14 and 18°C and an annual rainfall of 910 mm – downy mildew is an endemic disease always detected in these vineyards. There are several main diseases, discussed below in more detail.

1. Downy mildew (*Plasmopara viticola* (Berk. & M.A. Curtis) Berl. & De Toni

Downy mildew is a highly destructive disease of grapevines (*Vitis* spp.), caused by *Plasmopara viticola*, a biotrophic Oomycete (Stramenopiles) native of North America but in the late 1870s was accidentally introduce to Europe, Australia and Africa and in 1990 in New Zealand (Šrobárová and

Kakalíková 2007). It is found worldwide wherever grapes are grown but is endemic in America. The most important environmental factor in the development of this disease is moisture, combined with temperatures between 8 and 32°C (optimal 25°C) (Šrobárová and Kakalíková 2007). In this humid region of Argentina, this is one of the main diseases of grapevines, being sometimes a limiting factor (Sarasola and Sarasola 1975).

Downy mildew affects all aerial parts of the grapevine. Foliar symptoms appear as yellow circular spots with an oily appearance (oil spots) and under favorable weather conditions they may develop and coalesce to cover most of the leaf surface. A white downy fungal growth will appear on the underside of the leaves, generally localized along the veins (Fernández Valiela 1978). The disease gets its name "downy mildew" from the presence of this downy growth (**Fig. 12**). Early infection of young bunches can lead to significant crop loss, whereas severe leaf infection affects the source-sink relationship in the vine and may lead to defoliation and possible sunburn or lack of fruit ripening. Berries become resistant to infection within 2-3 weeks after blooming, although all parts of the rachis may remain susceptible 2 months after blooming. This destruction of leaf tissue may affect sugar accumulation and growth in the subsequent season. Currently, there are no suitable sources of resistance in commercially acceptable varieties, so fungicides are the primary means of disease control (Reuveni 2003).

Contact fungicides are used (copper sulfate + hydrated lime Bordeaux broth), Mancozeb®, Maneb®, Zineb®, copper oxichloride and systemic fungicides (Folpet fosetil-aluminium (Mikal®). In the case of contact fungicides around 4 or 8 preventive applications are carried out in function of the environmental conditions and the label recommendations. For determining the moment of application, the producer takes into account his observations about the climatic conditions, the crop state, etc. For the systemic fungicides it is recommended to carry out at most 2 applications before blooming and then to continue with contact products (Nazrala and Martínez 1972).

The applications begin when the buds are from 10 to 20 cm long. The critical or key period to control this disease is during blooming (end of October and beginning of November), since if buds are affected in this period the performance is significantly reduced. After the berry setting (November) the applications are important for a good sanity of bunches and buds. Thus, a good quality and amount of grapes and ripe buds are obtained and they will be future chargers in the next training.

2. Anthracnose (*Elsinoe ampelina* Shear/*Sphaceloma ampelinum* de Bary)

Anthracnose, also known as bird's-eye rot, may occur on all succulent plant material but it is most common on fruit and shoots. Infections begin with yellowish areas on the leaves that eventually develop into discrete gray lesions with a dark border. The areas of fungal infection start quite small and spread in size rapidly under wet, humid conditions. Lesions may coalesce, resulting in shoot death. As the disease progresses, stem lesions develop and are similar in color to leaf lesions, however, these lesions are sunken, but with slightly raised borders. Infected areas may crack, causing shoots to become brittle (**Fig. 13**). Grape clusters are susceptible to anthracnose infection before flowering. Lesions are initially small, circular and reddish in color. The center of the spot turns gray and is surrounded by a reddish-brown margin. This is the typical bird's eye symptom. The spot enlarges and may be slightly sunken. It is interesting to note that the leaves surrounding the infected grapes may turn brown, wilt, curl or drop off. Rachis and pedicel lesions are similar in appearance to shoot lesions, but on a smaller scale (Pérez de Obanos Castillo 2004). The symptoms of anthracnose on fruit, stems and leaves should not be confused with black rot (*Guignardia bidwellii* (Ellis) Viala & Ravaz), other diseases, or hail.

This disease is endemic in the vineyards of this area, but its incidence has not been studied yet.

3. Botrytis bunch rot (*Botrytis cinerea* Pers.:Fr.)

Infection of ripe berries is the most common and destructive phase of this disease. Infected berries first appear soft and watery. Under high relative humidity and moisture, infected berries usually become covered with a gray growth of fungus mycelium. Often, rotted berries are near the center of the bunch. The rot then spreads quickly and may encompass most of the bunch. Other organisms may invade the berries later, producing a large variety of colors, smells, and tastes. Occasionally, immature berries may develop a soft brown rot early in summer. The fungus also can cause a blossom blight that can result in significant crop loss early in the season. Although uncommon, leaf infections also occur, but appear to be of no economic importance. Leaf infection begins as dull, green spots, commonly surrounded by a vein. The spots rapidly become necrotic lesions. Young shoots may be infected in spring and develop brown, water-soaked areas. These areas generally girdle the shoot, causing it to wilt and die back. The characteristic gray moldy growth may or may not be present (Pérez Marín 2004).

Although in this region the occurrence of Botrytis bunch rot is frequently, there are no records about its importance.

Emerging diseases

1. Gravepine leaf spot (*Pseudocercospora vitis* (Lév.) Speg.)

In 2002, in the lowland of Berisso (in the north-east of Buenos Aires Province), diseased plants were observed, showing circular, 2–8 mm in diameter, brown or purplish brown leaf spots. *Pseudocercospora vitis*, the anamorph of *Mycosphaerella personata*, was consistently isolated from diseased material. This fungus was reported in Argentina on European grapevine (*V. vinifera*) almost a century ago but no symptoms were described (Spegazzini 1910). In this region, the relative humidity is high so pathogen infection is favored by this condition. Therefore the disease constitutes a potential problem for American grapevine in the specific cropping areas where it is grown (Sisterna and Ronco 2005; **Fig. 14**).

2. *Cylindrocladium* spp.

In October/November of 2006, plants of American grapevine showing wilt symptoms were observed in the same region. The dry plants were distributed in an isolate pattern and they did not bud after the latent period. From the scarcely developed roots showing rot symptoms, an isolate from the genus *Cylindrocladium* was associated to this pathology. The organism is still being studied by Sisterna and Ronco to confirm the specific denomination (pers. obs.).

Pests

The pests present in the Berisso riverbank are neither many nor do they cause serious damage. In these last years the attack of a small butterfly has become more serious impacting the vine's economic performance. It is a pest that affects mainly American varieties such as Isabella, so it is quite difficult to find literature on this pest and it is not identified yet (**Fig. 15**). The larvae bite the peduncle, pedicels and berries from which they are fed. Through the wounds they make microorganisms get into bunches and they also favor the attack of other insects such as flies and bees. Damage can be seen on the leaf center where the insect is placed producing folds. It is common that this pest weaves a thread tangle where its excrement is deposited. They settle in bunches damaging berries reducing the production.

Main pests are discussed in more detail next.

1. Cochinilla (C*renulaspidiotus lahillei* Lizer y Trelles)

It is a hemipterous insect, very polyphagous, which affects also citric trees and several ornamental plants (Zamudio and Claps 2005). It is very widespread in all vineyard zones (Claps *et al*. 2001). Females cause damage by sucking nutritive elements such as sap, resulting in a general weakness of the plant. The damage on the leaves causes an early fall in autumn and the vine shoots cannot lignify enough. In spring the *desborre* (evolution from buds to budding is delayed and the resulting buds are weak. In blooming there can be *corrimiento* or delay in flower opening. This pest is observed in trunks and vine shoots under the bark (**Fig. 16**). They secrete a sugary liquid element that serves as substrate for the growth of a fungus called *fumagina*, and also of ants. It is recommended the winter treatment since it hibernates in the form of larvae on the trunk and strain arms. The control is through applications in winter, carried out with emulsionable oil, which are performed after training and before the buds get swollen (Ruiz Castro 1965; Cucci and Becerra 2007).

2. Phylloxera (*Dactylosphaera vitifoliae* Fitch)

Grape phylloxera (Hemiptera: Phylloxeridae), is a worldwide pest of grapevines. Its life cycle has sexual and asexual portions with forms that feed from leaf and root galls. Root forms predominate on *Vitis vinifera* cultivars; leaf forms predominate on other *Vitis* species characteristic of the American native range, where was first described in 1855 (Russell 1974) (**Fig. 17**). It devastated the European grape, *V. vinifera* vineyards first in France, then was spread across the continent and finally around the world (Pouget 1990). In Argentina it was first reported in 1878 (Lopez Cristobal 1976), but it devastated San Juan Province plantations between 1928 and 1940, destroying 17% of the vine plantations in the province (Sánchez 2007). In the vineyards of La Plata River area, it was observed on *Vitis labrusca* by Lizer and Trelles (Lopez Cristobal 1976).

Secondary pests

1. Fruit flies (*Ceratitis capitata* Wiedemann and *Anastrepha fraterculus* Wiedemann)

These Diptera affect hundreds of commercial species of fruit trees. *Anastrepha fraterculus* is the South American fruit fly, main pest after the invader *Ceratitis capitata*, Mediterranean fly. The control of the population role is a constant challenge for the specialists since they attack dozens of wild and cultivated fruits. There is not an only way of controlling them since none of them by themselves guarantees the total control of the pest and therefore it is advisable to perform an Integrated Handling of The Fruit Flies (Cucci and Becerra 2007).

In the Berisso riverbank, although there are not losses assessments on the damages produced by these Diptera, producers do not consider necessary to perform a management of this pest.

INDUSTRIAL PRODUCTION PHASE

Historic practices in production

The choice of bunches, its handmade cleaning, crushing care (manual or electric crusher) and rackings, disinfection of containers and grape juice with allowed products are all techniques that continue and make the riverbank wine keep its handmade quality. Generally it is made with a grape of a quite uniform quality in the whole zone.

The harvest is carried out step by step, in stages, looking for those bunches which are ready to be crushed. This practice is suitable for small vineyards. It is unthinkable for big areas such as Cuyo or Uruguay.

According to the people interviewed, the appropriate organoleptic characteristics: harsh wine, with body, with a content of alcohol by volume ranging between 8 and 10°, preferably red and a typical sourness were due to the elaboration method which was mainly based on:

- Choosing and cleaning the grapes to be crushed.
- Cleaning wooden barrels with boiling water, water with peach leaves and rinsing with peach cane. The smelling sense was very important for detecting vessel contamination.
- Crushing the whole bunch without separating the stalks from the grapes.
- Many winemakers already added potassium metabisulphite to the musts in much lower amounts than those currently allowed.
- Most of them stated that they did not add sugar to wine, only in rare occasions when the grape did not have enough sugar quantity to reach 8º.
- During the first 8 days the cap was punch three times a day and sometimes every hour, in order to obtain wines with stronger color.

"The stalks gave the wine its typical sourness..." (Del Picolo, former wine producer, 60 years old).

Current practices in the phase of wine industrialization

- Its production involves many of the features corresponding to a hand crafted product, made by Berisso families and preserving characteristics of the inherited immigrant tradition.
- At present, changes resulting from the undercapitalization of the activity have taken place in the techniques. Abandoning the wine activity for almost 30 years has resulted in the disappearance of skilled workers such as "*toneleros*" who were in charge of the arrangement of fermentation barrels and wine storage and of the harvest and elaboration records.
- The way of producing wine is characteristic of each family and consequently the wine can be identified with each one. According to one of them:
  "I have begun making wine for two years and for ten in another orchard, near the River. I learnt observing my grandmother and nephews, it is not very difficult (…) every year it is different, it is necessary a good grape harvest for the wine to be good, one tastes it and already knows" (Juan , 37 years old, wine producer)
- If the evolution of observed technical resources is analyzed, it can be concluded that the techniques have not suffered relevant modifications compared to the way they were developed by ancestors with Italian, Portuguese and Spanish roots.

Must analysis

- Musts of grape Isabella from Berisso is characterized by a sugar concentration between 15-18% (9-11° Baumé o ~ 16-20 °BRIX for the considered class) with a rate glucose/fructose of 0.85-0.90, total acidity 3.3-4.9 (g tartaric /L) or 44-66 meq/L, tartaric acid 2.8 g/L, malic acid 2.0 g/l, pH 2.8-3.5. The amino-N can be very variable with a mean value of 115 ppm, though in some cases low levels as 60 ppm were found.
- These data agree in some aspects with the report of Rizzon *et al*. (2000) for the same variety cropped in the south of Brazil.

Winemaking

- Nowadays, in the elaboration of the Riverbank wine, stalks are separated from the raceme, and potassium metabisulphite (100-125 ppm) is added as the grapes are being crushed**.** Winemakers use only the naturally occurring yeasts that originate from grapes and winery equipment. In laboratory tests (microvinifications), some differences were observed between different lots of grapes. These differences are related to the kinetics

of alcoholic fermentation which seems to be linked to the amino-N concentration of the must. The wines obtained with musts of low nitrogen content have slower fermentation rates. Natural fermentations usually last from five to ten days. In a typical process the fermentation becomes significant from the third day of process (cap formation) at room temperature (25°C), using stainless steel vats. The musts reach a maximum temperature of 28-29°C between the 4th and 5th day, after which there is a decrease of fermentation intensity. Pumping-over is usually done every day during the fermentation process. When fermentation is complete due to sugar exhaustion, the first run off ("*vin de goutte*") is obtained. Next, the solids are pressed and the "*vin de presse*" comes out. These two are mixed and poured again in the vat. After two or more rackings, depending on the level of sediment, the clear wine is bottled, if necessary previously adjusting the SO_2 level.

- For Isabella grape, some wine data analysis are: pH 3.3-3.6, total acidity 46-65 meq/L, alcohol 8.8-11%, glycerol: 3-5 g/L, free SO_2, lactic acid 1.2-1.8 g/L, malic acid < 0.3 g/L, sugar 1.6-2.2 g/L. The values of volatile sourness are below the maximum allowed limits (0.8 g/l expressed in acetic) and are indicators of a low or non significant microbial contamination.

Malolactic fermentation (MLF), the enzymatic decarboxylation of L-malic acid to L-lactic acid, is an important secondary fermentation carried out by lactic acid bacteria (LAB) during the vinification of most red, and certain white and sparkling wine styles (Hervé *et al.* 2004). MLF usually takes place after alcoholic fermentation. The MLF is important since it produces a deacidification suitable for the wine; it makes it light, reinforces the color and assures the subsequent biological stability. During vinifications carried out in 2006 and 2007, it could be observed, by means of thin layer chromatography and enzymatic analysis, the presence of lactic acid (1.3-2.0 g lactic acid/L) and the absence of malic acid in several wine samples, suggesting that MLF had occurred during vinification of Isabella musts, which can be also a feature of the Riverbank wine. Due to the importance of MLF in red wine production, studies are being carried out to determine the chemical, microbiological and technological factors that affect this secondary fermentation during production of Riverbank wine (**Fig. 18**).

There are few studies about microorganisms involved in spontaneous fermentation of the Isabella grape. The first microbiological studies carried out from microvinifications allowed to isolate several yeasts and lactic bacteria in different stages of the vinification process. For the research, selective media for yeasts as WL (total counting) or lysine medium (for non-*Saccharomyces* yeasts) were used. The first colonies observations clearly establish that there was a succession of different yeasts during the spontaneous fermentation of Isabella musts.

Some possible characterization of isolated yeasts has been determined through the ITS1-5,8S-ITS2, PCR and RFLP analysis (Kurtzman and Fell 2006). In the initial stages the predominant yeasts would be *Kloeckera apiculata*, *Issatchenkia terricola* and *Pichia* sp., while at the end of fermentation *Saccharomyces cereviseae* and *Issatchenkia* sp., are present.

Innovations in the elaboration practice resulting from the interaction between winemakers and researchers from University:

- Addition of potassium metabisulphite in the proper concentration as an antiseptic, for controlling fungi and bacteria damaging grape and selecting yeasts. This practice improves fermentation, wine preservation and color.
- Replacement of most wooden vats by stainless steel tanks, easier to clean and to keep the hygienic conditions in wine elaboration and preservation.
- Incorporation of temperature and °Baumé records to determine the exact moment for pressing and the conditions in which the fermentation process takes place.
- Incorporation of analysis to determine: the level of total and free sulphur dioxide, sugar content, volatile acidity, alcohol by volume, methyl alcohol in order to establish the product harmlessness, total titrable acidity, pH, color, turbidity, dry extract, for wine characterization.
- Correction of the total level of sulphur dioxide, from the chemical analysis results and this ensures the innocuous conditions of the wine, improving its commercialization possibilities.
- Incorporation of centrifugal pumps and hoses for racking, speeding this process.
- Incorporation of new cleaning products for the elaboration materials, leaving aside products such as detergents with perfume and other products containing chlorine which alter the organoleptic characteristics of the wine.
- Incorporation of wax coating for sealing the bottle, improving the product presentation and its preservation during storage.
- A practice suggested by specialists and adopted by 80% of producers was the *derrasponado* (to carry out fermentation without stalks). Although this practice did not have either great influence on the wine organoleptic features or significant differences at phenol levels, acidity, colour, etc, the older producers think that the wines elaborated with stalks have more body and resemble more to the wines formerly elaborated.

COMMERCIALIZATION PHASE

Historic practices in commercialization

The frame of relationships is present in all phases of the Berisso Riverbank wine agro feeding system and it is focused on the family who is the making product core and is in charge of its commercialization. In its heyday, between 1940 and 1950, the wine sale took place in the vineyards and it was sold to both consumers and product suppliers in bulk in casks of 200 liters. It was sold in barrels to supply groceries, and for neighbors and friends in demijohns which were directly filled from the casks, in the wineries of each family.

"Some years ago it was "just direct from the vineyard", I went for it to the producers" (Carlos consumer from La Plata, 53 years old)

The first sales were at the beginning of winter though there were wine producers who began selling it in April, after the second racking.

"It was kept until the first frosts (in April – May) and then there was a general racking as there was already sediment at the bottom of the barrel, so all the wine was poured into clean casks. That wine was ready to be sold". (Raúl, wine producer from Berisso, 73 years old)

The quantities to be sold varied according to the area of each vineyard, ranging from 3,000 up to 100,000 l. However, 100% was sold in bulk. It was reported that 1,000,000 liters of Riverbank wine were produced in Berisso and that they were sold during the elaboration year as it was a young wine of low alcoholic graduation.

Current methods of commercialization

Years ago, the commercialization of "agricultural or traditional products" such as the Riverbank wine was, in most cases, reduced, local and based on personal relationships. But, nowadays, an important change is taking place, not only in the commercialized volume but in the ways of commercializing it. The product image and its packaging are now main aspects compared to the past. All these transformations indicate the change that has taken place in the consumption.

Since 1999, the organization of producers together with the Facylty has improved the product promotion. During this year the new producers bottled the riverbank wine in

750 cm^3 bottles and presented it in the traditional immigrant celebration in October 1999. This helped producers to understand the benefits of the vertical integration and direct sale.

Although it was a product demanded by consumers, it was necessary to promote it. If the idea was to continue developing the product it had to be promoted and advertised. There were several actions taken for its promotion. Here are some of them:

From the beginning of team work, promotion began with the participation in different events such as the Immigrant celebration. In the following years they continued participating in events or popular festivities (Immigrant celebration, La Plata Tomato Celebration, Sea Bass Party and Roads and Tastes, etc) where the product was advertised and sold. It is observed, that over the course of time, the organization as regards events to attend has improved. Generally, the Faculty technicians are those who give information about these events

The outlets are retail shops from Berisso, direct home sales of the co-operative, stands, popular fairs in the region and still the wine producers' premises like in the past.

The 65% of the product is bottled in 5 l demijohns and 35% in 750 cm^3 bottles. There is not yet a distribution net to sell the product in shops from the region, especially in La Plata and Great Buenos Aires.

The annual Celebration of the Riverbank wine was created in 2004 (**Fig. 19**). It is one of the most important actions in the promotion and commercialization of the product according to producers and technicians. Since its beginnings, the celebration has been organized by the Riverbank Cooperative from Berisso, Berisso Town Hall and Facultad de Ciencias Agrarias y Forestales (Otero 2007).

"…it is very important for our project – the Cooperative – and to promote and commercialize the wine, because there we can sell well. And it a successful celebration, this year – 2006 – 42,000 persons came. The first year 10,000, the second 30,000 and this year 40,000. It was very nice, very well-organized." Leonardo, 28 years old, from Berisso).

CONSUMPTION PHASE

Historical practices of consumption

The wine consumers were initially meat processing plant workers but the wine was also consumed by high and middle classes. Therefore, its consumption was not limited only to the working class at its peak by mid Twentieth century. Despite being typical from Berisso, the wine was not ignored by outsiders who with the excuse of eating out in canteens and playing cards came to taste it:

"... because here people came to eat pasta, pasta asciuta and to drink a good wine. That was the reason why. If the wine had not existed people would not have come ..." (Elena, 58 years old, from La Plata).

Meetings with friends in canteens, homemade food, music, beautiful women and dancing went unquestionably together with the wine.

There were no social differences either, the wine consumers were people from all origins and possible jobs: important doctors, workers, students, women, bohemian musicians, local shop owners and the always present "social drunkards": "… it was drunk by poor and rich people" (Raul, 60 years old, from Ensenada).

Another important cultural feature to emphasize was the act of sharing meals, related to the social function that food involves, beyond its main nutritional objective.

Current consumption

The consumption of a local product such as the riverbank wine implies a great familiarity with the product and its way of production. It is a much localized phenomenon and therefore it must be understood in its specific context. The consumers' expectations, behaviors, and taste vary according to the context. We can deduce that consuming this product is related to values and representations shared by a consumer society. And that these values participate in the product characterization. In other words, consumers impact on the definition process of the product they consume.

This new trend of consumption has appeared since the end of the 1970s as a consequence of the exhaustion of the Fordist model of massive products which resulted in another trend not centered in goods production or in offer any longer but in consumption, where the activities of distribution and marketing play a main strategic role (Sanz Cañada 2002; Soler Montiel 2002). The result was the consumption diversification and the strong tendency towards high quality products reinforced by the consumers´ distrust in food from the Green Revolution (Espeitx Bernat 1996).

The present consumers of the riverbank wine and the intrinsic characteristics, specific qualities or wine materials

One concern of the research is in relation to the current taste of the riverbank wine and its market expansion, since the organoleptic qualities give the wine a specificity that differentiates it from the wines from *Vitis vinifera* strains and in this sense it is important to recognize these qualities and the value consumers give to these qualities.

The descriptive analysis and the analysis of the variables point out that the main distinctive variables of the riverbank wine intrinsic features are the bouquet, the fruity flavor and the strong color, as it is shown in **Table 1**.

These aspects coincide with the opinions expressed in thorough interviews to current consumers of the riverbank wine.

The present consumers and the intangible or immaterial features of the riverbank wine

In order to analyze this aspect we consider as **intangible** or **immaterial** qualities those which allow associating the riverbank wine image to family tradition, origin, territory, history, landscape, environmental characteristics, and identity references. The interviewed people agreed on the following aspects:

Family and the recollection of the wine production in the family house is very significant for some of them:

"…my family has drunk the riverbank wine all their

Table 1 Positive answers on riverbank wine features according to gender.

	Frequency (%)	
	Female	**Male**
Fruit bouquet	26.7	22.9
Fruit flavor	15.6	15.7
Strong color	11.1	12.0
Full bodied	8.9	9.6
Light bodied	8.9	6.0
Little alcohol	4.4	7.2
Transparency	4.4	6.0
Cloudy	4.4	6.0
Harsh flavor	6.7	2.4
Light sourness	4.4	3.6
Strong sourness	0.0	4.8
Much alcohol	4.4	2.4
Light color	0.0	1.2

Table 2 Place of residence and association with the riverbank wine (%).

Place of residence	**The wine is associated with…**				
	Tradition	**Landscape**	**Landscape and tradition**	**Hand crafted**	**Landscape and hand crafted**
Berisso	26.3	15.8	13.2	2.6	2.6
Ensenada	2.6	-	-	-	-
La Plata	15.8	10.5	2.6	7.9	-

lives. My grandfather, who passed away, made wine in Punta Lara. Everybody made wine. I remember when I was 8-9 years old, my grandfather made wine in the house. He made it himself. He is part of Berisso, he was born of that: the scrubland, the wine, and … I am a fan of this city… My grandfather, all the stories he told me about the port. The cobble stones. You may think it is nonsense, but these are the things that make Berisso possible. The wine too, it is ok. …" (Gustavo, 26 years old, from Berisso)

The comments reveal a sort of assimilation of two concepts of the product: family and tradition. It is traditional because the wine has always been consumed in the family core and has been present in the family life many times. Thus, the interviewed consumers speak about traditional ways of acquiring the product (consuming it in the producer's premises) and associate its consumption to different moments (fishing, family meals, etc).

The present address of the interviewed people does not influence the results in **Table 2** about riverbank wine recollection. These results do not show significant differences for dwellers of Berisso, La Plata and Ensenada and therefore we can state that we are in presence of a localized product but its image goes beyond Berisso border, spread to the entire region.

Consumers state that family and immigrant tradition together with the landscape are two important aspects when drinking the riverbank wine.

Agroclimatic properties are significant when defining a kind of product of specific quality. One of the interviewed people commented:

"…yes, because the grape is very characteristic of the area, you will find it nowhere else, it grows next to the river. Here, the climate is very wet; the grape does not grow here. The best grapes, in the cordillera zone, very dry area, different climate. This grape would not grow in that area.…" (Miguel, 59 years old from La Plata).

Another intangible feature is that which links the product to the consumers´ identity, according to what was stated as follows in reference to identity elements:

"…why is it important to have a typical product? It has to do with the identity of places" "…because it expresses the habits, the place or the way of life, the work of the place" (Mrs. Dardis, 38 years old from La Plata).

The relationship between the product and land is what provides a distinctive property to wines of the same kind. A clear example is the specificity of the riverbank wine elaborated from Isabella grape type in the riverbank "albardon" of Berisso compared to other wines produced with the same variety in Colonia Caroya, Cordoba Province or to wines produced in Uruguay (Canelones) or in Brazil (Rio Grande do Sul). The difference lies in the agroclimatic qualities and in the consumer's image about the way of producing the wine. In **Table 3** it can be seen the link established between the production place and the different production methods (industrial, hand crafted, etc.) highlighting the importance the consumer gives to the artisan production and his current knowledge about the production area.

From these data, it can be observed different feelings of the present consumers about the reasons why they buy the product. Some of them do it because of experience, some others because of its background and others because it is from the region.

The consumer is getting adapted to new forms of consumption and to the new products found in the market, finding in the riverbank wine from Berisso something that satisfies not only food needs but also social ones.

It can be observed throughout the long analysis of consumers that they do not question its way of elaboration or the means to carry it out, but they point out the idea of what this product represents as regards tradition, identity, territory, history and hand crafted elaboration. And this reaffirms the potentiality of expanding its consumption and therefore its production.

The characterization of the riverbank wine as a hand crafted product is what prevails. The reasons expressed by the interviewed people are referred to low production scale, hand technology and to local people producing it.

Regarding the moments for drinking, the explanations are based on sharing the wine with others from Berisso because they know how to enjoy it and because "no one drinks wine alone".

Most producers agree on the concept of hand crafted wine but there are some contradictions about how to improve the quality of the product. Some state that a change on the present production conditions (improving the wine processing premises) and applying technology could increase the quality of the wine. Some others distrust the innovation process.

For expanding its consumption, it is proposed to broaden advertising so as to sell the product outside Berisso. Other locations like La Plata and the Great Buenos Aires are the most recognized destinations.

The type of consumer of this wine could be any according to some interviewed people. On the other hand, others point out that elderly people prefer or are used to the riverbank wine taste.

In our case it is very important to characterize and detect the preferences of riverbank wine consumers as they favour product reactivation.

Table 3 Relationship between the plantation area and the riverbank production according to the elaboration process.

Elaboration process	Do you know the area where the grape is planted and the wine is produced? (%)	
	Yes	No
Hand crafted	77.5	12.5
Semi industrial	7.5	-
Others	-	2.5

There is a significant relationship between knowing the elaboration process and knowing the plantation and production area of the wine. (χ^2 Test, p = 0.044)

Reactivation of Berisso riverbank wine production (1998-2007)

We will list the main factors that have influenced the recovery of grape and wine production in Berisso according to data interviews to wine makers grouped in the Cooperative and records of meetings between wine makers and university researchers in the period 1999 to 2007.

Current wine makers view

During the interviews carried out in 2006, current wine makers, who are grouped in 80% in Berisso riverbank Cooperative (founded in 2003), answered about the reasons why they began again planting grapevines and making wine. The reasons were the following:

1) Low offer of wine and high demand from Berisso consumer.
2) Family and local tradition of making wine.
3) Economic crisis and product profit
4) Suitable agro ecological conditions.

The deterioration of the riverbank wine production, which was restricted to 6,000 l in Berisso in 1999 (Source: Berisso riverbank Cooperative Ltd.) marked a critical moment but this does not explain why producers restarted the plantation of new vineyards involving great investments, improved the premises, barrels and machinery for wine elaboration, changed the commercialization methods, began acquiring new technologies in a wide sense, etc. We consider that the interaction with University encouraged the recovery of production.

University participation with wine makers

Certainly, there are different production situations in the territory. On the one hand, producers who practised an "of-

Table 4 Increase of numbers of plants and plantation area.

Year	Nº of plants	Nº of hectares
1999	5.500	2.89
2000	9.000	4.74
2001	12.000	6.32
2002	13.000	6.84
2003	15.500	8.16
2004	17.500	9.21
2005	19.000	10
2006	22.000	11.58
2007	23.750	12.50
2008	30.290	16
2009	40.000	20

ficial" agriculture with solid innovative techniques approved by scientific and technological institutions and on the other, traditional producers. This results in what Giddens (1995) calls "Back regions of development". However, the latter are those producers who carry out original innovations and are not generally visible. These traditional producers do not seem to be protagonists in the development.

The Argentinian crisis of 2001 made evident these sectors, which were not abandoned by the institutions at that time (Albaladejo 2004). They began to form a new reality giving rise to new development practices.

When Universidad Nacional de La Plata began development actions in Berisso territory, researchers combined the old and new practices and this gave rise to what Albaladejo (2004) called innovating experiences or "forward regions" of new territories in progress.

The most significant results of this joint work of riverbank wine activation were:

Productive economic results:

1. An increase of number of plants implanted has been registered (**Table 4**).

2. An increase of income according to better cost/benefit indexes, either for producers who make riverbank wine, for those who sell grape fruit or those who use mixed strategies.

Learning

We will point out two main ways of learning during the mentioned period. One, through the creation of Berisso Wine Makers group, allowed the exchange of knowledge between new wine makers and those who knew their jobs. The other, through exchange of information between university specialists and wine makers.

First, producers' organizations enabled new winemakers to meet experienced producers and increased the interaction between those who already knew each other, acquiring the necessary know-how for both grape and wine production. The experience of old producers has been of great importance for the group.

Second, a great deal of training courses was given by different specialists from University and other institutions. These courses were on different subjects: wine elaboration, soil fertilization, training and crop sanity, cooperativism. This participation of specialists was in charge of the Faculty choosing together with producers the topics to be dealt according to the arising difficulties (technical-productive, organization, etc.).

Another mechanism used was visits to wine makers' orchards where they discussed different solutions, research in producers' premises and field trips. They went to region of "Cuyo" (Mendoza, San Juan and San Luis provinces, Argentina), Uruguay and Brasil where they knew similar practices of production from which producers could compare and use some ideas to improve their production and organization.

Besides, the technical-productive know-how was improved by means of research.

In 2002, the first test on two main problems was carried out: a weed (Bermuda grass) and fungi diseases. The effectiveness of different fungicides for controlling grape diseases was evaluated. This experiment was carried out in the producers' premises and was directed by the Faculty

Undoubtedly, learning during all these years has been one of the most important factors in the product activation. If producers had not had the opportunity of interacting among them (new producers with those experimented ones), with Faculty technicians, with the protagonists of other similar experiences (field trips) and with the invited specialists, the development would have been much more difficult (**Fig. 20**).

Financing

According to Barjolle and Sylvander (2000), the support from political authorities can be very important in the activation process of a product. The authors mention that those chains formed to present a project of public interest to political authorities will have better possibilities of political support.

In this sense, the achievement of different kinds of financing to progress in activating the riverbank wine as a typical agricultural food product enabled wine makers to have a better vision and therefore, they began developing a productive project of social interest that was supported by different governmental institutions (national, provincial and from the Town Hall) and non-governmental institutions (REDAR Argentina, PRODAR/IICA, FIAR Canada).

In short, the received funds were mainly to subsidise labour, technical assistance, building a common winery and its building systems (**Fig. 21**). The support of political authorities was very important in this case for the activation process of the product. Several reasons made receiving such political support possible. However, the main ones were: being organized, and to work jointly with University. This, undoubtedly, helped to receive political support from the Town Hall, the Province and Nation.

Forming an association and collective action

At the end of 1999 the idea of forming an association or cooperative aroused among producers. This idea was supported by University and thus, different actions were carried out in order to achieve this goal (technical talks, meetings with already organized producers, training in cooperativism, meetings to advance in the creation of by-laws). In June 2003 the Incorporation Assembly of the Cooperative for provision and commercialization of Berisso Riverbank Ltd. was held.

There was a great deal of cooperative actions throughout the long process started in 1999: joint purchases of supplies, formation of a crew for the fungicide application, tool lending, plant financing, creation of a rotary fund to enable the purchase of supplies, etc.

The creation of the cooperative, beyond its business objectives, is the legal form that strengthens the social condition at local level, bringing about employment and encouraging better life conditions for Berisso producers and consumers.

CHALLENGES AND PROBLEMS TO FACE

Legal approval of Isabella variety for wine production

Since 1967 *Vitis labrusca* var. Isabella was excluded from the list of grapes apt for wine production by the INV, and this has resulted in the impossibility of making wine from this variety in Argentina. Despite this legal obstacle, in 2002 as a result of Argentinian crisis there appeared a resolution which created a new category: "Homemade wine maker" up to 4000 l per producer. According to this regu-

lation it is not compulsory the vineyard registration and the grape purchase is authorized for its subsequent elaboration. It is not necessary the permission for the wine plant to operate, and this has enabled the registration of Berisso riverbank Cooperative as "homemade wine producer".

Since harvest of 2004, producers belonging to the Cooperative tried to get from the INV the corresponding quality analyses and the stamps that allow the product commercialization in the whole national territory.

However, two are the main hindrances about not getting the approval for this grape variety:

- Impossibility of increasing production volume (they can only produce 4000 l per producer belonging to the cooperative)
- They are unable to mention in the label the grape strain with which the riverbank wine is made.

Besides, according to Law No 25.966 of Argentinean wine production (2004), *V. vinifera* strain wines have the legal protection as Controlled Guarantee of Origin and/or Protected Geographic Identifications. The riverbank wine cannot be classified in any of these categories since the strain that gives rise to it does not belong to *V. vinifera*, although all other aspects such as: "name of the location or of an area of a national territory registered (Berisso) that is necessary for labeling a typical product" and "whose qualities or features are exclusively or essentially due to the geographical environment, including natural factors and human factors" are all existing properties of the riverbank wine.

Technical-productive and social-economic challenges

- Big initial investment for the crop implantation.
- Needs for skilled labor available at critical moments (training and harvest)
- Difficulties for the provision of necessary supplies in different stages of grape and wine production
- Need for big investment to build family wineries like in the past.
- Strong competition with urban substitution jobs which imply instant income, thus threatening production increase.
- Difficulties in commercializing the wine since it is not a well-known product outside Great La Plata.
- Distinctive and very different intrinsic characteristics from other wines, making difficult its insertion in other segments of consumers. This suggests the necessity for taste education.
- Adjusting a quality still heterogeneous.
- Lack of maintenance of the rural area as regards infrastructure and services.

CONCLUSIONS

This experience that allowed planting again *Vitis labrusca* var. Isabella in Argentina implied not only the analysis of crop and riverbank wine production but also the analysis of the context where it re-appeared: a peri-urban and economically run-down area: Berisso. Its competitive advantages in relation to other territories are: the agro ecological basis and cultural background that refers to identity, a very important factor for the activation of typical products.

The aspects which seem to be significant for the product reactivation are:

- Product intensive in labor (90% of production cost) what requires hiring wage-earners.
- Its plurality of activities as work is focused on two seasons (winter/training – summer/harvest)
- There is available experience for grape production as it is a traditional production.
- Its strong integration with the urban life through its symbolic values: commensality, friendship, tourist spaces, enotourism, etc.
- Making a unique wine with 70% of grapes from the region in the common winery of the cooperative allows to lower costs and to make quality homogeneous, decreasing competition with wines of different qualities and origins in the area.
- The relationship immigrant origin – riverbank wine consumption, highlights the wine handmade qualities and its immaterial aspects (landscape, family background, working culture, etc.)
- State support for facilitating processes in common, learning, applied research, product promotion, and political support.
- Creation of the Riverbank wine celebration as a regional event.
- Encouragement for new wine makers from Berisso due to the product profit.
- Adopting innovations which allow the product adaptation to new conditions of the market without losing its position.
- An increasing possibility of expanding its consumption to middle class consumers now with better purchasing power.

Since agro-food systems are dynamic, we agree that for the case of riverbank wine there was an initial stage of restarting the activity with an increase in the number of production units and grape planted surfaces.

A second stage, at present time, where individual actions were a priority (we shall not forget that these actions began when the wine maker group from Berisso was formed in 1999) and combined with a growing and organization phase in which there are actions in common, different activities in the territory and an increasing number of protagonists.

Recovery of the Argentinean crisis of 2001 faces us with a strong competition for labor in rural areas. Industries of import substitution and urban housing construction attract temporarily country labor with higher wages. This situation may affect expansion and maintenance of the present vineyards if it is not achieved territory planning implying better wages, land distribution among those producers willing to work and activity diversification which allows better incomes to Berisso wine makers from a multifunctional strategy of the rural space.

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