

Outline for the definition of "Terroirs Viticoles ". application to the area of El Aljarafe (Seville, Spain)

P. PANEQUE, G. PANEQUE, M.L. MATO

Laboratorio de Edafología y Química Agrícola. Departamento de Cristalografía, Mineralogía y Química Agrícola. Facultad de Química. Universidad de Sevilla.

I. INTRODUCTION

The grapes producing and wine making regions are different in their use of agricultural, industrial or agroindustrial means. These means are quite often very original and/or specialised; and lately are also quite competitive. Such means are being defined with increased accuracy in the delimitation and definition of its characteristics (Paneque *et al.*, 1996 a). Human action together with other Elements and Agents involved in the vine growing production (Reyner, 1989) over these means lead to agronomic systems with important characteristics. Finally, the transformation of the vine growing production, through different technologies (Fleet, 1992), results in the creation of products with a different acceptance and economical value in the market.

In order to provide a method for the characterisation and definition of those factors taking part in vine growing and wine making, we offer a system of characterisation for the vine growing areas, their production and the products resulting from it.

II. SYSTEM OF CHARACTERISATION FOR THE VINE GROWING AREAS, THEIR PRODUCTION AND THE PRODUCTS RESULTING FROM IT.

II. 1. OUTLINE OF THE SYSTEM

LEVEL A. "NATURAL"

BASIC ECOLOGICAL FACTORS

-of terraines and lands-

AI. GEOLOGICAL FACTORS

A.I.1. Lithology

A.I.2. Geomorphology

A.II. CLIMATIC FACTORS

A.II.1. Pluviometrics.

A.II.2. Thermics.

A.II.3. Others

A.III. VEGETATION

LEVEL B. "AGRONOMIC"

AGENTS AND CHARACTERISTICS OF THE VINE GROWING PRODUCTION

-depending on A, Human Action and other Elements and Factors-

- B.I. SOILS
 - B.I.1. Soils (morphology, components and properties)
 - B.I.2. Soil labours.
 - B.I.3. Soil treatments and maintenance.
- B.II. VINES
 - B.II.1. Vine varieties
 - B.II.2. Grow
 - B.II.3. Treatments
- B.III. WINE GROWING PRODUCTION
 - B.III.1. Type
 - B.III.2. Quantity
 - B.III.3. Quality
- B.IV. MICROORGANISMS
 - B.IV.1. Yeasts
 - B.IV.2. Bacteria
 - B.IV.3. Moulds

LEVEL C. "INDUSTRIAL AND ECONOMICAL"

VINE GROWING TRANSFORMATION PROCESS AND PRODUCTS

-technological, analytical and economical levels-

- C.I. TECHNOLOGICAL LEVELS OF
 - C.I.1. Production processing
 - C.I.2. Transformation processes
 - C.I.3. Manufacturing of products
- C.II. ANALYTICAL CHARACTERISATION OF PRODUCTS
(physical and chemical; biochemical; biological; sensorial)
- C.III. ECONOMICAL AND MARKET CHARACTERISATION OF PRODUCTS

II.2. APPLICATION OF THE SYSTEM TO EL ALJARAFE AREA (SEVILLE, SPAIN)

A.I. Geology

The Neogene of the Betic Depression located between the River Guadalquivir and River Guadiamar forms a small meseta leaning S and SW. From the countryside, valleys and marshes of Seville it is seen as a "cornice" with slightly high, abrupt or hilly edges. Its formation is due to sedimentation and tectonic processes and to fluvial erosion, mainly finitertiarians and/or intraquaternarians.

A.I.1. *Lithology*: The elements that form this natural area local sediments of the lower Depression of the Guadalquivir (Paneque *et al.*, 1996, b).

A.I.2. *Geomorphology*: The *geomorphologic units* that limit and define the area are: to the N and NE the *countryside or depression del Campo*; to the E, S and W the *alluvial valleys* of the River Guadalquivir and River Guadiamar; the *erosion hills* of the *meseta* with remains of *fluvial terraces* and with the alluvial valleys of the same, that together with the elements of the cornice and the own ordering of sediments give the Sevillian Aljarafe its peculiar morphology. (Mudarra, 1988; Paneque *et al.*, 1996 a)

A.II. Climate

The climate is typically Mediterranean, with cool and wet winters and hot and dry summers, having the region a THERMIC temperature regime. The section for the control of soil moisture remains dry for five consecutive months from June and wet for four months from December. The average soil temperature for the whole year is about 17.5 °C, and the $t_{masv} - t_{masi} > 5$ °C, corresponding to the soil according to S.S.S., 1975, a XERIC moisture regime.

A.II.1. *Pluviometric details*: the rate of precipitation per year is 576 mm. July and August are the months with the smallest precipitation rate, January and December have the highest.

A.II.2. *Thermic details*: as above mentioned the average temperature for the year is 17.5 °C; July is the hottest month, with a maximum rate of 35 °C, and the coldest January, with a minimum rate of 5 °C.

A.II.3. *Others*: In the highest area, located between the River Guadalquivir and River Guadamar, with heights between 185 m (Olivares) and 140 m (Espartinas), in totally open zones and leaning South (mouth of the River Guadalquivir), the temperature of the air and its humidity content are influenced by the Oceanic winds and by the night condensation of humidity.

A.III. Vegetation (natural)

The vegetation of the Sevillian Aljarafe, like that of most of the Guadalquivir Basin, to which this *natural area* belongs, fits into the Mediterranean forest category, provided there are no anthropological or zoological actions. Of the above mentioned thermic region, almost free from frost, are unique to this area the wild olive tree "acebuche" (*Olea europea L.*) and the carob tree "algarrobo" (*Ceratonia siliqua L.*), cultivated for its oily fruit (olives) and by its sugary beans. The domain *Oleo-Ceratonion* shows a special association, the *Asparageto-Rhamnetum*. Given the geological and edaphological conditions and those derived from the exploitation of the soil, there are to be found two subdomains in El Aljarafe: *Asparageto-Rhamnetum corydothymetesum* -the largest, highest and on chalks- and *Asparageto-Rhamnetum cistetosum*, on sand, slit and pebbles (C.E.B.A.C., 1962).

B.I. Soils

B.I.1. Figure 1 shows the distribution of soils in the area Aljarafe Alto. The *morphology*, some *elements* and *important characteristics* are included in the *classification* of soils (Mudarra, 1988, 1996).

B.I.2. *Labours on the Land*: the first one during the winter, after pruning, with traditional plough ("viñero"); the second and third ones in March and June is to cut across with "rotovator". Exceptional works: before autumn and/or in August, with plough and "rotovator" (superficial); forming of basins ("cajas").

B.I.3. *Treatments*: Organic fertilising (dung) with forming of basins (>4 years) or dung incorporation to the soil in the lines of vines, with plough before autumn. Mineral fertilising (N-P-K), 400-500 Kg/Ha of 18-15-15 substitutes the organic. Other treatments, exceptional.

B.II. Vines

B.II.1. *Vine varieties and graft-holders*: The main one is *Garrido fino* (Palomino Garrido, "Garrio"); also *Palomino fino*, *Pedro Ximenez* and others (García de Luján *et al.*, 1992). The most used *graft-holders* are: 41-b Millardet, Rupestris de Lot (amasquito) and 161-49 of Couderc (Riparia x Berlandieri) (Baena, 1983).

B.II.2. *Growing*: most vines are square frame ("marco real") planted of 1.8 x 1.8 m; are *low* and *narrow*, with trunks about 30-40 cm high. The pruning takes place in vase with four aligned arms in the direction of the lines. Two arms opposed with two thumbs and the other two with one; all together typical pruning of twelve buds. In following years weight on the arms will be alternated. Exceptionally, pruning Guyot simple (thumb with two buds and branch with 5-8 buds).

Despalillado: early pruning of new shoots in old wood. *Desierpes*: pruning of shoots in graft holder. *Collection young shoots* (strong and long) by late May or early June and holding in high: "faroleado" in young vines; "encapachado", horizontal and roundways ("en redondo"), with less strong young shoots, in old vines (Baena, 1983).

B.II.3. *Treatments*: a) Application of Iron sulphate to the pruning cuts. b) Anticriptogamics: *Mildium* (*Plasmopara viticola*): usually three treatments per year, with copper sulphate in the form of Bordeaux broth and/or copper oxichlorurum, by the end of April or early May (depending on climate and estate), 25-50 Kg-Ha. Less frequent: cupric-organic treatments, organic products resulting from synthesis combined with the traditional forms of copper. Other fungicides.

Oidio (*Uncinula necator*). Treatment with sulphurs (sublimated or micronized soakable), by sprinkling or by spraying, in doses and timings variable. Occasionally, combined treatments against oidio-mildiu.

B.III. Vine production

The vineyard is in clear recession in El Aljarafe area, due to social and economical as well as administrative reasons. It affects both grapes for wine making and for table grape.

B.III.1. *Class*: The main production has been that of wine making, specially of the above mentioned varieties (B.II.1.). The traditional table grapes are : "Tempranilla del Aljarafe" y "Beba" (whites) ; "Mollar" (red). Recently adopted: Moscatel -from Italy- and Cardinalle ("purple").

B.III.2. *Quantity*: At present the vineyard census is being updated in El Aljarafe (D.G.I.G.A., 1996 ; Paneque y col., 1995).

B.III.3. *Quality (wine making grapes)*: The quality of the "Garria" from El Aljarafe has been appreciated since old times ; they are currently undertaken a (historical, cultural, scientific, technical, etc.) revision of this grape (Paneque y col., 1995).

B.IV. Microorganisms

Studies in the ecology of microorganisms and virus that are interesting from a vine growing and wine making point of view in certain areas of El Aljarafe (Paneque y col., 1995), follow up of those carried out by Iñigo and Vázquez (1964) on the agents of wine fermenting in El Condado and El Aljarafe, synthesised by Baena, 1983, Suárez e Iñigo, 1992 y Paneque *et al.*, 1996, b.

LEVEL C.

At present is being developed the description and characterisation of the transformation in the vine growing production of El Aljarafe (Paneque y col., 1995 ; Collantes, 1996).

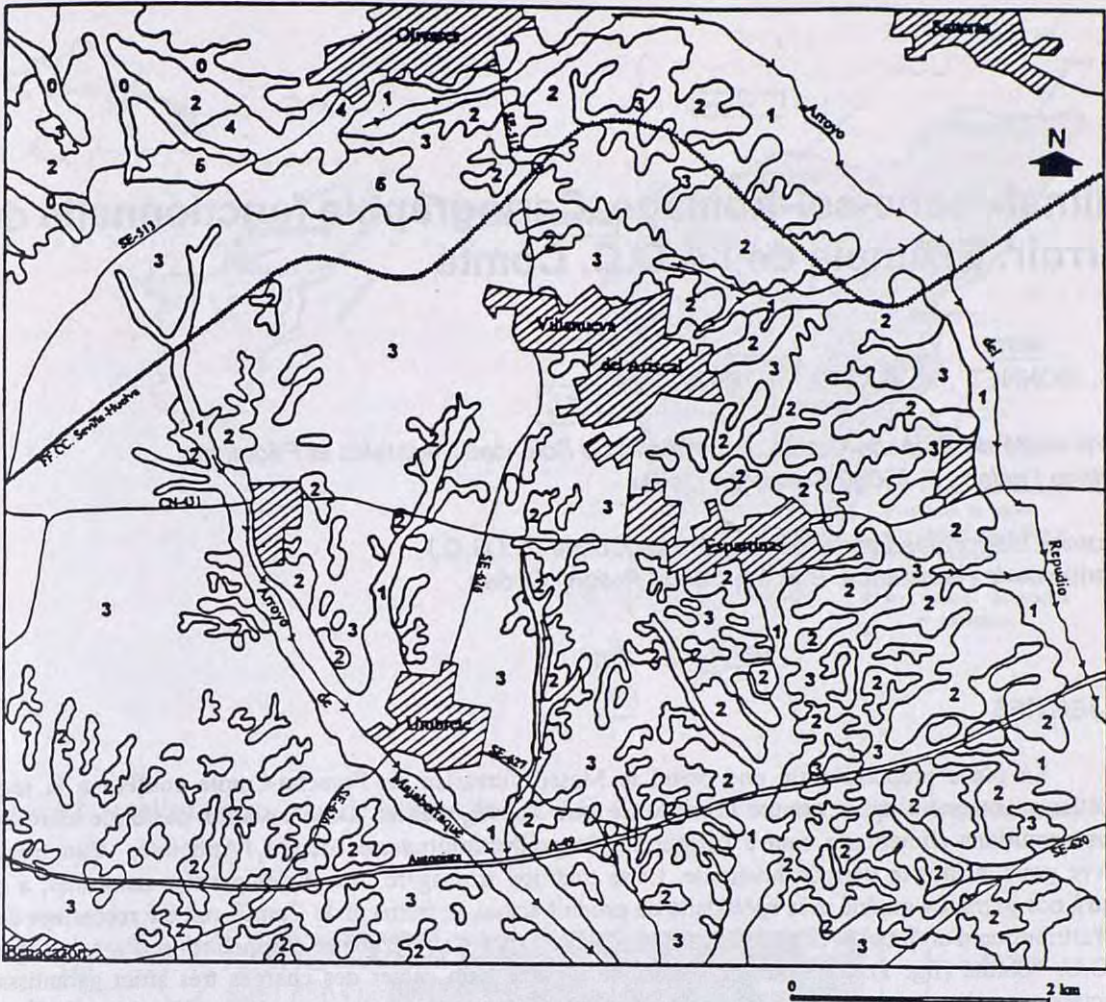
II.3. RESULTS

Aljarafe Alto is defined between 140-160 m of altitude and located in the centre-northern sector of the area. It is -probably- the most representative of the Sevillian Aljarafe: legal, health, social and economical, religious, vine growing and wine producing centre, etc. It is limited to the North by high (160-180 m), flat lands -remains of a pleiocenan platform- covered by pleio-quadernarian sediments (villafranquienses) over which are OCHREPTIC FRAGIXERALFS and TYPIC FRAGIOCHREPTS ; and by countryside lands (area of El Campo) with ENTIC CHROMOXERERTS and TYPIC CROMOXERERTS on marls from the Superior Tortoniense (Miocene).

To the W the Aljarafe Alto ends where the erosion hills of the Pleiocene platform, due to the River Guadalquivir, begin ; and to the E in the valley of the River Riopudio carved between such platform and the erosion hills (cornice) of the Guadalquivir. Figure 1 shows the distribution of soils and the main vineyards in three vine growing zones of Aljarafe Alto with different extensions, altitudes and leanings: "Villanueva del Ariscal", "Espartinas" and "Sanlúcar la Mayor". Other vine growing zones such as Umbrete, Benacazón and Bollullos de la Mitación, are located in Aljarafe Medio. Other characteristics of the zone Aljarafe Alto have been explained by Mudarra, 1988, or are subject of further analysis (Paneque y col., 1995).

REFERENCES

- BAENA LUQUE A., 1983. *La vid y el vino en El Aljarafe sevillano*. Proyecto Fin de Carrera. E.U.I.T.A. Sevilla.
- C.E.B.A.C., 1962. *Estudio Agrobiológico de la Provincia de Huelva*. Excma. Dip. Prov. de Sevilla. C.S.I.C. Sevilla.
- COLLANTES E., 1996. *Estudio del mosto de El Aljarafe*. Tesina de Licenciatura. Facultad de Química. Sevilla. En prensa.
- D.G.I.G.A., 1996. *Información sobre ocupación de viñedo en la Provincia de Sevilla*. Sº Est. y Estadística. Junta de Andalucía. C. de Agric. y Pesca.
- FLEET G. H., 1992. *Wine Microbiology and Biotechnology*. Harwood Academic Publishers.
- GARCÍA DE LUJÁN A, PUERTAS B. y LARA, M., 1990. *Variedades de Vid en Andalucía*. Junta de Andalucía. C. de Agric. y Pesca. D.G.I.E.A. Sevilla. 253 pp.
- IÑIGO B., VAZQUEZ D., 1964. Los agentes de la fermentación vínica en las zonas de El Condado y El Aljarafe. *Rev Agroq. Tecnol. Alim.* 4. 246.
- MUDARRA J.L.; 1988. *Reconocimiento de los suelos de la comarca de El Aljarafe (Sevilla)*. C.S.I.C. Inst. de Recursos Naturales y Agrobiología. Sevilla.
- MUDARRA J.L., 1996. *Seminarios Suelos de El Aljarafe (Sevilla)*. Area de Edafología y Química Agrícola. Universidad de Sevilla. Doc. Interno.
- PANEQUE G. Y COL., 1995. *Mejora de la calidad del mosto de El Aljarafe*. Proyecto Inv. D.G.I.E.A. Sevilla. Memoria. En prensa.
- PANEQUE G., MATO, MªL., PANEQUE P., COLLANTES E., 1996 a. eflexiones sobre el concepto y definición de Pago, Zona, Comarca y Región Vitícola y/o vitivinícola. Propuesta de una metodología de caracterización. *XVIII Jornadas de Viticultura y Enología de Tierra de Barros. Badajoz*. En prensa.
- PANEQUE G., MATO MªL., PANEQUE, P., 1996 b. Facteurs Physiques et Biologiques Affectant la Production Viticole et Vinicole dans la Region du "Condado de Huelva" (R.D.O. SW de L'Espagne). En: "*Les Terroirs Viticoles*". *Colloque International. Angers. France*.
- REYNIER A. 1989. *Manual de Viticultura* (Versión española de V. SOTES RUIZ). Ediciones Mundi-Prensa. Madrid.
- S.S.S. -Soil Survey Staff-, 1975. *Soil Taxonomy*. 7ª Aprox. U.S.D.A. Washington D.C.
- SUÁREZ J. M., IÑIGO B., 1992. *Microbiología Enológica. Fundamentos de Vinificación*. Ediciones Mundi-Prensa. Madrid.



LEYENDA

Suelos

- 0 XERORTHENTS
- 1 HAPLOXERALS / XEROFLUVENTS
(Acuicos)
- 2 XERORTHENTS / XEROCHREPTS
(Calcixerólicos)
- 3 RHODOXERALS / HAPLOXERALS
(Cálcicos)
- 4 FRAGXERALS / FRAGIOCHREPTS
(Ochrépticos) (Típicos)
- 5 FRAGXERALS / XEROPSAMMENTS / HAPLOXERALS
(Ácuicos)

Otros símbolos

- Líneas de ferrocarril, carreteras y Autopista.
- Red fluvial
- Poblaciones

Figure 1. Soil distribution in the area of Aljarafe Alto (Seville, Spain)