COFFEE BOURBON POINTU OF REUNION ISLAND :
How to define a terroir to obtain a "gourmet" coffee

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In 2002, 27 coffee Bourbon pointu stocks (coffea arabica [laurina]) are selected among the 2400 coffee trees found in the « creole » gardens on the Reunion Island. In 2003, 113 plots are planted all around the island (figure 3), in different ecological conditions with this selected plant material. The plots are georeferenced (longitude, latitude, altitude), soil analyses are done, and climatic data are collected (mean temperature, minimal and maximal temperatures, rainfall, wind speed, sun radiance).

Helped with statistical analyses, we have defined the most important factors to be combined. Studies of the soils and of the climate crossed with the cup testing of a great number of coffee samples are essential to identify the conditions to produce a "gourmet" coffee and to be able to draw the map of the "gourmet" coffee terroir on the Reunion Island.

Materials and Methods

The berries are collected and post-harvest processed by the Project (« Café Bourbon pointu de la Réunion »). Cup testing (table 1) of the samples are done by a panel of 12 coffee experts. The samples are prepared and tested according to the ISO 6668 standard.

Statistic analyses (ANOVA, MCA) are used to cross sensory data and pedoclimatic data.

The scale of the sensory scores is from 0 to 5.

	Harvest 2006	Harvest 2007	Harvest 2008
Number of cities and villages	11	9	6
Number of coffee plots	48	43	29
Altitude (from X to Y)	270 m to 1209 m	453 m to 1209 m	315 m to 1209 m
Number of coffee lots (used for the cup testing)	399	612	579
Number of different soils	6 (2,3,4,5,8,11)	5 (2,3,4,5,8)	4 (3,4,5,8)

Table 1 : Elements used to carry out the statistical analyses done on the 2006, 2007 and 2008 harvests to define the favourable terroir.

	Authentique	Sublime	Grand Cru
Aroma quality	Score ≥ 2.75	Score ≥ 2.85	Score ≥ 3.00
Persistence	2.50 ≤ Score ≤ 3.50		Score ≥ 2.50
Acidity	1.75 ≤ Score ≤ 3.50	1.75 ≤ Score ≤ 3.25	2.25 ≤ Score ≤ 3.25
Body	2.00 ≤ Score ≤ 3.25		2.50 ≤ Score ≤ 3.25
Fruity	Score ≥ 1.25		Score ≥ 2.00
Preference	Score ≥ 2.75	Score ≥ 3.00	Score ≥ 3.50

Table 2: Links between marketing classes and sensory attributes (from ANOVA and Fisher tests results).

The marketing classes stem from the correlations of sensory data (Table 2). The scores of defect attributes (Dusty, Woody, Grassy) are immaterial and the scores of the quality attributes (Aroma quality, Acidity, Fruity, Persistence, Body, Preference) have to belong to the determined ranges. Are downgraded in Original (non marketed), the lots not suiting to all the standards defined for the marketing classes. « Grand Cru » is the upper class with a Preference score ≥ 3.50.

Results and discussion

The study of the impact of altitude on the sensory quality shows that all the marketing classes are located between 700 m and 1000 m of altitude (Figure 1). « Grand Cru » is the only marketing class to be located between 800m and 900 m of altitude.

Table 3 shows the links between altitude and climate data. With such correlations, the temperature fluctuations and the sun radiance may have an impact on the sensory quality of coffee.

Variables	T° minimum	T° mean	T° maximum	Wind speed	Rainfall	Sun radiance
Altitude	-0,733	-0,863	-0,798	-0,178	-0,019	-0,530

Table 3 : Correlations between altitude and the climate variables

Figure 1 : Altitude/marketing classes (MCA).

Statistical analyses (ANOVA) show that the temperature fluctuations and the sun radiance have an impact on the coffee sensory quality. The ranges to be kept are: minimal temperature from 12°C to 16°C, mean temperature from 15°C to 19°C, maximal temperature from 22°C to 24°C, sun radiance from 15 500 MJ to 21 000 MJ for the year, rainfall from 750 mm to 1 750 mm, with a maximum of 3 dry months (rainfall < 25mm) along the year.

The analyses (MCA) (Figure 2) crossing the soils and the marketing classes shows that soil 4 (Silandic andosol on ashes) and soil 8 (Leptic cambisols on ashes) give coffees of better sensory quality (« Grand Cru » and « Sublime » are close to these types of soil).
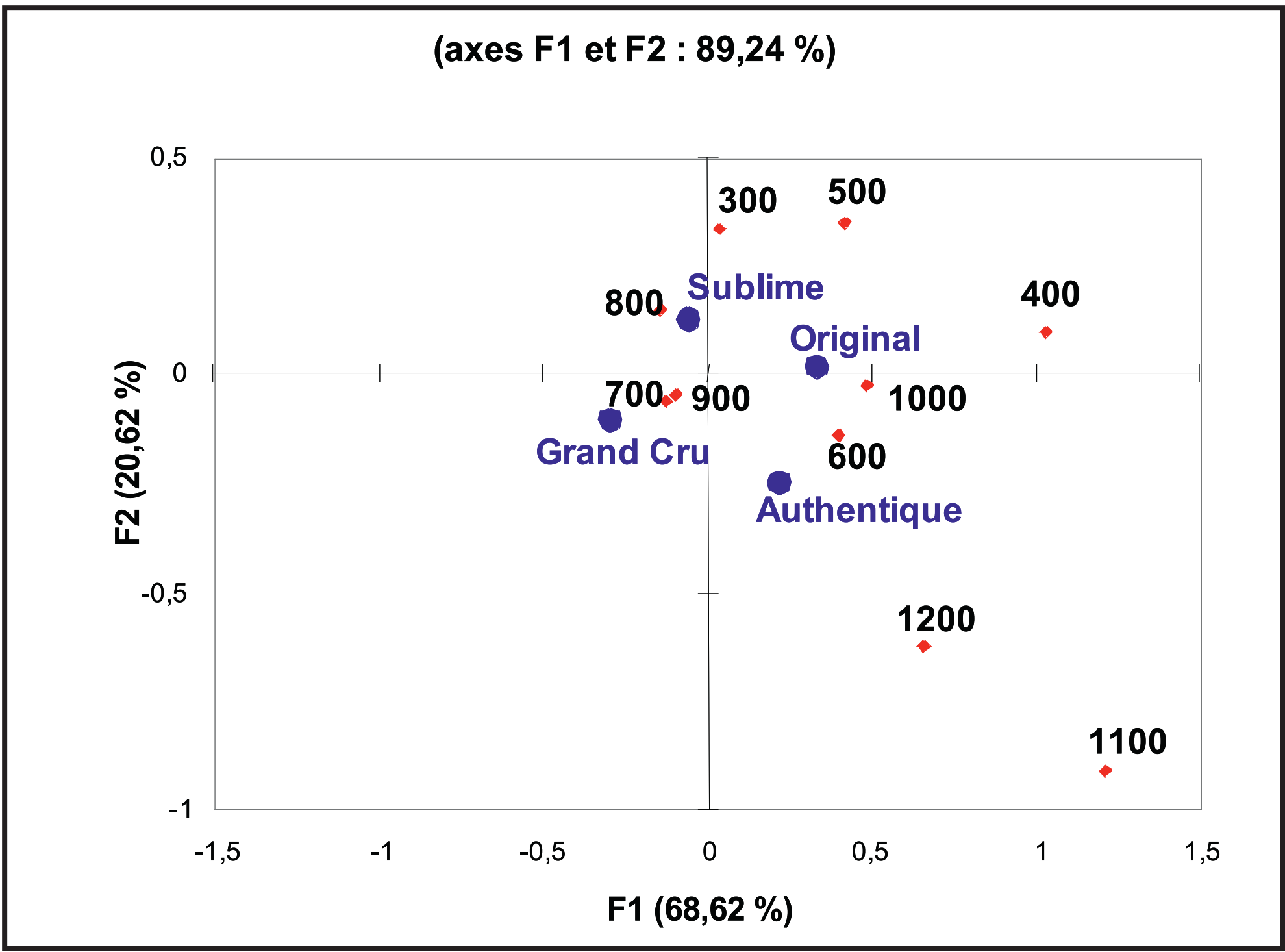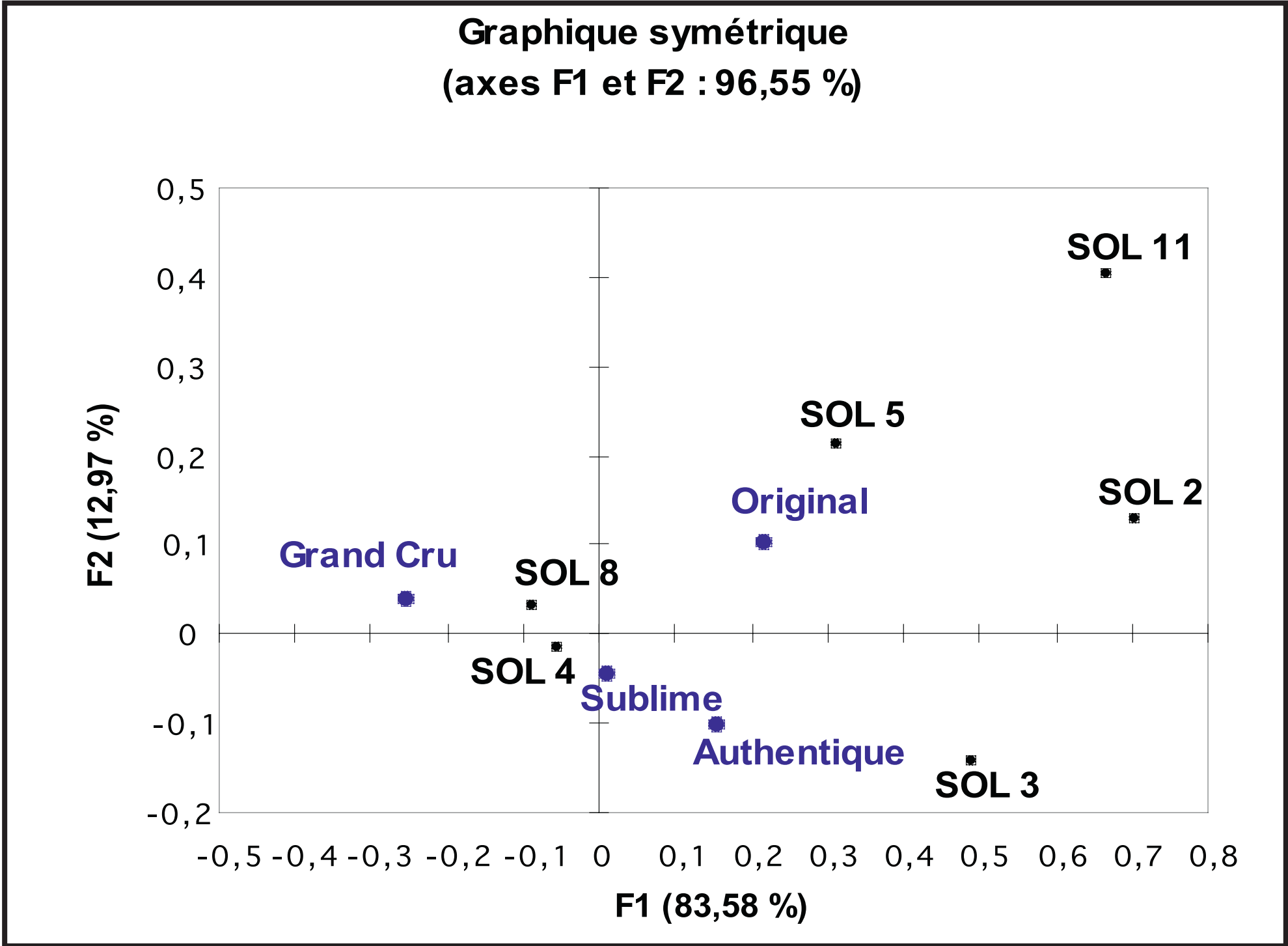

Figure 2 : Type of soil/marketing classes (MCA).

Conclusion

The statistical analyses enable to draw the map of the favourable terroir (Figure 3). However, the coffee plots enjoying a special microclimate and a propitious soil, may be located under the altitude of 800 m.

Out of the pedoclimatic conditions and altitude, some other factors are essential to produce a Bourbon pointu « gourmet » coffee :

- Plant material selected for its sensory performances,
- Berry maturity stage when harvesting,
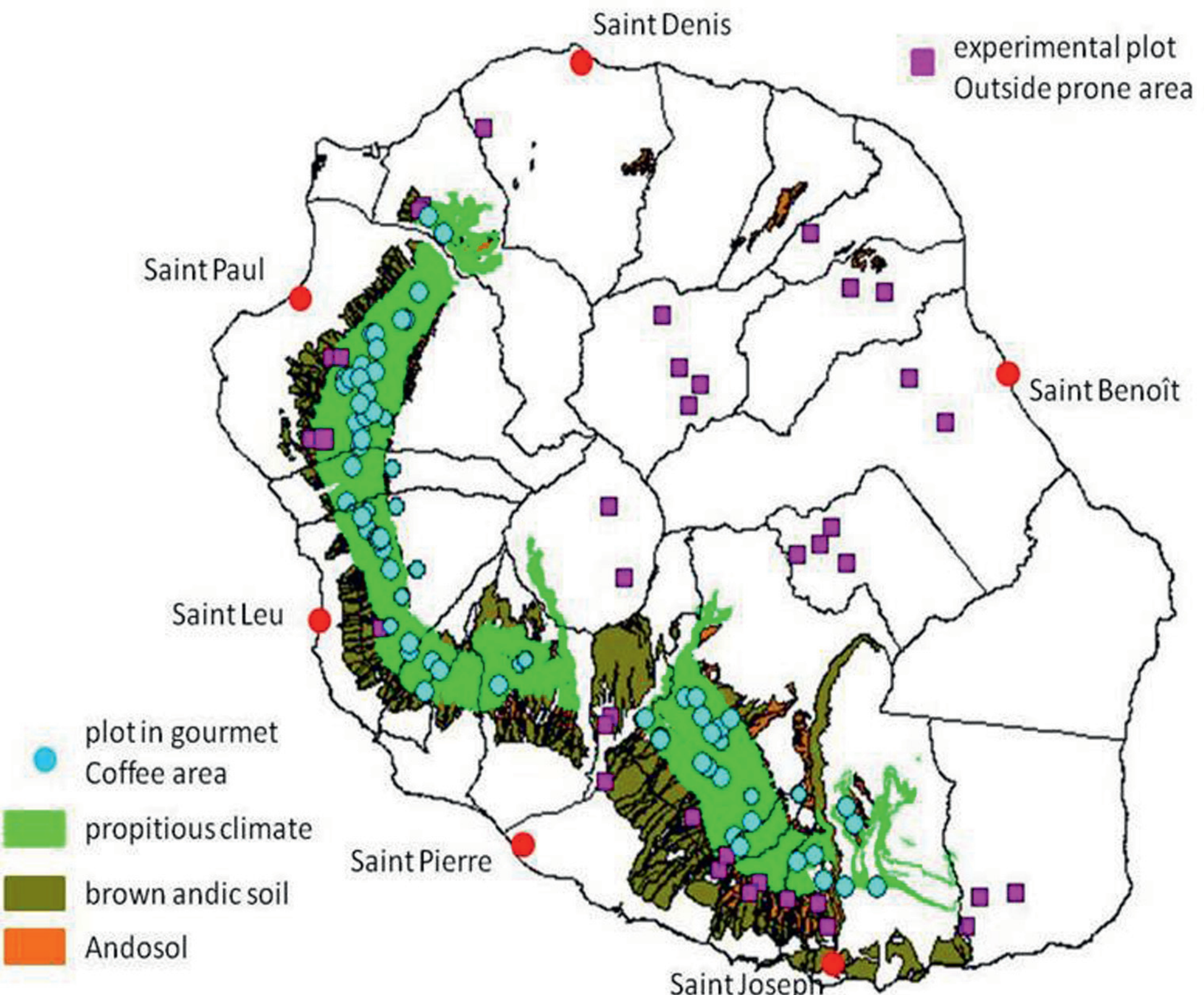- Post-harvest process…

Figure 3: Map of the favourable terroir to produce a Bourbon pointu «Gourmet» coffee.