

Sensory Typology: Method Used to Identify Homogeneous Groups of Coffee

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SUMMARY

The purpose of our study was to provide producing countries with an analytical approach to distinguish between coffees on a sensory basis. The aim was to establish clearly characterized groups of products capable of meeting the requirements of specific markets. The proposed method is based on studies conducted in several producing countries located in very different zones. Analyses were based on rational sampling in accordance with objectives, with the production structure in the country considered, and with prior knowledge of the variables affecting sensory quality. The latter was assessed by standardized sensory methods involving panels trained in descriptive analysis. A three-stage statistical analysis led to the establishment of coffee types. The types could be distinguished from each other significantly using major descriptors such as tastes (acid, bitter) or flavours (green, fruity). This typology provides a scientific contribution to often pre-existing commercial typologies.

RÉSUMÉ

Notre étude a pour objet de donner une démarche analytique aux pays producteurs pour différencier leurs cafés sur des bases sensorielles. Il s'agit d'établir des groupes de produits bien caractérisés pouvant répondre à la demande de marchés spécifiques. La méthode proposée repose sur des études réalisées dans plusieurs pays producteurs situés dans des zones très différentes. Les analyses sont effectuées à partir d'échantillonnages raisonnés en fonction des objectifs, de la structure de production du pays considéré et des connaissances préalables sur les variables influençant la qualité sensorielle. Celle-ci est évaluée par des méthodes sensorielles normées faisant appel à des panels descriptifs formés. Une analyse statistique en trois étapes permet de construire des types de cafés. Les types se différencient significativement sur certains descripteurs majeurs, comme les saveurs (acide, amer) ou les saveurs (vert, fruité). Cette typologie apporte une contribution scientifique aux typologies commerciales souvent préexistantes.

OBJECTIVES

Producer countries wishing to satisfy the demand of targeted markets need to be able to describe the flavours and aromas of their coffees. The information must be clear and concise if it is to be of use to decision-makers (producer organisations or authorities). The method used to identify these coffee groups meets these objectives.

We put forward an analytic approach, whereby sensory data is collated and associated with different groups identified by statistical classification. These groups provide a way of linking sensory variables with other kinds (genetic, agricultural, environmental or socio-economic). The method put forward is based on studies carried out in several producer countries.

SAMPLING

The sampling protocol is designed for studying the influence of certain external factors on sensory characteristics. Other factors are standardised to restrict their influence on sensory characteristics (for example):

- Altitude was studied: several samples by altitude layer
- Variety was studied: several samples of the main varieties
- Year of harvest was studied: the study was repeated over several years
- Date of harvest was standardised: samples were taken only at the peak of the harvest season
- Post harvest factors were standardised: just one standardised protocol was used.

The sampling process is determined by the objectives, the production structure of the country in question and prior knowledge of variables that influence sensory quality. A description is made of the potential for coffee across a zone.

SENSORY MEASUREMENT

A descriptive sensory profile is produced for each sample of green coffee. The green coffee is sorted to eliminate defects due to postharvest handling and then roasted in a laboratory roasting appliance. Five grams of ground coffee are infused in 100 ml of water to prepare the drink. A descriptive panel (5 to 12 persons), trained in sensory analysis of coffee, note down a series of descriptors. The protocol is based on international sensory standards.

STATISTICAL DATA PROCESSING

Sensory data often displays a certain amount of unexplained variability. This variability is reduced by the use of Principal Component Analysis (PCA) (Figure 1). Only the first axes are kept and in this way part of the noise is eliminated (about 20%).

Groups are established by means of two standard typology methods (hierarchical classification and dynamic clouds), which complement each other. It is thus possible to obtain coffee types (Figure 2).

Variance analysis shows that these types differ significantly in terms of major descriptors, such as taste (acid, bitter) or flavour (green, fruity) (Figure 3). Variance analysis is used to explore links with other quantitative variables. Links with qualitative variables can be analysed using χ^2 tests (Table 1).

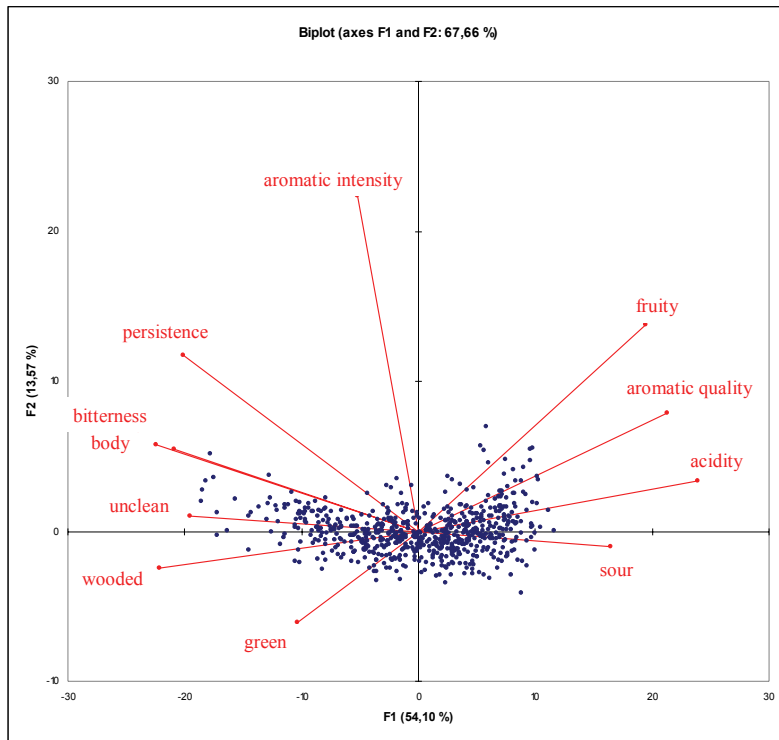


Figure 1. With PCA (Principal Component Analysis) it is possible to visualise the distribution of the sensory profiles of different coffees.

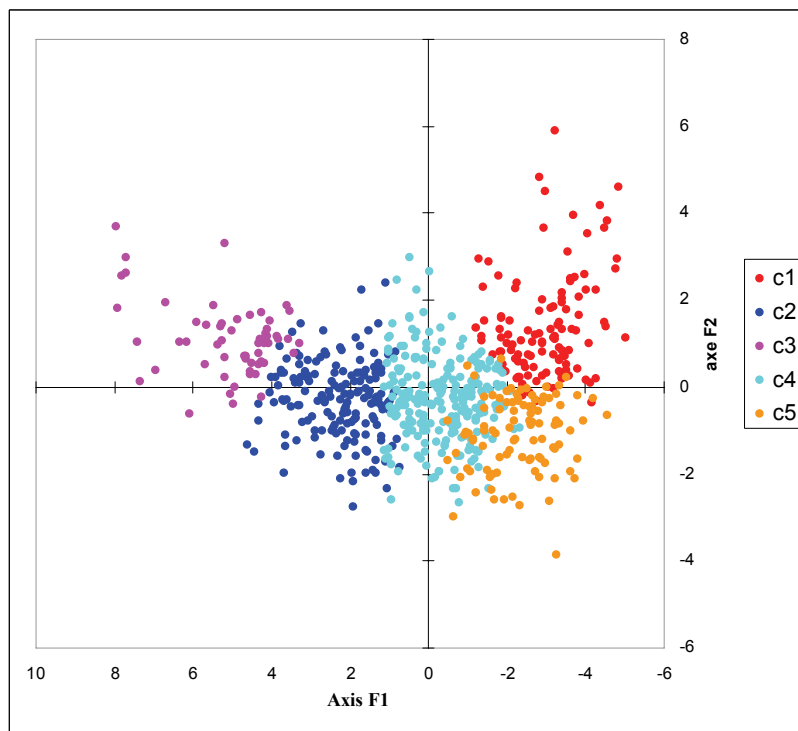


Figure 2. The classification methods are used to group together sensory profiles (in this example there are five groups designated c1 to c5). An initial structuring of the data emerges.

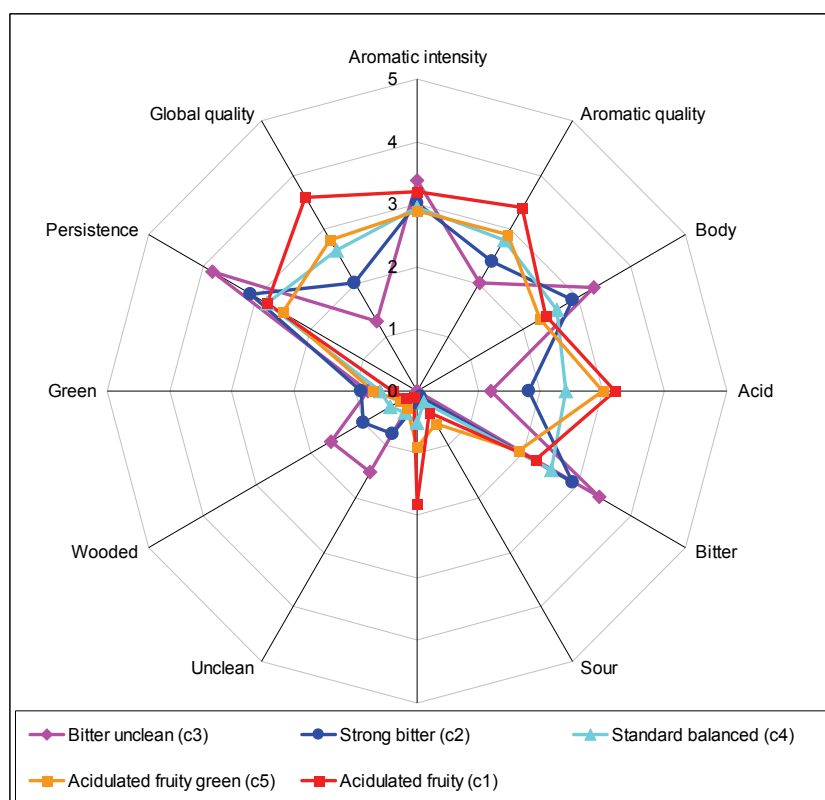


Figure 3. Average profiles of sensory groups. Using ANOVA (variance analysis), it is possible to see which sensory descriptors account for the significant differences between the groups.

Table 1. Comparison of granulometric distribution of samples by sensory group. The Chi-squared test shows that the distribution is not random.

		sensory groups				
		bitter unclean (c3)	strong bitter (c2)	Standard balanced (c4)	Acidulated fruity green (c5)	Acidulated fruity (c1)
granulometric groups	very small	3	11	7	3	0
	small	23	59	66	19	19
	big	22	52	89	26	41
	very big	8	37	66	37	45

Significantly more than the expected distribution
 Significantly less than the expected distribution

CONCLUSION

By conducting sensory analysis while at the same time taking account of complementary data (environmental, geographical, socioeconomic, etc.), it is possible to use this coffee typology as a means of aiding decision-making in the producer countries. The use of this tool may help identify niche markets (for products of a certain origin or *terroir*) as well as mass markets, in which particular characteristics are sought (such as lightness or strength in coffee). This typology makes a scientific contribution to the commercial typologies that already exist in many cases.