

## PRINCIPAL COMPONENT ANALYSIS (PCA) OF PHYSICO-CHEMICAL CHARACTERISTICS IN DIFFERENT NATIVE ALBANIAN FIG VARIETIES (*FICUS CARICA* L.)

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### Abstract

There is a growing interest in fruits composition and nutritional value among scientist, food producers, and consumers, related to their potential benefits to human health. Furthermore, native fruits remain an interesting group that should be studied, diversified and preserved. In this regards this study aims to determine the physico-chemical composition of different native Albanian fig fruits.

This study is based on experiments for 13 autochthonous fig varieties of cultivar *Ficus carica* L. conducted over three consecutive years (2015 - 2017). Selection of samples was made according to their distribution and cultivation (Tirana, Elbasan, Berat, Shkodra, Himara and Kavaja), colour (black and white) and their use (fresh consumption and processed). During this period 35 observation were made, for the following physico-chemical parameters were followed official AOAC methods: total soluble solids expresses in oBrix was determined with ABBE refractometer, total acidity expressed as citric acid was determined by titration with sodium hydroxide solution 0.1N, maturity index was determined as a ratio of total soluble solids and total acidity, pH was determined with pH meter, dry matter was determined by gravimetric method drying at 105 0C , total ash was determined by gravimetric method using a muffle furnace and incinerated at 525 0C, total carbohydrates determined by colorimetric method using Anthrone reagent, reducing sugars were determined by a titration method Lane-Eynon [44], crude fibre determined gravimetrically after treatment with sulfuric acid solution, 0.255 N and sodium hydroxide solution, 0.312 N, pectin was determined with gravimetric method precipitating as calcium pectate, total fat was determined with Soxhlet extraction method, total protein was determined by Kjeldahl method, and vitamin C determined by redox titration with iodine solution 0.1N.

The conducted study showed that the maximum variance direction in the data (first principal component, PC1) was 55.07% in the total variation. The second largest source of variation in the data (second principal component, PC2) was 11.34% in the total variation. The cumulative ratio of the two primary components in total variation was 66.41%. In the first principal component total soluble solids - 0.944, maturity index - 0.555, dry matter - 0.911, total carbohydrates - 0.943, reducing sugars - 0.944, crude fibres - 0.605, fat - 0.907, and protein - 0.521 had the highest coefficients, while in the second principal component total acidity - 0.589 had the highest value, based on squared cosines of the variables. Fig varieties had similarities and distinguished physico-chemical parameters, and based on them, also from principal component analysis visualized graphically in a multidimensional space, we distinguished some interesting varieties. Based on their characteristics, black varieties (large size fruit, juicy, high maturity index) are suitable for fresh consumption, while white varieties (medium-size fruit, high content of dry matter, sugars) are suitable for processing as dried fruits, additionally some fig varieties with a high content of organic acids are suitable for the production of other products (purees, smoothies, and juices).

Finally, it has been shown that fig fruit is an interesting raw material with a varied food composition and nutritional value, which is strongly determined by the variety. These data and PCA model would be beneficial to identify the most attractive varieties and to be used by the breeders, food processors and consumers.

**Key words:** Native fruits, *Ficus carica*, Physico-chemical parameters, PCA model.