

Dry matter and specific gravity content evaluation in the Central Colombian Potato Collection *Solanum tuberosum* group Andigena

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Introduction

Since 1995, the Colombian Corporation for Agricultural Research - Corpoica, is the responsible of the conservation of the Central Colombian Potato Collection (CCCP) that belongs to the Colombian National Germplasm Bank and seeks for the preservation of the genetic resource of potato which constitutes the starting material for plant breeding, agrobiodiversity conservation and food and nutritional security. The field collection comprises 1110 accessions that are renewed each year in the municipality of Zipaquirá (2950 masl) and is considered as an active collection propagated vegetatively through seed tuber in the field. It contains genotypes of the groups: *Andigena* (671 accessions); *Tuberosum* (68 accessions); *Phureja*: (204 accessions) and improved varieties (guata) (89 accessions).

Materials and Methods

The experiment was developed during the year 2017 in the municipality of Zipaquirá, department of Cundinamarca (2950 masl, an average temperature of 13.7 ° C and an average annual precipitation of 805 mm). 586 accessions of the Andigena group were evaluated for the variables of dry matter (DM), specific gravity (GE), physiological maturity (MF), number of harvested tubers (NTC) and yield (RTO) and a cluster analysis was performed. For quality variables, three samples of two tubers per accession were taken, weight in water, weight in air and dry weight were measured to calculate the specific gravity and dry matter according to the methodology proposed by the International Potato Center (CIP).

Results

To reduce the dimensionality, a principal component analysis (PCA) was performed for the variables GE, MS, MF, NTC and RTO. Considering the criterion of eigenvalue greater than 1, the first 3 components that explain 78.24% of the variability of the data set were retained. Component 1 refers to the production variables (NTC and RTO) and explains 36.89% of the variability and the second component refers to the MF and explains 21.32% of the variability; With the scores obtained in the ACP, a cluster analysis was performed, using the Ward method (Table 1). Three groups were formed, which can be observed in the biplot (Figure 1 and 2). Group 1 is characterized by having a higher average value of: MS (25,848), NTC (377,249) and RTO (23,276). Group 2 generally has lower average value of NTC (168,703) and lower RTO (11,837). Group 3 is made up of individuals with a higher GE value (1,104), lower MF value (162,548) and higher altitude (> 2700) (Table 1).

Table 1. Eigenvalues and eigenvectors of analysis of the principal component.

Variables	Component 1	Component 2	Component 3
GE	-0,018	0,401	0,859
MS	0,307	0,493	0,072
MF	0,172	0,694	-0,495
NTC	0,680	-0,074	0,017
RTO	0,642	-0,331	0,104
Autovalue	1,840	1,066	1,006
Proportion	0,368	0,213	0,201
Accumulate	0,368	0,581	0,782

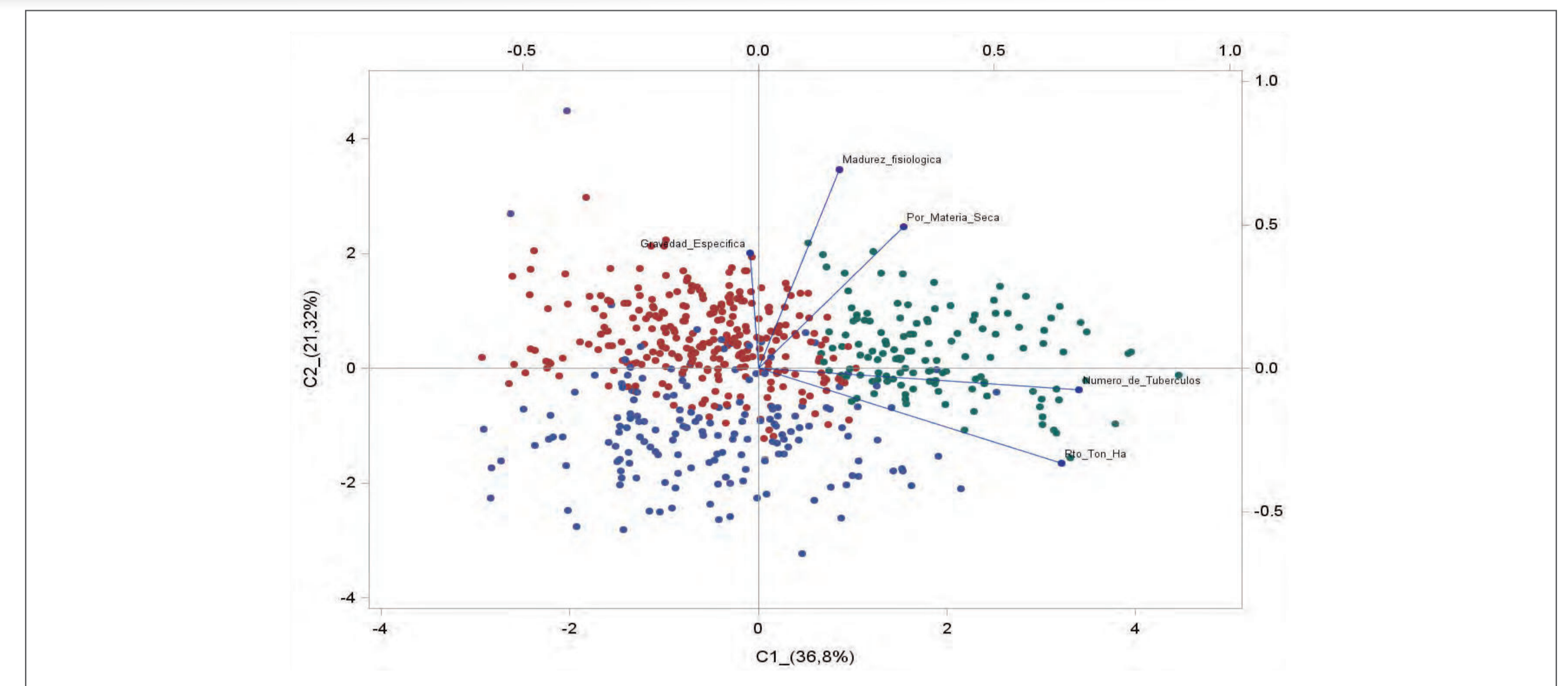


Figure 1. Principal Component Analysis

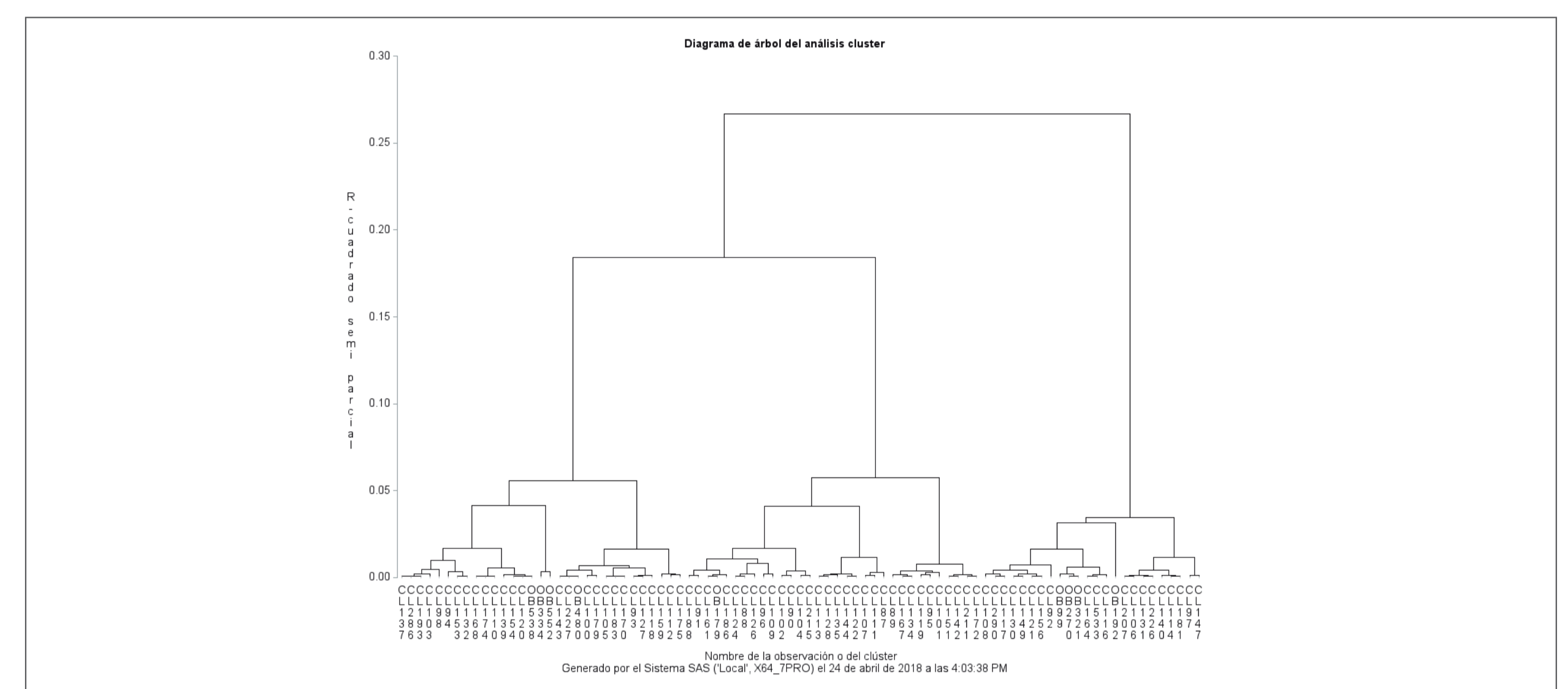


Figure 2. Cluster Analysis

Table 2. Table of means

Clúster	GE	MS	MF	NTC	RTO	m.a.l.s
1	1,097	25,848	205,690	377,249	23,276	2587,673
2	1,096	23,662	205,252	168,703	11,837	2601,897
3	1,104	23,304	162,548	187,566	16,005	2724,662

Conclusions

The greatest value for GE is directly related to altitude above 2700 masl and the value of MF is the lowest on average; however, the best yields are at altitudes between 2500 and 2600 according to the center of collection of the accessions.

The departments of Nariño, Boyacá and Cundinamarca altitudes range from 2500 and 2600, and are centers of collection of more than 50% of the evaluated accessions, materials from these regions have desirable characteristics in accumulation of MS, so they can be promising materials for industry.

Within the Colombian Central Potato Collection of the Andigena group there are materials with desirable characteristics in terms of quality and yield which can vary depending on the altitude of the collection centers and can be the basis of future breeding programs.

References

Centro Internacional de la Papa. 2007. CIP germplasm ordering system. En: CIP, <https://research.cip.cgiar.org/smta/search1.php>; consulta: enero 2018.