ESTIMATION OF FOOD QUALITY THROUGH INDIRECT COMPARATIVE ANALYSIS

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Abstract: *Corn is one of the most important cultivated plants due to its multiple uses. Maize grains are widely used in human nutrition, industry and animal feed.*
This paper makes a study on the quality of some maize hybrids, using a method of calimetry based on indirect comparative analysis.

Key words*: quality, comparative analysis, maize hybrids*

INTRODUCTION

Cereals and their derived products are of great economic and social importance, and it is estimated that for human nutrition, they provide about 65% of daily calorie requirements and 45% of protein. The quality of cereals is assessed according to certain characteristics or quality indices such as:

- external appearance, grain uniformity;
- humidity;
- hectolitre mass;
- mass of 1000 grains;
- degree of contamination;
- pest infestation;
- glassiness;
- germination power [1,3,9].

Corn (Zea mays) is a cereal rich in starch and poorer in protein. The embryo contains a large amount of fat, which causes a fairly high instability in storage [8,9].

Corn occupies a significant place in the national economy, through the large sown areas, through the realized productions, as well as through the multiple uses of the corn grains in food, industry and animal feed [11,12,14].

Increasing the nutritional value of corn grains is possible by using genetic and technological methods. In general, attempts to improve grain quality are accompanied by some undesirable consequences such as reduced production capacity and resistance to disease and pests. Therefore, it is necessary to take into account the achievement of a balance between production and quality in the choice of corn hybrids. The advantage of hybrid cultivation is that it offers a high level of production and superior stability to the varieties. There are currently over 100 hybrids growing. Hybrids are created from early (with a vegetation period of 100-115 days), to late hybrids (with a vegetation period of over 145 days). Each hybrid, as a vegetation period, expressed in days (sunrise - ripening), falls into conventional FAO maturity classes (100-200-300-400-500-600-700-800) [4,5,6, 7,11].

Human life in modern society is characterized by a huge idea, people and goods circulation. The goods, as object of economic exchanges, has general and specific properties that confer them utility, to satisfy needs. Consequently, the wide range of needs determines the diversity of products available at a certain moment on the market. Quality assessment is the extent to which a product is able to meet the conditions specified by the

standards, ie the needs expressed as a set of characteristics expressed quantitatively (numerically) or qualitatively (attributively or notionally) [1,3,8,10].

Estimating of products quality through an indirect comparative method consists in applying appropriate methodologies that involve the comparison of two or more goods, based on their representative characteristics [1,3,10].

Among many other beneficiaries of comparative quality analysis are consumers and is the most numerous and justified category to benefit from the objectivity of the analysis of the quality of products and services [1,10].

MATERIALS AND METHODS

The present paper carries out a study of the quality of some maize hybrids, using for this purpose a method of indirect comparative analysis [9,10,13,15]. Synthetic data and results are shown in tables and figures.

For this study, we have chosen the following maize hybrid variants:

- PR36R10
- DUPLO
- DK 5276
- LG 2306

The quality features, of the corn grains, chosen in the study are: colour, aspect, infestation degree, relative mass of 1000 grains, absolute mass, hectoliter mass, mineral substance content and productivity. Of these, the first three are attributive (notional) characteristics, and the next are numerical.

RESEARCH RESULTS

Quality features selected in the studied maize hybrids are shown in Table 1. The values of these properties are taken from the technical specifications of corn hybrids.

In order to apply the qualimetry method, we classify the quality features selected according to the way they are expressed, i.e. numerically and notionally (attributively).

Numerical quality features:

- the relative mass of 1000 grains (MMB), in g;
- the absolute mass (MA), in g;
- hectoliter mass (MH), in kg/hl;
- mineral substance content (Csm), in g/100 g of product;
- productivity (P), in t/ha;

Attributive quality features:

- colour;
- aspect;
- infestation degree.

To quantify data, we apply a system of points ranging between 0 and 10 (Table 2).

Table 1.

Selected quality features

Maize hybrid variants	Selected quality features							
	Colour	*Aspect*	*Infestation degree*	*MMB g*	*MA g*	*MH kg/hl*	*Csm g/100g*	*P t/ha*
PR36R10	Yellow-orange	Glossy	Small	314	248	81	29	13,1
DUPLO	Yellow	Glossy	Small	272	217	79	28	12,75
DK 5276	Yellow-orange	Glossy	Medium	251	201	76	25	11,9
LG2406	Yellow	Glossy	Tiny	283	229	78	26	12,5

Table 2.

Data concerning classical method of quality analysis

Product variants	Points of quality features								Total points
	Attributive features			*Numerical features*					
	Colour	*Aspect*	*Infestation degree*	*MMB g*	*MA g*	*MH kg*	*Csm g/100g*	*P t/ha*	
PR36R10	9	10	9	10	10	10	9	9	76
DUPLO	8	10	8	9	7	9	9	8	68
DK 5276	9	10	6	8	6	9	7	7	62
LG2406	8	10	10	9	9	9	8	8	71

In the following figures, we show the variations of each quality feature, in concordance with the product variants selected and the result of their quantification. Thus, if the customer appreciates more one of these features and wishes to choose the product depending on it, he can make an option for the most advantageous value.

He can also rapidly notice if there are significant differences between the variants of quality features and if the variations of the preferred quality features are proportional to the global quality of products; this is an extra argument in favour of the adequate assessment of products supplied by suppliers.

In the case of the maize hybrids studied, we will present graphically the group of quality features numerically expressed and the category of features attributively expressed (Table 3 and Figures 1 and 2).

Table 3.

Total points of numerical and attributive features

Product variant	Points of attributive features	Points of numerical features	Total points
PR36R10	28	48	76
DUPLO	28	43	71
DK 5276	26	42	68
LG2406	25	37	62

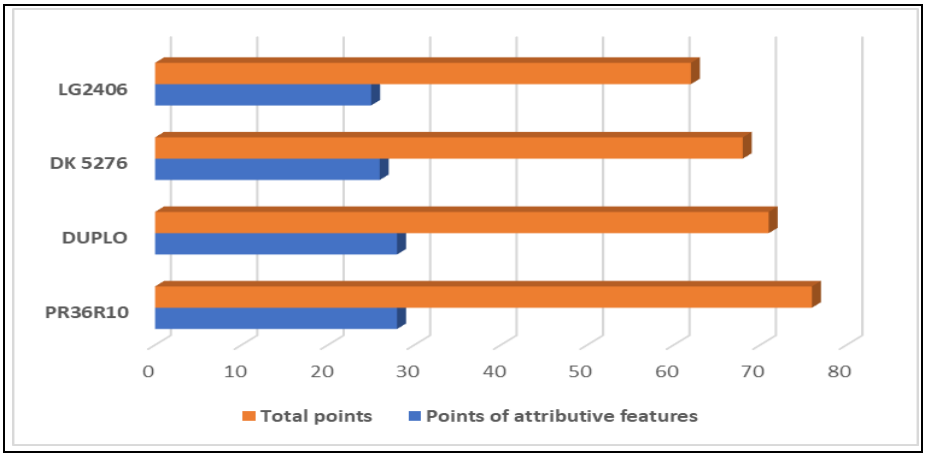

Figure 1. Range of atributive features

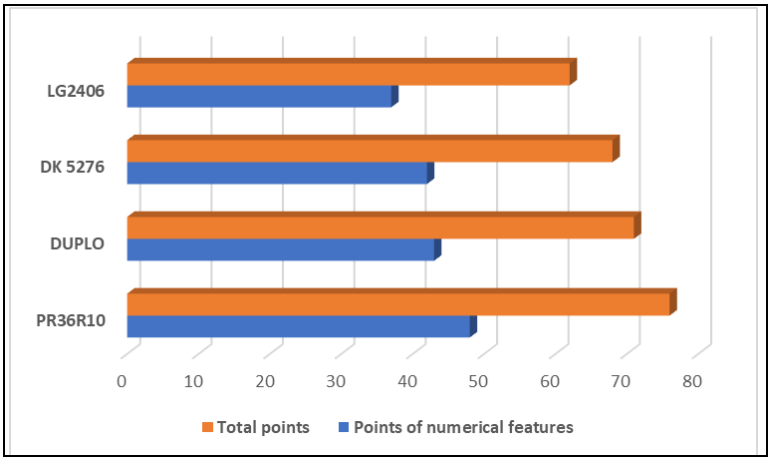

Figure 1. Range of numerical features

The range of product variants chosen for this study, according to the data obtained with the qualimetry method, is shown in Table 4.

Table 4.

Range of maize hybrids according to the methods used in quality analysis

Product variants	Classical method (∑)	
	Value	Rank
PR36R10	76	**I**
DUPLO	68	**III**
DK 5276	62	**IV**
LG2406	71	**II**

CONCLUSIONS

Analysing the results obtained with the analysis method, we may conclude that:

By applying the method of indirect comparative analysis, we can readily observe if there are significant differences between the quality features of the products analysed.

The variations recorded in the scoring of the attributive characteristics are smaller than those recorded in the numerical characteristics. For this reason it is very important to choose as many numerical characteristics as possible in a comparative analysis of quality because their scoring is done in relation to the quality specifications.

We may identify the quality features that are important for consumers; the producer may change these features in order to satisfy and even to overtake the expectance of its customers.

Although the the method used in the study presents high subjectivity level (all numerical and attributive quality features are pointed), compared to other qualimetry methods, the results may provide a comprehensive image of the product variants submitted to analysis.

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