DETERMINATION OF THE CHEMICAL COMPOSITION OF SORGHUM GRAINS FROM THE AGRICULTURAL AREA OF INAND, BIHOR COUNTY, ROMANIA

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Abstract. The present study aims to determine the chemical composition of sorghum grains harvested in 2018 from the agricultural area of Inand, Bihor County, Romania. Five sorghum hybrids (Armorik, Mousson, Alizée, Arsenio, and Lupus) were analyzed in terms of total protein, starch, fat, and ash content. The analyses were carried out on samples collected after harvest, using standardized laboratory methods. The results highlighted significant differences among the hybrids, particularly regarding protein content, which ranged from 10.59% (Arsenio) to 12.14% (Mousson). Starch content varied between 67.4% and 72.7%, fat between 2.2% and 3.2%, and ash between 5.53% and 6.74%. The Mousson hybrid stood out with the highest protein and ash content, making it suitable for feed uses that require a high protein supply. These results emphasize the importance of choosing the hybrid according to the agricultural or industrial purpose of sorghum cultivation.

Keywords: sorghum, hybrids, chemical composition, protein, feed uses.

DOI 10.56082/annalsarsciagr.2025.2.16

1. Introduction

Sorghum (*Sorghum bicolor* L.) is one of the most important cereal crops worldwide, due to its high adaptability to unfavorable climatic conditions, particularly drought and extreme temperatures [1]. In recent years, interest in this crop has also increased in Romania, in the context of climate change and the need to diversify sustainable agricultural systems [8].

Sorghum grains are valued for their nutritional content, being an important source of energy (through starch) as well as plant protein [3]. These characteristics

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recommend sorghum for both human and animal nutrition, as well as for use as raw material in the food and feed industries [5] [6].

The chemical composition of sorghum grains can vary significantly depending on several factors, including soil and climatic conditions, cultivation technology, and especially the hybrid used [4] [2]. Choosing a hybrid adapted to the area and the intended purpose of production is essential for optimizing both the nutritional and economic value of the harvest [7].

The present paper aims to analyze the chemical composition of sorghum grains harvested in 2018 in the agricultural area of Inand, Bihor County. The study compares five sorghum hybrids in terms of protein, starch, fat, and ash content, in order to identify the most nutritionally valuable ones.

2. Materials and Methods

The study was conducted in 2018 within an experimental platform located in the agricultural area of Inand, Bihor County, Romania. The aim of the research was to determine the chemical composition of sorghum grains depending on the hybrid, under the specific soil and climatic conditions of the area.

The experiment included five sorghum hybrids, commercially available and adapted to the cultivation conditions of western Romania: Armorik, Mousson, Alizée, Arsenio, and Lupus.

Photo 1. Sorghum Crop. Original.

They were cultivated under similar agrotechnical conditions, on the same soil type, while respecting the recommended standard density (270,000–300,000 seeds/ha), in order to ensure the comparability of results.

After reaching physiological maturity and harvesting, grain samples were collected from each experimental plot for physico-chemical analyses. For each hybrid, representative samples were obtained and processed according to agricultural laboratory sampling standards.

The chemical composition of the grains was determined in the laboratory, considering the following parameters:

- Total protein (%)
- Starch (%)
- Fat (%)
- Ash (%)

The determinations were performed using standardized methods commonly applied in cereal analysis:

Protein content was determined by the Kjeldahl method.

Starch was determined through enzymatic hydrolysis and spectrophotometric measurement.

Fat content was analyzed using Soxhlet extraction.

Ash was determined by incineration at 550 °C in a muffle furnace, according to AOAC methodology.

3. Results and Discussions

The chemical analysis of sorghum grains harvested in 2018 from the agricultural area of Inand revealed notable differences among the five hybrids studied. The parameters analyzed were total protein, starch, fat, and ash. The values are presented in Table 1.

Table 1. Chemical Composition of Sorghum Grains – 2018 Production

Hybrid Name	Total Protein (%)	Starch (%)	Fat (%)	Ash (%)
Armorik	10.96	72.7	2.2	5.56
Mousson	12.14	67.4	2.8	6.74
Alizee	11.19	68.6	2.5	6.17
Arsenio	10.59	70.1	3.2	5.53
Lupus	11.61	71.9	2.8	6.28

Based on these data, it was found that the Mousson hybrid had the highest total protein content, reaching 12.14%, followed by Lupus (11.61%) and Alizée

(11.19%). The Armorik and Arsenio hybrids showed lower protein contents, of 10.96% and 10.59%, respectively.

Regarding starch content, the highest value was recorded in Armorik (72.7%), which may make it suitable for energy or industrial uses. In contrast, Mousson had the lowest starch content (67.4%), but this was offset by its high protein and ash content.

Fat content was highest in the Arsenio hybrid (3.2%), followed by Mousson and Lupus (2.8%). Armorik had the lowest fat content (2.2%).

For ash, an indicator of mineral content, Mousson also stood out, with the maximum value of 6.74%, followed by Lupus (6.28%) and Alizée (6.17%). Lower values were recorded in Arsenio (5.53%) and Armorik (5.56%).

In 2018, the hybrid with the highest protein content was Mousson (12.14%), followed by Lupus (11.61%), Alizée (11.19%), Armorik (10.96%), and Arsenio (10.59%).

The significant differences among the hybrids confirm that the genetic material strongly influences the nutritional values of sorghum grains. Depending on the intended purpose of the crop (feed, food, or industrial), choosing the appropriate hybrid is essential:

The Mousson hybrid is suitable for feeding systems that require a high protein supply.

Armorik, with its high starch content, is better adapted for applications where an energy source is needed.

Arsenio, with the highest fat content, could be used in feed formulations with high caloric density.

Additionally, the ash content may indicate a higher mineral contribution, which can positively influence digestibility and the supply of trace elements in animal feed.

Conclusions

(1) Following the analyses of the chemical composition of sorghum grains harvested in 2018 in the agricultural area of Inand, Bihor County, significant differences were observed among the five hybrids studied.

(2) The Mousson hybrid stood out with the highest total protein (12.14%) and ash content (6.74%), making it suitable for feed uses targeting high nutritional intake.

(3) The Armorik hybrid had the highest starch content (72.7%), making it appropriate for applications requiring increased energy supply.

(4) The Arsenio hybrid recorded the highest fat content (3.2%), a characteristic that may be advantageous in concentrated feed formulations or specific industrial processes.

(5) These results highlight the importance of selecting the hybrid according to the technological or economic objective of the crop, as there are significant variations in the chemical composition of the grains.

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