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WHEAT PRODUCTION QUALITY BASED ON HECTOLITER WEIGHT – COMPARATIVE ANALYSIS

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Abstract: The study comparatively analyzed the quality of wheat grains, 'Alex' variety, based on hectoliter weight (HW, kg/hl). The experimental variants were provided by nitrogen fertilization (five doses) and Super Fifty fertilization (six doses, at each nitrogen level). The HW value series presented a normal distribution. The ANOVA test confirmed the reliability of the data, and significant differences between the mean values, and the Kruskal-Wallis test confirmed significant differences between the median values. The Dunn's Post Hoc test confirmed significant differences between four SF variants (SF_2, SF_3, SF_4 and SF_5) in relation to SF_0, and respectively between two variants (SF_3 and SF_4) in relation to SF_1. Multivariate analysis (PCA, correlation) explained the variance at the data set level, according to PC1 = 53.779%, and PC2 = 31.228%. Multivariate analysis highlighted the correlation of the N and SF variables in the formation of wheat grain quality, based on hectoliter weight.

• Introduction

Wheat production is characterized by different agronomic parameters and seed quality indices, with differentiated importance in relation to the way wheat grains are used [1], [6]. Agronomic, morphological parameters, and quality indices of wheat grains vary in relation to the cultivated genotypes, environmental factors, crop technology, stress factors, interactions of these factors, but also in relation to preservation and storage conditions [16], [11], [22]. Hectoliter weight is an important quality parameter of wheat grains, and varies in relation to the cultivated genotype, environmental conditions, and cropping system [3], [18], [9]. The variation in hectoliter weight, along with other parameters and quality indices in wheat in relation to fertilization, has been reported [24], [10].

• Material and method

The field experiment was located within the Didactic and Experimental Resort, University of Life Sciences "King Mihai I" from Timisoara, between 2018 and 2022. The Alex wheat variety was cultivated on a plot with chernozem soil, in a non-irrigated system. At plant maturity, grain samples were collected from each experimental variant. Hectoliter weight (HW, kg/hl) was determined as an index of seed quality. The correlation of the N and SF variables in relation to the quality index values (HW) was evaluated by multivariate analysis, and the level of loading of the SF factor in relation to the principal components. The degree of similarity between the experimental variants was highlighted by cluster analysis..

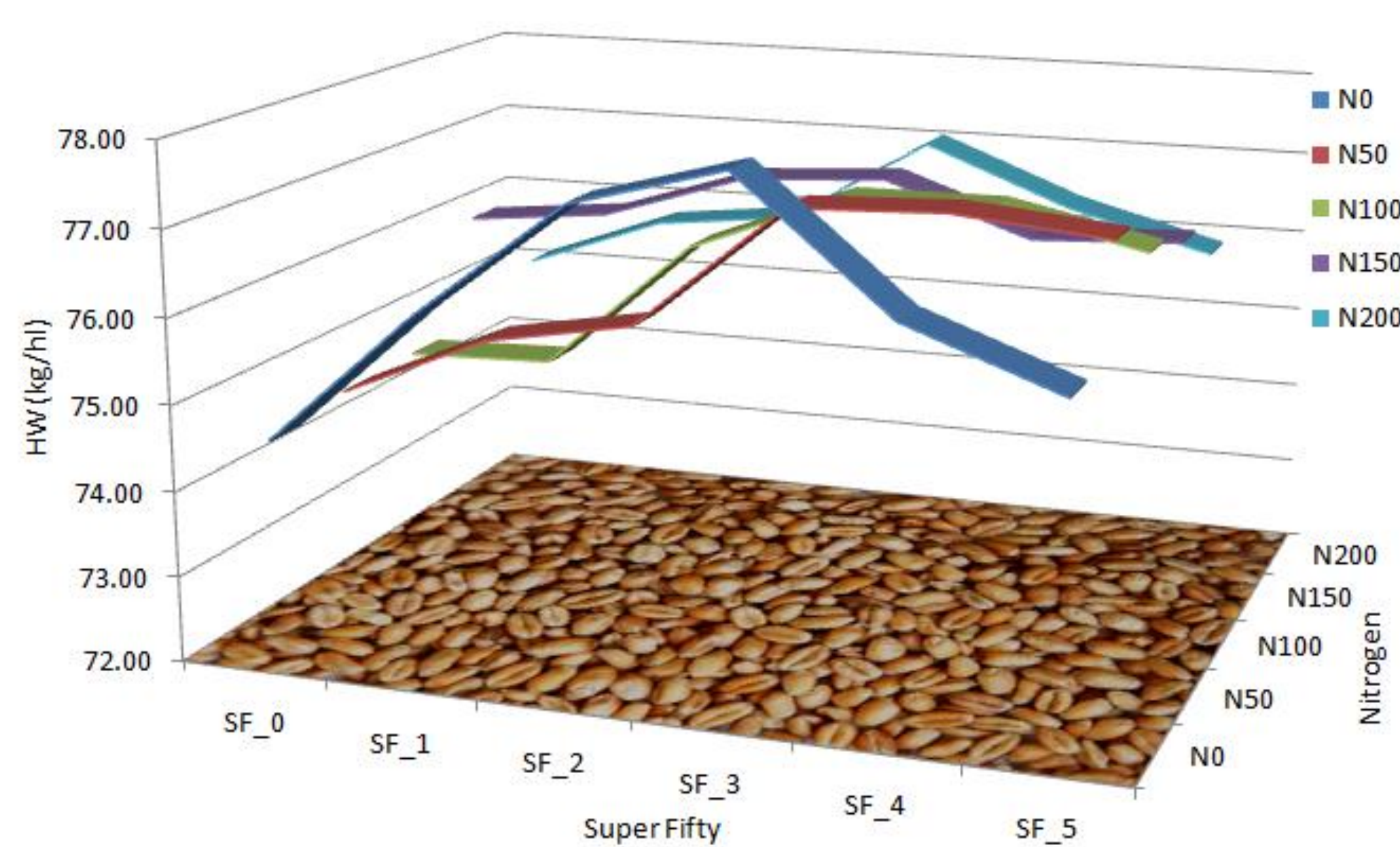


Figure 2. Graphical representation of HW values in wheat, 'Alex' variety

• Results and discussions

Hectoliter weight, as an index of wheat production quality, varied in relation to the experimental variants provided by nitrogen fertilization and the Super Fifty algae extract-based biofertilizer, under the study conditions, Figure 2. The ANOVA test confirmed the reliability of the experimental data, and differences in statistical reliability between the mean values. The ANOVA test confirmed the reliability of the experimental data, and differences in statistical reliability between the mean values. Significant differences were identified between four SF variants (SF_2, SF_3, SF_4 and SF_5) in relation to SF_0, and respectively between two variants (SF_3 and SF_4) in relation to SF_1. Multivariate analysis (PCA, correlation) explained the variance at the data set level, according to PC1 = 53.779%, and PC2 = 31.228%, with the PCA diagram in Figure 3. Cluster analysis grouped the N and SF variants based on similarity, in relation to the effect in hectoliter weight (HW) values, Coph. corr. = 0.813, Figure 4. The distribution of HW results in the color matrix, associated with the SF and N variants grouped in clusters on the similarity matrix, confirms the PCA results.

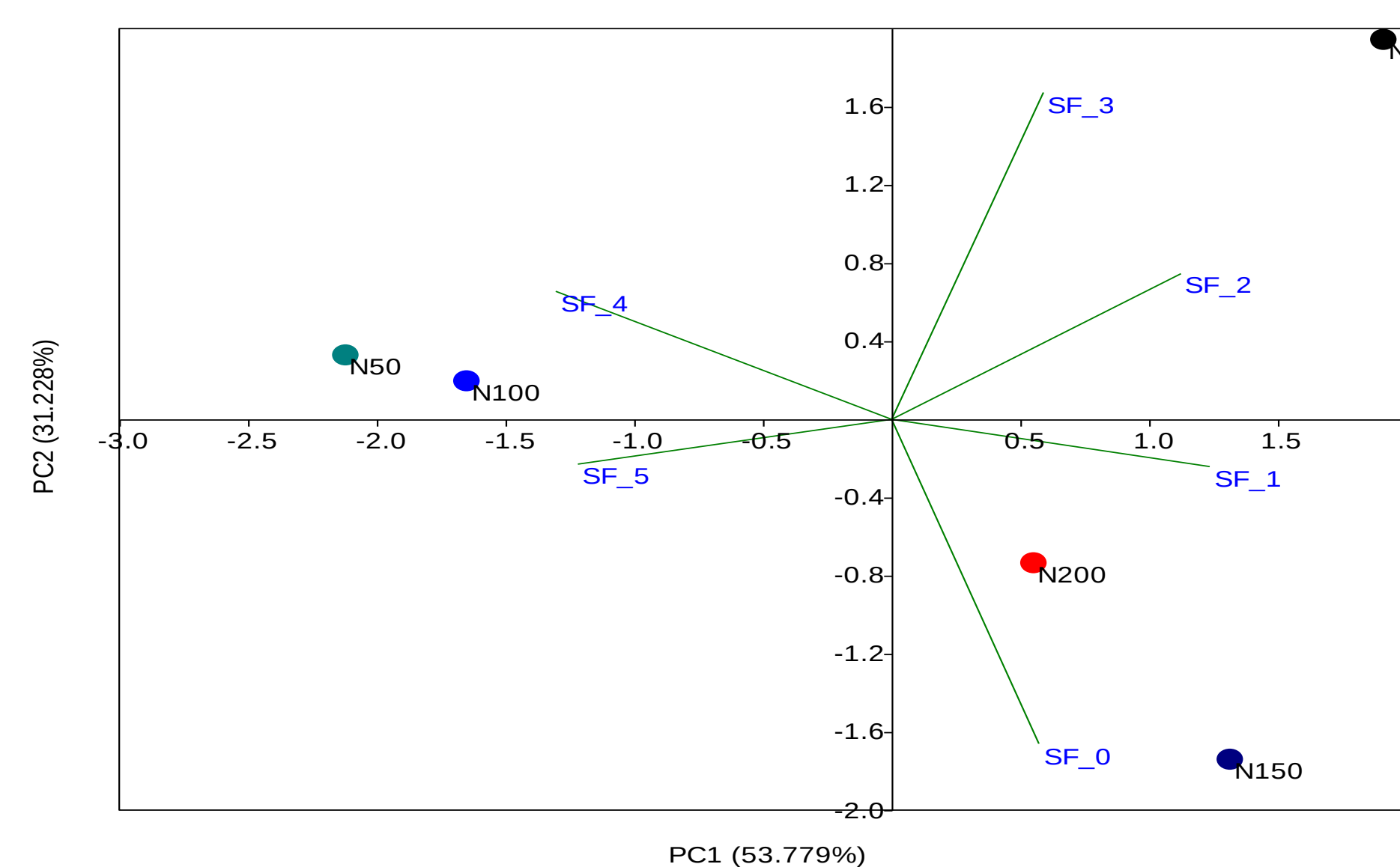


Figure 3. Graphical distribution of AE values for wheat, 'Alex' variety

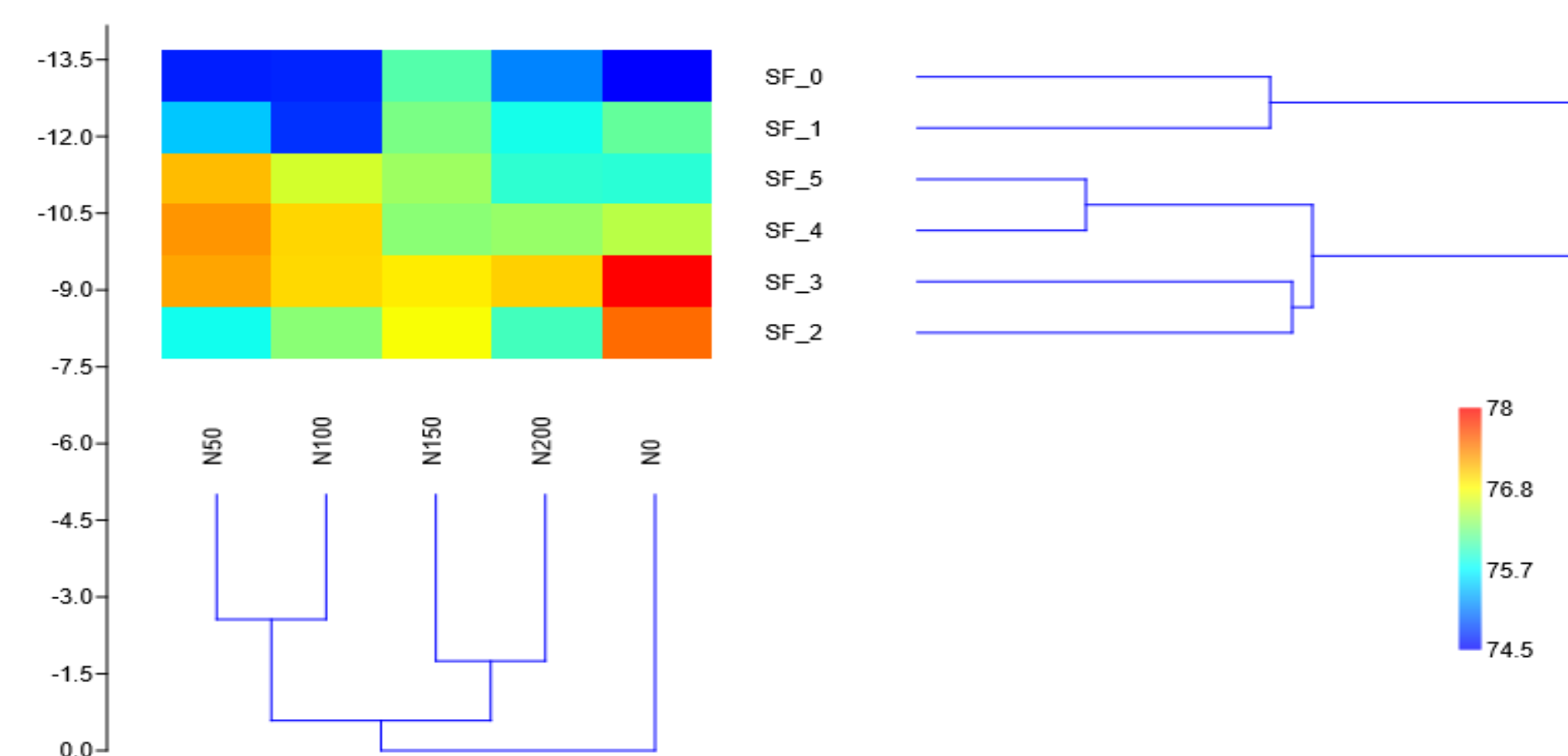


Figure 4. Cluster dendrogram, two-way, based on HW values on wheat, 'Alex' variety

• Conclusions

Fertilization with nitrogen and with the Super Fifty product based on algae extract, showed a direct and interaction effect in the formation of volumetric weight (HW) values in wheat grains, 'Alex' variety. Normal distribution was recorded in the data series, with correlation coefficient values ranging from $r = 0.857$ for SF_3 to $r = 0.975$ for SF_2. Statistical reliability in the data set, and significant differences between the mean and median values were confirmed. The correlation of the variants (N, SF) as factors in generating volumetric weight values was highlighted by multivariate analysis. The result was the positioning of N0 correlated with SF_2 and SF_3, the positioning of N150 and N200 intermediate between SF_0 and SF_1, and the positioning of N50, N100 correlated with SF_4 and SF_5, respectively.

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