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THE BEHAVIOR OF WINTER WHEAT IN THE CONSERVATIVE TILLAGE SYSTEM UNDER THE CONDITIONS AT A.R.D.S. PITEȘTI - ALBOTA

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Abstract

In the conservation agriculture, minimum tillage and direct sowing have been widely spread lately in the wheat crop. The paper presents the experimental results obtained in the agricultural year 2023-2024 regarding the effect of pedoameliorative and basic soil works - conventional and conservative system (direct sowing) on the wheat crop. The research was carried out in the experimental field of the ARDS Pitesti-Albota. The yield varied according to the pedoameliorative works (scarified soil, nonscarified soil), the depth of the basic soil works, but also the climatic conditions recorded during the research period. In the experimental year 2024, the average wheat yield recorded a value of 5683 kg/ha in the scarified soil variant and 5399 kg/ha in the nonscarified soil variant, with a difference of 284 kg/ha in favor of the scarified soil variants. From the data obtained in the reserch area of ARDS Pitesti Albota in the conditions of the typical luvosol, the conservation system was favorable to the wheat crop.

Key words*: conservative system, grain yield, luvosol, soil works, wheat.*

INTRODUCTION

Agriculture is a vital human activity, providing food, clothing and shelter. It has been shown that
because for every 1% rise in agricultural output, there is a 0.6-1.2% drop in the number of poor households worldwide (Thirtle et al., 2001).

The main concern of the Romanian rural community is agricultural yield, which includes the cultivation of winter cereals, especially wheat (Lipianu et al., 2023).

Wheat (*Triticum aestivum* L.), the most significant grain and the plant that covers the most land worldwide, is essential to human nutrition (Erenstein et al., 2022).

High yielding wheat varieties capacity must be resistant to important climatic risk factors in Romania, must be resistant to major foliar diseases and allow the growth of quality crops.

As per the study published by the United States Department of Agriculture, wheat is the most significant cereal crop in the European Union, with an expected global yield of 789 million tonnes in the 2023/2024 agricultural year. In 2022, wheat, considered one of the most common foods in the world, was sown on 2.15 million hectares in Romania, according to the National Institute of Statistics. In Romania, the total amount of wheat harvested in 2022 was 8.559 million tonnes, despite estimates that the world wheat harvest was the second largest of all time (http://www.fao.org/faostat).

The practice of conventional tillage can negatively affect soil yield in the long term, leading to erosion and loss of soil organic matter. Conservative tillage, crop rotation, and the retention and utilization of crop residues are methods for achieving sustainable soil management (Hobbs et al., 2008). Research carried out in a variety of climatic circumstances, soil types and crop rotation systems have shown that soils under direct seeding and minimum tillage have have a significantly higher content of organic matter compared to conventionally cultivated soils (Alvarez, 2005).

The success of wheat cultivation, both in terms of productivity and quantity, depends on the pedoclimatic conditions that are affected by the applied technology (De Vita et al., 2007a;

Warechowska, 2009; Ceclan et al., 2015; Zain et al., 2015). In addition, a long-term study showed that, compared to agricultural practices, the variation in climatic conditions explained a higher proportion of the variability in wheat crop yield. This highlights the importance of considering this vital parameter in predicting crop productivity (de Cárcer et al., 2019).

It is difficult to predict the reaction of wheat crop to the tillage system, as yields are affected by a variety of factors (Liliane et al., 2020), including soil characteristics, microclimate and the association of different practices (soil preparation, sowing dates), equipment used, crop rotation, hybrids used, fertilization and weed control (Moraru et al., 2012).

Wheat quality is not solely determined by its technological qualities; customers are becoming more conscious of and worried about the grain's nutritional value (fiber, minerals, macro- and micronutrients, vitamins), as well as any potential health effects. For instance, cooperation between wheat protein geneticists and allergy specialists will be necessary for study on a number of diseases linked to the use of gluten-based goods (Igrejas & Branlard, 2020).

Conventional agricultural yield systems use agrochemicals with negative environmental impacts. These inputs are not exploited in organic systems, instead biological inputs are applied. Even if the effects on the environment are less severe than those of traditional farms, depending on the production area, organic wheat yields are disproportionately low (Smith et al., 2019).

Wheat yield uses material and energy inputs, including fertilizer and fuel, for various operations (Vinci et al., 2022). The huge amount of agrochemicals and fuels associated with global wheat yield has had serious environmental implications since the Industrial Revolution and, more recently, the Green Revolution (Acevedo et al., 2018).

The technology of cultivating winter wheat in a conservative system (the minimal tillage variant and the direct sowing variant in stubble) is practiced on increasingly large areas and aims to reduce energy consumption, conserve soil and water, organize an adequate crop rotation, protect plants with environmentally friendly substances, and reduce soil erosion and compaction.

The conservative system (no-tillage) has the advantage of better water conservation in the soil, which can be gradually used by plants during drought periods. The economic efficiency of the no-tillage tillage system results mainly from the reduced fuel consumption (approximately 50%) and the reduced number of soil works, which determines a reduction in total technological costs (Chețan et al., 2017). Not only the tillage system, but also the type of soil and the agricultural machinery used have a major effect on cereal yields (Ferrández-Pastor et al., 2018).

This paper describes the effect of tillage systems on crop establishment, quality indices and yield of wheat crop.

MATERIALS AND METHODS

The paper contains experimental results obtained in the 2023-2024 agricultural year in the cultivation of winter wheat, by practicing a technology based on soil improvement (scarified, nonscarified) and basic soil works, in a classical system (deep plowing, normal plowing) and conservative (discultivation, direct sowing in stubble).

The three year crop rotation (corn, peas, and wheat) took place at the experimental field of A.R.D.S. Pitești in 2023/2024 season. The study was conducted on a typical luvosol soil type, which has a clay texture (27.2% clay content in the 0-20 cm layer), poorly supplied with nitrogen and phosphorus (Nt = 0.130% mg/, PAL = 31 mg/kg), moderately supplied with potassium (KAL = 83 mg/kg) with a humus content in the arable horizon of 2.1% and pH = 5.3.

The experimental design method used was that of subdivided plots arranged according to the completely randomized block method in four repetitions.

As part of the experiment, variants with four graduations were established (deep plowing, normal plowing, discing and direct sowing), on two agro-funds: scarified and nonscarified.

Plot dimensions were 560 m^2 (5.6 x 100 m).

In the autumn of 2021, scarification was only done at the experiment's establishment, at a depth of 40-50 cm, the wheat crop benefiting from the effects of loosening in the third year of cultivation.

Loosening is the right solution for working the soil after repeated plowing, breaking the formed hardpan, achieving deep loosening, which contributes to improving the aerohydric regime and increases the amount of water stored in the soil.

Scarification is not a long-term solution, because soils easily recomplicate and it is necessary to repeat it, and over time the intensity of compaction and recompaction increases. This is why these soil improvement works also require other measures to prevent compaction, which should include long-term rotations with improving plants, organic fertilization and a rational soil tillage system.

In the conventional (classic) system, sowing was carried out on 26.10.2023, with the SUP-31 seeder, at a sowing depth of 4cm-5cm. The wheat variety used was Ursita. The sowing density was 550 germinating seeds/m², corresponding to a quantity of 281 kg/ha of seed.

In the unconventional (no till) system sown directly into stubble, sowing was also carried out on 26.10.2023, with the Mzuri Pro-Til 3T Select seeder from ETU-Farm under the same technological conditions as in the conventional system.

The fertilization formula used was N_{128} P_{92} K_0 s.a. kg/ha. Basic fertilization was carried out before sowing where complex fertilizers of the $N_{18}P_{46}K_0$ type were applied, in a quantity of 200 kg/ha of commercial product. In the spring, when the plants resumed vegetation, the nitrogen dose was completed by applying the commercial product urea 200 kg/ha.

In 2024, a treatment with the herbicide Floramix at a dosage of 260 g/ha plus 0.6 l/ha Dassoil adjuvant was conducted to manage weeds. The fungicide Falcon Pro was sprayed at a rate of 0.6 l/ha to combat ear and foliar diseases.

The wheat crop was harvested on 1.07.2024.

The results obtained were processed and statistically analyzed using the Polifact program.

The constantly changing climatic conditions have negative influences on the physiological mechanisms of cereal development, which are disrupted in particular by the prolonged droughts that are increasingly frequent in our country (Berca et al., 2023).

The research station is located in an area with a temperate continental climate, with a multiannual average temperature of the researched period over the last 10 years of 10.1°C.

The sum of multiannual rainfalls for the period is 609.4 mm. Its distribution is completely uneven, both during the year and from one year to another.

During September - July 2023-2024, temperatures and rainfalls were monitored and recorded using the weather station within the resort to track the influence of environmental factors on plant growth and development (Figures 1 and 2).

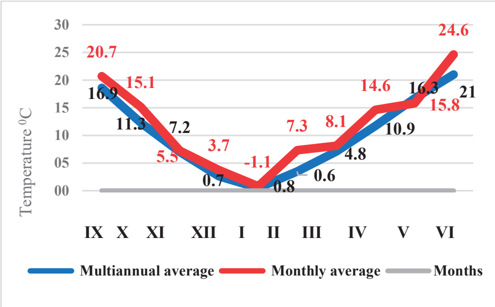

Figure 1. Temperature evolution between September 2023 to June 2024

Temperatures recorded between September and June (the growing season of wheat) recorded a positive average deviation of 1.7°C compared to the multiannual average.

The climate data for the 10 months characterize the year 2023-2024 as warm and dry, with increased temperatures with positive deviations from the multiannual average except for May which recorded a negative deviation of -0.9°C.

In the agriculture year 2023-2024, the average annual temperature recorded was 11.8°C, exceeding the multiannual average temperature of 10.1°C by 1.7°C (Figure 1).

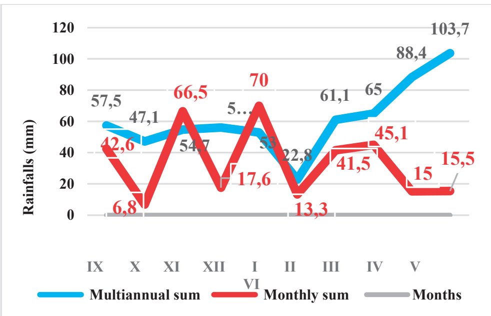

Figure 2. In 2023-2024 total monthly rainfall during the cropping season (September to June) at ARDS Pitesti

The climatic data of the researched period characterize the agricultural year 2023-2024 as dry, with low rainfalls with negative deviations from the multiannual amount, with the exception of the rainfalls in January which recorded a positive deviation of 17 mm compared to the multiannual amount of 53 mm. The monthly rainfalls sum for the period recorded a value of 334.2 mm, registering a deficit of -275.2 mm, compared to the multiannual sum of 609.4 mm.

Under these conditions, with temperatures with a positive deviation compared to the annual average and rainfalls with a negative deviation compared to the multiannual average, wheat sown in the optimal period emerged with a very long delay, staggered, with complete emergence occurring in the second decade of December, which no longer allowed the twinning period to be completed in the autumn.

RESULTS AND DISCUSSIONS

The correct choice and application of tillage systems has a significant effect on grain yield and quality. They can play a decisive role in achieving optimal wheat yields, directly influencing not only yield but also long-term soil health and sustainability (Chetan et al., 2017).

The studied factors (scarified, nonscarified; working depth of basic soil works) as well as the climatic conditions recorded during the research period influenced winter wheat yield.

In the fall season of 2021, scarification only took place at the experiment's establishment, at a depth of 40-50 cm. The wheat crop benefited from the effects of loosening in the third year of cultivation

Table 1. Influence of soil scarification on wheat yield

Factor A	Grain yield (kg/ha)	%	Diff.	Semnif.
A_1 - nonscarified soil	**5398.7**	**100**	**-**	**Mt**
A_2 - scarified soil	**5683.4**	**105.3**	**284.6**	***
LSD 5%		1.26	**68.03**	
LSD 1%		2.17	**117.18**	
LSD 0.1%		5.12	**276.68**	

As can be seen from Table 1, the average wheat yield on nonscarified soil recorded a value of 5398.7 kg/ha, and on scarified soil 5683.4 kg/ha with a very significant positive difference of 284.6 kg compared to the control variant.

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From the results obtained on the soil (typical luvosol) in the Pitesti high plain area, it is observed that the scarification work performed indicates an increase in wheat yield.

Table 2. Influence of soil tillage on wheat yield

B-Factor	Grain yield kg/ha	%	Diff.	Semnif.
b_1 - deep plowing (control variant)	**5898**	**100**	**-**	**Mt**
b_2 - normal plowing	**5434**	**92**	**-464**	**000**
b_3 - disc	**5298**	**89.8**	**-600**	**000**
b_4 - direct sowing	**5534**	**93.8**	**-364**	**00**
LSD 5%		3.71	**218.9**	
LSD 1%		5.08	**299.8**	
LSD 0.1%		6.92	**408.6**	

In the conventional (classic) tillage system, deep plowing considered as the control variant, the yield value was 5898 kg/ha. The normal plowing variant recorded a value of 5434 kg/ha, with a very significant negative difference of 464 kg/ha compared to the control.

The average yield in the conservative system with minimal soil work (disc) had a value of 5298 kg/ha, the difference of 600 kg/ha is very significantly negative compared to the control variant.

In the conservative soil tillage system, direct sowing variant, yield recorded a value of 5534 kg/ha, with a distinctly significant negative difference of 364 kg/ha compared to the control variant (Table 2).

Evolution of morphological characters of wheat in the conservative tillage system

Regarding the influence of the two factors, the total biomass production ranged between 12550 kg/ha and 16825 kg/ha. On the nonscarified soil agrofond, the differences were smaller (12550-15475 kg/ha).

From the data of the factor A nonscarified soil it results that the highest increase was in the control variant (deep plowing), then slightly lower but similar values were recorded in normal plowing and disc. A positive element was observed in the direct sowing variant of wheat where the total biomass yield was 13025 kg/ha, respectively 500 kg/ha more than normal plowing and disc. The explanation is given by the fact that although the achieved density was lower (the nutrition space is larger) the plants had a more vigorous development compared to the normal plowing and disc variants.

Under conditions where the soil was scarified, significant increases were recorded in all four tested variants.

Table 3. The influence of experimental factors on wheat yield elements

Factor A	Factor B	Biomass yield (kg/ha)	%	Ears yield (kg/ha)	%	Grain yield (kg/ha)	%	TGW (g)
A_1 nonscarified soil	**deep plowing control variant**	**15475**	**100**	**8993**	**58.1**	**5627**	**36.4**	**36.9**
	normal plowing	12675	81.9	7543	59.5	5347	42.2	36.8
	disc	12550	81.1	7428	59.2	5144	40.9	36.0
	direct sowing	13025	84.2	7583	58.2	5477	42.0	37.6
A_2 scarified soil	**deep plowing**	16825	108.7	9123	54.2	6169	36.7	37.2
	normal plowing	13725	88.7	7738	56.4	5520	40.2	37.1
	disc	13688	88.4	7635	55.8	5453	39.8	36.9
	direct sowing	15625	101.0	7763	49.7	5590	35.8	38.4
Averange		**14198.5**		**7975.7**	**56.4**	**5541**	**39.3**	**37.1**
LSD 5%		**1093.55**	7.06	**222.93**	2.48	**381.77**	6.78	**0.77**
LSD 1%		**1603.28**	10.36	**313.39**	3.48	**524.37**	9.31	**1.14**
LSD 0.1%		**2698.33**	17.43	**466.16**	5.18	**721.49**	12.82	**2.00**

The highest biomass yield was obtained in the conventional system on deep plowed scarified soil of 16825 kg/ha. In the normal plowing and disc plowing variants the values were close, 13688-13725 kg/ha. In the direct sowing variant the same phenomenon of increase in the amount of biomass (15625 kg/ha) was observed with a significant effect (Table 3).

In terms of percentage, it was found that in the nonscarified variants, biomass yield represented between 81 and 84% of the deep plowed control. In the scarified variants, increases were found over the control (deep plowing and direct sowing over 100%), and in the normal plowed and disced variants, biomass approached 90% of the control value.

Regarding the yield of ears, values between 7428 and 8993 kg/ha were recorded on the nonscarified agricultural land. With the scarification action, the yield of ears was somewhat higher, namely between 7635 and 9123 kg/ha.

In terms of percentage, in the variants on nonscarified soil, the ear yield represented between 82 and 84% of the control. On the scarified soil, the ear production was expressed at higher values, between 7635 and 9123 kg/ha. These constituted 95-96% in the variants with normal plowing, disc plowing, direct sowing, while in the variant with deep plowing, wheat produced 1.4% more than the experimental control.

Grain yield primarily expressed a characteristic of the crop year.

In the nonscarified soil variant, a certain uniformity of the yield level was found, between 5144 and 5627 kg/ha. From a statistical point of view, there are slight significant differences. In the scarified soil variant, differences were found, between 5453 and 5590 kg/ha on the last three variants and over 6169 kg/ha in the deep plowed variant.

From a percentage point of view, the figures follow the grain yield values, namely below 91-97%.

In the case of scarification, the deep plowing variant induced a significant increase, compared to the rest of the variants which were below the control level.

Regarding the absolute mass values of wheat grains, a relative uniformity was found throughout the experiment with one exception. Thus, the TGW had values between 36 and 37.6 g in the first seven variants, including the variant control. The exception was variant eight with direct sowing on scarified soil, where the value obtained was 38.4 g. One of the explanations would be that in this wheat crop year, the climatic conditions and the scarification work ensured more favorable conditions.

Analyzing the entire experiment in the 2023-2024 agricultural year, it was found that the Ursita wheat variety produced 14199 kg/ha of total biomass. Considering that most winter wheat varieties yield between 14000 and 16000 kg/ha of total biomass, we consider that in this crop year the quantity obtained was satisfactory.

Of the total biomass obtained, the ears represented an average quantity of 7976 kg/ha, which represents a percentage of 56.4%. We also consider in this case that the percentage in which the plant produced ears biomass was high. From a biological point of view, the Ursita variety, having a relatively low to average height, the spike biomass is considered more than satisfactory.

The average grain yield was at an average level of 5541 kg/ha. In percentage terms, this production constituted 39.3% of the total wheat biomass. Given this percentage of grains in the total biomass, it is considered that the Ursita variety can be classified as an intensive variety. Grain yield and the assessed crop's quality indices are both greatly increased by planting winter wheat following peas. Plaza-Bonilla et al. (2017) also showed that prior leguminous crops had a favorable impact on wheat output, as they acquired a better grain yield following a pea (*Pisum sativum* L.) crop than following a sunflower (*Helianthus annuus* L.).

Table 4. Influence of soil tillage on wheat quality indices

Factor A	Factor B	Protein PB (%)	Starch (%)	Gluten (%)	Zeleny index (ml)	MH (kg/hl)
A_1 nonscarified soil	deep plowing control variant	12.4	69.7	24.1	37.9	84.5
	normal plowing	12.1	69.2	22.8	36.5	83.6
	disc	12.0	67.8	24.0	41.5	85.6
	direct sowing	11.4	70.0	21.6	31.7	85.2
Averange		11.9	69.2	23.1	36.9	84.7
A_2 scarified soil	deep plowing	12.9	68.7	25.1	41.3	83.9
	normal plowing	12.9	68.5	25.9	44.0	84.5
	disc	12.7	68.7	25.1	41.5	85.7
	direct sowing	12.4	69.1	24.0	37.3	84.4
Averange		12.7	68.7	25.0	41.0	84.6
Total averange		12.3	68.9	24.1	38.9	84.66
LSD 5%		0.85	1.97	2.69	9.53	1.40
LSD 1%		1.20	2.91	3.96	14.24	2.05
LSD 0.1%		1.85	4.99	6.79	25.22	3.44

To establish the quality indices, the NIR PERTEN analyzer model Inframatic-9500 was used.

Regarding crude protein (PB %) in the nonscarified variants, the values were between 11.4 and 12.4%. From a qualitative point of view, the soil tillage variants, disc and direct sowing, fall into the second category, while the deep plowing and normal plowing variants correspond to the first quality category. By applying the scarification work, the PB % values fell between 12.4 and 12.9%, which corresponds to the first quality category for all variants. The average crude protein value recorded 12.3%, which corresponds to the first quality class, in all soil tillage systems (Table 4). Similar results were obtained by Leonte et al. (2024), who showed that the soil tillage system did not influence the protein, oil and starch content of wheat grains, these quality indices registering close values between the studied variants.

On the nonscarified soil, the starch content was between 67.8 and 70%. Of these, only the disc variant was in the good starch category. The average of the A_1 factor (69.2%) is in the very good category. By scarifying the soil, values between 68.5 and 69.1% were obtained.

After analyzing the results obtained, it is observed that the average starch content in the variants carried out on scarified soil was below the very good category.

At the level of the entire experiment, it was found that the average starch (68.9%) is slightly below the conditions of the very good category.

Wet gluten recorded values between 21.6 and 24.1% on the agrofond nonscarified soil. The highest values were obtained in the deep plowing and disc plowing variants, respectively 24%. The average gluten content in wheat grains in the nonscarified soil variants was 23.1%. By scarification, the gluten content varied between 24% (direct sowing) and 25.9% (deep plowing). The average of the A_2 factor (scarified) was 25.0% (wet gluten). By comparing the average of the two A factors, a difference of 1.9% more gluten in favor of the scarified soil variants is found (Table 4). At the level of the entire experiment, wet gluten had an average of 24.1%, which demonstrated a satisfactory quality classification.

The fourth characteristic studied, namely the Zeleny index, characterizes the possibility of classifying bread wheat according to certain indices.

The four soil works performed without scarification recorded Zeleny indices ranging between 31.7 and 41.5 (ml). The highest value of the Zeleny index was obtained in the conservative system, the minimal-disc works variant, 41.5, and falls into the good category. The average of the A1 factor (unscarified soil) was 36.9, also falling into the good category. Through the scarification work, the wheat recorded Zeleny index values ranging between 37.3 and 44.0 (ml). The highest value was obtained in the normal plowing variant. At the level of the entire experiment, the Zeleny index was 38.9, which places the wheat quality in the Good category. The average of the works based on scarification was 41.0, which means good quality (Table 4). Similar results were also obtained by Bărdaș et al., in a two-year experience (2015-2017) carried out at the ARDS Turda, the protein percentage obtained by them being between 12.1 and 13.8%, gluten between 23.5 and 27.3%, and the Zeleny index between 35 and 48% (Bărdaș et al., 2024).

From the data presented in Table 4 it appears that the highest value of the hectoliter mass MH was recorded in the conservative system, the variant with minimal disk work on scarified soil (85.7 kg/hl). The lowest value of MH (83.6 kg/hl) was obtained in the conventional system, the variant with normal plowing.

The tillage system did not determine significant differences in the average hectoliter mass MH, the values recorded being 84.7 on nonscarified soil and 84.6 on scarified soil.

The soil tillage system applied to the wheat crop influenced both yield and quality indices, falling into the good quality group.

The yield and technological value of wheat grains are genetically determined and depend mainly on the properties of the variety, as well as on agronomic and environmental factors (Horvat et al., 2015)

The correlations of the qualitative indices of wheat production (Ursita) concerned: crude protein (PB%), starch content, gluten, Zeleny index, TGW and MH (Table 5; Figures 3-6).

Regarding grain yield, it had insignificant positive relationships with protein, gluten, Zeleny index and TGW and insignificant negative correlations with starch and MH.

Table 5. Correlations obtained regarding the values of the qualitative indices studied in wheat

	Grain yield (kg/ha)	**Protein (PB %)**	**Starch (%)**	**Gluten (%)**	**Zeleny index (ml)**	**TGW (g)**	**MH (kg/hl)**
Grain yield (kg/ha)	1	0.164	-0.095	0.109	0.045	0.193	-0.298
Protein (PB %)		1	-0.254	**0.793**	**0.641**	0.074	-0.059
Starch (%)			1	**-0.551**	**-0.803**	**0.375**	-0.028
Gluten (%)				1	**0.891**	-0.146	0.141
Zeleny index (ml)					1	-0.282	0.124
TGW (g)						1	-0.248
MH (kg/ha)							1
	DL 5%=0.35		**DL 1%=0.45**		**DL 0.1%=0.55**		

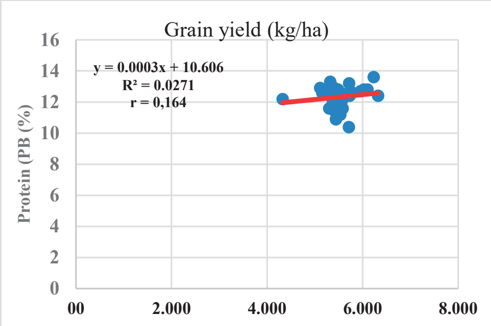

Figure 3. Correlation between crude protein content (PB %) and grain yield (kg/ha)

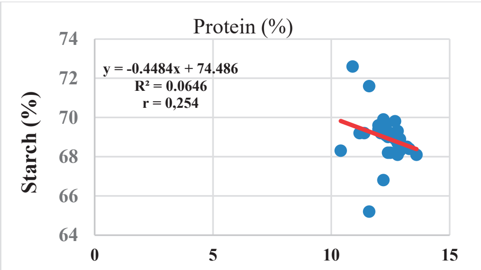

Figure 4. Correlation between starch content and crude protein (%)

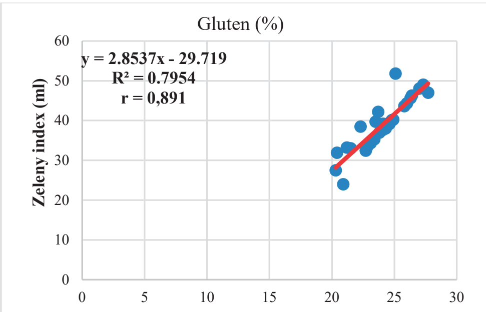

Figure 5. Correlation between Zeleny index (ml) and gluten %

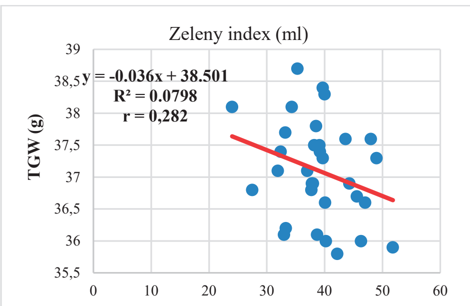

Figure 6. Correlation between TGW (g) and Zeleny index (ml)

Regarding the links (correlations) between the quality analyses performed, different situations were found. From the data obtained, both positively significant and negatively significant situations were found. Regarding the correlations with the grain yield obtained, it is establish that protein and gluten along with TGW demonstrated positive but insignificant links. This situation proved positive in the experiment due to the fact that the variants favored the formation of crude protein (PB%) and additional gluten.

Grain gluten has a very significant positive correlation with the Zeleny index and demonstrates a very favorable direct link in bread production. Another favorable element was found between gluten and MH through the positive correlation coefficient, a necessary element in the valorization of wheat grains.

The protein content of cereals is one of the most important criteria for determining the quality of common wheat (*Triticum aestivum*). One of the major obstacles to the yield of wheat for bread making is the negative correlation between protein content and grain yield (Geyer et al., 2022).

This is backed up by another positive feature, specifically the rise in the Zeleny index, which is advantageous when obtaining bakery goods. However, the development of heavier grains also contributed to the rise in wheat grain output.

CONCLUSIONS

In the research with conservative works (disc and direct sowing) in the winter wheat crop, a specific improvement was generally found in both plant biomass and quality analyses on the two agrofund systems (nonscarified soil-scarified soil).

The experimental results obtained on wheat crops in the 2023-2024 agricultural year, under the conditions at ARDS Pitesti, indicate an increase in wheat yield in scarified variants, thus resulting in the need to carry out scarification work once every 3 years.

The tillage systems influenced the grain wheat yield obtained per unit area, the values being different depending on the tested variants.

As a result, the conventional tillage system produced the maximum wheat yield (6169 kg/ha for the deep plowed scarified soil version) while the conservative method produced the lowest yield (5144 kg/ha for the experimental disk variant).

Under terms of TGW evolution, it fluctuated between 36.0 g of nonscarified soil under the conservative minimal work-disc approach to 38.4g on scarified soil when direct sowing was used. The scarified soil variant recorded values of 36.8 g for the wheat crop's one thousand grain weight, while the nonscarified soil variant recorded values of 37.4 g. The difference between the two tillage soil tillage variants was 0.6 g. Regarding the crude protein content in wheat grains, similar values were recorded in both tillage systems, 12.6% for the conventional system and 12.2% for the minimal tillage system.

The percentage values of starch content in the wheat grain ranged between 67.8% disk -70% direct sowing, both on nonscarified soil and between 68.5 and 69.1% on scarified soil.

The wet gluten showed positive values, almost all having values above the technical minimum of 22%. The exception is the direct sowing variant on nonscarified soil in which the gluten was at 21.6% very close to the normal limit. At the same time, all the works carried out on scarified soil were registered at the value of 25%, which means an increase in quality over the scarified variant.

The Zeleny index demonstrated, from the bakery quality point of view, values that fell within the good range (Zeleny index 38.9 ml). At the same time, it was found that in the conservative system, the direct sowing variant, the Zeleny index (34.5 ml) was in the satisfactory category.

The hectoliter mass MH kg/hl determined in both soil work systems (conventional and conservative), unscuffed and stubbled soil had average values of over 80 kg/hl, which qualifies the yields obtained in category I.

From an economic point of view, such values achieved in experience indicate obtaining higher prices per product unit.

Both positive and negative relationships were found among the analyzed indices. The correlations obtained between grain production with protein, gluten and TGW recorded insignificant positive relationships.

In the 2023-2024 agricultural year, we found that, in practice, the conservative method (disc, direct sowing) produced outcomes with comparable values to the conventional system (plowing) in terms of biomass and quality indices.

Considering these positive aspects obtained in the experimental field of the ARDS Pitești, it is recommended to promote the conservative soil cultivation system - disc harrowing and direct sowing - in wheat crop.

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