

STUDIES ON STARCH CONTENT OF SOME WHEAT SPECIES UNDER GROWING CONDITIONS FROM SUCEAVA PLATEAU

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Abstract

The wheat is an important starch resource for the bio-ethanol production due to the good accessibility at a rich start source. Some wheat varieties and lines are studied in order to select the most adequate from the point of view of the starch content. There is a direct correlation between the starch content and the protein content of the wheat.

Keywords: *Wheat varieties, starch, protein, bio-ethanol.*

Introduction

There is a large orographic and soil-climate area in Moldavia, especially in the northern and North-West part, fact that offers favorable conditions to winter wheat growing. In this region of the country where a chillier and wetter climate prevails, wheat belongs to, besides potato and corn, the main agricultural plants, bringing a great contribution of significant production to the Romania's global wheat crop. On the other hand, these plants are the main starch source for alcohol manufacture, used both in food industry and as a non-conventional fuel (Mencinicopski, 1996).

Bio-ethanol utilized as fuel can be obtained from molasses and starchy raw materials to which enzymatic treatment is applied to, in order to increase the content of fermentable glucids (Dan, 2001).

To this sense, a series of studies were carried out in order to determine the starch and protein content of some wheat species cultivated in the area, as well as to identify the most suitable autochthonous and foreign winter wheat species, in view to use them as raw material for non-conventional fuels (Holzberg, 1967; Banu, 1987; Lehninger, 1987).

From a quantitative point of view, wheat grain sugars have greater importance, due to the fact they have the biggest weight in the wheat caryopsis. Compositionally, they are represented by monosaccharides, fermentable oligosaccharides and polysaccharides (mainly starch, dextrin, hemicellulose and cellulose). Starch represents almost 85-90 % of glucid total and is being accumulated in endosperm as granules, storage substance. Cellulose and hemicellulose prevail in the peripheral parts of the wheat grain. (Sarbu, 2001).

Alcoholic fermentation, bio-process based on production technology of ethyl alcohol is an anaerobic process by which fermentable glucids are metabolized by oxide-reduction reactions under yeast enzymatic action into main products (ethyl alcohol and carbon dioxide) and by-products: higher alcohols, acids, aldehydes, etc. (Dan, 2001).

The brewer's grains, resulted from alcoholic fermentation, have a high content of protein that can be valorized under the form of protein concentrates in animal's feed.

Experimental

The experiments were carried out on eight species of wheat grown by S.C.D.A Suceava (yield 2005). The main characteristics of the tested varieties are (Gaspar, 1996):

Flamura 85 variety created by I.C.D.A.- Fundulea, has a high production potential up to 8.5 t/ha, has good falling -resistance, as well as good resistance at the attack of main pathogenic agents. The plants have a medium height of 85 cm and a medium wintering resistance.

Dropia variety, created also by I.C.D.A – Fundulea is characterized by the same yield as Flamura 85, by a medium resistance against the main diseases and wintering and by a good falling- resistance. The plants are higher with 7-8 cm as compared to those of Flamura 85 variety.

Gasparom variety, created by S.C.D.A Suceava is characterized by plants of medium height that have the same falling-resistance as the standard variety (*Flamura 85*). Unlike to this latter one, Gasparom has a very good wintering resistance and is more resistant to septoriose, the

most “aggressive” pathogenic agent from our area. Therefore, it has the highest production potential that may reach up to 10 t/ha in the very favorable years.

Magistral variety, created by S.C.D.A Suceava has the best falling-resistance, a very good wintering resistance (the same as Gasparom variety), is two- day more precocious than the standard one and it is similar to this one regarding the plants’ height, and is different by a higher production potential that reaches 9.5 t/ha.

Drobeta variety, created by S.C.D.A Suceava has a high production potential up to 9 t/ha, very good wintering resistance, remarkable falling and satisfying resistance against most pathogenic agents in the area.

Voronet variety, created also by S.C.D.A Suceava has also a high production potential up to 9.5 t/ha, high falling-resistance possesses good wintering and satisfying resistance to the main diseases. It is similar to the standard variety (*Flamura 85*) regarding the plant’s height (86 cm), but it is two-day belated than the latter one.

Sv 2071-00 line is different from the standard by an increased yield with 1 t/ha, reaching up to 9.5 t/ha as well as a better resistance to the most damaging agent in the area.

Cezanne variety (French line) has a very good falling-resistance, medium sensitivity at winter conditions in Suceava.

Chemical determinations:

The starch turns into soluble glucids by hydrolysis. The determination of reducing glucids has been made by the chemical Luff-Schoorl method (ISI 28-1e). The method principle consists in treating the sample to be analyzed with an excess of Fehling reagent. Determination of reducing glucids is based on the iodometry determination of Fehling agent excess (Segal, 1990). The protein is determined from the total nitrogen by Kjeldahl method. Humidity is determined by Mettler Toledo thermo-balance.

Results and Discussions

Generally, the studied varieties belong to the genotypes group with a high starch and protein content, as a result of a significant genetic progress. Therefore, between them it was not registered significant differentiations.

Table 1. The main characteristics of the studied wheat varieties.

Variety or line	Starch %	Protein %
Flamura 85	69.15	13.9
Dropia	68.50	13.8
Gasparom	68.65	13.8
Magistral	69.21	13.8
Drobeta	67.54	13.4
Voronet	68.80	13.6
Sv 2071-00	67.69	13.3
Cezanne	67.91	13.7

Among the varieties from the table 1, Magistral, Flamura 85, Gasparom and Dropia are remarked due to the highest levels both of starch and brute protein. Unlike of them, the SV 2071-00 line and the Drobeta variety have a smaller content both of starch and brute protein.

The starch content ranks among 67.54 % - 69.25% so, the wheat studied varieties and lines can be used as raw material in alcoholic fermentation.

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The brewer's grains, resulted from alcoholic fermentation, have a high content of protein that can be valorized under the form of protein concentrates in animals' feed.

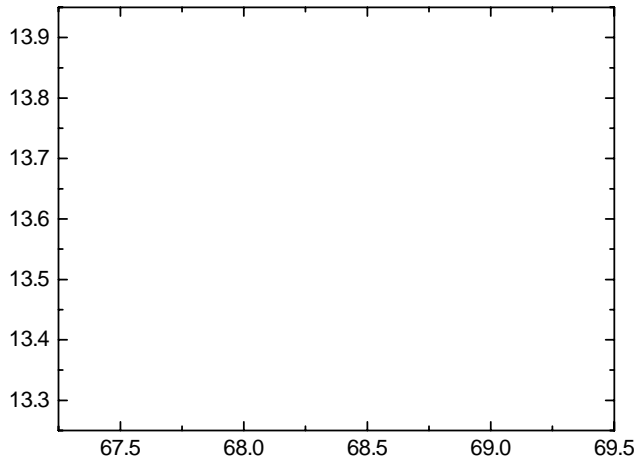


Figure 1. Correlation between the starch grain units % (s.u) and protein % (s.u) on the eight studied and grown species from S.C.D.A Suceava.

The high value of the correlation coefficient, and his good significance ($R = 0.8048$), permits to spotlight that the varieties with a big amount of starch also have a big amount of brute protein (see Figure 1).

At the same time, it must be mentioned that both the linear regression (Figure 1) and the value of the correlation coefficient does not indicate any proportionality relationship.

Conclusions

The research carried out in view to identify and create some more valuable, productive varieties, well-adapted to growing conditions from the North of Moldavia, finally led to a significant genetically progress.

There are no great differences between the experimented varieties and lines: from the quality characteristics point of view they are belonging to cereals of good qualities.

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