Organic Wheat Genotypes in Romania

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Romania is a "wheat country", as many other East-European and Asian countries, because of widely cultivated of this crops, especially for grains used in making bread and pasta. The wheat is alone crops which can be used, fresh or baked, *from seeds to seeds,* for its essential nourishment importance in the diet of humans and animals. Also, in Romania the main cultivated wheat species are winter *Triticum aestivum, Triticum durum* and, in the last time, *Triticum spelta.*

Organic wheat is still an unknown for many farmers, in specially the organic genotypes which may have *a greater impact than agricultural techniques* (Claude Aubert, 2006). The breeding of wheat for organic farming is still in "incubation" phase because of lack holistic concept and skills of wheat breeders. In this context, identification of wheat genotypes for organic farming seems to be, for the moment, alone practical solution to cultivate organic wheat genotypes.

This paper aims to evaluate the effects of organic farming system on yields and quality index of winter wheat varieties for bread with a view to identifying of the best organic wheat varieties.

Materials and methods

The study consisted in a trial with 24 winter wheat varieties for bread from Romania (first 18 + Litera) and other European countries (France - 2, Austria – 2 and Hungary – 1), carried out in 2008 and 2009 in an organic field of the Agroecological Center of Research, Innovation and Technical Assistance Fundulea, placed in Muntenia, one of the representative Romanian agriculture area with a continental climate and chernozem soils. Also, the cropping system in this experiment consisted in: previous crop – lens and minimum tillage - disk harrow: 2 times + combinator (ones) for seedbed preparing and flex-tine harrows (ones), in spring for weeds control.

The yield index - plant height and grain yield were estimated by gravimetric methods and quality index - protein and gluten, with an infrared analyzer, INSTALAB 660.

Results and discussion

Winter wheat is one of the main crops in Romania with more than 2.0 million ha cultivated each year. Organic winter wheat is, also, an important crop (tab.1) with an annual increasing tendency of area and yield in 2000 – 2007 period of the 4010 ha, respective 8281 tons. Evolution of the average yield (tons/ha) was more or less chaotic, with 2 distinct period, first 4 years with less than 2 t/ha and last 4 years with more than 2t/ha. Also, in this short organic wheat history, was registered a minimum average yields (0.9 t/ha) in 2003 because of a strong spring drought and pest infestation and a maximum in 2006 (2.97 t/ha) and, may be, in 2008, because of the favorable climate and international market.

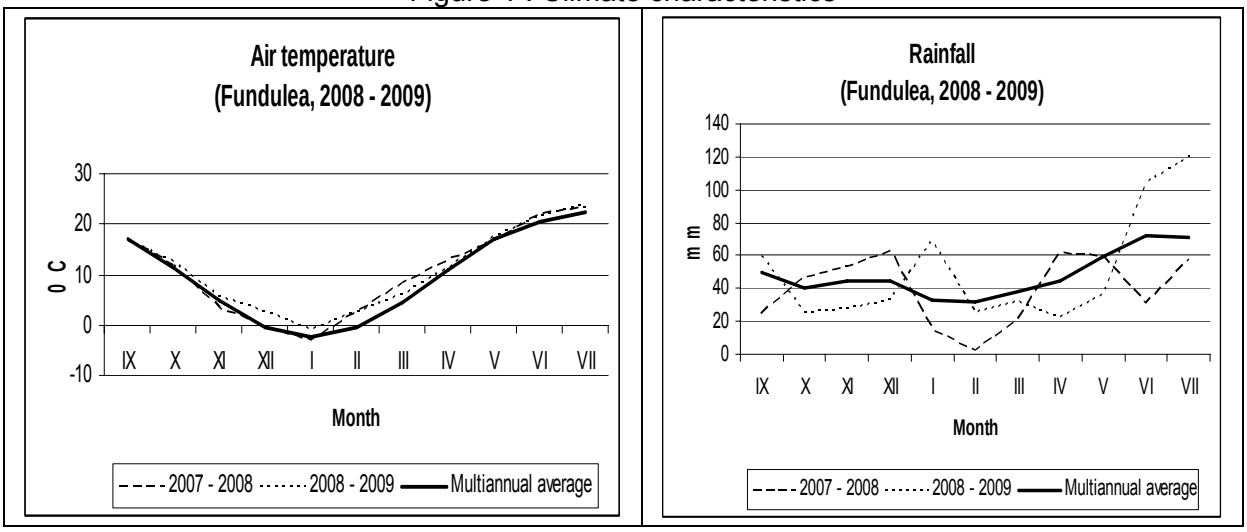
Table 1. Evolution of the organic wheat area and yields
(Romania, 2000 – 2007)

Year	Area (ha)	Yields	
		Total tons	tons/ha
2000	4 000	7 200	1.80
2001	8 000	12 500	1.56
2002	12 000	16 000	1.33
2003	16 000	14 400	0.90
2004	20 500	41 000	2.00
2005	22 100	55 000	2.49
2006	16 310	48 441	2.97
2007	32 222	65 127	2.02

Source: M.A.P.D.A.R & Certification bodies

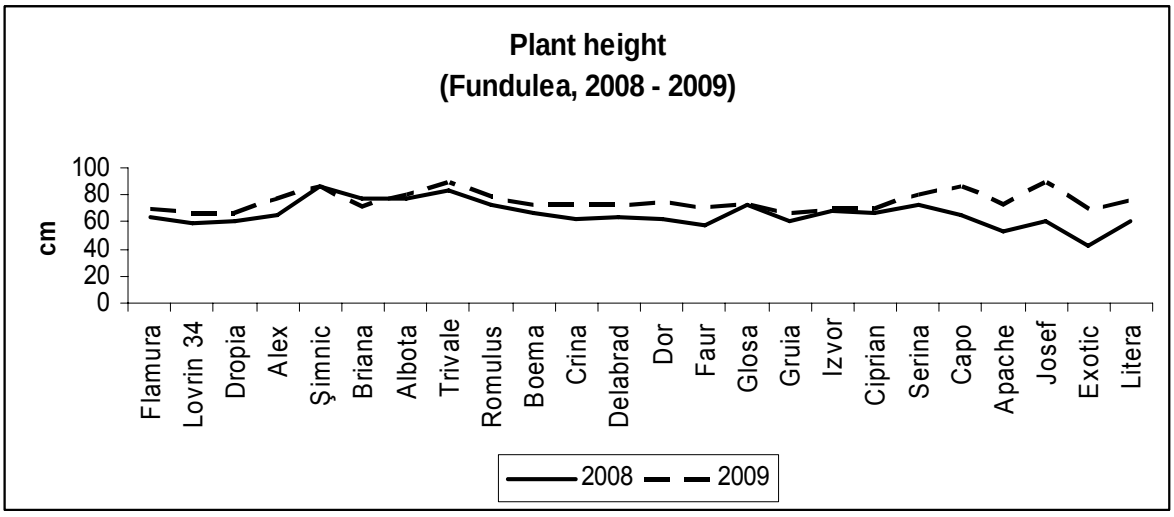
The impact of climate on winter wheat is inevitable because the growing of wheat take place in all 4 sessions of the year: autumn, winter, spring and summer. In figure 1 it is showing the main climate characteristics of the last 2 years which had an influence on all yield index – a higher air temperature than multiannual average and less rain for the whole vegetation period, especially in spring month.

Figure 1 . Climate characteristics



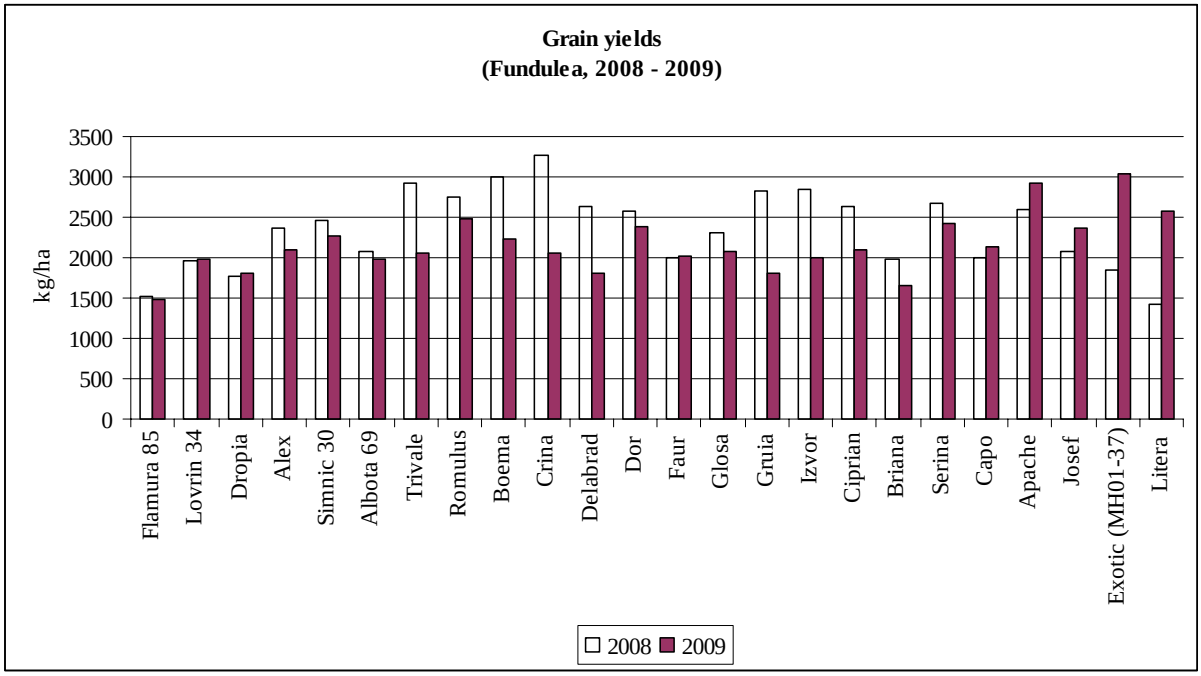
The effect of climate was significant on phenotypic features – plant height and grain yields.
The plant height (fig. 2) is important for the weeds competition, because the high crop correspond with less weeds infestation. Therefore, in our study, in 2009 was registered a less weeds infestation than in 2008 and each year the cleanest plots were cultivated with the highest varieties: Simnic 30, Trivale, Albota 69, Serina and Capo.

Figure 2. Plant height



Unfortunately, the plant height is in a weak correlation with grain yields (fig.3), the best varieties, Romulus and Apache, with a average yields constant higher than national multiannual average (2500 kg/ha), have a medium height. Majority of the highest wheat varieties are in a group with a average yield between 2000 – 2500 kg/ha: Simnic 30, Trivale, Serina and Capo.
Also, with exception of 5 genotypes (Capo and Josef from Austria, Apache and Exotic from France and Litera from Romania) which have a higher yields in 2009 than in 2008, the previous year (2008) is got higher yields for all other varieties. The highest yields is got in 2008 by Romanian genotypes Crina (3272 kg/ha) and Boema (3008 kg/ha), and in 2009 by French varieties Exotic (3042 kg/ha) and Apache (2928 kg/ha).

Fig 3. Grain yields



As regards the gluten content (tab. 2), in our study is observed 5 wheat varieties with gluten content constant higher than the standard (min. 22%), of which Delabrad variety is in the top because the high quality is genetically conditioned.

Table 2. Wheat varieties for bread
(Fundulea, 2008 – 2009)

Wheat varieties	Variety	Origin	Gluten content (%)
Flamura 85	Erythrospermum	Romania (NARDI Fundulea)	22.3
Dropia	Erythrospermum	Romania (NARDI Fundulea)	22.5
Briana	Erythrospermum	Romania (RDS Simnic)	23.1
Crina	Erythrospermum	Romania (NARDI Fundulea)	23.0
Delabrad	Erythrospermum	Romania (NARDI Fundulea)	24.6

Conclusions:

1. Evolution of the organic wheat area and yields in Romania is good, but not enough comparative with country potential and market demand;
2. The area and yields of organic wheat are under climate „sign", especially under future challenges: global worming and autumn and spring droughts;
3. The study of the last 2 years for identification of the best wheat varieties for organic farming proved that wonder genotypes, insensible to the climate change, resistant to the pest and diseases and, consequently, with constant big yields and high quality, do not exist.
4. In organic farming, it is recommended, for the moment, all wheat varieties with medium and high plant height and high yield potential, because, except Delabrad, the high quality of all other varieties is climatic and technological conditioned.

References

Claude Aubert, 2006: Organic agriculture quality and safety of food and human health, Sofia/Bg.

www.madr.ro & *Organisme de inspecție şi certificare*