# A NEW CROP OPENS NEW WAYS FOR THE MILLING AND BAKING INDUSTRY

***Erika Ács and Lajos Bona***
Cereal Research Ltd.
Szeged 6701, POB 391., Hungary
e-mails: erika.acs@gk-szeged.hu lajos.bona@gk-szeged.hu

**ABSTRACT**

Triticale (*Triticosecale* Wittm.) is a young, economical crop and its acreage has continuously been growing as the sustainability of farming is having superior status in all over the world. Today, triticale is a typical "on-farm" crop: farmers desire it as feedstock at their properties. Research reports however, revealed that this crop may be a useful, new ingredient in human consumption. This study is about the present situation and prospect of triticale production and utilization, particularly in human consumption. Lately, three environmentally sound triticale variety were developed in our institution for farmers for both low input, eco-production and conventional agronomical systems. In this study, we examined the most important milling and baking characteristics of these new triticale varieties.

Two of the tested triticales proved to have high alpha-amylase activities suggesting that using triticale component in target flour blends is desirable when improving the poor amylase activity of wheat components. The first Hungarian-bred spring triticale cultivar GK Idus has got exceptionally high kernel hardness as well as protein content. Thus, GK Idus can be used fairly in development of various whole mail cereals and confectionary industry. The results showed that all the tested triticales are suitable to use in human consumption, particularly to compose valuable flour blends using 10-50% triticale flour and 50-90% bread wheat flours as components. Triticale cultivar GK Szemes having exceedingly high loaf volume may be particularly valuable constituent in forthcoming baking industry.

## 1. INTRODUCTION

Triticale, the "human-made crop" developed by crossing wheat (*Triticum* sp. L.) and rye (*Secale cereale* L) is a young species if compare to its ancestors. The first crosses made at the end of the nineteenth century by botanist Wilson in Scotland, farmer Carman in the US, and breeder Rimpau in Germany. Actually, Rimpau was the first successful triticale breeder and his materials were used by subsequent researchers in many parts of the world (Ammar et al. 2004). In the last twenty five-year period (1988-2012), triticale has achieved an outstanding occupation in all over the world. The planting area of this crop has been steadily growing and according to the FAO statistics it reached over 4 million hectares by 2011. At the same time, the acreage of rye continuously decreased in recent decades. World rye production fifty years ago reached over 30 million-, while it decreased to 5 million hectares by today. In Hungary, triticale production started in late 1960's on sandy soil areas, in the middle regions of the country, around Kecskemet where A. Kiss exhibited his pioneer breeding efforts on this crop (Kiss, 1966, Kiss and Kiss, 1981). The results achieved by Arpad Kiss were outstanding ones: Triticale No. 57 and No. 64 the first ever released triticale varieties in the world were developed in Hungary (Zilinsky, 1985). Despite of the exceptionally successful breeding work, an adverse political-economical decision blocked the research, development and production of this crop in this country. In 1970, the authorities decided to terminate the extensive triticale breeding in Hungary. Kiss was forced to donate his valuable advanced materials to Polish scientists From that time, triticale breeding in Poland was enhanced substantially. Polish scientists has made tremendous efforts to improve adaptation of triticale (Bona and Kiss, 2002, Banaszak and Marciniak, 2002).

After a twenty year of 'silence', the revival of triticale production in Hungary started in the early 1990's. At this time, due to the political and economical changes in this region, the

renewing small family farms showed a strong interest in triticale. Small-holders and new private farmers discovered quickly the profitability of triticale - particularly on dry, poor, infertile soils. We continue our breeding activities on low-input varieties providing and environmental sound biological background for farmers and potential users in animal husbandry as well as in food industry. Based on this strategy, recently, three environmentally sound triticale varieties were developed in our institution suitable for feeding as well as for human food. Albeit, utilization triticale as human food is not a new idea (Salmon et al. 2002, Bona et al. 2002, Mc Goverin et al. 2011), till today, there is no role and regulation at any European Codex Alimentarus for grain and milled or crushed products on this crop. In this study, we examined the most important milling and baking characteristics of these new triticale varieties and also tested one winter bread wheat and one rye variety as controls.

## 2. MATERIALS AND METHODS

Recently released 2 hexaploid winter cultivars (GK Rege, GK Szemes) and a facultative-spring hexaploid cv. (GK Idus) were the subject of this study. Two control varieties were also incorporated (Jubilejnaja 50 /J-50/ winter wheat and Wibro rye). Grain samples were originated from the nursery field of our Experimental Station, Cereal Research Ltd., Szeged, Hungary, 2010 crop-year. Grain physical characteristics were identified by Perten SKCS 3100. Wet gluten, protein content and kernel hardness were tested by NIR and falling number (FN) of the entries was measured by Hagberg method. Probe loaves were baked and their parameters determined.

## 3. RESULTS AND DISCUSSION

Figure 1 shows that grain hardness of the tested entries positioned between 39 (rye cv. Wibro) and 96 (triticale cv. GK Idus). Triticale entries tested in this study were notably different from each other. GK Rege was similar to rye while and the GK Szemes reached the wheat hardness level. In this set, similarly its hardness the protein content of GK Idus was superior (data not shown). It suggest that special milled and crushed products may be elaborated when utilize the grain of this variety.

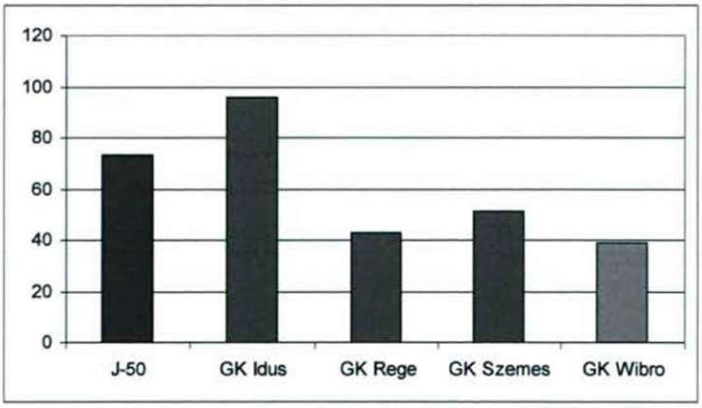


***Figure 1. Grain hardness of cereal entries assessed in the study***

Hagberg FN of the tested triticale entries ranged 122-357 s (Figure 2). The average of the triticale entries were similar to the rye entry. Records in the literature suggest that alpha amilaze activity of triticale generally high similar to rye (Boros 2006, Hajós 2007). Our

present data suggest that "enzyme-poor" wheat stocks such us J-50 in this study may be improved by using triticale addition to optimize blends. This study revealed that FN of some entries (i.e. GK Rege), however, can be as high as the average wheats.

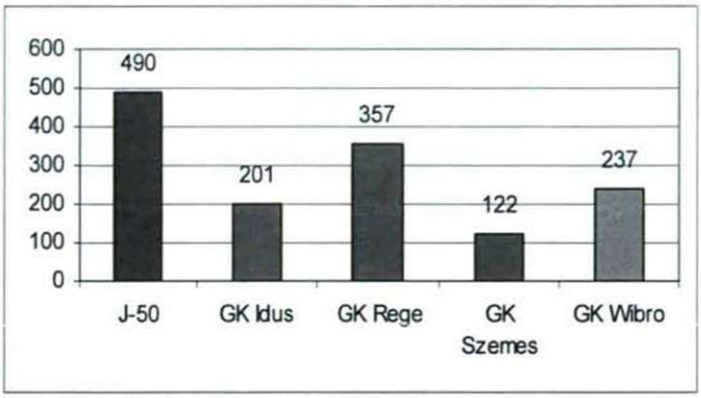


***Figure 2. Formation of falling numbers of the tested triticale, wheat and rye entries***

Wet gluten content of the flours ranged widely in this study. It was impossible to detect any gluten in the rye cv. Wibro, and with the exemption of GK Idus, poor wet gluten values were detected in triticale samples (data not shown).

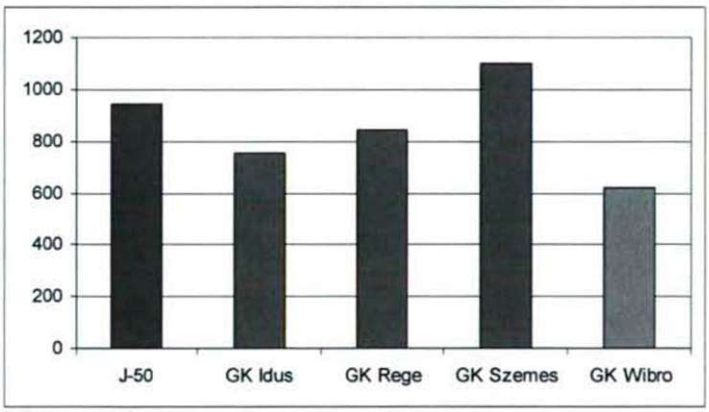


***Figure 3. Volumes ($cm^3$) of the experimental loaves baked from the triticale and control varieties***

The outcome of the experimental baking revealed that in spite of the poor gluten contents, triticale flours can be used in baking. Loaf volume of GK Szemes triticale reached an extremely high volume (Figure 3). The above results suggest that triticale flours may be used as valuable components when assembly high nutritional level flour blends for bread-making and other baking purposes. An extremely favorable textured bread can be baked when use the suggested triticale- wheat flour blend. Triticale variety GK Szemes has a prospect in bread making and general baking industry. Cultivar GK Idus may have a special legation in cookie and pasta industry and all of the tested entries may be used as good components in home economic purposes.

## 4. CONCLUSIONS

To date, the most common usage of triticale as a feed stock has been in poultry and hogs. It is obvious that the next major revolution in triticale breeding, production and utilization will be its innovation as human food. Based on our research, we recommend our recent triticale varieties for the cereal industry. Targeted triticale-wheat blends may be highly valuable food components in future cereal industry. Joint efforts of breeders and seed industrials, grain traders and millers, bakeries and food industrials will elevate the usage of triticale in human consumption and reach the consumer table with a healthy and high quality cereal food products.

## ACKNOWLEDGEMENT

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