Possibility of Exploitation of Serbian Local Varieties and Landraces of Cabbages (*Brassica oleracea* var. *capitata* L.): Case of "Futoski Cabbage" from Futog Region.

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Abstract.

Many varieties of cabbage are grown in Serbia, but two local varieties, Futoški and Srpski melez, predominate the cabbage production in Central Serbia and the Vojvodina Province. Their advantage over the introduced varieties is that they are better suited to the local taste and methods of use (pickling of whole heads or sauerkraut, preparation of traditional local dishes and fresh consumption). It should be noted that local cabbage populations are widely grown in remote parts of Serbia. A recently completed SEED-Net Project was aimed at collecting local cabbage populations on the territory of Serbia. Populations were collected in the locations of Boljevac, Čurug, Deronje, Donji Katun (Varvarin), Futog, Taras (Elemir), Leskovac. The sources of collected materials were mostly local markets, home gardens and home stores in isolated villages, where old farmers still maintain land races of various brassicas in small quantities and for domestic use. These cabbages have juicier and thinner leaves, which predisposes their heads for fine grating and also makes them pliable and easy to roll up during food preparation. It is characteristics like these that give the local populations an advantage over hybrids. The climatic and soil characteristics in the typical and traditional production area favor the production of late cabbage varieties. Fresh cabbage from Vojvodina production area is a good raw material for fresh use and biological fermentation. The winter cabbage is suitable for biofermentation and long storage in the form of sauerkraut. The fermented Futoski cabbage has been certified at one point as a product with geographic origin.

INTRODUCTION

As in other Eastern European areas (Luczaj and Szyman´ski, 2007; Pieroni, 2008), in Vojvodina - North Province of Serbia, most vegetables are preserved for consumption during the winter via lacto-fermentation. Cucumbers, cabbages, tomatoes, turnips, and sometimes egg plants are harvested, stored in barrels of salt water, and left to ferment. On the other hand, the people of Vojvodina have retained a few traditions surrounding their use of local plant resources, (Cervenski et al., 2010).

In Republic of Serbia, Futog is well known region where the best quality cabbage is cultivated. Cabbage is cultivated in Futog from the times of 18th century, from the ages of crowning of the empress Maria Theresia. From the year of 1760 there exist the written documents describing the export of cabbage to Vienna. During the decades of cultivation

of cabbage in Futog, a population was created that was different according their quality properties from the others. Producers have beginned in each harvest year to keep only the specified plants for seeds. The long-durating selection was responsible for the creation of the population called "Futoški kupus" (the Futog cabbage), which was important for the fresh consumption, and for souring, as well. To the creation of this population, of course, contributed the convenient agroecological conditions and geographic location of district of Futog, (Mastilović et al., 2008).

MATERIALS AND METHODS

The work has been based on an extensive desk research and field visits that aimed at getting more familiar with production practices and Futoski abbage living conditions. Desk research has been focused on collection and analysis of available data on the main actors and organizations involved in geographical indication programs in Serbia and research papers and literature about Futoski cabbage and people. The paper deals mainly with descriptive methods. Futoski cabbage protection effects were considered not only on producers but on all actors dealing with Futoski cabbage production and marketing. Linkages between all stakeholders and their roles have been analyzed as well.

RESULTS AND DISCUSSION

Brassica oleracea, B. napus and *B. rapa* are cultivated in almost all parts of Serbia. The most common *Brassica oleracea* species are the head cabbage, kale and cauliflower. In most countries the cabbage production is mostly founded on the cultivation of hybrids. In Serbia, however, local cultivars, introduced cultivars and local populations are still used in commercial production. The tradition of growing such cultivars and populations is primarily to do with their intended uses, which are fresh consumption and sauerkraut making. Of course, the use is determined by the quality of the produce, i.e. the softness of leaves, sugar content, compactness, absence of head splitting, etc., (Astley et al., 2007).

Why to protect the cabbage? The protection of labelling of the geographic origin has, first of all, the purpose to protect the quality and characteristics of the product which are formed due to the speciffic geographic climate, i.e. that represent the result of the speciffic natural and human factors, modes of production, pretreatment and processing of products that are applied in stringently defined geographic region. Keeping in mind that the Futog Cabbage is appreciated in Serbia, as well as on the market of EU, as a high-valuable product, during the last 20 or so years, exists very serious problem of plagiarizeing of the Futog cabbage. Cabbage which is not grown in Futog is declared as the Futog cabbage. Hybrid cabbages are also declared as the Futog cabbage, (Mastilović et al., 2008).

PLACE FOR PICTURE 1

White cabbage, cultivar Futoški is traditional population in Futog district, it has some speciphic morphological characteristics like loose heads, specific oval head, lighter color of the leaves, thinner leaves, milder nervature of the leaves,better elasticity of leaves. Futoški cabbage has more loose heads and leaves are not packed so tightly as is the case with hybrid cabbage heads. White cabbage cultivar Futoški after 20 days of fermentation achieved that diffusion of salt and brine into the cabbage tissue covered more than 90% of cabbage leaves surface, (Cvetković et al. 2012), (picture 1.).

Traditional foods are an expression of culture, history and lifestyle and generally possess health qualities, since tradition rarely favors foods which are not palatable and healthy. White cabbage, cultivar Futoški has got certificate as product with geographic origin according domestic legislation (Mastilović et al., 2008). Fermented cabbage from Futog received a certificate as a product with geographic origin, (www.futoskikupus.org/parts/brend.jpg).

Cabbage and cabbage products are interesting from both marketing and dietary points of view because cabbage has many beneficial effects on health. From a traditional point of view, cabbage in the form of sauerkraut is one of the best known traditional foods. Traditional foods are an expression of culture, history and lifestyle (Trichopoulou, Soukara, & Vasilopoulou, 2007, Jevšnik et.al. 2009).

Futog sour cabbage must be produced using the native population of the Futog Cabbage. The Futog cabbage is primarily designed for sour cabbage making, for which is convenient it's sugar content. In raw cabbage, sugar content was determined (Bylaw, SFRJ, 29/1983). Sugar content was measured at three points: on the top, in the middle, and inside the cabbage head, whereas fermentation process started with salt diffusion from out of coatings to cabbage's root. Sugar content near the top of the head is about 3,22%; in the middle of the hear is about 3.4%, and near the root it amounts to about 3.55%, (Cvetkovic et al., 2008).

PLACE FOR TABLE 1

Futog's white cabbage is, above the rest, intended for biofermentation, because sugar content is appropriate for fermentation. Sugar content is significant because fermentation process is based on transformation of fermentable sugars into lactic acid by the microorganisms. Sugar content of three spots of cabbage head is shown in Table 1., (Cvetković et al., 2008).

Overall acidity, pH value, and salt content are important parameters for checking out of fermentation process. In table 2. those parameters are shown in three different moments of fermentation of Futog's cabbage. Acidity is major factor for fermented cabbage quality and for verification of fermentation tendency. In the begining change of pH value showing us if fermentation goes to adequate direction. In further currency pH value preventing the pathogenic microorganisms development. Usually pH value of fermented Futog`s cabbage range over 3.5-3.8. Salt content have relevant part in fermentation process rather then like quality factor, (Cvetković et al., 2008).

Sensory characteristics of the Futog sour cabbage: after the fermentation, head of the Futog sour cabbage has uniform, amber-yellow color, which is considered as very convenient property with respect of consumers. Head of the Futog sour cabbage has slightly oblate form. Leaves of the Futog sour cabbage are overlapping in such a way that the next leaf from the opposite side is situated ofer the preceeding one, so that the separation of leaves has to be performed gradually and with attention, in order to avoid their damaging. Leaves of the Futog sour cabbage have sligthly ellipsoid form. Leaves of the Futog sour cabbage are in all their surface thin, central part of the leaf with which is the leaf connected with stalk is not thick; it is elastic and flexible, (Mastilović et al., 2008).

PLACE FOR TABLE 2

Domestic cultivars are bred from autochtonous populations from different parts of Serbia. These are cabbages with thinner and juicier leaves, which predisposes their heads for fine grating and also makes their leaves readily bendable and easy to roll up when pickled. It is characteristics like these that give the local populations an advantage over hybrids. The sources of collected materials are mostly local markets, home gardens and home stores in isolated villages, where old farmers still maintain landraces of various brassicas in small quantities for domestic use. The characteristics of domestic varieties are important for Serbian consumer, but, on the other hand, hybrid cultivars are uniform and give much higher yields.

White cabbage, cultivar Futoški and hybrid Bravo in native form and as fermented cabbage shows that white cabbage, cultivar Futoški has specific, more acceptable sensorial characteristics. Fermentation process was developed faster in the case of Futoški cabbage, decrease of pH value was more rapid and diffusion of salted brine was more effective than in the hybrid cabbage heads. Chemical analysis shows that fermentation process advanced in the desired direction. Slightly lower overall acidity proving mild odor and flavour in fermented Futoški cabbage what is important for the consumers who find it pleasant and acceptable, (Cvetković et al. 2012).

Cabbage populations have been improved by farmers through mass selection for centuries. Their cultivation as a percentage of the entire cultivated area for cabbage is reducing. Compared with commercial hybrids, the local populations of cabbage are less productive and their heads lack uniformity and field durability, but they have thinner head leaves that are crisper and juicier. The type of use indicates that these are cabbages with thinner and juicier leaves, which predisposes their heads for fine grating and also makes their leaves readily bendable and easy to roll up when pickled. It is characteristics like those that give the local populations an advantage over hybrids (Koutsos et al., 2001; Cervenski et al., 2011).

In Europe more than 900 traditional geographical indications for food and agricultural products are protected against misuse and imitation by regulation (EC) no. 510/06. The protection of geographical indications under regulation (EC) 510/06 offers food producers the possibility of maintaining traditional and regional food regulations and subsequently even food culture and customs. According to regulation (EC) no. 510/06 only those geographical indications of agricultural or processed food products can be protected that possess a long production tradition (minimum 20 years). The other main criterion is that these traditional products must have a tight quality or reputation connection with their region of production. This link can be climate or soil conditions as well as traditional production processes or indigenous breeds or seeds which have a proved impact on product quality or reputation, (Wirsing et al.,2011).

Many Serbian authentic agro-food products risk to be lost if they are not properly protected. A new Law on Indications of Geographical Origin was issued in 2010 (Official Gazette of the Republic of Serbia No.18/2010) but geographical indications of typical producs are not well developed and exhaustive studies on their social and economical benefits are missing. The main problems are lack of knowledge, information, organizational and marketing skills, financial resources, institutional support and an effective control system, (Stojković et al. 2011).

CONCLUSIONS

The reputation of geographical indications and their specific local resources linked to them (production know-how and traditions, landscapes shaped by agricultural systems

over time, specific native animal breeds or plant varieties, etc.) can be used as vehicles to attract consumers and tourists in the production area to important tourist locations and attractions (particular museums, archaeological sites, etc.) and to promote a differentiated basket of local products and services based on the use of local resources. Vice versa rural tourism can play a major role in supporting the collective promotion of geographical indication product as a culinary ambassador of the rural region, by organizing itineraries for tourists and disseminating information such as gastronomic stopovers in restaurants or at production site and combination of scenic routes (FAO, 2009). Geographical indications may support the generation of added value from tourism in rural areas, by establishing cultural events linked to geographical indications, integration of local associations linked to these products, and improvement of the public image and reputation of the region after registration (London Economics, 2008).

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Table 1. Averaged sugar content with standard devitiation in different parts of cabbage head (Cvetković et al., 2008)

Sugar content in the different parts of the cabbage (%)	**average**
top of the cabbage	3,22
middle of cabbage	3,4
inside of cabbage	3,55

Table 2. Overall acidity expressed as lactic acid, pH value and salt content during fermentation (Cvetković et al., 2008)

Fermentation time in days	Overall acidity expressed as lactic acid (%)	pH	NaCl content (%)
3-rd	0,090	5,38	4,088
20-th	0,675	3,57	3,430
28-th	0,905	3,32	3,430

Picture 1. Futoski fresh cabbage and pickled cabbage as a product with geographic origin (www.futoskikupus.org)