CONTRIBUTION OF ALTERNATIVE CROPS TO ORGANIC AGRICULTURE IN THE FUNCTION OF BIODIVERSITY CONSERVATION

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Abstract
In this paper the following alternative crops interesting to be cultivated in Balcan cuntries in order to enlarge the biodiversity are discussed: broomcom, grain sorghum, proso millet,smail and iarge headed italian millet, canarygraas, buckwheat,oil pumpkin,hemp,flax,tobacco,medicinal, aromatic and spice species as well as amaranth.Alternative crops occupy a relatively small acreage but their contribution to the diversification of field crops production is considerable. Natural biodiversity is of high relevance considering the ecosystem stability and productivity.A high level of agro-biodiversity is very important because of wider crop rotations, growing leguminous crops for the nitrogen input, and the need for specific site and system adapted species and cultivars, also when considering special marketing strategies. For the further improvement of the production of alternative crops expanded literature, selected cultivars and innovative production andprocesing technologies are neccesary. It works best if covering and integrating the whole value chain including wholesalers, retailers, and consumer.

Key words: organic agriculture, agrobiodiversity, alternative crops, conservation.

Introduction
Conservation genetics is an interdisciplinary science that studies the possibilities of applying genetic methods in the protection and restoration of biodiversity. Research in conservation genetics includes various areas, such as population genetics, molecular ecology, molecular biology, evolutionary biology and biosystematics. Genetic variability is one of the three basic postulates of biodiversity, so it is directly important in conserving biodiversity, although genetic factors are also important in preserving species (species diversity) and the diversity of ecosystems (ecological diversity). Preserving genetic variability is important for the overall health of the population, as reduced genetic variability leads to an increased inbreeding effect and a reduction in the adaptation value of phenotypes (Robert W. Morin P., 2004). If genetic variability weakens in many genes of one species, it becomes more and more at risk of biological vulnerability and even extinction. Then it has only one possible choice of genetic information on all or almost all of its genes; In other words, all the individuals are almost identical. If there is a new selection pressure (such as ecological catastrophes), populations with high genetic variability have a greater chance that at least some individuals have a genetic constitution that allows them to survive. If genetic diversity is very low, none of the individuals in the population can have the characteristics needed to deal with new unfavorable conditions. Such a population may suddenly disappear. Genetic variability of species is always open to change. No matter how many genetic variants present in today's population, only those varieties that survive in the next generation can contribute to the future variety of species. When certain gene variants are lost once, they can not be recovered in the same form. For the assessment of the genome status of one species, specific genetic techniques are applied in relation to specific conservation issues as well as the genotype structure of the population (Vučinić M.and Pešić V., 1997). These analyzes can be done in two ways: by analyzing the DNA of today's individuals and / or fossil DNA (Woodworth, L., Montgomery, M., Briscoe, D., Frankham, R., 2002) . In order to

stop the still present loss of biodiversity and the degradation of ecosystems, EU published an EU Strategy for the Preservation of Biodiversity by 2020, on 03.06.2011 aimed at "restoring lost biodiversity and accelerating EU transition to a resource efficient and green economy". By formulating the aim of this new strategy, it is indirectly acknowledged that all previous activities and measures were more or less unsuccessful.

Material and methods

Focusing on agro-biodiversity, the European Commission has adopted two directives aimed at addressing a wide range of issues pertaining to this area:

Directive 2008/62 / EC of June 2008 on the acceptance of agricultural local populations and varieties naturally adapted to local and regional conditions and endangered by genetic erosion and the placing on the market of seeds and seed potatoes of these local populations and varieties.

Directive 2009/145 / EC of 26 November 2009 on the acceptance of local populations and varieties of vegetables traditionally cultivated in certain sites and regions and varieties without essential value for commercial crop production but are under special conditions for seed placing on the market. Some of the initiatives in the field of organic agriculture and nature conservation could make good use of both of these directives when they are transposed into the national legislative framework and adapted to it. The main activities are the identification of registrations and the return to the use of local populations and old varieties. In this paper, agriculture is shown as one of the important factors with a great impact on biodiversity and the environment. The aim of the paper is to point out the importance of agro-biodiversity of crops in organic agriculture from various aspects of agricultural policy and to the comparison of relations between other areas with biodiversity. In order to provide adaptable varieties to the ambient environmental conditions, some long-term initiatives for organic breeding and reproduction of seeds have been successfully launched.

Results and discussion

Biodiversity and Sustainability of Agricultural Production

Ecological factors of agricultural sustainability understand environmental protection and biodiversity. Namely, since the goal of agriculture is to produce sufficient quantities of quality food for human population, food production must be organized so as not to affect the quality of air, soil, surface and ground waters, and not to disturb the existing equilibrium in the biosphere, i.e. natural diversity of plant and animal genotypes and phenotypes and their natural heritability. Therefore, it is said that agricultural production is sustainable only if it is organized as to concurrently provide the biosphere sustainability under conditions of ever-increasing population growth (Heitschmidt et al., 1996). Biodiversity means the total of the existing plant and animal genotypes and phenotypes, i.e. natural heritability, thereby sustainability of plant and animal genome variability. Within all the existing ecosystems, biodiversity sustains their steady stands thus enabling them to function, i.e. survive as well as to interact with surrounding ecosystems. In the same way agri-ecosystems, i.e. agricultural ecosystems influence their environment and vice versa. From the standpoint of agriculture, biodiversity preservation means production that does not affect equilibrium in the biosphere, i.e. enabling the survival of plant and animal genetic resources (bioresources) and contributing to their adaptability and future use in food production. Irrespective of highly productive breeds in animal production, cultivars and strains in field crop production, fruit- and vinegrowing. efforts and investments are made to preserve traditional biotops and rare local races, strains and cultivars. Although an agri-ecosystem is only a small portion of the entire biological diversity, it is of crucial importance for human population survival. This means that in the context of agriculture biodiversity must enable continuing food production for people living in a variety of environments but not affect the evolutionary course, i.e. biodiversity of other ecosystems. In other words, agricultural production must not cause the reduction in the number of existing natural varieties within the genome of plant and animal species belonging to other mini-ecosystems that a particular agri-ecosystem interacts witii (Haila, 1995). Concurrently, agricultural production must be organized in such a way as to preserve and protect all existing genetic varieties within an agri-ecosystem, particularly favoring the survival of plant and animal species, races, strains and cultivars adaptable to all growing conditions, resistant to diseases characteristic for certain locations, not susceptible to agrotechopathies, i.e. those productive and yielding in different ecogeographical locations. Since genetic variability is conditioned by the intensity of selection, heritability, size of population and breeding program, this means that biological diversity sustainability within an agri-ecosystem is dependent right upon these factors.

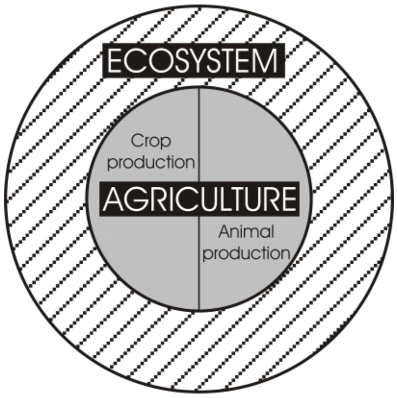

Figure 1. Aspect of ecosystems and agriculture

Of the listed factors, the size of the existing populations of plant and animal species is most important for biodiversity preservation. The reduction of size of a certain population inevitably leads to the status of homozygosity which contributes to genetic variability reduction. By favoring the growing of only highly productive plant and animal species, all cultivars, strains, races and even species that are low productive but disease resistant and sustainable in all living conditions may disappear from an agri-ecosystem. If this occurs, the disrupted biodiversity within an agri-ecosystem would label agriculture as an unsustainable activity and would soon endanger the preservation of natural genetic variability and heritability in all other ecosystems that agriculture interacts with. We can simply say that the goal of agriculture is to close food chain in which man is the final link. If there were no agricultural production, this link would exist. However, by unplanned and short-term selection measures, breeding methods and growing of beneficial species, agricultural production may affect the genetic variability reduction, extinction of some genetic, i.e. biological varieties. Their extinction always results in the loss of one link in a food chain, the chain is broken, and man suffers, he who has organized this activity. To avoid the consequences, the Ministry of Agriculture and Forestry in many countries enacts long-term development programs, considering specific demands in lowland, hilly and mountainous ecogeographical locations (Atkinson and Watson, 1996). It was found that unorganized favoring of pasture grazing with increasing number of herbivore population, in a certain ecogeographical location, leads to fast biodiversity degradation within plant species on a pasture susceptible to defoliation. To avoid this, it is necessary to know apical meristem position in the species grown on pasture. Extinction of some plant species from the pasture further effects full extinction or reduction, i.e. rise in population numbers, of invertebrate and vertebrate beneficial for agriculture (earthworms, birds, insects, rodents, etc). When such a condition follows, biodiversity in a pasture is disrupted, and the pasture itself has no longer its function. In situations like this, utilization of a pasture being a degraded agri-ecosystem is left without undertaking any cultural practices to improve the state. Since the instances of biodegradation accumulated from year to year coupled with other factors affecting adversely global biodiversity, it was necessary to undertake measures for its preservation. Genetically variable populations are much more adaptable to new living conditions compared with genetic populations grown exclusively for one production purpose like high productivity (Pesic et all, 1997). Therefore, it is a requirement to assess genetic diversity at both national and global levels. The goals of growing must be organized so as to consider all genotypic and phenotypic characters of a particular species, race, cultivar, strain, both morphological and functional characters like reproductiveness, disease resistance and stress susceptibility. The key question to the issue of sustainable agriculture and biodiversity relates to cost-effectiveness of growing rare, low-productive biological sources within certain agri-ecosystems.

Biodiversity in Organic Agriculture

From the very beginning of the development of the organic farming system, biodiversity has been considered one of the key issues, which is as important as the fertility of the land. With the language of modern terminology, biodiversity in organic agriculture focuses on two issues. One is the impact of agriculture on process quality and considers the issue of welfare for nature as stated (Pesic et all, 2009), and the second relates to the biodiversity and beauty of natural or wild species, habitat and biotope, to the level of appearance of natural areas. High biodiversity is considered to be the result of processing agro ecosystems by methods of organic agriculture. Many studies that deal with the impact of different agricultural systems have clearly demonstrated the positive impact of organic agriculture on biodiversity parameters such as: more diversified taxa, greater wealth, higher abundance (Bengtsson, 2005; Frieben & Koepke, 1996; Fuller et al., 2005; Wetterich & Haas, 2000). Stability of agro ecosystems as resources in agriculture leads to indirect pest control, which ensures and increases productivity. In a recent study (Krauss et al., 2011), when comparing the conventional and organic fields, it has been concluded that organic agriculture increases biodiversity, including important functional groups such as plants, polinators and predators that improve natural pest control. Preventive insecticide application in conventional fields has only short-term consequences for the number of populations of leaf lice, and long-term negative consequences for biological control of pests.

Breeding and selection for the needs of agro-biodiversity

In the 1980s, in Germany, after years of discussion, it became clear that organic agriculture needed special varieties to meet its specific needs. The first research findings based on the definition of ideologies have been published (Haas & Friedt, 1990; Drews et al., 2009). Research networks exchanged ideas, discussed approaches and limitations in organic breeding. One of the key initiatives was the EU-COST Act 860: "Sustainable Low-Input Grain Production: Required Characteristics of Varieties and Biodiversity Crops". The networks were further divided into working groups: "genetics and breeding", "biostatistics", "plant-land interaction", "plant-plant interaction", "plant-disease-complexes" and "testing and certification of varieties". Publications, reports, manuals and contact partners are still available:

• www.cost860.dk, www.cost860.dk/doc/Action860Brochure.pdf

•http://w3.cost.eu/fileadmin/domain_files/ABFS/Action_860/ final_report /final_report-860.pdf

Today, as in all other sectors, the EUCARPIA breeder association covers both the field of organic farming and one of the activities carried out is the EUCARPIA Conference held in Paris, 1-3 December 2010, with the theme "Breeding Resistance: One of the Strategies for Organic and Low-Input AgriculturalSystems"(https://colloque.inra.fr/eucarpia2010organicli/Proceedings). It is highly probable that Serbia and the countries of the Western Balkans will intensify their efforts to reach the level of agricultural production in Northwestern Europe with significant loss of biodiversity and agro-biodiversity. However, on the other hand, Serbia and the Balkan countries, and especially its southern parts, they always have very high and rich biodiversity and agro-biodiversity. Every individual remains to preserve the agro-biodiversity of rich flora and fauna, regardless of whether he is a politician, scientist, breeder, farmer, processor, trader or consumer. Therefore, within the framework of I.S.L.E. network, we propose the initiative and we propose the establishment of the Balkan Center for Organic Agriculture Breeding with all the regional centers in the countries of the Western Balkans, because they can have the maximum possible potential of biodiversity and agro-biodiversity in Europe.

Conclusions

The interconnection between organic farming and biodiversity lies in the fact that this type of production entails the application of ecological principles and agro-ecological measures in order to revive natural biological cycles, while respecting the interconnection between living organisms. Natural biodiversity is of high relevance considering the ecosystem stability and productivity. Alternative crops occupy a relatively small acreage but their contribution to the diversification of field crops production is considerable. At the same time, multi-functional organic farming contributes to the conservation of genetic resources and ecosystem diversity, and its job-opening and profit increasing potential creates the foundation for a better quality of life in rural areas. In this paper the following alternative crops interesting to be cultivated in Balcan cuntries in order to enlarge the biodiversity are discussed: broomcom, grain sorghum, proso millet, smail and iarge headed italian millet, canarygraas, buckwheat, oil pumpkin, hemp, flax, tobacco, medicinal, aromatic and spice species as well as amaranth.

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