THE IMPORTANCE OF SUSTAINABLE AGRICULTURAL PRODUCTION FOR THE DEVELOPMENT OF RURAL TOURISM

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Abstract: Due to the fast way of life and work, there is an increasing number of tourists who opt for destinations such as destinations where the environment is unpolluted and the production of health-safe food. The synergy between agriculture and tourism can improve rural regions. In order to produce health-safe food with an increased content of nutritious components and to preserve the environment, two directions of food production (organic and integral) have been developed. The methods of organic and integrated production in rural households require the education of producers. In the system of sustainable food production, there are increasing demands for the application of organic manure, compost, as well as various biostimulators of plant growth. The application of biostimulators attracts interest in modern agriculture, primarily for improving the morphological characteristics of crops, improving flowering and fruit setting, increasing yields, resistance to environmental stress and the efficiency of using nutrients. Biostimulators can be inorganic or organic substances, as well as living microorganisms (bacteria, fungi and yeasts). The use of biostimulators is of particular importance. They can be applied during the vegetation period, they have no negative side effects, unlike synthetic preparations obtained by chemical means or preparations of animal origin. Today, the application of multiple inoculations with a mixture of different types of so-called effective microorganisms, in which the following additives are found: molasses from sugar cane, humic acid, phosphoric acid, a large number of microelements, algae, extracts of medicinal plants and water is increasingly used. The use of microbiological preparations is becoming a mandatory part of the input in organic agriculture. The goal of the research is to determine the impact of the application of organic and integral production methods in plant species that are represented in the human diet.
According to the research carried out in different plant species grown according to the principles of organic production, an increase in the tested properties was found. In the organic production of two genotypes of beans using organic fertilizer and microbiological preparations with effective microorganisms, an increase in the protein in the beans was determined by 5.92-9.54%. In the organic production of the two tested garden pea varieties, an increase in grain yield of 21.15-23.47% was determined. In the integral production of two varieties of bread wheat, a microbiological preparation with effective microorganisms was used in supplementary nutrition through the leaves during the growing season. An increased content of total crude protein in the grain was found, which ranged from 1.56 to 3.98%. In the production of alternative grains, which, due to the chemical composition of the grains and resistance to agro-ecological changes, are increasingly represented in the human diet, it is possible to achieve stable yields by using organic fertilizers and microbiological preparations with effective microorganisms. In research with two varieties of alternative wheat, an increase in grain yield from 39.82 to 40.85% was determined.
Based on the research, it can be concluded that with the plant species that are most represented in the production system on rural farms, the application of organic and integral production methods can achieve high-quality and stable yields. This kind of production system offers the possibility of development.
Keywords: sustainable agricultural, rural tourism, garden pea, beans, wheat

1. INTRODUCTION

Agriculture and tourism are, in essence, very interconnected and interdependent. Quantitative changes in tourist traffic (number of tourist arrivals and overnight stays, average length of stay in the destination and similar indicators), determine the dynamics of tourist consumption, as well as the consumption of agri-food products included in the tourist offer.
The connection between agriculture and tourism can be clearly seen in various aspects of rural tourism, such as agro-tourism, gastronomic tourism and similar types of tourism (Ristić et al., 2019). Considering that agrotourism implies the stay of guests in an agricultural household, while gastronomic tourism involves the trade of food and domestic specialties prepared in the traditional way characteristic of the destination, they clearly show a strong connection between agriculture, ie food production and rural tourism.

Food can carry: chemical and microbiological risks, then genetic and risks arising from the application of new technologies (Babović et al., 2005). Šovljinski and Lazić (2007) point out that in addition to additives, pesticides and veterinary drugs, or their residues reduce the health safety of food, they also negatively affect health, so the negative effects are often not visible immediately, but after many years of introduction into the human body, due to cumulative effects severe illness can also occur. These are the reasons that lead tourists to very often opt for some form of rural tourism where healthy food is served.

In accordance with that, food production systems are becoming more and more interesting, where the environment is also preserved.

Organic agriculture in rural tourism

The industrial way of food production has led to long-term devastation and pollution of land, water and air, as well as the entire environment. That is why it is especially worrying, although not surprising, that as much as 90% of harmful substances are taken into one's body through food. The European Union is increasingly turning to rural areas in its development, so tourism has become the basis of their rural development policy. Due to the growing need for holidays in a safe environment, rural tourism is becoming increasingly important, especially in the EU (Italy, Austria, Germany, Great Britain and France). According to Baćac (2011), the offer of rural tourism includes households engaged in agriculture in Austria (8%), France (6%), Germany 3%, and at least 0.3% in Italy. According to the reports of the World Tourism Organization, about 25% of tourists annually opt for rural tourism, and it is estimated that this trend will increase in the future.

The motives of tourists for certain destinations are different (desire for rest, recreation, entertainment, acquaintances, business travel, as well as getting to know the culture, habits, religion and customs of the people). However, catering facilities and destinations are becoming more and more important, where health-safe food is offered, which, in terms of taste, quality and method of preparation, expresses the tradition and culture characteristic of the chosen destination.

Organic agriculture is considered one of the most important development opportunities in this regard. Need or trend, organic food has taken a significant place in the kitchen of consumers in the West. The production of safe food is no longer an alternative production of individual producers, but a part of agriculture based on the application of ecological and agro-ecological principles while protecting human, animal and environmental health.

Organic agriculture combines tradition, innovation and science for the benefit of maintaining the environment, promoting fair relations and a good quality of life for all involved (Šeremešić et al., 2017).

In today's conditions of production, it is necessary to apply different production models, production management strategies and the inclusion of many natural resources and organisms. Within the framework of new technologies in plant production, various groups of microorganisms can be included in the function of reducing toxic substances as a replacement or supplement to mineral fertilizers (Cvijanović et al., 2020; 2021).and as biopesticides in the protection of plants from diseases and pests (O'neal et al., 2018). It is very important to choose the right variety that will be grown according to ecological principles.

Within rural tourism, rustic tourism is increasingly present in Serbia. In addition to recreation, rest and staying in nature, picking forest fruits and medicinal herbs, tourists can get involved in a number of activities related to the agricultural production of food offered in the household. Since organic production requires the application of modified agro-technical measures, this form of production is very important for the development of educational tourism that can take place on the farm by including tourists in production technology. Given that the largest percentage of rural tourism is the urban part of the population, they often show interest in including and performing, for them until then probably insufficiently known, agricultural work (Urošević et al., 2017).

The total area under organic production in the Republic of Serbia in 2020 (counting the organic status of parcels and parcels in the conversion period) was 20,970 ha. Of that, the arable area was 17,453 ha. In the last 10 years, there has been a growth trend in the area of 231%. The largest areas under organic production are cereals on 3,623.15 ha or 20.75% of the total arable land. Wheat is grown on 1,436.51 ha, which are also the largest areas. Vegetable production takes place on the smallest areas of 121.56 ha, which represents 0.69% of the total arable land. In organic farming systems, autochthonous varieties of cereals, fruits and vegetables have an advantage, but also domestic animal breeds. Today, there is a growing demand for alternative cereals that have valuable nutritional characteristics such as durum and spelled wheat, triticale, millet, buckwheat, flax, pumpkin oil, rapeseed oil, quinoa, quinoa, chicory, sweet potatoes and other types. Bavec and Bavec (2006) state that today about 40 little cultivated field, vegetable, aromatic and medicinal species are grown in organic production. Considering the favorable agrometeorological conditions and the relief of Serbia, it can be said that there is a large range of plant species that can be grown in rural households according to the principles of ecological production. In addition to the production of food that is not genetically modified and in which there are no residues of toxic substances, it is very important to preserve soil fertility and biodiversity (Hass, 2012). Biodiversity is the basis for further development of all material

and spiritual values of human society, as well as the basis for some forms of rural tourism. Protection of biodiversity through organic production means the preservation and improvement of indigenous species and old varieties, breeds and local populations, which are invaluable for each area (Filipović et al., 2010). According to research by Krauss et al., (2011) found that in organic production there is an increase in the biological diversity of plants, pollinators and predators that with their presence and abundance improve the natural control of pests. Farms engaged in organic production had on average about 30% more species and 50% more individuals compared to farms where conventional production was performed (Bengtsson et al., 2005).

Organic plant production requires the application of measures to replace chemical inputs with biological ones. In order to maintain good quality and stable yield, microbiological preparations are increasingly used for plant nutrition. In addition to the already known preparations that contain bacteria that fix atmospheric nitrogen, there are more and more preparations with effective microorganisms. The use of such preparations in plant organic production increases biodiversity, strengthens the immunity of plants, preventively protects plants from diseases, maintains the yield and quality of products.

Numerous studies have shown that organically produced vegetables and fruits have better nutritional properties (higher concentration of antioxidants and other phytochemicals). Worthington (2001) indicates that the content of vitamin C, iron, magnesium and phosphorus is higher, and the content of nitrate is lower compared to products of conventional origin. Cvijanović et al., (2021a) state that in the fruits of different varieties of tomatoes grown on ecologically acceptable principles, a higher content of macroelements was determined, and very small amounts of the maximum allowed amount of rare metals. In addition, yields also increase, e.g. salads by 17.7% (Tošič et al., 2017). The representation of medicinal plants in treatment and cooking is large, and measures to increase the green mass of plants as well as different oils are very significant. In the organic production of basil according to Filipović et al., (2016) the content and yield of essential oils was increased from 16.84-21.8% depending on the climatic conditions.

2. MATERIAL AND METHODS

During the research, different genotypes of several plant species were grown at several locations in different periods of time using sustainable production methods. At the end of the growing season, certain chemical properties of the grain and the yield were determined. In Bačka Topola, region of Vojvodina, two varieties of beans (Maxa and Zlatko) were grown in the period 2014-2016 in the system of organic production. The protein content in the beans was determined. In the period 2016-2017, two varieties of garden peas (Tamiš and Klavedon) were grown in the area of Eastern Serbia in an organic system. At the end of the growing season, the grain yield was measured. According to production methods with reduced plant nutrition, two varieties of wheat (Pobeda, Ratarica) were grown in the Banat area in the period 2017-2019. The content of total proteins in the grain was determined. In the area of Bačka Topola, two types of alternative grain were grown using organic production methods in the period 2018-2020 and the grain yield was determined

3. RESULTS AND DISCUSSIONS

Beans are a plant species that belongs to legumes and is very common in the world human diet. In Serbia, beans are considered the national food. Due to its neutral taste and availability throughout the year, it is very common in the human diet as a main dish, and also as a spice. Beans have great nutritional value of pods and seeds (Cardador-Martínez et al., 2002). The chemical composition of bean grain contains the necessary biological substances: proteins (26%), carbohydrates (52%), fats (2.1%), then all essential amino acids, lecithin, potassium and others. Bean pods are rich in pectins and, thanks to a good combination of fiber and folic acid, have a number of benefits in maintaining human health. Plain dried beans are the most important food product for direct consumption in the world.

The application of organic production methods (use of organic fertilizers and effective microorganisms) in the cultivation of beans can increase the content of protein in the grain. Based on research conducted in the period from 2016-2017 in the region of Vojvodina with two varieties of beans (Maksa white and Zlatko yellow), an increase in protein content in grain in both varieties of beans in different agrometeological conditions of 5.92-9.54% in relation to the conventional system (Tab. 1).

Table 1. Content of total proteins (%) in grain of different varieties of beans

Beans	Method of production	2014	2015	2016	Average	Deviation (%)
Maksa	Conventional	21,97	18,37	19,97	20,10	100
	Organic	23,26	19,45	21,15	21,29	5,92
Zlatko	Conventional	20,37	17,03	18,52	18,64	100
	Organic	22,32	18,67	20,29	20,42	9,54

In addition to beans, peas are a very useful legume in the human diet. Its pods and green grains are used in the diet, and when it ripens, so do the ripe grains, which surpass beans in their nutritional value. Easily digestible proteins, starch, sugar, vitamins A, B and C, as well as the minerals iron, potassium, sodium, calcium and magnesium are present in green seeds.

Organic pea production in Serbia in 2020 was 1.56 ha. Based on the results of research on the production of garden peas according to the principles of organic production, it is possible to achieve a stable grain yield. The research was in Eastern Serbia for two varieties of peas (Tamiš and Kelvedon) in 2016-2017 (Tab. 2).

Table 2. Yields of garden peas (tha^{-1})

Garden pea	Method of production	2016	2017	Average	Deviation (%)
Tamiš	Conventional	9,8	11,0	10,4	100
	Organic	11,4	13,8	12,6	21,15
Kelvedon	Conventional	11,2	11,9	11,5	100
	Organic	13,8	14,6	14,2	23,47

Wheat production is very important because the basis in the bakery industry and nutrition is over 80% of the population. The importance of wheat is mainly attributed to its ability to be ground into flour and semolina, which are the basic ingredients of bread, other bakery products and pasta. By grinding wheat, the anatomical parts of the grain are separated. Wheat flour consists mainly of starch (70-75%), water (12-14%), protein (8-16%) and other components such as dietary fiber (2-3%), lipids (2%) and ash (1%) (Egesel et al., 2013).

The protein content of bread wheat is one of the most important chemical indicators of quality. Wheat is classified into quality classes based on protein content (SRPS E.B1 200). By grinding durum wheat with a high protein content (11% -14%), an appropriate raw material for the bakery industry is obtained. For good quality of flour and bread, it is necessary to improve the chemical composition of grains, primarily proteins, the percentage of which ranges from 8-15%. According to research on the impact of the application of integrated organic production methods in different varieties of bread grain, it was found that the content of total protein in the grain can increase from 1.56 to 3.98% depending on the variety (Tab. 3).

Table 3. Content of total proteins (%) in grain of different varieties of bread wheat

Bread wheat	Method of production	2017	2018	2019	Average	Deviation (%)
Ratarica	Conventional	13,02	13,79	13,40	13,40	100
	Low input	13,17	13,88	13,79	13,61	1,56
Pobeda	Conventional	13,19	13,40	13,29	13,29	100
	Low input	13,78	13,86	13,82	13,82	3,98

Due to the beneficial effect on human health, the interest in products made from alternative types of cereals has been growing in recent years. Special types of bread made from spelled or groats are rich in dietary fiber, microelements (magnesium, iron, copper and zinc) have a high nutritional value. Since the yields of these cereals are lower than those of bread wheat, stable yields can be achieved by using microbiological preparations in organic production. According to research conducted in the period 2018-2020, the impact of the application of effective microorganisms in soil and foliar was determined that the yield of alternative wheat cereals was significantly higher than in the conventional production system. The increase in grain yield ranged from 39.82 to 40, 85% (Tab.4).

Table 4. Average grain yield (kgha^{-1}) of alternative wheat species

Types of wheat	Method of production	2018	2019	2020	Average	Deviation (%)
Triticum durum	Conventional	1.641	2.021	2.132	1.931	100
	Organic	1.988	3.601	2.571	2.720	40,85
Triticum spelta	Conventional	2.596	3.687	3.872	3.385	100
	Organic	4.077	5.267	4.854	4.733	39,82

5. CONCLUSIONS

The production of safe food as a form of organic agriculture can be a part of sustainable tourism and a significant factor in the choice of tourists to come to that household. Since this form of food production has its own specifics, it is very suitable for smaller areas located in rural areas. By developing consumer awareness of the importance and values of organically produced food, a healthy environment, it significantly influences the choice of tourists for destinations such as vacations in rural households. Considering that tradition and culture are preserved through this type of food production, the promotions should emphasize the destinations where health-safe food is produced, all in the function of preserving the health of tourists.

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