

**AGRICULTURAL GEOGRAPHY OF BOSNIA AND HERZEGOVINA:
A CASE STUDY OF BUGOJNO**

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Abstract

In Western Balkan countries, particularly in Bosnia and Herzegovina, which still have significant agricultural characteristics, with predominantly private ownership of land and small farms, agricultural geography has not been sufficiently explored. This is especially true for smaller areas, with their specific socio-geographical and natural-geographic processes that are the subject of special attention in this paper. Bugojno municipality is a rounded territory with significant opportunities for the efficient development of agriculture. Characteristics of Bugojno in many features are analogous with almost the entire part of the mountain-valley area of Bosnia and Herzegovina.

Key words: Climate, Development, Agricultural land, Relief, Cereals

Introduction

Analysis and evaluation of geoposition represents an important factor for understanding of genesis, development, and function of any kind of area. The geographical position of the Municipality of Bugojno has the following characteristics: it is situated in the Northern Hemisphere, in the field with geographic coordinates 43°54' and 44°09' North latitude, and between 17°18' and 17°37' East longitude.

Political-geographically, the Municipality of Bugojno is situated in the state of Bosnia and Herzegovina, the entity of the Federation of Bosnia and Herzegovina, and within it, in the Middle-Bosnian Canton. Regional-geographically, it belongs to the Mountain-Valley macroregion, and the Upper Vrbas-Pliva mesoregion of Bosnia and Herzegovina. Micro-regionally, it is situated in the Uskoplje valley. Transport-geographical position is satisfactory. By roads, Bugojno is almost equally away from the cities of Banja Luka, Sarajevo, Mostar, and Split (around 140 km). The total length of the border of the Bugojno municipality towards the neighboring municipalities is 102.7 km and inside those borders the Municipality of Bugojno is around 361 square kilometers in area (Fig.1). The valley of the Vrbas River once gave the ideal life conditions for prehistoric man, and a fertile soil enabled his early engagement in agriculture, cattle breeding, mining, fishing and hunting. The economic development of areas west of the Vrbas, means the Župa Uskoplje, and within it Bugojno, is not known enough. In the year of 1604, in Bugojno were registered two properties and seven farms, with two mills as well. One of the mills was probably on the Veseočica River (under the name of Rešeta, in the register), and the other one was probably on the Poričnica River.

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Starting from 1878, with the arrival of Austro-Hungary in these areas, we can more exactly follow up the development of agriculture in the Municipality of Bugojno. What is characteristic for that period is impoverish of farmers, in the first years after the occupation. The position of farmers was made difficult also by compulsory *kuluk* (unpaid forced labor), introduced by the government for building the roads. Due to difficult situations, some preventive measures have been taken: the farmers were given seeds and beasts of burden. In 1904 the first District Collective Farm in Bosnia and Herzegovina was established with its seat in Bugojno. The members of

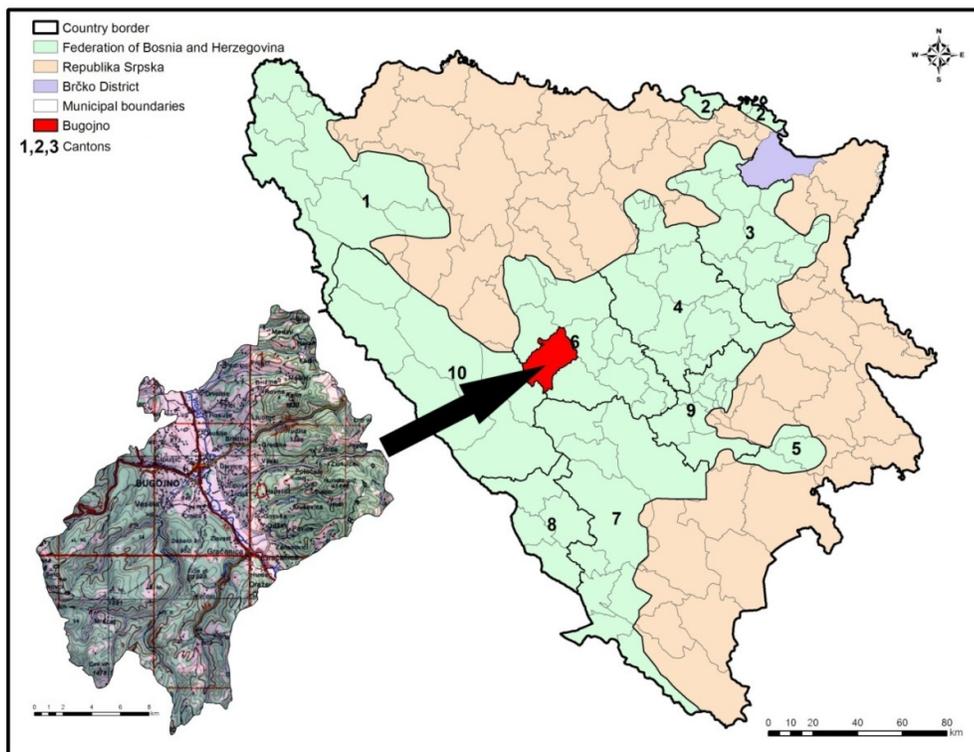


Fig.1 Geographic position of Bugojno Municipality in Bosnia and Herzegovina.

the farm were all proprietors, peasants, legal owners of land or forests, excluding those lands free from real-estate taxes and tenths as they belonged to military and national entity. One of the most important activities of the District Collective Farm in Bugojno in 1905 was the foundation and building of the District Grain Barn in Bugojno. The barn was built in 1907, and it was situated in the west part of the town, on the way to Kupres, close to the Catholic Church, and it served for a

long time for the purpose of storage of grains from the vicinity. After the year of 1945, the barn was replaced with modern silo (for that period), situated on the way to Gornji Vakuf, south from the center of the city. In the district of Bugojno, agriculture was the most important activity for its population.

According to the results of the census of 1895, agriculture was the main profession for 87.5 % of the population. The contribution of an agrarian population until 1910 decreased to 84.5 %. Among cereals, the most produced were barley, sharecropping, wheat, and maize. Growing potatoes were significant, means that 118 kg of potato was produced annually per resident. For the biggest complexes in processing of potato were given financial awards.

Natural-geographical conditions of the agricultural development

Relief of the Bugojno municipality is polyphase, polymorphous and polygenetic, what is the result of the activities of several of endogenous and exogenous factors. There are various shapes of relief, starting from a ravine which takes the central part, up to mountain massives in the east and west, including spacious areas between and on those massives. Thus, three large relief units are emphasized: ravine, mountains and plateaus, so this area is classified as mountain-valley area. Basically, the area is a compound of river plateau of the upper course of the Vrbas, known as the Uskoplje valley, and surrounding mountains that make the frame of this valley.

The Uskoplje valley is the lowest part of the Municipality. It is in-between mountain's depression situated between mountain massives and crests which slowly raising towards the east and west of the municipality, and which has, together with mountain edge, Dinaric stretch direction. Due to slope of terraces towards the Vrbas flow and towards the west and southwest, terraces on the right side of the Vrbas valley are on higher hypsometric levels and are slightly developed, while those at the left side of the river are significantly more developed and they are at lower hypsometric levels. The lowest part of the Uskoplje valley is an alluvial plateau of 560 m average height and it is the youngest terrace of the Vrbas River. Town of Bugojno is situated on this terrace, on the left side. As the Vrbas River built its valley in softly, lake sediments, the valley itself have gentle sides, wide alluvial plateaus and river terraces of various heights. This is the most important area for agriculture activities. Possibilities for growing plant cultures are the most favorable at an altitude up to 750 m, while the mountain areas give good conditions for cattle breeding and certain farming production, first of all, the production of roughage. All areas with altitude of 300-600 m cover 40.25 km² or 11.16 % of the municipality's surface. The second hypsometric level is about 601-900 m and it covers 145.7 km² or 40.4 %, and the third level is above 900 m with 174.9 km² or 48.5 % of the surface. Terrain configuration of the Bugojno's area conditioned the way of usage of agricultural land and its today's structure, in which meadows and pastures cover 16.9 %, and arable lands and gardens cover 18.1 % of the territory.

According to data acquired from the meteorological station of Bugojno, this area belongs to pre-mountain moderate continental climate type or, according to Kepen's Climate Classification, this municipality's region is dominated by Cfb climate (moderate warm and wet climate with warm

summer), while in the mountain areas especially in the east, northeast and west, is presented Cfc climate as well (moderate warm and wet climate with fresh summer).

Summers are moderately warm here, winters moderate cold with snow precipitation. Average annual air temperature amounts 8.8°C. Average monthly temperatures for a period of several years of follow up are positive for all months except January which has negative mark of -0.3°C. The hottest month is July with an average temperature of 17.8°C (Fig.2).

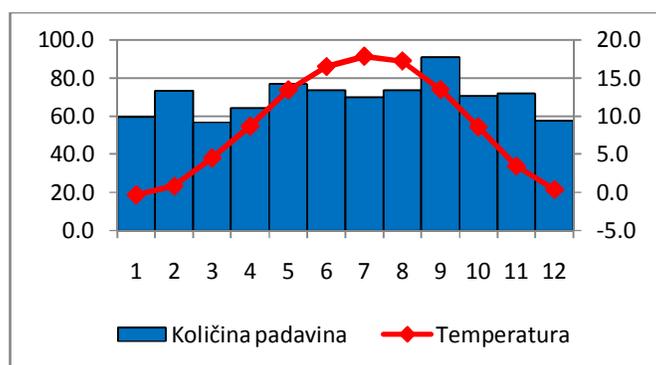


Fig. 2 Climate diagram of Bugojno (1961-1990)

Concerning the appearances of average daily temperatures with negative marks, the average date of the first frost in Bugojno is in early Autumn, on 27 September, and the average date of the last frost is in the late spring, on 7 May. Average number of days with frost during the winter season amounts 67.7. In the annual flow of days with frost, nine months have a certain number of days with temperatures below 0 °C and yet 115. 6 days on average in the Bugojno municipality are with frost.

All climatic elements and appearances have a very significant impact on genesis, growth and survival in life of plant communities. Among them, temperatures are especially emphasized. Heat has an important influence on bio-chemical processes going on in plants. Arising of plants in spring happens at teperature values of 5°C, in soil on the depth of root's system. In moderate latitudes throughout Europe, these termic relationships are realized usually at the end of March, and they ended in the second half of October. We call this period in plant communities – vegetation period.

The mid date of the beginning of vegetation period (average daily temperatures higher or equal to 5 °C) is between 11-21 March, and the mid date of the end of vegetation period is between 11-21 November. Therefore, an average duration of vegetation period is 245 days. Such a long vegetation period for plants adapted to moderate climate is favorable for growing various crops (cereals, fruits and vegetables).

In an annual air temperature trend, it is clear that winter temperatures are the lowest ones, also influenced by appearance of winter isotherms. They are mostly expressed in a valley-ravine areas in which the cold air from surrounding mountain tops falls down and thus causing the appearance of inversion of air masses lending which is combined with radiation inversions. The inversions also influence on late spring frosts what can bring then to devastating of flowered fruits and early crops.

In average 862 mm of precipitation annually falls on this area. Maximum of precipitation is at the beginning of Autumn, in September, when 91 mm falls in average, while secondary maximum is in April with 77 mm of precipitation in average. The smallest quantity of precipitation falls in January with 60.6 mm (the main minimum), and in the month of December with 60.8 mm (secondary minimum). Annually, there are 128 rainy days in total. Spring months are the rainiest months with 40 rainy days in total.

Beside winter, snow can appear also during the spring months, April and May, as well as in the second part of Autumn. Snow cover is the most maintained in January, approximately around 16.4 days, then in February and December, around 10 days. Maximum snow height of 85 cm has been recorded in February. Of course, the snow height varies on the area of Bugojno, and it is significantly higher in the mountain areas. Average annual cloudiness is about 65 %, and the cloudiest ones are winter days. Approximate annual duration of insolation amounts 1.578 hours, what clearly shows that this is the area with a little shadow. Due to the specific relief structure and morphology, as well as regional atmospheric circulation, the most frequent is northwest (14.7 % of days), north (10.8 % of days) and south (10.6 % of days) winds with average speed around 2.7 m/s. Tranquility period is recorded in 47 % of days during the year.

The territory of Bugojno is very rich in waters, rivers, streams and springs. That enables the irrigation of larger areas and development of growing fruits and vegetables. The main hydrographic skeleton of the Bugojno's area is presented by the Vrbas River and its tributaries. That is why this area, from hydrographic point of view, belongs to the Black Sea's river basin. In the space between Gornji Vakuf and Donji Vakuf in the Uskoplje valley, the Vrbas River flows through its central part named Bugojno valley.

The Vrbas River comes into the space of the Municipality of Bugojno from the south, at an altitude of 610 m in Humac area and it flows 19 km in length, after which at altitude of 531 m in Kopčić it leaves the Bugojno's area. Here the Vrbas receives many tributaries both from the left and right side, characterized, however, with small lengths of their flows. The right tributaries of the Vrbas River in the Bugojno's area are: Zanesovići stream (4 km), Odžak stream (5 km), Goruša stream (6 km), Kandija stream (3,5 km), Vileši stream (13 km), Milanovac (3 km), Vitina (11 km), Boganovci stream (2 km), Rovna stream (7 km), Švarići stream (3,2 km) and Drvetina river (9 km). According to lengths, not small are the left tributaries, and these are: Gračanica (7 km), Veseočica (6 km), Poričnica (10 km), Okašnica (2 km), etc. The level of usage for agriculture is low, due to fact that the irrigation is not regulated and is performed in a primitive way.

According to the national classification in the area of Bugojno, there are 14 types of soil. The greatest part of land in the Municipality of Bugojno belongs to the section of automorphic soils,

while the ones along the Vrbas River and at lower flows of its tributaries belong to hydromorphic soils. That relationship is as follows: automorphic soils are presented with 6/7 that is 86 % of the Bugojno's area, while hydromorphic soils are presented with 1/7 that is 14% of the area. The most presented are soil complexes ranker+dystric cambisol on 25% of the area, and soil complexes of calcomelanosol+calcocambisol on 21% of the area.

Concerning the geographical position, the Municipality of Bugojno belongs to Holarctic flora world, Euro-Siberian flora region, flora type of inside Dinaric areas of Bosnia and Herzegovina and finally, in the frame of it, it belongs to the lowest flora rang – Koprivnica region. The largest percentage of the Bugojno's area is represented by the forests and that is 60.9%. Today's spacial arrangement of forest resources is conditioned by configuration and orographic development of the terrain. Forests are kept on lands where rural population has not had an interest to turn them into agricultural lands, due to many reasons – they had bigger inclination, they were bad, shallow and more rocky ones on which the basic foundation come to the surface or they were at higher altitudes or they were unreachable. The most spread ones are oak, hornbeam, beech, fir, white and black pine forests. Forest areas are rich in various games. Especially, there are living places of the bear, wood grouse, wild pig, deer, wolf, fox and the wild cat.

The main social-geographic conditions for the agriculture development

In the Bugojno's area, which today covers only 0.7 % of the area of Bosnia and Herzegovina, in 1991 there lived 46.889 of people, or 1.1 % of the population of Bosnia and Herzegovina. After the World War II there were 17.407 inhabitants of which 4000 employed, approximately 3000 were employed in agriculture. All until 1991, as a consequence of fast industrialization, urbanization and the total economic development of the municipality, the number of population increased by 2.5 times. During the same period, with presence of de-agrarization, the number of population employed in agriculture decreased to only 524.

After the war 1992-1995, as a consequence of migrations and population suffering, the number of inhabitants significantly decreased, so today it amounts about 37.000. Besides, great losses in the economic sector additionally hit the agriculture. Number of employed in agriculture sector amounts only 400. We should emphasize that, starting from 1991, the census in Bosnia and Herzegovina has not taken place up to now, yet planned for October 2013, what makes the geographical examinations of such type much more difficult.

When talking about the economic-geographical development of the Municipality of Bugojno, it should be said that in the year of 2001 GDP amounted USD 846 what is 87.7 % less than GDP in the Federation of Bosnia and Herzegovina. In 2005, the situation was improved – the value of GDP increased by 109.1 %. Still, it is lower than the average for the Federation. In 2009, GDT in the Municipality of Bugojno amounting USD 3.460 and that was the largest value recorded in the observed period. It corresponds to increase of even four times compared to 2001. Yet, it is less than in the Federation by USD 3.056 or 88 %, what is a big difference, bigger than the one in 2001.

Concerning GDP values, the Municipality of Bugojno is at the 61st place in the Federation of Bosnia and Herzegovina, and it belongs to poor developed municipalities. If we compare GDP values with the world's average, we would find out it is higher than the one in the Municipality of Bugojno, and that it amounts approximately USD 10.500. EU average is around USD 32.600 annually and is much higher than GDP in the Municipality of Bugojno, even 9.5 times more. It must be emphasized that the unemployment rate is a very high and it amounts even 45 % of the total active population. However, there is no valid data on the participation of the agriculture sector in GDP values.

Organization of agriculture

Agriculture areas, according to the way of usage, point out on real agriculture development possibilities and on a level of land exploitation. In total land balance, forest land participates with 59.4 %, agriculture with 36.4 %, and others or sterile with 4.2 %. As of agricultural land, 49.5 % belongs to arable lands, 46.2 % are covered with meadows and pastures, and orchards covers 4.2 %. A large percentage of meadows and pastures represent the specialty of this area. The official world's statistics registers only orchards and arable fields as cultivable soils, so, according to that, the total area would then amounts 7.067 ha, what is 53.7 % of total agricultural land or 19.6 % of the total land of the Municipality of Bugojno.

We must underline here that in the last 30 years, due to migrations of younger and active population, great number of older households in villages, due to impossibility of land cultivation, constantly spreads their area under meadows and pastures.

A huge potential of Bugojno is in meadows, and especially those with little slopes which can be used for intensive development of fruit growing and truck farming production. Pastures, with some investments can be turned into meadows or orchards (depends on slope). The forest is of extraordinary quality and it represents the base for economic development. Very much fertile fluvisol from both sides of the Vrbas is favorable for intensively upbringing of husbandry and truck farming cultures (especially maize as fodder).

Far from this zone, relief is much divided, and is also very suitable for fruit growing and truck farming. In the hilly part of the Municipality of Bugojno, especially at the edge of the Uskoplje ravine, lands are very suitable for fruit growing. Development of husbandry and growing potatoes has the best conditions on some higher altitudes.

The relationship between available and necessary agriculture lands per person is presented by the land balance. Minimum land needs for the food and lodging per person, on this latitude, and on the base of knowledge from the late 70s, amounts: 0.40 ha cultivable land for food; 0.80 ha to 0.174 ha for housing, roads, pipelines, collection points, etc.

Land balance of 0.153 ha per person, done on the base of usage of cultivable land, is only 38.2 % of the necessary one. Relying on accessible data, available cultivable land per person, suitable for sustainable food production, on the base of population from 1991, is significantly below the

necessary one (0.40 ha). As the estimated number of population from 2008 (37.359) is significantly less than the one from 1991 (46.889), and as cultivable areas and areas under meadows are slightly decreased, it has come to increase of the observed areas per inhabitant in the Municipality of Bugojno. However, that is still not enough from an aspect of optimal land usage per inhabitant, because it doesn't allow the production sufficient for the population's food.

For better understanding of the agriculture geography of Bugojno, important are data related to conditions in agriculture farms. An average size of private farm is 4 ha, while the total average number of parcels is 5.4. Average size of the parcel is 0.26 ha. About 87 % of farms have the possibility of irrigation of crops. Before all, that relates to fluvisoles in the valleys of rivers which are intensively used for production of husbandry, roughage and truck farming cultures. The most presented way of irrigation is with rainy waters, which is usual in irrigation of the mentioned cultures. On Bugojno's farms there are usually 3 workers, approximate age of 43, and these are family workers. Season workers are employed to harvest of fruit cultures.

Only 1.5 % of the total number (132) of farms uses bank services, what tells us enough about agriculture investments. On the other side, about 75 % of producers are financed from agriculture, what is insufficient for any faster development. According to types, private farms are mixed production farms for own purposes, while less amounts of surplus are sold. Most of farms don't have a booking. The booking is carried out in specialized commercial companies in primary production and in manufacturing. In a mechanization structure, 64 % of inquiring approximately has tractors with 25-50 horsepower, and 7.7 % of them tractors with 50-75.

Almost 98 % of inquiring population usually doesn't carry out the analysis of soil fertility, which means they fertilize by model. Processing of products is small (25.6 %). Only 23.1 % of inquired is produced for the market, and 76.9 % in combination (for the market and for own use). It is estimated by the poll that 74.4 % of inquired sell their own products in retail trade in a distance of 5 km from the farm. In a wholesale trade, in a distance of 5-50 km yet 2.6 % of inquiring sells their products.

According to this, it is clear that the existing limits for agriculture development in the Municipality of Bugojno are as follows: chopped and divided property, disorganized water regime, old age and education of working force, old mechanization.

Agriculture

Agriculture in the Municipality of Bugojno is one of the most developed, if compared to other municipalities in the Federations of Bosnia and Herzegovina, what can be clearly seen in further parts of the paper, when will be carry out the comparison in production of some cultivations. As for agriculture in the Municipality of Bugojno, the greatest importance has husbandry, then truck farming and fruit growing, while upbringing of grapevine as wine growing culture is rarely presented. After 1991, due to the war circumstances happened the fall in production and plant of agriculture cultivations. In a structure of sown arable lands dominated are cereals, roughage and vegetables, while industrial plants are not grown. In the period 1991 – 2009, it is noticed that in a

structure of arable lands came almost double decrease in participation of cereal areas, by 715 ha. The main reason for this was the war conflicts in the area which influenced both population and infrastructure. One part of those areas was pre-oriented for growing roughage and vegetables, while the other part is not used. It is also noticed the great decrease in cultivated areas with roughages, as well with vegetables.

For the economy of the Municipality of Bugojno, as of cereals, the most important is barley growing which is cultivated on 4.2 % of arable lands. However, barley participates with 28.3 % of the production of the most important cereals. Related to pulse production, the most important is the production of beans, which is cultivated on 1.1 % of arable lands, means on almost 99 % of areas under the pulses. It is also important the potato growing of 6300 tons with its productivity of 15t/ha, and is cultivated on approximately 400 ha of arable lands. Now, beside favorable natural-geographical conditions for cultivation, agricultural production is decent, though observing the crops, and by increasing of cultivated areas and finding the market, it would be a great developmental chance for this region.

Cultivation of industrial plants has not been recorded in a significant measure. Out of plants used for fodder, the most often cultivated are lucerne and clover which cover 17.3 % of arable lands. According to data obtained from the Federal Statistic Institute, in the Municipality of Bugojno there is 730 ha of arable lands under cereals. It amounts 11.2 % of all arable lands. On the area under cereals, the most cultivated are barley with 37.2 %, then wheat by 25.2 %, rye with 17.0 %, oats with 12.3 % and maize with 6.8 %.

Wheat is the most produced cereal which contributes 32 % of cereal production, and which crops are second by quantity, 4.2 t/ha of arable land. Barley contributes 28.3 % of total cereal production, and rye 18.6%. Oats participate with 11.3 % in total cereal production, while maize in grain – 9.8%. Maize has the greatest productivity – 4,7 t/ha of arable land.

Wheat

Wheat is mostly cultivated on areas such are the edge of the Uskoplje valley and towards the east. Temperatures in this area are a bit lower comparing to the ravine's bottom (during the vegetation period, August is the hottest month with an average temperature of 16.5 °C). Beside fluvisols which are situated out of reach of waters, the most represented lands are rendzina and cambisol. Today wheat is the most cultivated in a height belt of 600-700 m altitude.

Unlike the wheat areas, wheat production trend was different. In 2001 there was produced 546 t of wheat, what was 28 % of production from the year of 1991. Since that time, wheat productions by hectare haven't been changed. Since 2006, as a result of larger investments into agriculture, wheat crops by hectare are significantly increased (Table 1).

Table 1 : Net sown area, production and yield of wheat in Bugojno (1991-2009)

Wheat	1991	2001	2005	2009
Net sown area in ha	698	195	150	184
Production in tones	1.953	546	525	766
Yield t/ha	2,8	2,8	3,5	4,2

Source: Federal Bureau of Statistics Sarajevo

In the year of 2009, wheat crops by hectare were 1.5 times bigger than in 1991, what tells us about Bugojno farmers considerable better equipped with modern agrotechnical means. However, wheat production was considerably increased in the last two years that is 1.5 times in regard to 2005, what is very encouraging. If comparing wheat crops, the situation is similar because according to production, the Municipality of Bugojno is on the 23rd place in the Federation of Bosnia and Herzegovina. It means it gives 1 % of total wheat production in the Federation of B&H. It is important to emphasize that wheat crops by hectare in the Municipality of Bugojno are higher compared to the FB&H (4.2 : 3.9 t/ha). Wheat crops by hectare in Bugojno are higher than the world's average (2.8 t/ha), but they are lower than the average in the European Union where, on a hectare, are produced around 6.3 t of wheat. It is assumed that the wheat crops will grow with our country's approaching to European integrations.

Barley

After wheat, barley is the most important husbandry culture in Bugojno, because it is sown on 272 ha or 37.2 % of the area under grains. In 2009 the production amounted 678 to what was 28.3 % of cereal production. By areas cultivated with barley, the Municipality of Bugojno takes ninth place in the Federation B&H (3.2 % cultivated areas), and by production, it takes tenth place in the Federation B&H (3% of production). Crops were 2.5 t/ha what is less than those in the Federation B&H (2,5:2,8 t/ha).

Barley production, similar to wheat production, together with cultivated areas is much more less that in 1991. Today, areas cultivated with barley make 39.4 % of those in 1991, while the production makes 54.5 % of the one in 1991. Crops in 1991 were only 1.8 t/ha, while today they are increased to 2.5 t/ha, mainly on 3 t/ha, what depends on seasonal meteorological conditions (Table 2).

Table 1 : Net sown area, production and yield of barley in Bugojno (1991-2009)

Barley	1991	2001	2005	2009
Net sown area in ha	691	250	280	272
Production in tones	1.244	700	840	678
Yield t/ha	1,8	2,8	3,0	2,5

Source: Federal Bureau of Statistics Sarajevo

The best areas for barley growing in the Municipality of Bugojno are bottom area and a part of the Uskoplje valley. Barley doesn't like acid soils, and it also bad grows on sandy soils, so for it's growing the most favorable are above mentioned areas, because there prevail lands with I, II, and

III category, mostly fluvisols, rendzinas and stagnosols. When growing, barley needs moderate temperatures 20-24°C, and during that period low temperatures are extraordinarily dangerous. That is why these areas are also climatically the most suitable for its growing. However, as barley is one of the most resistant cereals on drought, it is recommended to grow in height belt somewhat higher than the wheat one. It means not on a very bottom of the Uskoplje valley, but on the edge parts of the bottom and on the edge. In the Municipality of Bugojno it is grown on lands where usually wheat grows, but mainly in a higher hypsometric belt all up to 800 m.

If compared barley crops in the Municipality of Bugojno with the one in the world and the EU, we would come to the following conclusions: Barley crops in the Municipality of Bugojno are lower than the world's average by 0.3 t/ha; Barley crops in the Municipality of Bugojno are lower than the European Union's average by even 2 t/ha; The difference in crops is, first of all, the result of barley's not grown in the best favorable areas, but on a bit higher hypsometric level.

Rye

Optimal lands for rye growing in the Bugojno's area would be those in belt higher than lands for growing barley that is at an altitude of 700 – 800 m. These are the edge of the Uskoplje valley, but also some higher areas, especially those linked to its eastern part. Rye is mostly grown in a height belt at altitude of 650 – 750 m, from both sides of the Vrbas River, but also in some hilly-mountainous areas somewhat east from the Uskoplje valley's edge.

By areas cultivated with rye, the Municipality of Bugojno is on the fifth place in the Federation B&H, it has 7.6 % of all areas under rye. On 124 ha in area, it was produced 444 t rye, and by that the Municipality of Bugojno is on the fourth place in the FB&H, because it gives even 9.4 % of total rye production. Crops amounts 3.6 t/ha and they are a bit higher than those in the FB&H. The world's average is 2.6 t/ha of rye, and EU average is 3.3 t/ha of rye, what means that rye crops are higher than both the world's average and average for the European Union, what is a very good index in successful growing rye in this area.

Oats

As oats can stand very low temperatures when blooms (similar as rye), and later its needs for warmth grows, and as he cannot stand high temperatures and drought during summer (easily suffers from heat stroke), optimal conditions for its growing would be on the edge of the Uskoplje valley, even up to 800 m altitude, and in some east mountain areas up to 850 m altitude. Oats requests also a great amount of humidity, and can be grown on various lands, that is why those areas are favorable for its growth and development.

Mostly, oats are grown eastern from the Vrbas River in area of the bottom and edge of the Uskoplje valley on very fertile soils what should be changed and plant wheat in this area, and oats on higher hypsometric levels. Oat crops in the Municipality of Bugojno are higher even than the world's average (3:2.7 t/ha) as well as than the average for the EU (3:2.85 t/ha), and they could be

increased even more if oats would be sown on somewhat higher altitudes than it is now, and if would be used modern agrotechnical measures.

Maize

Today maize is mainly grown in areas of the Uskoplje valley's edge, as well in an area which is not the most optimal for its growing, as it is grown at altitudes of 600 – 700 m. Mostly, it is grown in settlements that are close to traffic roads. Areas planted with maize are almost exact as those ones from 1991. The big difference between 1991 and 2009 is in production, because due to increased usage of modern agrotechnic measures, crops significantly increased as well. Crops were increased by 3.5 times, and yet the production was increased by even 69 %. According to data from 2009, on 50 ha in area it was produced 235 tons of maize, and crops amounted 4.7 t/ha.

Maize crops in the Municipality of Bugojno are lower than the world's average (4.7 : 5.1 t/ha) and than the EU average (4.7 : 7.1 t/ha). This big difference in crops is, before all, the result of non-usage of modern agrotechnic measures and maize growing in unsuitable natural-geographical conditions compared to the optimal ones. Obviously that maize growing in the Municipality of Bugojno doesn't have the same treatment as previously husbandry cultures, and if it grows on somewhat lower altitudes with favorable natural-geographical conditions, crops would be significantly increased.

Crop Yield Index and other indexes

When we talk about the crop yield is noticeable that they are higher than in the Federation of Bosnia and Herzegovina as shown by the crop yield index. The crop concentration index is quite a different story. Poles are wheat with only 47.5 values and rye with very high concentration index of 402. Rye is far more important in Bugojno in relation to the entire region. Index of intensity of cropping has been just above 100 mainly as a result of absence of extreme weather conditions (Table 3).

Table 3: Crop Yield Index, Crop Concentration Index and Index of intensity of cropping in Bugojno, 2009

Cereals	Yi (Yield Index)	Ci (Concentration Index)	Index of intensity of Cropping
Wheat	145	47.5	103.37
Barley	102	155	101.11
Rye	124	402	104.21
Oats	136	119	102.42

Source: Adapted by author from the Federal Bureau of Statistics Sarajevo

Conclusion

Having in mind development factors, first of all natural-geographical, accomplished level of development, possibilities and needs in the aim of agriculture development, it is necessary to take concrete measures. Bugojno agriculture revitalization measures should be applied also to areas of husbandry and cattle breeding. One of the most important causes of decline is migration of the rural population towards towns, as well as insufficient investment in agriculture. Aggravation circumstance is that agrarian households are not provided with certain placement of products to the market. This shortage could be corrected by the recovery of collective farms and their intensive engagement in development of Bugojno's village. Plant production sector should be directed to the production of: grains, roughage, potatoes and fruits (apple, plum, and berrylike fruits). In order to realize these aims, financial means are necessary, as well as various kinds of support from the state. Realization of these aims should be linked to individual sector, with certain help from expert services, but it should be also linked to revival of collective farms.

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