



---

## NATURAL RESOURCE POTENTIAL - BASIS FOR DEVELOPMENT OF THE BIOECONOMY, RELATED TO CONVENTIONAL AND ORGANIC FARMING IN BULGARIA

**D. Toteva\*, R. Popov, P. Marinov**

Institute of Agricultural Economics - Sofia, Bulgaria

### ABSTRACT

The lithosphere is the solid foundation formed during the formation of our planet. Natural resources have been formed in its layers, which directly influence the Socio-economic development of human civilization during different time periods. The natural complex of Bulgaria is formed by three basic components: natural environment, natural resources and natural conditions. They take part in one way or another in the formation and development of economic, economic and environmental territorial structural units at the local level.

Unlike the classical branch economy - Bioeconomy could form and analyze its synergetic models based on ecological attitude to all economic activities of the landscape such as: extraction of mineral and forest resources, tillage, extraction of non-metallic minerals (low carbon), mineral waters, processing of waste for secondary industrial use and other economic activities.

The aim of the present study is to study the natural resource potential on the territory of Bulgaria and to analyze the existing opportunities for development of the bioeconomy. To compare and analyze the relationship between conventional and bio culture crops in ha. on the territory of the country, the possibility for their practical application in the systems of the circular economy.

**Keywords:** Bioeconomy, natural environment, conventional and bio culture crops.

### INTRODUCTION

One of the most important problems not only in Europe as a continent, but also in other areas inhabited by the human population in the coming decades will be the replacement of conventional natural resources with “new” ones to replace traditional ones. In the agricultural sector, the step that can be taken in the direction of new things is the cultivation of agricultural products in an organic way. The development of the present scientific work is connected with the comparison of the conventional areas in ha against those on which organic crops are grown. The methodology applied aims to show the relationship between the two types of areas based

on a mathematical model and comparative analysis, visualized in tables and figures, presenting the issues from different angles. The natural resource potential is the basis of developed agriculture and in particular plant growing. On the basis of a new Bio politics by the EU within the agricultural sector, an opportunity is created for the introduction of new technologies and processes that will push the sector to innovative activity. The scientific publication gives ideas about organic farming, its scientific definition, significance, and the authors allow themselves to offer their opinion without claiming to be exhaustive. In this line of thought, the authors present the various Socio-economic factors influencing the development of crop production in particular. The formation of natural resource factors is directly related to Socio-economic factors, the symbiosis between them is

---

**Correspondence to:** Chief Assistant Desislava Toteva, PhD, Institute of Agricultural Economics - Sofia, Bulgaria

basic for the development of the bioeconomy as a new direction in the economic activities of the country. The statistical information is related to the areas occupied by conventional agriculture of the different types of crops, as well as the biological ones in ha on the territory of the country for a period of eight years. Establishing a ratio between the areas occupied by conventional crops and organically grown identical species aims at the possibility of replacing the classic species with species grown in a new way that meets the modern needs of the human individual.

### MATERIALS AND METHODS

The research develops an overview of the natural resource complex of Bulgaria, which has a direct connection with the development of the bioeconomy and the cultivation of crops in a biological way. The 2012 EU strategy for the development of the bioeconomy in Europe is used as a basis. An overview is made of the different types of factors that have a subjective or objective influence on the processes related to the cultivation of agricultural crops in a biological or conventional way.

The research applies the statistical-mathematical method for analysis of agricultural areas in ha, used in the cultivation of biological and conventional crops in the country for a period of eight years. Comparative analysis of the obtained values is used to determine the percentage ratio between biological and conventional occupied areas of agricultural crops. Table three of the research shows four years of the research period in order to specify the problem and cover the leading years. The following formula is used to calculate the areas in ha:

$$D = A+B$$

$$B / (A+B) * 100$$

Where:

- A** - area of conventional crops in (thousand ha)
- B** - area of organically grown crops (ha)
- D** - Total area of agricultural crops in (thousand ha)

### INTRODUCTION

Unlike the classical branch economy, the bioeconomy could perform its analyzes and form synergetic models based on ecological attitude to

all economic activities of the landscape - extraction of mineral and forest resources, tillage, extraction of low carbon resources, mineral waters, processing of waste for secondary industrial use and others. In this situation, discussed above, natural resources in the three aggregate states have played a direct role in the formation of human activities over the millennia and again for the same reason, they will influence people in the formation of “new” socio-economic orders of society, but under the influence of technologies used and applied in the bioeconomy (EC - The Bioeconomy Strategy 2012, Falaleeva and et. 2016, Bashev, 2016, Wiezik and et., 2018, Mihailova, 2019, Olah and et, 2020).

The natural complex of Bulgaria is formed by three components: natural environment, natural resources and natural conditions (Markov, I., 2004, Marinov, 2018, Markov, 2018). The main elements included in their structure are: geographical location, relief, high and low carbon resources, climate, water, soil, vegetation and fauna. All of them take part in one way or another in the formation and development of economic complexes and territorial units of the country. There is a close connection between the three components, the development of landforms and the structure of the Earth's crust. The great diversity of high and low carbon natural resources in the country is determined by the long and very different in nature geotectonic development of the Balkan Peninsula and in particular Bulgaria. On the other hand, natural resources can be grouped according to their use and purpose: means of labor - arable land, water for irrigation (hydropower), low-carbon energy sources or high-carbon energy sources. Consumption products - drinking water, biological species of the world's oceans, creation of a genetic bank as a development of genetics in the field of agriculture (Bashev, 2016, Borisov and et, 2020, Shaban, and et., 2020). The imposition of new technologies in the use of renewable low-carbon energy sources. Natural resources can also be considered from an economic point of view, as this term denotes all-natural resources that directly and indirectly create prerequisites or conditions for the economic and social development of society. Their use is carried out at a certain stage of human

development depending on technological advancement and the need for them.

According to “Bioeconomy Innovation for Europe. Sustainable growth” 2012 - Bioeconomy covers the production of renewable biological resources and their conversion into food, feed, biologically based products. This includes agriculture, forestry, fisheries, food and pulp and paper production, as well as parts of the chemical, biotechnology and energy industries. Its sectors have strong innovation potential due to their use of a wide range of sciences (life sciences, agronomy, ecology, food science and social sciences), stimulating and industrial technologies (biotechnology, nanotechnology, information and communication technologies and engineering), as well as local and tacit knowledge.

## DISCUSSION AND RESULTS

The development of the bioeconomy as a process is largely a moral choice for making decisions related to the preservation of the natural environment and at the same time maintaining the necessary standard of living of the nation. There are objective factors that directly affect the bioeconomy as a process in the country. They have to be considered individually, (NUTS) like the indicators they do not have an exact formula or definition for their template application. Conditionally, the factors are similar and are characteristic of each territory in local or global aspect. Thematically, they can be divided into five major groups: 1) *Natural factors* - landscape potential, sunshine number of hours, climate, water and soil; 2) *Social factors* - demographic, social infrastructure, innovation, new technologies, level of education, individual cultural development for a particular community, ethical behavior and moral value system; 3) *Economic factors* - investments, credit system, labor market, technical infrastructure, competition and purchasing power of the population; 4) *Ecological factors* - abiotic and biotic, absorption capacity of the environment and regularities in the course of natural processes; 5) *Anthropogenic factors* - a set of actions and processes that have negative impacts (air, water and soil pollution, felling of trees/forests, use of

conventional energy sources, etc.) on the environment in urban areas and beyond.

According to the Encyclopedia Britannica - “Organic farming, an agricultural system that uses ecologically based pest control and biological fertilizers derived mainly from animal and plant waste and nitrogen-fixing cover crops. Modern organic farming has been developed in response to the environmental damage caused by the use of chemical pesticides and synthetic fertilizers in conventional agriculture, and has numerous environmental benefits”.

Another type of definition for Organic Agriculture is given by the Ministry of Agriculture, Food and Forestry (MAFF) – “Organic farming is a combined system of agricultural management and food production, which combines best practices in environmental protection, maintains a high degree of biodiversity, protects natural resources, applies high standards of welfare to animals and production methods in accordance with the preferences of some consumers for products produced using natural substances and processes”.

According to the authors of the publication, without claiming to be exhaustive, offer their view – “Organic farming does not correspond to the application of pesticides, insecticides, GMO products, fertilizers (in all their varieties), antibiotics and other similar species in the cultivation of various species agricultural crops and their application in animal husbandry. Based on the basic principles of biological development is the creation of a sustainable environment in agriculture as a whole, which in turn contributes to the natural development and conservation of plant and animal species in the surrounding environment”.

According to the MAFF, by the end of 2018 the regulated biological operators on the territory of the country are 6 660, of which 6 214 are producers, 234 are processors of organic products and 212 of all are traders - importers, exporters and traders. wholesale and retail. In the same year, the organic producers in the country represented nearly 7,2% of the total registered agricultural holdings under Ordinance № 3 from

1999 г., register of agricultural holdings. There is a relative preservation of farms engaged in

organic farming, with a minimum decline of 162 from the previous year.

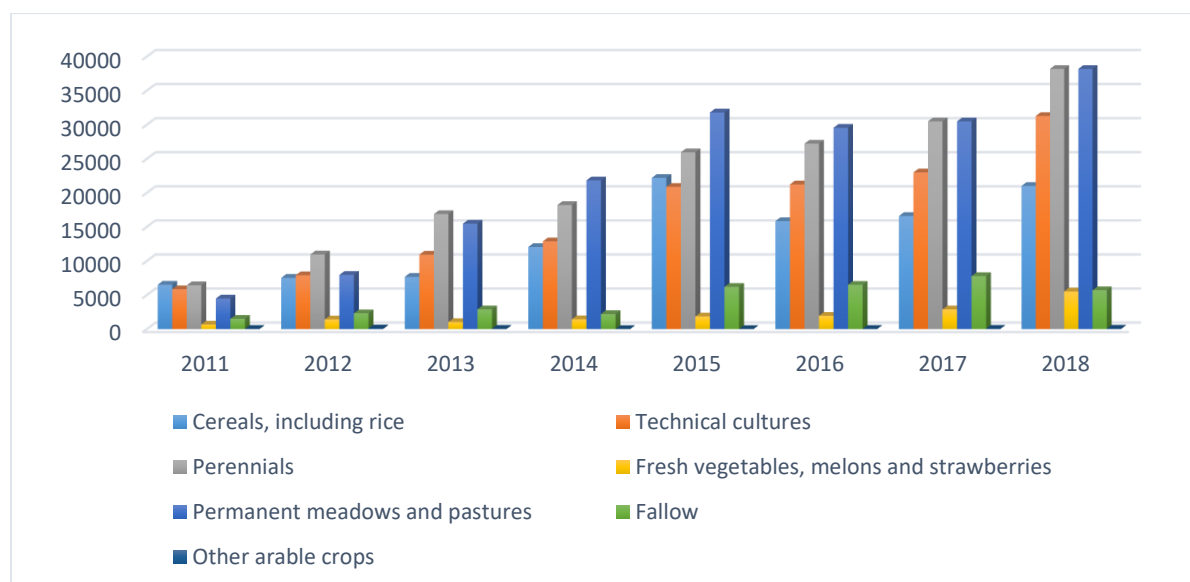
**Table 1.** Organically grown areas (ha) in Bulgaria

Types of crops	2011	2012	2013	2014	2015	2016	2017	2018
Cereals, including rice	6521	7532	7669	12061	22191	15847	16,602	21019
Technical cultures	5846	7909	10924	12878	20873	21236	22,998	31273
Perennials	6442	10959	16885	18213	25946	27221	30485	38188
Fresh vegetables, melons and strawberries	670	1421	1037	1445	1866	1954	2894	5527
Permanent meadows and pastures	4491	7957	15476	21831	31796	29548	30485	38188
Fallow	1513	2315	2905	2205	6209	6501	7782	5707
Other arable crops	32	96	45	22	16	35	58	65

Information "Agrostatistics - Crop production" – MAFF

On the **Table 1** are visualized different types of agricultural crops grown in an organic way on the territory of the country for a period of eight years. In the case of cereals throughout the study phase, a gradual increase in the areas occupied by this type of crops can be seen, or their growth at the end of the period has increased by 31,02%. Areas with industrial crops also report an increase in growth from the initial to the final stage of the analysis or there is an increase of ha by 18,69%. Perennials, the trend during the eight-year period

is in an ascending line or an increase of 16,86%. Fresh vegetables, melons and strawberries increased by 12,12% compared to previous crops, there is the least increase due to the specifics of this type of crop. The areas of meadows and pastures increased by 11,76%, as well as of fallow land by 26,51% for the eight-year period. In the category of other crops and arable land, during the study period the values move in different ranges, dictated by objective or subjective factors in the respective territories.



**Figure 1.** Areas of organically grown crops in (ha) in Bulgaria  
Information "Agrostatistics - Crop production" – MAFF and authors' calculations

In **Figure 1** indicates the organically grown crops (ha) in the country for a period of eight years. The upward trend from the first to the last year of ha research is clear - a gradual increase in the area

(ha) of organically grown crops, as in 2016 - 2017 there is a slight decline, but the trend remains upward.

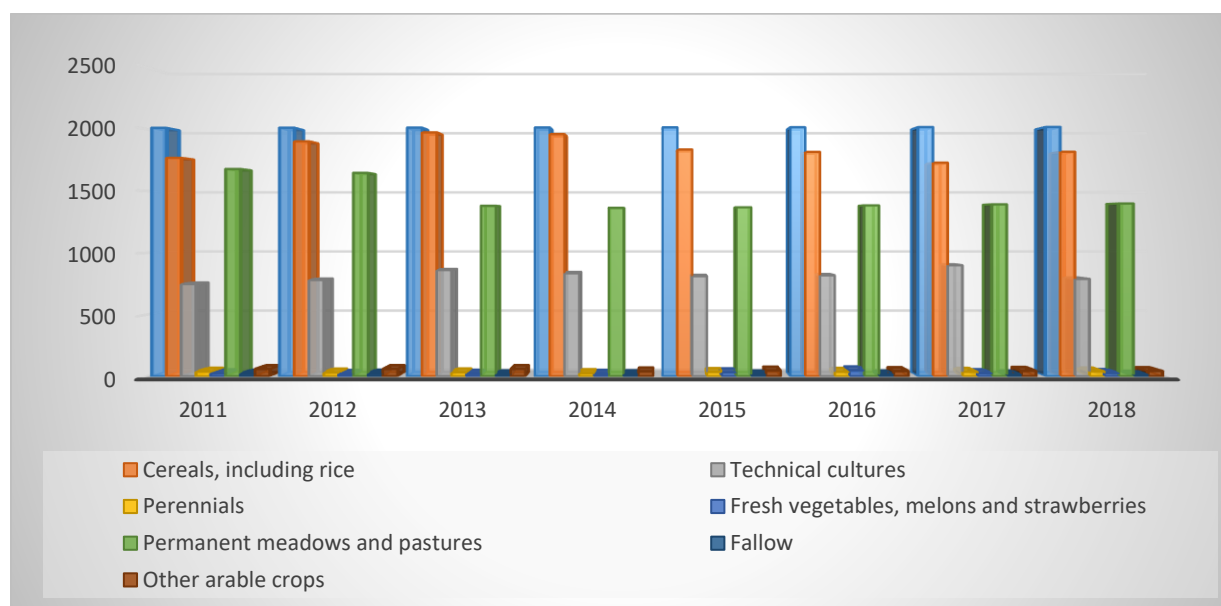
**Table 2.** Areas of agricultural conventional crops in (thousand ha) in Bulgaria

Types of crops	2011	2012	2013	2014	2015	2016	2017	2018
Cereals, including rice	1768,5	1902	1974,7	1960,7	1835,8	1816,6	1729,3	1817,8
Technical cultures	747,1	780	860	834,6	810,8	817,5	898,8	788,7
Perennials	38,6	31,6	32,8	26,7	35,6	37,2	37	39,9
Fresh vegetables, melons and strawberries	25	19,6	21,3	19,9	32,9	49,7	26,5	27
Permanent meadows and pastures	1678,3	1647	1381	1364	1368,7	1384,1	1392,4	1399,1
Fallow	22,5	22,2	16,8	17	15,6	15,3	15,2	14,8
Other arable crops	59,9	60,1	60,2	40,5	47,6	42,9	44,8	43,5

Information "Agrostatistics - Crop production" – MAFF

The study of the areas of conventional agricultural crops in Bulgaria for a period of eight years is visualized in **Table 2**, for cereals, from the initial to the final stage of the study there is no major change in ha used for the production of these types of crops or the area coverage is 2,71%. For industrial crops there is a relatively minimal increase of ha in 2016 and 2017 at the end of the period compared to the initial stage, ha has an increase of 5,27%. For perennials during the years of study there are insignificant changes in ha of arable land. Fresh vegetables, melons and strawberries with the highest growth of ha of

arable land are reported in 2016, in the period from the initial stage to the final, the growth of ha has increased by 3,25%. In the meadows and pastures during the eight-year study period a decrease in ha by 279,2 thousand ha or by 19,95% was observed. For the areas sown with set-aside, there is also a decrease in the areas from the initial to the final stage of the study by 7,7 thousand ha or by 52,02%. For other crops in conventional agriculture there is also a decrease in the area from the initial to the final stage of the study by 16,4 thousand ha or 37,70%.



**Figure 2.** Areas of agricultural conventional crops in (thousand ha) in Bulgaria  
Information "Agrostatistics - Crop production" – MAFF and authors' calculations

The areas with the conventional agricultural crops in (thousand ha) for Bulgaria, indicated in **Figure 2** throughout the study period, maintain constant values. Fresh vegetables also maintain a constant position in ha occupied spaces. There are small exceptions for ha in meadows and fallow lands, where there is a slight decrease in the

occupied terrain. Conventional crops continue to take precedence over those grown organically, due to a number of socio-economic considerations. The development of this type of crops is largely due to the natural resource potential, typical for the whole territory of the country.

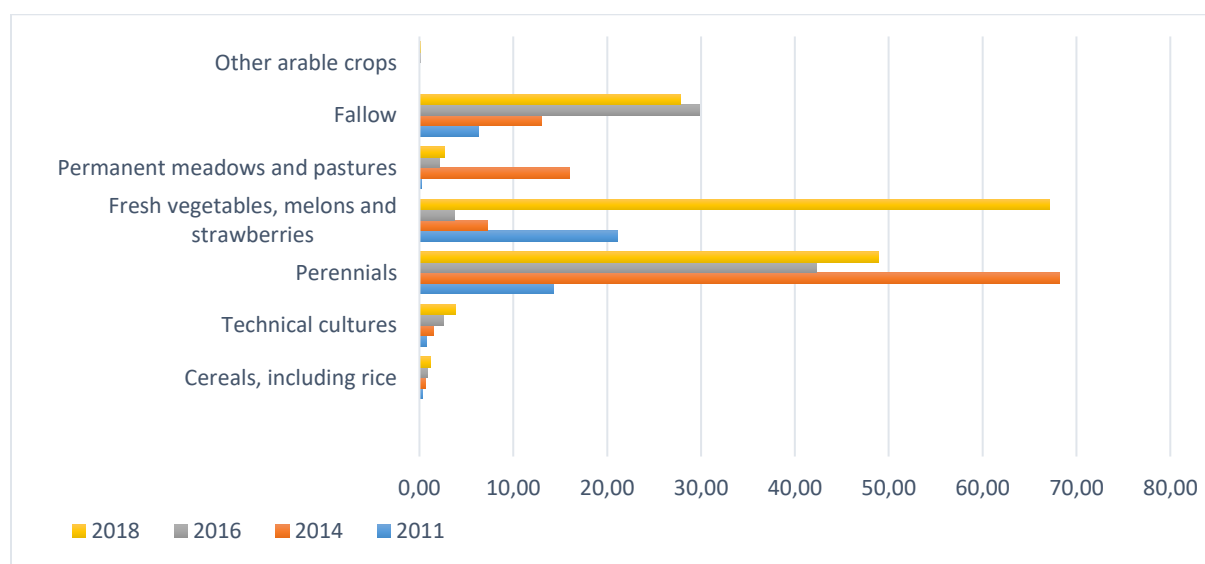
**Table 3.** Percentage ratio between biological to conventional crop production sown areas (ha) in the period 2011-2018

Types of crops	2011	2014	2016	2018
Cereals, including rice	0,37	0,62	0,86	1,14
Technical cultures	0,78	1,54	2,53	3,81
Perennials	14,30	68,21	42,25	48,90
Fresh vegetables, melons and strawberries	21,14	7,26	3,78	67,18
Permanent meadows and pastures	0,27	16,01	2,09	2,66
Fallow	6,30	12,97	29,82	27,83
Other arable crops	0,05	0,05	0,08	0,15

Information "Agrostatistics - Crop production" – MAFF

Based on the European Strategy for 2012 and its continuation from 2018, on the territory of the country, the areas for organically grown crops have insignificant growth compared to those of conventional agriculture, **Table 3**. The four years (2011-2014) included in the study give the clearest idea of the relationship between these two types of areas. The first year is the base year

(2011), which gives an idea of the state of the ratio, the second (2014) has the largest increase in the percentage of agricultural land in ha - due to the entry of the bioeconomy as a strategy in the EU. For the next years (the last two) there is a preservation and increase of the status of the lands occupied by organic crops.



**Figure 3.** Sown areas (ha) as a percentage of organic to conventional crop production for the country in the period 2011-2018

Information "Agrostatistics - Crop production" – MAFF and authors' calculations

The ratio between conventional crops and biological crops in ha on the territory of the country is in favor of the former due to a number of Socio-economic factors. The visualization of the trend in **Figure 3** clearly expresses the upward movement, the increase of the areas in ha of the cultivated biological crops. In cereals from the initial study period until 2018 there is an increase in ha by approximately 1%. The reason for the slight increase is the “classical attitude” towards conventional cultures or the slow change, which largely depends on, as we have already mentioned, a number of Socio-economic factors. Technical crops during the study period (2011-2018) increased as areas in ha by approximately 3%. In the case of perennials as seen in fig. 3 have the largest growth trend in ha compared to other crops. The basic reason is that this type of crops is not so much related to food nutrition and it is possible to apply a higher percentage of organic farming and expansion of the areas in ha. Fresh vegetables, melons and strawberries, their trend is very different, but retain their upward development. Meadows and pastures also maintain the upward trend, with an increase of approximately 2% from the beginning to the end of the study. In acme, there is again a clear upward trend in the study period. The category of other and other crops in ha retains its values below one percent and does not affect the whole picture of the ratio between conventional and bio cultures in ha area.

## CONCLUSION

Compared to conventional agriculture, organic farming uses fewer pesticides, reduces soil erosion, reduces nitrate extraction in groundwater and surface water. When recycling animal waste (in all forms), the amounts of energy that are generated are returned to the farm. These benefits are offset by higher food costs for consumers and generally lower yields. In fact, yields from organic crops have been found to be about 25% lower than conventionally grown crops, although this can vary considerably depending on the type of crop. The challenge for future organic farming will be to maintain its environmental benefits, increase yields and reduce prices, while tackling the challenges of climate change and the world's growing population.

The natural resource potential of the country on the basis of - soils, waters, amount of solar radiation, traditions in the cultivation of agricultural crops, creates conditions for the development of organic production and increase of production areas.

In the areas of conventional agriculture for the crops - cereals, perennials and technically there is an increase, while in the other crops there is a decrease in the used arable land. The areas on which are used for growing organic crops during the study period are increased by minimal percentages, based on factors, of subjective and objective order.

The bioeconomy encompasses all sectors and systems that use biological resources. It is one of the EU's largest and most important industries and includes agriculture and forestry, fisheries, the food industry, biomass energy and bio-based products. Its annual turnover is about 2 trillion euros, and it employs about 18 million people. The bioeconomy is also a key area for stimulating growth in rural and coastal areas.

## REFERENCES

1. Bachev, H., (2016), An Approach to Assess Sustainability of Agricultural Farms, *Turkish Economic Review*, Volume 3, Issue 1, pp 28-52.
2. Bachev, H., (2016), Defining and Assessing the Governance of Agrarian Sustainability, *Journal of Advanced in Law and Economics*, Volume VII, Issue 4 (18), 797-816.
3. Borisov, P., Dimitre Nikolov, Teodor Radev, Ivan Boevski (2020), ANALYSIS OF MECHANISMS TO SUPPORT THE AGRICULTURAL SECTOR IN THE CREATION OF PUBLIC GOODS, *Journal of Bio-based Marketing* vol.1, 2020.
4. Falaleeva, M., Iryna Usava and Emilia Rekestad (2016), REALS –RESILIENT AND ECOLOGICAL APPROACHES FOR LIVING SUSTAINABLY, PROJECT PARTNERSHIP STATEMENT AND POLICYRECOMMENDATIONS, *Technical Report* . October 2016, DOI: 10.13140/RG.2.2.25253.9136
5. Innovating for Sustainable Growth a Bioeconomy for Europe, cataloguing data can be found at the end of this publication.

- Luxembourg: Publications Office of the European Union, 2012 ISBN 978-92-79-25376-8.
6. Marinov, P. (2018), Natural resource potential in the rural areas of the South Central region, Plovdiv, ed. Fast Print Books, ISBN 978-619-236-000-9.
  7. Markov, I., N. Dimov. Rural regions in Bulgaria: through priorities of regional development. First international conference "Human dimensions of global change in Bulgaria", Sofia, 2004, p. 113-116.
  8. Markov., N., K. Toneva, (2018), Ispolzvane na geografiski informacioni sistemi za izmervane na prostranstvata dostapnost do zdravni uslugi, Regionalni disproporcii i biznes vazmognosti, Trakiiski universitet, p. 86.
  9. Mihailova M., Urban Forests: Bioeconomy and Added Value, 12th International Scientific Conference, Digitalisation and Circular Economy: Forestry and Forestry Based Industry Implications, in organisaton of WoodEMA, i.a. and Union of Scientists of Bulgaria, Varna, Bulgaria, September 11th – 13th 2019, pp 117-125.
  10. Olah, B, Vladimír Kunca and Igor Gallay (2020), Assessing the Potential of Forest Stands for Ectomycorrhizal Mushrooms as A Subsistence Ecosystem Service for Socially Disadvantaged People: A Case Study from Central Slovakia, Department of Applied Ecology, Faculty of Ecology and Environmental Sciences, Technical University in Zvolen, T.G. Masaryka 24, SK-960 01 Zvolen, Slovakia; kunca@tuzvo.sk (V.K.); gallay@tuzvo.sk (I.G.).
  11. Shaban, N., Hrabrin Bashev and Eman Kadhum (2020), State and development of agrarian research and development, anniversary of Agricultural education in Gorky Belarus, Project: www.isle-project.eu.
  12. Wiezik, M., Tomáš Lepeška, Igor Gallay, Juraj Modranský, Branislav Olah, Adela Wieziková (2018), WOOD PASTURES IN CENTRAL SLOVAKIA – COLLAPSE OF A TRADITIONAL LAND USE FORM, *Acta Sci. Pol. Formatio Circumiectus* 17 (4) 2018, 109–119, ISSN 1644-0765.
  13. Falaleeva, M., Iryna Usava and Emilia Rekestad (2016), REALS –RESILIENT AND ECOLOGICAL APPROACHES FOR LIVING SUSTAINABLY, PROJECT PARTNERSHIP STATEMENT AND POLICYRECOMMENDATIONS, *Technical Report* October 2016, DOI: 10.13140/RG.2.2.25253.9136
  14. <https://www.britannica.com/topic/organic-farming>
  15. <https://www.mzh.government.bg/bg/sektori/rastenievadstvo/biologichno-proizvodstvo/>
  16. [https://www.dfz.bg/assets/15042/NAREDBA\\_3\\_ot\\_29011999\\_g\\_za\\_syzdavane\\_i\\_poddyrjana\\_na\\_registyr\\_na\\_zemedelskite\\_stopani\\_Zagl\\_izm\\_DV\\_b.pdf](https://www.dfz.bg/assets/15042/NAREDBA_3_ot_29011999_g_za_syzdavane_i_poddyrjana_na_registyr_na_zemedelskite_stopani_Zagl_izm_DV_b.pdf)