



# BIOTERRA

**BULLETIN OF SCIENTIFIC INFORMATION**  
**NR. 34 JULY- DECEMBER 2017**  
(twice a year publication)



**CERMI Publishing House**

Recognized by

National Council for Scientific Research in Higher Education (NURC), cod 181  
edituracermi@hotmail.com www.cermi.3x.ro 0040 723 136 640

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<http://www.bioterra.ro/bulletin.php>

Publication Recognized by NURC category "C" code NURC : 882  
The journal is indexed in the following International Databases:  
ReportLinker.com, SCOPUS, Google Scholar, INDEX COPERNICUS, CABI, EBSCO.  
ISSN 1454 – 816X



## *Rector's Allocution*

*We have the special pleasure to let you know that the Review of our University, „Bulletin of Scientific Information”, having ten years of consecutive issue, it achieved the recognition of the National Council for Scientific Research in Higher Education (NCSR), being comprised in the category „National Reviews – 6 Category”.*

*So, the Bioterra University review „Bulletin Of Scientific Information” works as a real platform for the information and exhibition of the most recent and valuable research in the agricultural field and connected sciences (food industry, agro-tourism, ecology, agricultural economics etc.).*

*This way I express my gratitude the contributors to our review, authoritative academic and university names of whose studies are found in the selection done by the scientific board of the review, co-workers with whom we have strong relations of partnership and mutual support in the development and course of some conjoined research projects.*

*I wish to the review many and consistent issues.*

*Prof. Floarea Nicolae, PhD  
Rector of Bioterra University Bucharest*



## *Editorial Board's Allocution*

*„Bulletin of Scientific Information” magazine was published at the initiative of several young researchers with the direct support of Bioterra University Board, having the first edition in 1998.*

*Years passed and this magazine has enriched continuously its scientific and didactic dowry, becoming slowly but surely a veritable platform for academic information.*

*In 2008 the magazine changed itself into a new more dynamic and attractive format, being published in special graphic conditions (full-color) and fully in English language. Also, since 2014 the magazine benefits of a modern website: [www.bsi.bioterra.ro](http://www.bsi.bioterra.ro).*

*Every year the editorial team has increased the number of members; nowadays it brings together numerous personalities of the scientific and academic world from different foreign countries, thus being a guarantor of a high scientific level.*

*Thanks to all our readers and collaborators that through their suggestions, criticisms and feedback contribute to the improving of our magazine quality.*

**Prof. PETCULESCU Nicole Livia, PhD**

*Vice Rector of International Relations*

A handwritten signature in blue ink, appearing to be 'N. Livia'.

**Prof. GALAN Catalin, PhD**

*Vice Rector of the Educational Activity*

A handwritten signature in blue ink, appearing to be 'C. Galan'.



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## THE INFLUENCE OF KEYNESIAN DOCTRINE IN THE AGRI-FOOD SECTOR

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**Abstract:** *This present paper is based on the importance of the keynesian doctrine in time and tries to make a brief foray into the life and work of John Maynard Keynes, revealing important aspects related to the new concepts this doctrine brought in the history of economic thought, looking at the same time to the criticism addressed to the keynesism and studying the effects they had in the development study of economic science.*

*The objective of this theory is “the analysis of the mechanism of the market economy in order to ensure sustainable development, reducing or eliminating the disequilibrium, when it is not verified in practice the idea of the self equilibrium through the price mechanism.” Keynes wrote in an era marked by mass unemployment, by degradation and suffering at an incredible level. A reasonable person could have supported the failure of capitalism, concluding that only major institutional changes - perhaps nationalization of means of production - could restore economic health.*

**Key words:** *the Keynes's, markets economies, unemployment, stability, macro-economy.*

### ***Introduction***

In time there was spread the idea that economic science is based on the work of the three titans: A. Smith, K. Marx and J.M. Keynes. First they say that he read the secrets of free market economy and stressed the virtues increasing the wealth of nations; the second investigated the contradictions and the laws that govern the economy going to fall, claiming its replacement with the planned economy, and the third one argued that the market-based economies can be saved from collapse if the society, by state, oblige them to organization, control and conduct.

In this sense, Keynes can be considered the theoretician of the organized capitalism, by which he saw a way to save the Western civilization. This present paper is based on the importance of the keynesian doctrine in time and tries to make a brief foray into the life and work of John Maynard Keynes, revealing important aspects related to the new concepts this doctrine brought in the history of economic thought, looking at the same time to the criticism addressed to the keynesism and studying the effects they had in the development study of economic science.



## *Materials and methods*

This chapter aims to achieve a detailed analysis of issues related to full employment versus unemployment. Inconsistencies between the model and operation of neoclassical economics, he began to develop a comprehensive theory, which moves the economic analysis from the micro to macro level. The objective of this theory is „the analysis of the mechanism of the market economy in order to ensure sustainable development, reducing or eliminating the disequilibrium, when it is not verified in practice the idea of the self equilibrium through the price mechanism.“

## *Results and discussions*

In time there was spread the idea that economic science is based on the work of the three titans: A. Smith, K. Marx and J.M. Keynes. First they say that he read the secrets of free market economy and stressed the virtues increasing the wealth of nations; the second investigated the contradictions and the laws that govern the economy going to fall, claiming its replacement with the planned economy, and the third one argued that the market-based economies can be saved from collapse if the society, by state, oblige them to organization, control and conduct. In this sense, Keynes can be considered the theoretician of the organized capitalism, by which he saw a way to save the Western civilization.

This present paper is based on the importance of the keynesian doctrine in

time and tries to make a brief foray into the life and work of John Maynard Keynes, revealing important aspects related to the new concepts this doctrine brought in the history of economic thought, looking at the same time to the criticism addressed to the keynesism and studying the effects they had in the development study of economic science. This paper starts with some simple questions: Who was John Maynard Keynes? Why we have to study this doctrine? Is it still in trend? There are still economists who believe in the keynesism? Etc.

John Maynard Keynes (1883-1946) was a complex personality of the XX century. He remained popular in the history of economic thought for a revolutionary view over science and practice, by rethinking the economic role of the government in society, namely the use of monetary and fiscal measures for mitigation of adverse effects of recession, crisis and economic boom. Many economists consider him as one of the main founders of modern macroeconomics.

Speaking about Keynes a few years ago, Time magazine classified him among the more influential 100 personalities of the XX century, writing that “born in 1883, the year Karl Marx died, Keynes probably saved capitalism from itself (Keynes, J.M., 2009, pp.7-9).

Beyond its importance in the sphere of economy, as a professor at Cambridge and author of a new current of economic thought, Keynes seems to have lived more lives into a single one. He was directly involved in politics, standing for the Liberal Party in Britain in the interwar period, and as a civil servant in the Treasury. At the same time,



he was a businessman and a speculator, managing to achieve an impressive fortune. He was among intellectuals who formed the famous Bloomsbury Group, which had a major influence on the interwar culture.

Economists spoke about Keynes not only in the XX-th century. He is a continuous character, about whom the press and economists still write. For over the past seventy years, *The General Theory* formed views even of those who have not heard of it, or who believe they disagree with it. It appears that the Keynesian doctrine is still a subject of debate, especially in the current context in which some economist associate words like “crisis” or “recession” with the name of Keynes.

Starting from such considerations, this paper attempts to record some aspects of the emergence, evolution and criticism of the Keynesian doctrine, starting from the life and work of J.M. Keynes and reaching up to study the most important concepts of the doctrine. Thus, the paper is structured in two parts. The first part, entitled *THE PRESENT STAGE OF THE SCIENTIFIC RESEARCH OF THE KEYNESISM*, focuses on highlighting key elements of knowledge and understanding the work of J.M. Keynes. This part includes a brief foray into the life of the economist, and a brief incursion into his work. First Chapter, *LIFE AND WORK OF J.M. KEYNES*, conduct a review of the main writings of Keynes, starting from the premise that he properly observed the trends of science and economic practices of the era. The scientific work of J.M. Keynes can be observed in: “*The Economic Consequences of the Peace*”(1919), “*A Tract*

*of Monetary Reform*”(1923), “*A Treatise on Money*”(1930), “*The General Theory of Employment, Interest and Money*”(1936), “*How to Pay for the War*”(1940), numerous studies in magazines, book reviews, press articles. In all these he synthesized the progress of economic thinking. First chapter puts a special emphasis on “*The General Theory of Employment, Interest and Money*”, about which Nobel Prize winner for Economics in 2008, Paul Krugman, said that “... is an epic journey toward intellectual enlightenment.” With the publication of the *General Theory*, J.M. Keynes marked the onset of major mutations. Almost all the histories of economic thought stop to the Keynesian revolution and during almost half a century after Keynes the economics was rich in developments and debates, which marked changes in the economic landscape of economic thought, first, against the backdrop of state interventionism, affirming and dissemination of the keynesism, and then a reflux of the corresponding booming of the liberalism and the new current of thought.

The Nobel Prize winner for Economics in 2008, Paul Krugman says in the preface to the main work of Keynes (edition of 2009) that in principle, the *General Theory* may be expressed in four points:

- Economies may suffer, and often even suffer from a lack of overall demand, leading to involuntary unemployment;
- Automatic tendency of the economy to correct insufficient demand, if any, operates slowly and painfully;
- Conversely, government policies to increase demand can reduce unemployment quickly;



- Sometimes increasing the money supply will not be sufficient to convince the private sector to spend more, and government spending should be done (Keynes, J.M. 2009).

For a specialist in political economics, none of them - except perhaps the last point – sounds amazing and not even particularly questionable. But these ideas were more radical then, when Keynes proposed them; those ideas were even close to inconceivable. And the great achievement of the General Theory was exactly that of them to be conceived by economists.

By highlighting the sources of Keynesian methodology, in order to be able to see the new conception of the market economy brought about by Keynesianism, Keynes made the founder of macroeconomics. We also want to bring critical elements to classical theories while focusing on the theoretical foundation of Keynesian economic policies. Keynes made a critical examination of the prevailing economic theory officially accepted in Western countries - neoclassicism - and began to develop a comprehensive economic theory. General Theory of Keynes sought for the reported disruption of the economy, explained in many ways, to find practical solutions to mitigate or even remove the imbalances and revive the economic system as a whole. Shocked by blatant inconsistencies between the model and operation of neoclassical economics, he began to develop a comprehensive theory, which moves the economic analysis from the micro to macro level. The objective of this theory is “the analysis of the mechanism of the market economy in order to ensure

sustainable development, reducing or eliminating the disequilibrium, when it is not verified in practice the idea of the self-equilibrium through the price mechanism.”

The Keynesian doctrine starts from the importance they have in the Keynesian doctrine concepts such as: money and interest rates, savings and consumption, investment, balance, imbalance, insufficient effective demand and under-employment, full employment etc. Starting from the definition of the concepts mentioned above and highlighting the characteristics of macroeconomics in the context of the XX century, this chapter aims testing the theory of J.M. Keynes on investments, seeking to answer the question: Does forecasts and the confidence in them matter?

In his work, Keynes explained the remaining behind of the consumption from production through the psychology of people, which usually and in average incline to increase the consumption when their income increases, but not as much as the income increases, this being called “fundamental psychological law”. Also the slowing of investment has also psychological causes, taking into account the uncertainty of obtaining high profits and the existence of a high interest rates (for savings to be invested, it is necessary that the marginal efficiency of capital to be substantially higher than the rate interest, other ways investors preferring to deposit their cash at bank) and the preference of people to keep their available money as cash. State intervention in the economy with the purpose to solve these imbalances is a priority oriented to hand full employment, because as Keynes said “the defects of



the economic society in which we live are its inability to secure full use of people who work and arbitrary and inequitable distribution of wealth and income". The state action is achieved by discouraging savings and stimulating spending, particularly public spending, in order to increase effective demand, by using two economic and financial policies, namely monetary and budgetary policy.

In his book "The general theory of labor force, interest and money theory", he first dealt with the concept of occupation, then focusing on expectations, seen as one of the factors determining production and occupation. It is also highlighted "The 45° diagram". The paper aims to achieve a detailed analysis of issues related to full employment versus unemployment. Keynes wrote in an era marked by mass unemployment, by degradation and suffering at an incredible level. A reasonable person could have supported the failure of capitalism, concluding that only major institutional changes - perhaps nationalization of means of production - could restore economic health. Many economists, in fact, reached that conclusion: large numbers of British and American intellectuals, who did not have any special antipathy to markets and private ownership, become socialists during the years of economic depression, because they simply have not seen any other means of passing through the huge failures of capitalism.

However, Keynes argued that these failures had limited technical causes. "We are facing a technical problem" he wrote in 1930, at the time at which people sink into recession.

And because Keynes saw the causes of mass unemployment as being technical and limited, he argued that the key issue could be also limited and technical: "the system will need a new alternator, but there is no need to be replaced the whole car". While many of his contemporaries wanted that the government to take over the whole economy, Keynes argued that far fewer intrusive policies could ensure adequate effective demand, allowing the market economy to function as before.

J.M. Keynes denounced liberal policy inspired by classical writings. He did not believe that the microeconomic imbalances can be compensated in order to obtain a general equilibrium. It is therefore necessary for the state to intervene in order to avoid the collapse of the market economy. This intervention can be made by cash, budget and structural measures and regulations. In case of unemployment, the objective is increasing the effective demand. Costs have a multiplier effect on national income. This effect is even greater as the marginal savings rate is lower. Savings must be discouraged by practicing lower interest rates, which have the added benefit to encourage the increasing of investments.

The economic world after J.M. Keynes, explores the main achievements of economist representing the neokeynesian doctrine and it studies what it means the new Keynesian economy. In the last one, we can easily find a wide variety of approaches. Basically, these approaches are so numerous and varied that one can say that the only point of convergence is the assumption of the market failure, due to stiffness or to the existence of imperfections in the



economy. However, these separate lines of research can be classified and assigned to a certain typology depending on the type of imperfections envisaged and the type of market. Politicians did not exactly respect the Keynesian concepts and views and have not realized the correlation between deficits from the recession periods with the surpluses of the boom. Fiscal policy has failed because of its institutional practice in democratic politics. As a corollary of the above, this paper aims to capture, but without claiming to having elucidate all issues addressed, the main aspects of the emergence and evolution of Keynes doctrine.

## *Conclusions*

Therefore, it can be concluded that the purposes of the keynesian “conversion” were quite large. They stretched from the purely academic controversy, on Say’s law, to practice in the real world the condition that public expenditure should be limited to income taxes collected. Politicians did not exactly respect the Keynesian concepts and views and have not realized the correlation between deficits from the recession periods with the surpluses of the boom. Fiscal policy has failed because of its institutional practice in democratic politics. In the second part of this paper, there are also caught some of the criticisms that were made during time to the keynesian work.

Keynes wrote in an era marked by mass unemployment, by degradation and suffering at an incredible level. A reasonable person could have supported

the failure of capitalism, concluding that only major institutional changes - perhaps nationalization of means of production - could restore economic health.

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## RESEARCHES ON AGROTURISM AND THE NEED FOR DEVELOPING A STRATEGY FOR THEIR DEVELOPMENT

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**Abstract:** Agritourism can be considered an attractive and at the same time important land both locally and regionally, which exploits the surplus of household accommodation. It can be prepared and arranged especially for guests, and it assumes the existence of a set of goods and services offered by the farm for the consumption of the people / tourists.

It is also of particular importance, changing in a positive way the life of the locals, increasing the living standards resulting from the use of specific own resources, transforming the structure of agricultural crops to meet the need of tourists. Agrotourism is employment solutions that prevent “rural depopulation,” revitalizing crafts and harnessing agricultural products, spreading income sources, facilitating the expansion of investment for tourism, combating environmental pollution by removing sources and preserving conditions living in rural areas, and last but not least the development of sectors: agriculture, forestry, zootechnics and agro-tourism. In order to analyze the services and activities, the agrotourism evaluation indicators, which are expressed by the number of agrotourism hostels, the number of tourists, the number of jobs, the value added of the constructions obtained through the arrangements, the amount of the complementary incomes.

**Key words:** agrotourism, evaluation indicators, complementary revenues

### ***Introduction***

The agrotourism approach from the perspective of rural development is even more necessary than in the case of other non-agricultural activities carried out in rural areas, given the double direct contact of the agrotouristic activity with the environment, namely: as a tourist activity itself and as an economic activity, generally agricultural, to obtain the products offered to the tourists. The rural tourism richness, its landscapes and the great effort made by local communities to offer quality accommodation and varied leisure activities, added to the warmth and quality of “peasant-style” reception, make the rural area come back attractive

destination for Romanian and foreign tourists. The Romanian rural environment offers, in its diversity, beauty, tranquility, comfort for the entire population, possessing a great wealth of flora and fauna as well as an important part of the cultural heritage.

### ***Materials and methods***

The following indicators are favorable for the characterization of agritourism:

a) Result indicators:

- number of farms arranged for agritourism;
- number of tourists / year;
- the number of new jobs created or maintained.



b) Impact indicators:

- the value-added of the constructions obtained through fittings;
- complementary revenue volume.

The impact of tourism development has as a result the regional development which is oriented according to the studies on the following aspects: increasing the size of households, technical endowment of households, which is a condition for increasing resource efficiency, professionalisation and education, as a lever to improve the level the living of the inhabitants through an efficient use of resources.

sharing of resources with other users, such as agriculture and industry. The global agrotourism development strategy must take into account a number of developmental principles such as:

- Establishment of environmental limits and standards, according to which it is necessary to promote values that encourage standard consumption, consumption that falls within the limits of possible ecological. This “ecologically possible” must become a benchmark for all agri-tourism activities;

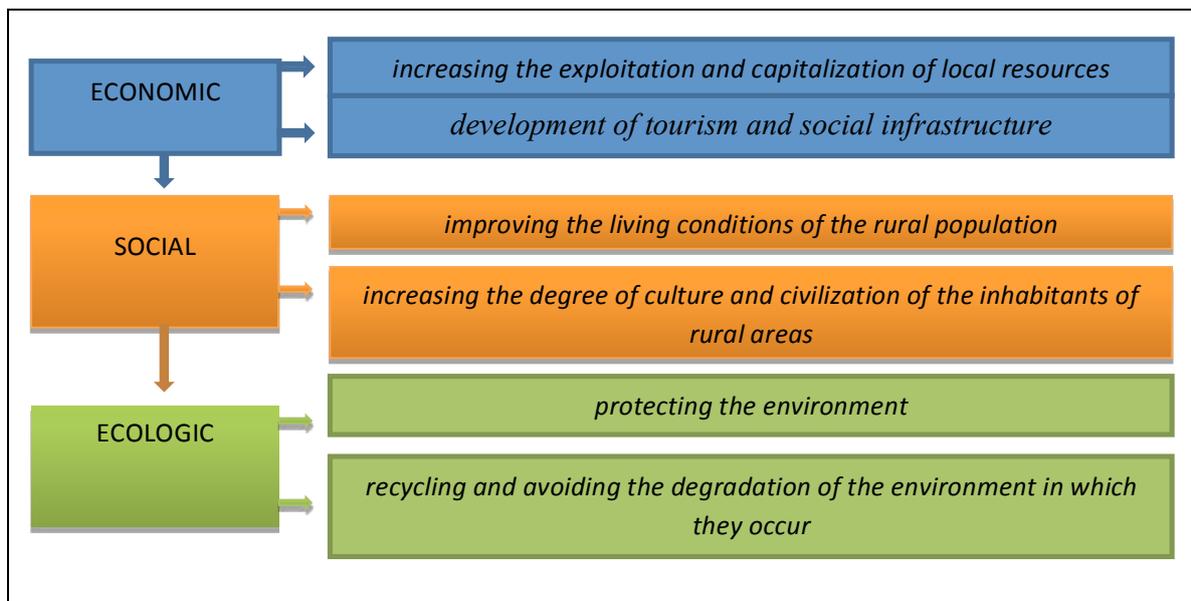


Fig. no. 01 - Three main plans in the Romanian rural area  
(Source: By authors' interpretation)

## ***Results and discussions***

The effects and results of agrotourism development in the Romanian rural area should be analyzed and quantified on three main plans (Fig. no. 01).

The rural development process is given both by its specificity as an activity that uses the physical and human environment to produce its products, as well as the

b) The economic growth, according to which the redistribution of economic activity, the reallocation of resources and the satisfaction of the essential needs of life in agritourism must ultimately result in present and future economic growth;

c) Resource control for the population, according to which the existence at a given time of a population in a given space must be correlated with the productive potential of the ecosystems;



- d) Conservation of basic resources, according to which sustainable development should aim at protecting the natural systems that sustain life, namely: air, water, soils, creatures, etc.;
- e) Forecasting, which seeks to find and discover new resources, as well as new technologies for their capitalization, long before the current resources are exhausted or technologies “aging”;
- f) Effective charging of ecosystems, according to which the ecosystem load capacity must be within rational limits and at the same time the production and revenues are constant over time. The capacity to load ecosystems is determined by taking into account indicators such as: the average number of tourists, the average duration of the stay, the relative preference of the tourists, the number of days / tourists, etc., as well as the use of an appropriate methodology for measuring the tourist traffic, correlated with the determination of resource capacity;
- g) The existence of a reservoir of resources, which refers to the necessity of a minimum rate of consumption of irrecoverable resources;
- h) To minimize the impact of agro-tourism activities on the integrity of ecosystems, which aims to minimize adverse impacts on air, water and other natural elements;
- i) Economic viability, according to which local policy must pursue the economic well-being of the community and at the same time respect the governmental policies that set the limits of economic growth;
- j) Rural - level control, which relates to the control exercised in relation to development decisions affecting local ecosystems and which must be unique to all activities carried out, in order to ensure a balance between these activities.

## *Conclusions*

Rural tourism is an employment alternative for the rural labor force, a way of diversifying the rural economy and a source of alternative income for rural residents. An important component of Romanian rural tourism is agrotourism, usually practiced by farm owners or in rural households, as a secondary activity, complementary to agriculture. As a result, it can be appreciated that supporting rural tourism in general and agro-tourism in particular as well as recreational activities related thereto helps not only to diversify rural activities but also to create opportunities for integration of young people and women on the labor market. The precarious income situation of rural residents fully justifies the need to develop a diversified rural economy, building on the current development potential of the non-agricultural sector as a sustainable source of decent living for the rural population, as well as development of the rural economy.

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## THE CONTRIBUTION OF AGRO-TOURISM THROUGH SUSTAINABLE DEVELOPMENT, THE STRENGTHENING OF AGRICULTURE AND ENVIRONMENTAL PROTECTION

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**Abstract:** *Designed as a necessary association between people and nature, as a new way of development that can support the human progress in time, sustainable development can be seen as a harmonization of interests between present and future generations.*

*Therefore, in order to respond to present needs without compromising the capacity of future generations to meet their own needs, sustainable development planning must be understood as a process unfolding at three different levels: economical - by increasing the exploration and the exploitation of resources, environmental - by avoiding environmental degradation, and social - through jobs growth, traditional crafts, agro-tourism and by strengthening the cultural identity of local communities.*

*These levels are closely linked with the different problems agriculture and environmental are facing; so, in order to have a proper development/performance, a sound management and suitable solutions, we need a national legislative framework that is harmonized with international rules; this condition must be regarded as the first/prerequisite step to be taken for a sustainable development in the future.*

**Key words:** *economic approach, rural tourism, agrotourism, sustainable development*

### ***I***ntroduction

Designed as a constructive association between man and nature, as a new way of development that can support human progress in time, sustainable development can be regarded as a harmonization of interests between present and future generations.

Therefore, in order to respond to present needs without compromising the capacity of future generations to meet their own needs, sustainable development planning must be understood as a process unfolding at three different levels: economical - by increasing

the exploration and the exploitation of resources, environmental - by avoiding environmental degradation, and social - through jobs growth, traditional crafts, agro-tourism and by strengthening the cultural identity of local communities. Those levels can be related with different problems such as the agriculture and environmental problems.

As environmental issues are more and more discussed at different levels by specialized institutions and organizations, agriculture developed as an important issue within these debates. The European model of agriculture represents a catalyst for the European



integration process, a tandem evolution process between the European society and the rules of sustainable development. The evidence of this workable/functional tandem can be traced in the past CAP reform objectives, as well as in the present ones. Keeping the balance of this model's evolution tendencies makes European agriculture more expensive as compared to its competition and places the European farmers in a slightly disadvantaged position. The bases of the European model of agriculture are the two CAP pillars. The first one represents a pillar of stability supporting farmer's incomes and softens market shocks determined by price volatility. The second pillar takes the stabilization process one step farther by promoting development, restructuration and diversification of activities, as a genuine promoter of investments and of sustainable farming methods. The way the two pillars objectives interact represents an essential element for the sustainable development of the rural economy. Although there is not just one definition for the process of sustainable development, it is often described through its objectives - job creation and welfare, improving life standards in rural areas (source: according to the PNDR 2014-2020 definition).

## *Materials and methods*

Development can be more sustainable when at central or local level real growth and revitalization opportunities are found, which, in time should guarantee certain degree of self-sufficiency for rural communities.

Romanian rurality must be seen as an authentic development path. From this perspective, sustainability understood as a process intended to reduce the gaps between

urban and rural should contribute in raising the living standards of the villagers without invading the picturesque and traditional character of the rural areas through uninspired modernization. As such, rural tourism should promote countryside in the true sense of the word, not only develop rural guesthouses, disruptive for the environment. Highly important for the rural areas stays the further development of utilities - water, sewer, electricity, gas - thus providing a rural infrastructure capable to support a friendly development of nature, within a multifunctional rural agro-food sector. The development of the infrastructure and of the basic services in the rural areas - including recreational and cultural activities, the revive of villages and of those activities intended to rebuild and improve the cultural and natural patrimony/heritage of the countryside, represent essential elements of an effort to fully capitalizing the growth potential of the rural areas, as well as their sustainability. Therefore, support should be provided for operations/activities developed for this purpose, including those regarding access to information and communication technologies and the development of fast and ultrafast broadband connection. According to these objectives, the development of services and infrastructure that leads to social inclusion, determine reverse trends of the economic and social decline or even stop the depopulation of rural areas should be encouraged (source: The European Parliament and Council Regulation concerning support for rural development from the EAFRD - <http://www.madr.ro/pages/afaceri-europene/propunere-regulament-ce-627.pdf>).

Income increasing activities must be designed and promoted in order to raise the living standards of the people who live in rural areas. A first such activity could be the development of rural tourism in those areas



that benefited from programs encouraging touristic activities.

In practical terms, the revive and the development of rural areas will determine a new form of tourism, an alternative to traditional tourism - agro tourism. Therefore, agro-tourism can provide tourists with accommodation, meals, entertainment and other complementary activities taking place in the peasant's household. As such, the tourist enjoys a clean/unpolluted and picturesque environment full of natural attractions, cultural-historical values, traditions and customs specific for rural areas. Through their various components, rural areas address a wide range of demands: rest and recreation, knowledge, culture, sports, clean air or spa, hunting and fishing. This explains why agro tourism has the possibility to cover a large area of leisure opportunities for tourists.

Agro-tourism includes organized activities run by local people closely related to the natural environment. Agro tourism has/ possess a high level of complexity, including touristic activity (accommodation, services, sports, entertainment, etc.) as well as economic activity, usually of agricultural nature, like production, processing and trading agricultural products. As such, agro-tourism represents an integral recovery of the rural environment, with its agricultural, tourism, human, technical and economic potential. Agro-tourism capitalizes rural, natural resources, cultural traditions and historical agricultural products, trademark/ regional identity and ethnographic and cultural specificity. A consequence of the post-industrial civilization, agro-tourism offers tourists the chance to rediscover nature. Therefore, natural environment plays the leading role, as the main theatre where recreational activities are supposed to take place. A special role in keeping

a sound natural environment must be taken by the inhabitants of the rural areas, through a proper usage of their agricultural land and the application of methods of production compatible with environment protection, including biodiversity, water, soil and landscape protection. In order to consolidate both the agricultural sector and the environment, a number of normative acts were implemented over time, at national and European level. Such acts count as premise for a long term sustainable development process.

Unfortunately, the elaboration and implementation of legislative acts intended to stimulate the Romanian rural tourism was very slow in the years after the fall of Communism. Government Ordinance no. 62 of 24th August 1994, approved by Law no. 145/1994 established the definitions for tourism pensions and agro-touristic farm for tourist accommodation. There after, the National Tourism Authority Order no. 61/1999 (published in Official Monitor no. 242 bis/1999) updated the concepts, as well as their content with rural tourism pension and agro-tourism pension.

These two types of accommodation as well as food services are also redefined and merged into a single concept – the rural tourism guesthouse, by Government Decision 1328/2001 and OMT no. 510/2002 (M.O. 582 encore / 2002). Compared to rural tourism guesthouses, agro-tourism guesthouses (meaning agro-tourism farms) can cover some of the tourists meals from their own production, without any service obligations (this definition has a restriction). Agro-tourism guesthouses do not provide accommodation services. However agro-tourism is more restrictive in terms of the holiday spending; in addition it takes into consideration the economic impact over rural households and rural communities as a whole.



Agro tourism involves spending time in the farmers household - a farm or a guesthouse etc. - consuming agricultural products (sometimes a given proportion - at least 20% is mentioned) and participating, more or less, at the agricultural activities - “peasantry farm”). Its equivalent is often used to designate the participation of those peasant houses that lost their agricultural function or that are part-time used/ inhabited by their owners as active farmers. In spite of losing the directed connection with the farming activity, “farm tourism” is an important form of rural tourism, with a considerable contribution to the local economy.

The National Rural Development Program 2014-2020 was elaborated and implementing accordance with EC Regulation 1305/2013 of 17 December 2013 and Council Regulation on support for rural development by the European Agricultural Fund for Rural Development (EAFRD). Nationally, the Program is coordinated by the Ministry of Agriculture and Rural Development, and foresees financial support for agro-touristic activities, both from European non-refundable funds, but from the national budget for various common measures aiming rural development policy. Based on these measures, the rural development policy for 2014-2020 focused on three themes (known as “thematic axes”).

These are:

- improving the competitiveness of agriculture and forestry;
- improving the environment and rural areas;
- improving quality of life in rural areas and encouraging diversification of the rural economy.

## *Results and discussions*

The following measures are of real interest for a sustainable development through agro-tourism: Measure 10/ 2014-2020 - “Agro-environment payments” and Measure 313 - “Encouragement of tourism activities”. Payments for agro-environment play an essential role and contribute to the sustainable development of the rural areas by satisfying growing demand of the society for environmental services. They should also continue to encourage farmers and other land managers to exercise a real function for the benefit of the entire society, by introducing or maintaining agricultural production methods compatible with the protection of the environment, landscapes and their characteristics, of the natural resources, the soil and of genetic diversity. In this respect, we should pay special attention to the conservation of the genetic resources in agriculture.

According to the annual report NPRD 2016 the number of holdings that benefited from support was 251,337, and also include farmers who, by the end of 2016, received at least one type of support for applications submitted in the campaigns from 2014 – 2020. The physical area for which payments were made is of 1,528,725.81 hectares. According to data registered in the quarterly statements of expenditure, adjusted with the annual statements submitted to the Commission when clearing of accounts for the previous financial year, the total payments made for supporting these areas amounts 651.927,435 Euros. Out of this sum, 327.242,645 thousand Euros were paid in 2016, representing 33% of the measures total allocated sum.



The financial execution rate (payments) is 65%, representing which is 651,927.44 thousand Euros out of the allocation of 996,408.187 thousand Euros.

The general objective of this measure is to encourage the development of tourism activities in the rural areas, that contribute to reduce the unemployment, to create alternative income possibilities and increase the attractiveness of the rural areas. Support under this measure aim investments in rural areas, namely: tourist accommodation infrastructure, recreational activities, small-scale investments in infrastructure and information centres, developing tourism signs and symbols, etc., development and/or marketing of tourism services related to rural tourism. As mentioned in the previous paragraphs, agro-tourism is regarded as a form of rural tourism that offers accommodation and dining services only within touristic and

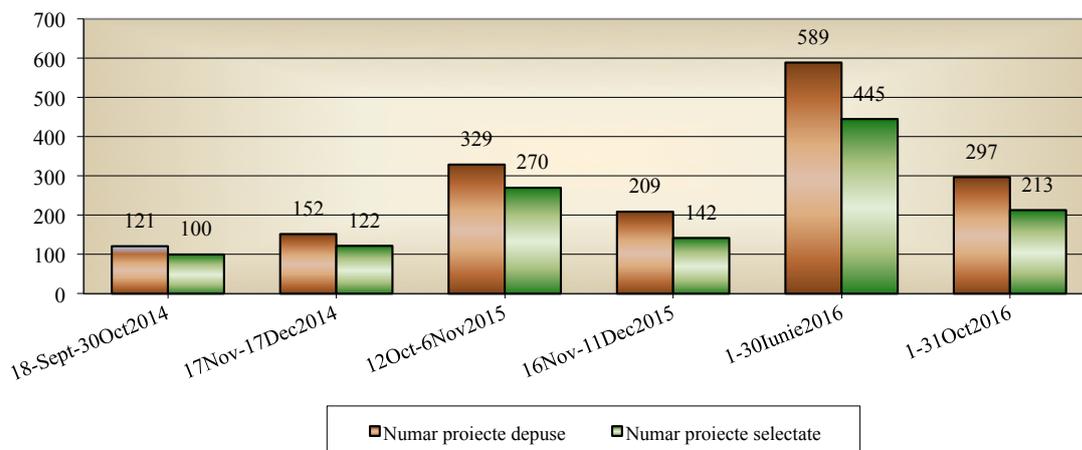
agro-touristic guesthouses allocated in an unpolluted and picturesque environment, with natural tourist attractions and cultural-historical values, as well as traditions and customs of the rural areas.

## Conclusions

This type of tourist activities support the development of rural areas capable to address a wide range of activities: rest and recreation, knowledge, culture, sports, clean air and spa, hunting and fishing. As such, agro-tourism represents both a promotion and a capitalization opportunity of the rural areas, especially when taking into consideration their agricultural, touristic, human, technical and economic potential.

Typical agro-tourism costumers are person usually residing in urban areas. The beneficiaries of this form of tourism, can

Table no. 1:  
Number of projects submitted and selected per sessions



(Source: Data from NPRD Annual Report 2016)



also be, in specific situations, persons that have relatives or even secondary residences at the countryside, but also people who have different kind of interests (e.g. economic) in rural agriculture. Agro-tourism can be mountainous, hilly and lowland. It can be organized by individual households (licensed and certified) or at the local level - through subcontracting accommodation spaces. As stated in the annual report NPRD 2016, 589 projects were contracted in the reference period (the number reflects contracts that remained in the system after operating rescinded contracts), a number representing 6.65% of the 7665 projects NPRD target (Table no. 1).

The total volume of investment is 172,805.75 thousands Euros, representing 17.64% of the 837,265.81 thousand Euros target, with payments of 14,970.07 thousand Euros, representing 3.9% of the allocation out of which 11,976.05 thousand Euro represent EAFRD contribution.

Until 31.12.2016, six projects submission sessions were conducted under this measure; within this sessions 1697 projects were submitted, summing up a total eligible value of 284,242.695 thousand Euros. Out of the 1,697 projects submitted, 1292 projects were declared eligible by the Selection Committee and only 1028 were contracted projects (the number reflects the contracts remaining in the system operation after operating rescinded contracts). The total investment volume was of 398,605.184 thousand Euros, with a non-refundable eligible value of 170,554.734 thousand Euros (Table no.2).

In terms of regional distribution, Region 7 Centre - Alba Iulia has the largest share, respectively 22.86% of total projects approved under this measure, followed by Region 6 North-West Satu Mare with a share of about 19.46 % of total approved projects. The lowest rate, 0.29%

Table no. 2:  
Regional distribution of approved projects

Region	Number of projects M 313	Non-refundable eligible projects (thousand Euro)
	Approved	
1.Nord-East Iasi	148	20832,771
2.South East Constanta	80	14169,905
3.South Muntenia Targoviste	115	20305,642
4.SouthWest Olentia Craiova	74	12739,212
5.West Timisoara	173	28897,46
6.North-West Satu Mare	200	33060,507
7.Centre - Alba Iulia	235	40036,114
8.Bucuresti Ilfov	3	513,123
Total	1028	170554,734

(Source: Data from NPRD Annual Report 2016)



respectively of the total projects approved under this measure is held by Bucharest Ilfov Region 8.

In order to have a truly functional Romanian agro-tourism and in the context of sustainable development, more attention should be given to rural areas rich in traditions, with a particular natural environment, with local people more involved in this type of activity, with customer oriented services (accommodation, meals, local attractions), and the existence of infrastructure (access roads, transport, accessible and acceptable facilities), as well as national and international legislation capable to regulate and stimulate the development in this field of activity.

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## THE CHARACTERIZATION OF SEA BUCKTHORN FRUITS AND COPSES IN TERMS OF SEROTONIN AND MICROELEMENTS

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**Abstract:** *The content of microelements in sea buckthorn fruits, leaves and copses was determined through neutron activation. Also, the content from fruits and leaves was analyzed by atomic absorption, for 11 sea buckthorn bio-types. The content in the dry matter was analyzed from the ashes of the sea buckthorn, depending on the harvesting time. The variation in serotonin content was analyzed depending on the origin of the fruits (three geographic regions).*

*Estimations were made regarding:*

- *some ways of processing different plant organs;*
- *the biological effects of sea buckthorn;*
- *the perspective for serotonin as an immunoinductor in different diseases.*

*The effects of sea buckthorn are the result of a large number of active physiologic substances, like hydro- and lyposoluble vitamins, hormones and phytohormones, amino-acids (including the essentials), provitamins A, carotenoides, serotonin, melatonin.*

*The majority of our research done together with research centers: industrials, medical and production units. Serotonin's effects are well known: immune-inductor, energizing, anti-depressive, chemical mediator, with implications in disabilities like insufficiency in transmitting the information through the nervous system to the organs.*

*The serotonin with the other substances from sea buckthorn is recommended for sickness or discomfort, too. Mostly concerning the severe conditions that affect the XXI century: cancer, HIV, depression, anxiety, suicide tendencies, insomnia, alcohol abuse, schizophrenia, any disease generate by a physical, chemical or biological agent.*

**Key words:** *fitotherapy, immunity, metabolism, sea buckthorn, serotonin*

### ***Introduction***

The content of micro and infra-micro elements from sea buckthorn fruits (Fig. no. 1) and copses was determined by the activation of neutrons. We also analysed the content of Zn, Cu, Mn, Fe, Ba, Mo, determined by photometric or atomic absorption in 11 sea buckthorn bio-types

(Brad et al.1976). The content in the dry matter has been analysed macro, micro, semimicro- and inframicro-elements from the ashes of the sea buckthorn, depending of the time of harvesting. There has been analysed the variation in content of serotonin depending, on the origin of the fruits (three geographic regions) (Cojocaru and Brad, 1984; Brad et al.1997).

Estimations were made regarding:

- some ways of processing different plant organs;
- the biological effects of seabuckthorn;
- the perspective for serotonin as an immunoinductor in different diseases.

of our research done together with research centers: industrials, hospitals and production units (Uluitu et al. 1997; Brad et al. 2002). Today, micro-elements are considered to be "mineral vitamins" because they meet all the requirements of what vitamins are. The

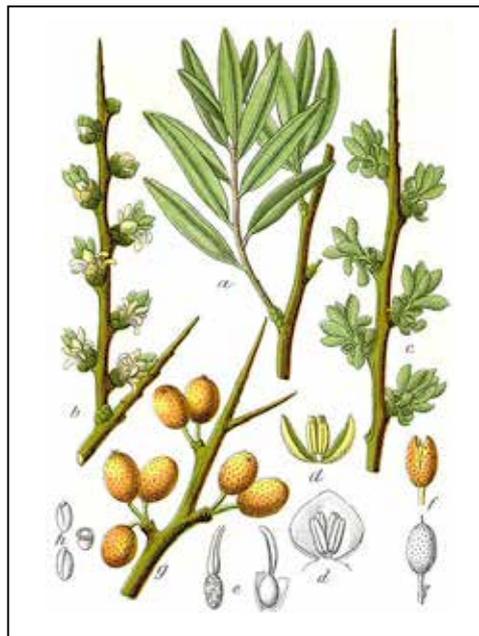


Fig. no. 1 - Sea Buckthorn fruits

(source: [https://ro.wikipedia.org/wiki/Fisier:Hippophae\\_rhamnoides\\_Sturm41.jpg](https://ro.wikipedia.org/wiki/Fisier:Hippophae_rhamnoides_Sturm41.jpg))

The effects of sea buckthorn are the results of a large number of active physiologic substances, like hydro and lipo-soluble vitamins, hormones and phytohormones, organic acids with an important role in metabolism, aminoacids (including the essentials), flavonoides, pro-vitamins A, carotenoides, serotonin, melatonin (Mathiev and Azizov, 1981; Uluitu and Brad, 1984).

The use of seabuckthorn products (single or in association), act as immune-inductor and have other benefits, due to the fact that they act simultaneous, synergic and harmonic, determines effects of the many active ingredients from seabuckthorn fruits, leaves and corses (Brad and Medeşan, 1987). Most

vitamins are not synthesized by the human organism; they are co-enzymes or co-factors of numerous enzymes that act in all the human chains, tracks and metabolic cycles. Macro, micro and inframicro-elements have the same characteristics, they play different roles in the metabolic chain. Being at the same time stimulants and inhibitors, synergic or antagonists, being found in the structure of some substances, with different physiologic roles than vitamins. These „mineral-vitamins” are function inducers and structure stabilizers or play a role in catalyst processes or regulate the enzymatic activities. For some micro-elements the intimate, subtle process is unknown, but



their inexistence is often harmful but their presence has exceptional effects, even in small amounts (ppm) (Bazarova, 1978; Talichova, 1998; Puhalskaia, 2000; Brad et al., 2007).

## ***Materials and methods***

As biologic materials we used seabuckthorn fruits, leaves, offshoots and offshoot bark. Micro and inframicro-elements were determined by the activation of neutrons from the Atomic Physics Institute and through

atomic absorption spectrophotometry were determined at the Pedologic Institute at ASAS. It was determined the content in Zn, Cu, Mn, Fe, Br, Mo in 11 biotypes (Tables no. 1, 2, 4 and 7).

The serotonin was determined with a fluorescent method at the Normal and Pathologic Physiology Institute. We are presenting the results regarding the content in dry substance, ashes and micro-elements in white seabuckthorn fruits (Table no. 6).

Determinations were made on micro-elements: Zn, Cu, Mn, Fe, Mo where there could be seen impressive quantities that vary

Table no. 1:  
The concentration of elements in the white seabuckthorn copses and fruits ashes  
(g% - analysis by neutron thermo activation)

<b>Element</b>	<b>Copse</b>	<b>Fruit</b>
Al	0.55	0.21
Au	0.000014	0.000006
Ba	0.075	-
Ca	14.40	4.20
Co	0.0005	0.0004
Cr	0,0038	0.0032
Fe	1.09	1.10
La	0.00096	0.00040
Mn	0.106	0.034
K	25.40	31.80
Rb	0.014	0.031
Ru	-	0.0007
Sm	0.00004	0.00003
Se	0.00025	0.00014
Na	1.48	1.29
Sb	0.0004	0.0001
Th	0.00025	0.00016
Zn	0.074	0.140

(Source: Hofigal Bucharest Romania \_Laboratory data files)



Table no. 2:  
Analytical results regarding the content of dry material, ashes and microelements in white seabuckthorn fruit samples (Station for Trees Research Bacău).

Type	ash (450°C)	ppm in dry material in air					
		Zn	Cu	Mn	Fe	B	Mo
Sf. Gheorghe 4	4.19	8.0	9.25	6.8	63	13.5	3.15
Sf. Gheorghe 5	3.68	10.5	5.25	9.5	280	11.0	3.10
Sf. Gheorghe 6	3.41	9.8	5.50	8.0	53	12.7	3.40
Sf. Gheorghe 9	3.65	12.5	4.50	10.8	118	19.0	2.57
Sf. Gheorghe 10	3.66	12.3	5.00	8.8	78	16.4	5.07
Delta 60 M	3.57	14.3	6.75	9.0	183	17.5	3.10
Fără spini	3.82	11.8	6.75	10.0	95	11.0	2.62
Șerbănești 1	3.75	16.0	7.00	11.3	428	3.5	3.15
Șerpeni 1 1	3.18	12.8	4.50	9.3	323	19.0	1.43
Șerbănești 4	3.33	15.3	3.00	10.5	83	16.0	2.02
Ciumași	3.91	9.3	6.00	12.5	88	16.4	1.75

(Source: Hofigal Bucharest Romania\_Laboratory data files)

Table no. 3:  
Analytical results regarding the content of dry substance, ashes and microelements in white seabuckthorn leaves samples (Station for Trees Research Bacău)

Type	ash (450°C)	ppm in dry material in air					
		Zn	Cu	Mn	Fe	B	Mo
Sf. Gheorghe 4	11.05	14.8	6.25	48.8	278	153.0	6.24
Sf. Gheorghe 5	7.83	18.5	6.75	56.8	300	101.0	2.76
Sf. Gheorghe 6	6.99	17.3	4.00	80.8	213	87.0	3.00
Sf. Gheorghe 9	6.35	10.5	13.70	42.5	135	43.5	2.42
Sf. Gheorghe 10	7.68	11.0	4.50	40.5	203	58.5	1.95
Delta 60 M	10.02	13.8	5.25	41.8	235	77.5	3.90
Fără spini	7.31	23.3	5.00	74.3	340	66.5	2.28
Șerbănești 1	7.82	14.5	5.00	56.8	395	80.5	0.65
Șerpeni 1 1	7.73	15.5	5.00	31.8	315	66.5	2.60
Șerbănești 4	7.86	11.5	3.00	89.3	245	60.0	0.83
Ciumași	6.66	11.5	5.23	46.3	245	65.0	1.08

(Source: Hofigal Bucharest Romania\_Laboratory data files)



by breed and soil/ weather conditions. In the dry fruits and ashes are found elements enumerated by us in alphabetical order: Al, As, Au, Ba, Ca, Ce, Co, Cr, Cs, Fe, Hf, K, La, Rb, Mg, Mn, Mo, Na, Sb, Se, Se, Sm, Sr, Th, U, V, Zn, Yb. Being found in the metabolism in different chains and cycles (according to the nowadays knowledge în regard with the micro-elements) it was revealed that they participate or constrain in more than 80-100

metabolic sequences (Table no. 3 and 5).

The serotonin was analyzed from seabuckthorn fruits obtained from different sources (Bucharest, Buzău and Craiova). It could be seen a slightly smaller difference expressed in micrograms/gram of serotonin, the quantity was necessary and sufficient to have some effects from 8-10 g of dry substance daily, that corresponds to 40-50g of fruits (Table no. 8).

Table no. 4:

The content of dry substance in white seabuckthorn fruits - dry substance (Șerbănești biotype) in macro, micro, semimicro, and inframicro-elements (analysis through neutron thermo activation: neutron flux  $2 \times 10^{12} \text{ n/cm}^2 \cdot \text{s}$ )

<b>Element</b>	<b>Date 1 - 4. X Media ± s</b>	<b>Date 2 -27. XI Media ± s</b>
Ca %	19.832 ± 1.188	8.013 ± 0.561
K %	8.45 ± 0.42	22.06 ± 1.10
Na %	4.095 ± 0,082	2.117 ± 0.042
Fe %	1.261 ± 9.063	0.635 ± 0.032
Zn ppm	401 ± 28	895 ± 36
Ba ppm	421 ± 70	156 ± 37
Rb ppm	105 ± 11	213 ± 24
Br ppm	127 ± 2	66 ± 2
Cr ppm	36 ± 3	18 ± 2
Ce ppm	20 ± 2	11 ± 2
As ppm	15 ± 1	4.8 ± 0.5
La ppm	12 ± 1	5.1 ± 0.2
Co ppm	6.4 ± 0.6	3.9 ± 0.4
Th ppm	2.8 ± 0.3	1.2 ± 0.2
Se ppm	2.8 ± 0.1	1.5 ± 0.1
Cs ppm	2.3 ± 0.6	1.3 ± 0.3
Sm ppm	1.83 ± 0.08	0.9 ± 0.05
Yb ppm	1.4 ± 0.4	0.9 ± 0.3
Hf ppm	1.5 ± 0.3	0.5 ± 0.2
Sb ppm	1.3 ± 0.1	0.9 ± 0.1
Au ppm	260 ± 10	94 ± 6

(Source: Hofigal Bucharest Romania\_Laboratory data files)



Table no 5:  
The content in micro elements and inframicro-elements in the white seabuckthorn fruit ashes  
(Șerbănești I biotype) established by neutron activation

<b>Microelement</b>	<b>Date 1-4. X Media <math>\pm</math> s</b>	<b>Date 2 -27. XI Media <math>\pm</math> s</b>
Al %	0.263 $\pm$ 0.003	0.60 $\pm$ 0.011
As ppm	0.4 $\pm$ 0.2	0.9 $\pm$ 0.3
Au ppb	509 $\pm$ 15	55 $\pm$ 8
Br ppm	27 $\pm$ 1	50 $\pm$ 1
Ca %	5.12 $\pm$ 0.50	4.55 $\pm$ 0.45
Co ppm	5.7 $\pm$ 0.4	5.3 $\pm$ 0.8
Cr ppm	73 $\pm$ 4	21 $\pm$ 2
Fe %	0.588 $\pm$ 0.024	0.474 $\pm$ 0.019
K %	17,22 $\pm$ 0,69	24.38 $\pm$ 0.98
La ppm	1.7 $\pm$ 0.1	1.4 $\pm$ 0.1
Mg %	3.24 $\pm$ 0.22	4.89 $\pm$ 0.34
Mn %	270 $\pm$ 8	480 $\pm$ 12
Mo ppm	50 $\pm$ 5	88 $\pm$ 6
Na %	0.6986 $\pm$ 0.070	0.6256 $\pm$ 0,063
Rb ppm	43 $\pm$ 4	31 $\pm$ 3
Sb ppm	0,76 $\pm$ 0.11	0.57 $\pm$ 0.09
Se ppm	0.39 $\pm$ 0.01	0.45 $\pm$ 0.01
Se ppm	5.7 $\pm$ 0.4	3.5 $\pm$ 0.3
Sm ppm	0.21 $\pm$ 0.02	0.31 $\pm$ 0.03
Sr ppm	0.21 $\pm$ 0.02	279 $\pm$ 28
U ppm	sub 1	sub 1
V ppm	4.3 $\pm$ 0.5	5.3 $\pm$ 0.8
Zn ppm	10.89 $\pm$ 25	7.26 $\pm$ 3.5

(Source: Hofigal Bucharest Romania \_Laboratory data files)



Table no. 6:  
The result of the biochemical analysis done on some seabuckthorn biotypes  
(Ciumași, Sf. Gheorghe 4, 5, 6, 9, 10, Șerbănești 1, 4, Șerpeni 11, Without thorns, Delta 40 M)  
selected at Bacău

<b>Mentions</b>	<b>Media ± s</b>	<b>The biotype Limits</b>
Average Production fruits (1991-1994) Kg /plant t / ha	18.09 ± 3.40 18.197 ± 3.425	5.13 - 87.97 8.747 - 27.939
Hydrosolubile Substance (%)	12.9 ± 3.7	11.5 -15.0
Ascorbic acid (mg%)	149.06 ± 82.90	22.21 - 260.52
Total Acidity (% d.s. Malic acid)	7.6170 ± 2.0624	4.1059 -11.5487
Average Production (1991-1994) green substance t/ha dry substance t/ha	18.179 ± 7.34 3.33 ± 1.25	8.547 - 27.939 1.666 - 5.231
Oil g% t/ha	14.4671 ± 4.3319 480 ± 303	8.8800 - 21.9402 168 -1147
α-, β-, γ-caroten mg/100 g g/ha	24.12 ± 12.30 135 ± 145	6.27-42.72 28-473
Serotonin in fruits μg/g g/ha	27.28 ± 7.81 95.4 ± 53.4	16.72 - 41.59 26.80 -18.11
Serotonin în leaves μg/g g/ha	37.48 ± 8.07 143.7 ± 104.3	26.39 - 48.48 48.9 - 403.8
<b>Microelements in leaves</b>		
Zn ppm g/ha	14.7 ± 3.9 49 ± 20	10.5 - 23.3 13 - 79
Cu ppm g/ha	5.8 ± 2,8 21 ± 16	3,00 - 13,75 3.5 - 64.0
Mn ppm g/ha	55.4 ± 18.5 170 ± 54	31.8 - 89.3 85 - 244
Fe ppm g/ha	164 ± 73 853 ± 371	135 - 340 286 - 1648
B ppm g/ha	84 ± 27 267 ± 142	58.5 - 153.0 70 - 543
Mo ppm g/ha	2.52 ± 1.58 10 ± 6	0.65 - 6.24 1 - 22
<b>Microelements in fruits</b>		
Zn ppm g/ha	12.1 ± 2.5 49 ± 17	8 - 16 18 - 67
Cu ppm g/ha	5.77 ± 1.66 19 ± 8	3.00 - 9.25 3.4 - 33.0



Mn ppm	9.95 ± 2.18	6.8 - 15.5
g/ha	33 ± 7	12 - 72
Fe ppm	173 ± 130	53 - 428
g/ha	576 ± 487	97 - 1690
B ppm	14,2 ± 6.6	3.5 - 19.0
g/ha	50.2 ± 30	5.2 - 99.0
Mo ppm	2.65 ± 0.98	1.43 - 5.07
g/ha	9 ± 4	2 - 7

(Source: Hofigal Bucharest Romania\_Laboratory data files)

Table no. 7:

The variation in content of serotonin from hydroponic (watery) extract from dry leaves and fruits, gathered from 11 types of seabuckthorn populations selected at Fructex S.A. Bacău

<b>Population</b>	<b>Dry Fruits (µg / g)</b>	<b>Dry Leaves (µg / g)</b>
Without thorns	16.72	27.27
Sf. Gheorghe 5	25.30	40.00
Sf. Gheorghe 6	29.99	49.37
Șerbănești 1	17.90	45.27
Ciumași	41.59	43.29
Șerbănești 4	27.33	42.01
Sf. Gheorghe 9	39.12	26.39
Delta 60 M	26.36	33.05
Sf. Gheorghe 10	27.44	35.88
Șerpeni 11	21.31	48.48
Sf. Gheorghe 4	29.69	26.63
<b>Media ± s</b>	<b>22.23 ± 7.73</b>	<b>27.97 ± 14.42</b>

(Source: Hofigal Bucharest Romania\_Laboratory data files)

Table no 8:

The variation in content of serotonin from dry seabuckthorn fruits, leaves, offshoots and offshoot barks depending on the origin

<b>Fruits types</b>	<b>µg/g d.s. serotonin</b>	<b>Types</b>	<b>µg/g d.s. serotonin</b>
Plafar Bucharest	31	Leaves Buzău	49
Plafar Craiova	30	Offshoots Buzău	31
Plafar Buzău	32	Offshoots barks BZ	190

(Source: Hofigal Bucharest Romania\_Laboratory data files)



## *Results and discussions*

It was also determined the serotonin in leaves, offshoots, offshoot bark; we can see big differences between the content in serotonin from dry leaves and fruits (the offshoots contain almost the same quantity of serotonin as the dry fruits and the offshoot's bark contain 6-7 times more serotonin than the offshoot and 4 times more than the leaves, the values being between 30-100 micro-grams/day).

For the serotonin there can be used as extraction methods the concentrated acid solutions through reverse osmosis or there can be extracted plain serotonin or associated with a precipitation element or co-precipitation, knowing the chemical proprieties of serotonin. Serotonin's effects are well known: immune-inductor, energizing, anti-depressive, chemical mediator, with implications in disabilities like insufficiency in transmitting the information through the nervous system to the organs. The serotonin with the other substances from seabuckthorn is recommended for sickness or discomfort, too. Mostly concerning the severe conditions that affect the XXI century: cancer, HIV, depression, anxiety, suicide tendencies, insomnia, alcohol abuse, schizophrenia, any disease generate by a physical, chemical or biological agent (Koslowski, 1970; Morichi, 1977; Takasahi, 1983; Muster, 1984).

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## NATURAL DIETARY SUPPLEMENTS HAVING ANTISTRESS PROPERTIES

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**Abstract:** The plants, St. John's Wort, (*Hypericum perforatum*), Stinging nettle (*Urtica dioica*), Passiflora (*Passiflora incarnata*) aerial parts, Sea buckthorn (*Hyppophae rhamnoides*) fruits, and leaves, Valerian (*Valeriana officinalis*) roots, grown in own organic cultures, were transformed using standardized proceedings, in order to obtain powders of plants, intermediates in antistress supplement obtaining. The powders of plants were obeyed to physico-chemical analysis for their total content of carotene derivatines (in  $\beta$ -carotene), polyphenols (in chorogenic acid) and flavons derivatives (in rutin), by UV-VIS spectrometry using a double rayed JASCO-UV-VIS V 530 spectrophotometer. The theory of the degenerative processes, issued as a result of the surplus of free radicals, associated with „oxidative stress”, emphasized the importance of antioxidant activity for the studied plant powders.

**Key words:** antioxidant activity, natural dietary supplements

### *Introduction*

The cause of the grave and actual diseases, like cardiovascular, gastrohepatic, nervous and dermatologic affections, cancer and diabetes, the stress existing in our life, is unavoidable. The orientation of prophylactic and curative medicine towards natural and compatible with organism remedia, stimulated the producer's efforts to obtain natural food supplements having antistress properties. The aim of the present work is to perform studies of composition and antioxidant activity of some plants, in order to obtain antistress preparates, having characteristics according to the UE demands.

### *Materials and methods*

The plants, St. John's Wort, (*Hypericum perforatum* - Fig. no. 1), Stinging nettle (*Urtica dioica* - Fig. no. 2), Passiflora (*Passiflora incarnata* - Fig. no. 3) aerial parts, Sea buckthorn fruits (*Hyppophae rhamnoides* - Fig. no. 4), and leaves, Valerian roots (*Valeriana officinalis* - Fig. no. 5), grown in own organic cultures, were transformed using standardized proceedings, in order to obtain powders of plants, intermediates in antistress supplement obtaining. The powders of plants were obeyed to physico-chemical analysis for their total content of carotene derivatines (in  $\beta$ -carotene), polyphenols (in chorogenic acid) and flavons derivatives



Fig. no. 1 - St. John's Wort aerial parts (*Hypericum perforatum*)  
(source: <http://cdn1.shopmania.biz/files/s1/129541897/p/1/7/>)



Fig. no. 2 - *Urtica dioica* aerial parts  
(source: <https://tryonfarm.org/share/files/images/>)



Fig. no. 3 - *Passiflora incarnata* aerial parts  
(source: <http://worldoffloweringplants.com/wp-content/uploads/2017/>)



Fig. no. 4 - *Hyppophae rhamnoides* fruits  
(source: <http://gardenmedicine.com/wp-content/uploads/2011/08/seaberry.jpg>)



(in rutin), by UV-VIS spectrometry using a double rayed JASCO-UV-VIS V 530 spectrophotometer.

Hypericine, hyperforine in St John's wort aerial part and sesquiterpenes in Valerian were appreciated by High performance Liquid Chromatography (HPLC) using a DIONEX apparatus equipped with a diode array, UV-VIS UVD 340U detector, column RP8 Lichrosorb 4,6x 200mm 10 $\mu$ m t=20-250C, mobile phase A=MeOH B=H<sub>3</sub>PO<sub>4</sub> 0.01M, working in gradient. Methanolic extracts were injected in the apparatus. Antioxidant activity of the powders was appreciated by pursuing

the reaction of lipid peroxidation, in the presence of ascorbic acid, being estimated the malondialdehyde as a reaction product, by a coloured complex with thiobarbituric acid  $\lambda=532$ nm. Superoxide dismutase „SOD like enzyme” assays, were performed using their capacity to scavenge the superoxide anions radicals. A system of radicals generating tetramethylethylenediamine-methylene blue was used, and the unscavenged free radicals were measured by their reaction with nitroblue tetrazolium, the absorbance of resulting formazan being read at  $\lambda=560$ nm.



Fig. no. 5 - Valeriana officinalis roots

(source: <http://bibitbunga.com/wp-content/uploads/2016/10/akar-valerian.jpg>)



## Results and discussions

The choice of the plants for the antistress products was performed based on their beneficiet properties on the nervous system,

mentioned in the recent literature, and on the physico-chemical and biochemical assays, for the biological active compounds. The theory of the degenerative processes, issued as a result of the surplus of free radicals, associated with „oxidative stress”,

Table no. 1:  
The contents in active compounds in the studied powders plant

Powder	Active biological compounds					
	Carotene in $\beta$ -caroten (mg/100g)	Polyphenolsin chlorogenic acids (%)	Flavones in rutin (%)	Hiperozide in hipericin (%)	Sesquiterpene in acid terpene (%)	SOD extract (U/ml)
St. John's Wort aerial part	-	1.2	0.2	0.08	-	-
Stinging nettle aerial part	15	0.3	0.2	-	-	-
Passiflora aerial part.	-	0.8	0.1	-	-	80
Sea buckthorn dried fruits	20	1.6	0.33	-	-	-
Sea buckthorn leaves	-	2.8	0.9	-	-	300
Valerian roots	-	-	-	-	0.7	-

(Source: Hofigal Bucharest Romania\_Laboratory data files)

Table no. 2: The inhibition percents of lipide peroxidation for various powder plants (2 different concentration extracts)

Powder plant	The inhibition percents of lipide peroxidation (%)	
St. John's Wort - aerial part	72	93
Stinging nettle - aerial part	60	80
Passiflora - aerial part	-	23
Sea buckthorn - dried fruits	10	47
Sea buckthorn - leaves	47	100
Concentration mg/ml	0.12	0.24

(Source: Hofigal Bucharest Romania\_Laboratory data files)



emphasized the importance of antioxidant activity for the studied plant powders. The obtained results are presented in table no. 1. One's observed from the table no. 1 that the highest percent of carotene derivatives is in dried fruits of sea buckthorn and in stinging nettle aerial part. A high content of polyphenols and flavones, derivatives, and SOD like enzyme, is present in seabuckthorn leaves. The active compounds in St John's Wort: (hiperozide) and in valerian (sesquiterpene) were observed. Associated to these data table no. 2, presents the antioxidant activities (in the inhibition percents of the lipoperoxidation reaction). Emphasized at 0.24 mg/ml concentration, the highest inhibition percent of peroxidation reaction is observed for sea buckthorn leaves, followed by St. John's Wort and stinging nettle aerial part.

## *Conclusions*

In order to obtain new antistress natural food supplements, studies were performed concerning the concentration of active biologic compounds: carotene, polyphenols, flavones derivatives, hiperozide and sesquiterpenes, SOD like enzymes in the series of plants powders, known for their good doing activity on nervous system. Antioxidant activities of these plants, protective against „oxidative stress” was also established. The carrying out determinations, lead to the obtaining, of antistress natural food supplements like Complet antioxidant, Flavovit C, Extravit, beside other new products in research.

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## CULTIVATION OF WILLOW LIKE ECO-ENERGY PLANT AND THE VALORISATION OF IT'S WASTES

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**Abstract:** Currently, in Romania, different energy plants can be grown for production of biomass in mince form (pellet) and wood for construction (for the production of OSB plates). For this purpose, can be cultivated: willow (*Salix alba*), artichoke (*Cynara cardunculus*), elephant grass (*Miscanthus*), Chinese reed (*Giganteus*), hybrid energy poplar, canary grass (*Phalaris canariensis*), giant reed, oil tree (*Jatropha*, the processing, gives an oil used to produce biodiesel). Valorification of the willow eco-bark consists in obtaining dietary feed supplements like: dried extracts, aqueous extracts, glicero-hydro-alcoholic mixtures or compressed with effects on health which can be demonstrated by case studies and clinical studies.

**Key words:** eco-energy plant, willow.

### Introduction

Fertility is the most important property of the soil required development of vegetation. For the purpose of determining soil fertility are analyzed specific parameters: macronutrients (N, P, K, S, Mg), micronutrients (Co, Cu, Zn, B, Mo, Cl), pH and the addition of humus [1,2]. According to the results, the eco-energy willow develop a thicker stem and branches, which can be achieved mince with small percentage of bark, criteria increasingly demanded by pelleting or briquette factories [3]. Bark, which detaches easily, can be valorization by producing methanol, as source of cellulose or for the manufacture of dietary supplements such as: Natural Salicylol, Gemoderived from willow bark, with real effects on health [4].

Currently, in Romania, different energy plants can be grown for production of

biomass in mince form (pellet) and wood for construction (for the production of OSB plates). For this purpose, can be cultivated: willow (*Salix alba*), artichoke (*Cynara cardunculus*), elephant grass (*Miscanthus*), Chinese reed (*Giganteus*), hybrid energy poplar, canary grass (*Phalaris canariensis*), giant reed, oil tree (*Jatropha*, the processing, gives an oil used to produce biodiesel).

Quality of products and by-products can be found also through an adequate management of the cultivated soil. To obtain ecological products is aimed at an appropriate conversion. The dynamic study watching a comparison between the ground quality from the area greenhouses- field of a Hofigal Bucharest reported at a ground type humus originating in a Natural Reserve from Republic of Moldavia, known like one of the most eco-friendly in eastern Europe. Base on the analyse of the quality for the soil from the Hofigal greenhouses eco-area, the



study highlight the valorification potential of by-products from eco-energy willow (*Salix*).

## *Materials and methods*

### A. Soil analysis

In the study was compared the soil fertility from Hofigal eco-greenhouses with a cernoziom with high humus level from the across meadow Natural Reserve from Slobozia Mare, The Republic of Moldavia. The study was carried out in the Environmental University Laboratories from Bucharest. Were harvested 5 samples of soil from Hofigal glasshouses (culture of rosemary) and 5 samples from the Natural Reserve territory (S-E area); all samples have been extracted from 20 cm deep. Were analyzed the content of major macronutrients (N, P, K) and the pH.

For mineral nitrogen has been used the method for the reduction of NO<sub>3</sub> in sulfanilic acid and naphthylamine, being confirm on colorimetric analysis - pink color with different intensities.

For inorganic phosphorus has used the method for the reduction of fosfomolibdenic acid with SnCl<sub>2</sub>, with the appearance of a dark blue color with different intensities.

The potassium analysis was based on reaction with dipicrylaminat of magnesium in an acid medium (HCl), when it appears a red-orange-yellow color, which can be colorimetric analysing. also. Determination of the pH has been by color comparison (Fig. no. 1, 2).

### B. Salycine determining

By the bark analysis (vegetal by-product obtain after the eco-energy willow processing) and by the Hofigal supplements (base on *Salicis cortex*) analysis.

b.1.) The bark quality was analyzed by

determination of the content in salycilic derivatives, expressed in salycine, according to the European Pharmacopoeia, current edition, monograph "SALICIS CORTEX", by chromatography of liquids (3 samples, from Breaza, Furculesti, Gheorghieni area). b.2.) To the Gemoderivate from bark of salix (glicero-hydro-alcoholic extract 1 DH), the salycine has been determined in accordance with E.F, by thin-layer chromatography (TLC).

b.3.) For Natural Salycilol (dietary supplement as tablets), salicyne has been determined in accordance with F. E., by chromatography of liquids.

## *Results and discussions*

### A. Soil analysis

Analytical values obtained in the Experimental Laboratory of the Ecological University of Bucharest has been interpreted in agreement with the levels of nutrients in soil as determined on the basis of legislation and standards in force; have been shown qualitative similarities between the two types of analyzed soil. The evaluation of the main macronutrients content has been done base on the MAPPM G.O. no. 756/1997 regarding the evaluation of the environment pollution specific for the soils with less sensitive use (Graphic no. 1, 2, 3, 4).

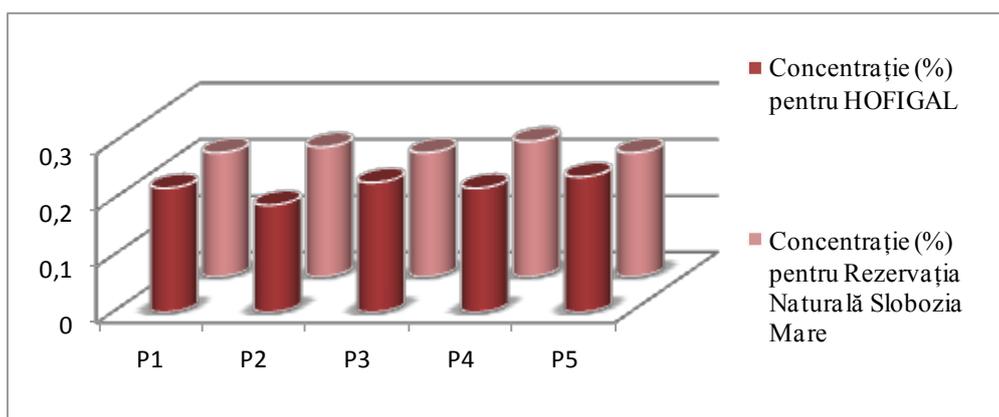
### B. Salycine determining

b.1.) The bark quality has been expressed in salycine, for all the 3 samples; the only appropriate one was from Furculesti, with a content of salycine >1.5 %. Metering is not validate if the obtained resolutions between the appropriate peaks of salycine and piceyne and between the appropriate peaks of piceyne and resorcinol are not of at least 1.5 (Fig. no. 3, 4, 5; Table 1).

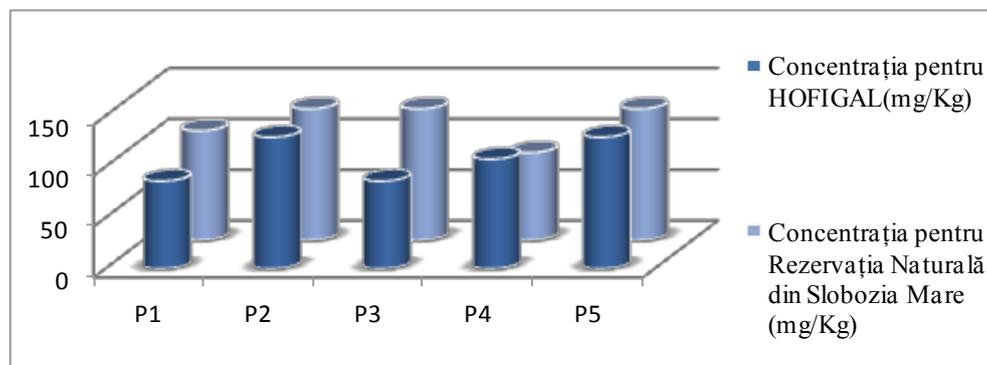


b.2.) To Gemoderivate from willow bark (glicero-hydro-alcoholic extract 1 DH), the salycine has been determined in accordance with E.F., by thin-layer chromatography (TLC). The chromatogram obtained with the reference solution shown to it's middle third part a red-purple spot determined by salycine. In the chromatogram obtained with test solution the spot determined by salycine was clear, more intense and has above, another spot determined by the salycortine or 2'-O-acetyl salycortine. Are also other yellow, blue or brown spots in both chromatograms.

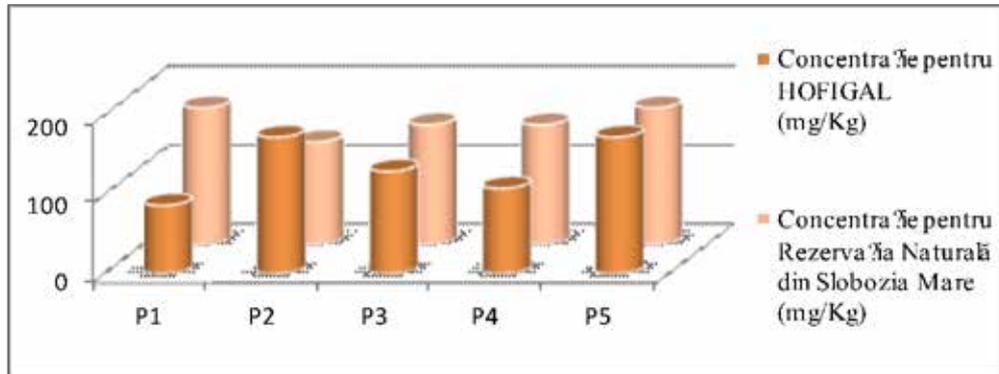
b.3.). For Natural Salicylilol (dietary supplement as tablets), salycine has been determined in accordance with E.F., by chromatography of liquids. Reported to the technical specifications, all analyzed samples: dry and water extract, mixture for compression and stabilized compressed of Natural Salicylilol were employed in parameters regarding the quantitative levels of salycine, being declared as products that are in conformity (Fig. no. 6, 7, 8, 9; Table no.2). Metering is not validate if the obtained resolutions between the appropriate peaks of salycine and piceyne and between the appropriate peaks of piceyne and resorcinol are not of at least 1,5.



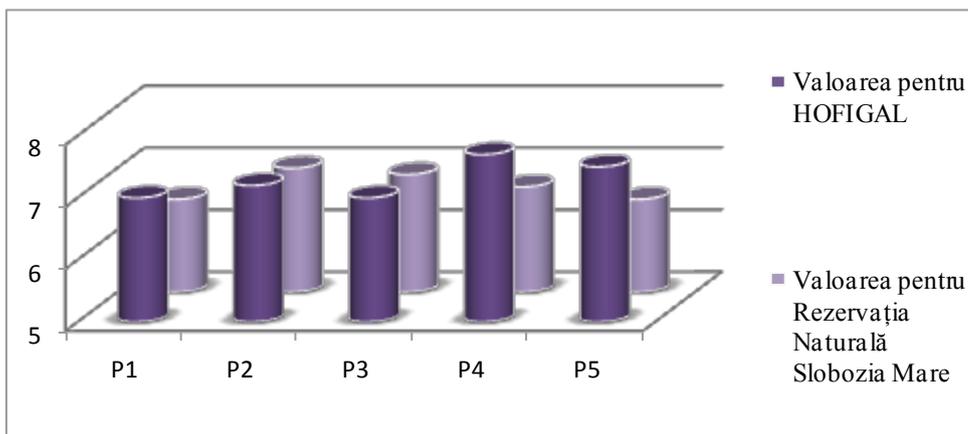
Graphic no. 1 - Comparison of the nitrogen values (N total) in soil (source: EUB Lab. Res., 2012)



Graphic no. 2 - Comparison of the phosphorus values (P mobile) in soil (source: EUB Lab. Res., 2012)



Graphic no. 3 - Comparison of the potassium values (K mobile) in soil (source: EUB Lab. Res., 2012)



Graphic no. 4 - Comparison of the pH values in soil (source: EUB Lab. Res., 2012)



Figure no. 1 - Analytical work in the laboratory for soil analysis



Figure no. 2 - Kit for soil analysis

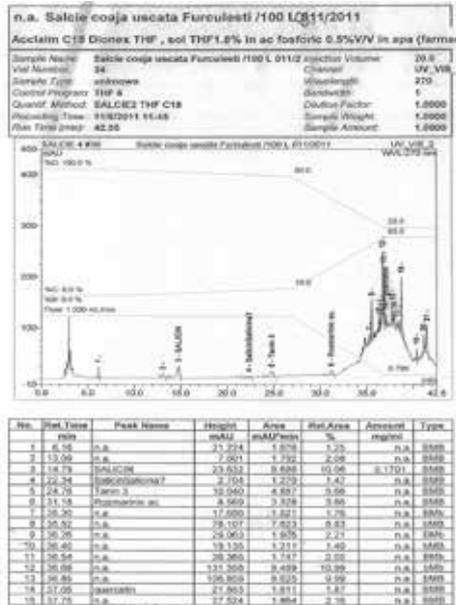


Figure no. 3 - Salix cortex, Furculesti  
 (Source: Hofigal Bucharest Romania\_Lab data files)

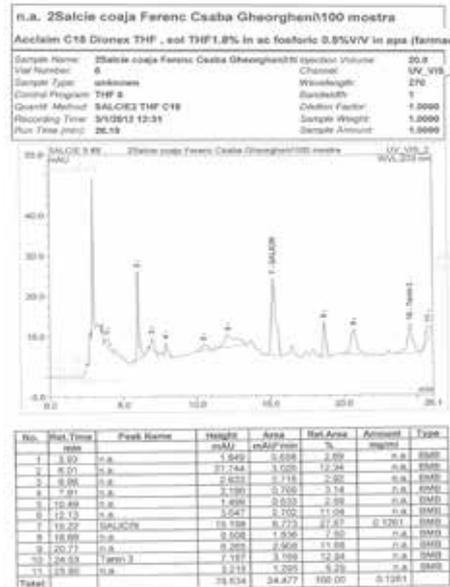


Figure no. 4 - Salix cortex, Gheorghieni  
 (Source: Hofigal Bucharest Romania\_Lab data files)

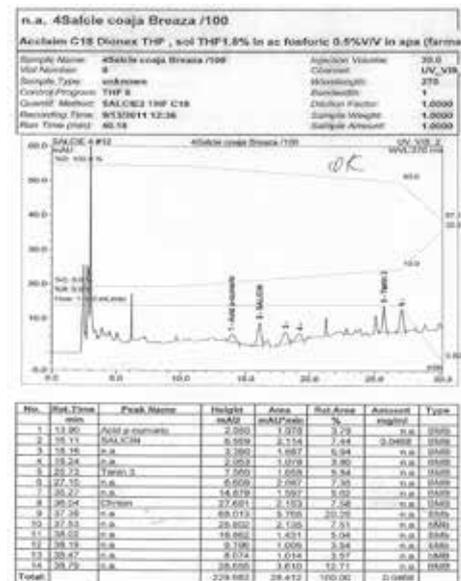


Figure no. 5 - Salix cortex, Breza  
 (Source: Hofigal Bucharest Romania\_Lab data files)

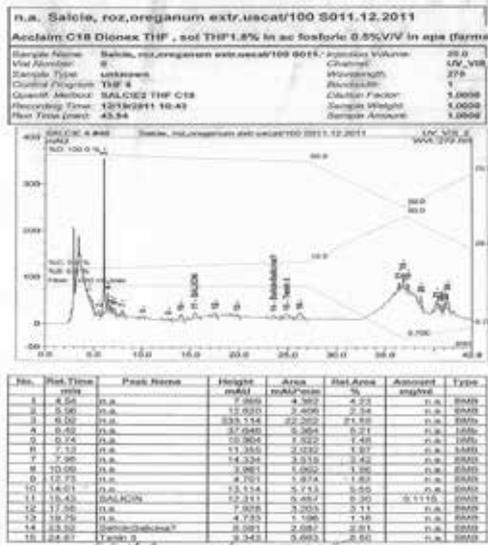


Figure no. 6 - Salicylil, Dry Extract  
(Source: Hofigal Bucharest Romania\_Lab data files)

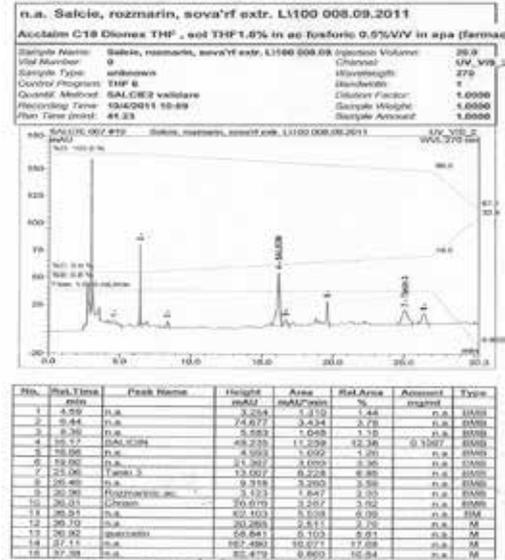


Figure no. 7 - Salicylil, Aqueous Extracts  
(Source: Hofigal Bucharest Romania\_Lab data files)

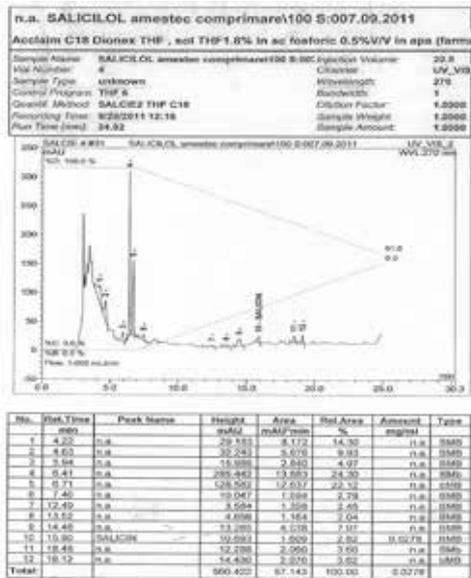


Figure no. 8 - Salicylil, Mixture for compression  
(Source: Hofigal Bucharest Romania\_Lab data files)

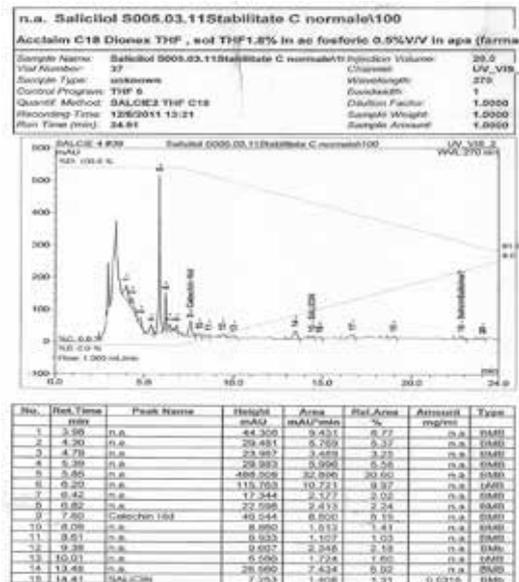


Figure no. 9 - Salicylil, Stabilized compressed  
(Source: Hofigal Bucharest Romania\_Lab data files)



Table no. 1:  
The content of salycine determined on dry bark of salix

No.	Area of cultivation / harvest	Content in salycine (%)
1	Breaza	0.50
2	Furculesti	1.70
3	Gheorghieni	1.26

(Source: Hofigal Bucharest Romania\_Lab data files)

Table no. 2:  
The content of salycine determined on Natural Salycilol

No.	Studied sample	Min. content in salycine base on technical specification (%)	Content in salycine determined (%)
1	Dry Extract	0.15	1.10
2	Aqueous Extracts	0.25	1.09
3	Mixture for compression	0.17	0.28
4	Stabilized compressed	1.00	1.86

(Source: Hofigal Bucharest Romania\_Lab data files)

## Conclusions

» In terms of the main macronutrients (N, P, K) and the soil pH, the soil from the Hofigal eco- greenhouses is qualitative similar with the soil from the Slobozia Mari Natural Reservation - The Republic of Moldavia, recognized as one of the most eco-friendly in eastern Europe.

» Even if willow is cultivated first like energy plant (biomass for pellets, biodiesel), where are monitored the environmental conditions of the cultivation area, the wastes represented by a easily removable bark can valorised because its contain salycine in concentrations which, depending on the area, match or even exceed the limits imposed by European Pharmacopoeia.

» Valorification of the willow eco-bark consists in obtaining dietary feed supplements like: dried extracts, aqueous extracts, glicero-hydro-alcoholic mixtures or compressed with effects on health which can be demonstrated by case studies and clinical studies.

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Code NURC : 882 category „C”

ISSN: 1454 – 816X

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