

“SEABUCKTHORNOLOGY” A POSSIBLE NEW INTERDISCIPLINARY SCIENCE

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Abstract

The purpose of the paper was to present a critical overview on the main opinions and research results on "seabuckthornology" as a new interdisciplinary science, as mentioned on various international conferences and other events hold in different countries where the author took part and expressed his opinions as expert in the field. The current opinion of many experts is that the sea buckthorn is the result of a long hard work in the field of research, practice, landscape architecture, production, soil science, animal and human health. It is an important plant of the 3rd millennium. The only problem many experts are facing is the fact that it is very difficult to put in order all multidisciplinary information from Botany, Geology, Marketing, Medicine, Biochemistry, Agronomy, Management etc. The solution is the elaboration of a statute of the interdisciplinary new science "seabuckthornology" and the creation of a multilingual data base, which should be updated permanently as at any moment a manufacturer having sea buckthorn oil production to find many offers from the entire world, obtaining all parameters and prices in few minutes, the address, fax, e-mail, phone number etc. In the actual world crises, a scientifically aboard of seabuckthorn may be a solution to health and environmental problems.

Key words: Romanian contribution, cure, land improvements, scientific and commercial information, remedy, seabuckthornology, terminology, viticulture

INTRODUCTION

Humanity is in the third millennium of its Christian time measured existence. Romania is a country which benefited of excellent natural conditions. Now it is in a profound crisis, the solution being a radical change of actual approach in all domains of activity and in conditions of a modern reappraise of scientifically work of past generations. Under these conditions, it is necessary to reconsider the importance of some species from spontaneous flora which could become important resources for the economy and environmental protection. In the entire world, the situation is also critical, at Rio de Janeiro and Paris there were global reunions against environmental changes and the desertification. At Florence, Italy, it was adopted The European Convention of the Landscape. The objectives are: the protection of landscape, the management and arrangement and the organization of the European co-operation in this domain. In Romania, a new legislation provides rules and measures to protect various areas like „Dunes with

Hippophae rhamnoides L.”

Sea buckthorn could become a solution for the arrangement of landscape in regions which are now the subject of desertification, salinity a.s.o. The production of fruits is a resource of food and medical industry development. All the aspects of sea buckthorn utilization in the actual conditions in Romania were presented in 2006, in the Ph.D. Thesis on “Studies about the importance of sea buckthorn (Hippophae rhamnoides L.) in the environmental protection and human health economy” [19] Under the actual climate conditions, this plant is able to fix the lands which are deeply degraded (it has many suckers), to assimilate Nitrogen directly by roots (it has an ameliorative effect to the soil). The fruit contains a lot of vitamins, (the C vitamin content being twice higher than in hip roses), carotene, citric acid etc. The oil contains E vitamin which is revitalizing the human organism, besides P, B1, B2, A, K, F vitamins (F vitamin defends cells against cancer and irradiation). There are also 15 microelements such as: Fe, Mn, B, Al, K, F, Ti etc. From fruits, it is possible to obtain food products:

juice, vine, jam (with cherry, apples and plums), butter etc. All these products are very rich in vitamins. In pharmaceuticals and cosmetics, it could be used for treating the burned and irradiated tissues. In animal feeding, sea buckthorn could improve the hair of dogs, cats, and horses, egg quality, immunity etc. The *Hippophae rhamnoides* L. is a decorative plant, being used in landscape architecture in combination with other plants grace to its green-white colour contrasting with the orange of flowers and fruits.

In this context, the paper aimed to synthetically present an analysis of the importance of *The Hippophae rhamnoides* L. in many fields of activity and emphasize the reasons why it is need to develop a new multidisciplinary science named "*seabuckthornology*".

MATERIALS AND METHODS

This paper is based on a large documentation on the biological features and economical uses of the plant grace to the updated information provided by many research works of high importance presented to various international scientific events where the author took part. His opinions are also put into evidence and are based on his experience in the field which allow him a critical approach of the main aspects taken into consideration.

RESULTS AND DISCUSSIONS

Global climate situation

According to the US National Academy of Sciences, "Climate Intervention 2009" [22], the Earth's surface temperature has risen by about 1 degree Fahrenheit in the past century, with accelerated warming during the past two decades. There is new and stronger evidence that most of the warming over the last 50 years is due to human activities. Human activities have altered the chemical composition of the atmosphere through the build up of greenhouse gases—primarily carbon dioxide, methane, and nitrous oxide. The heat-trapping property of these gases is undisputed although uncertainties exist about how earth's climate responds to them.



Photo 1. Tulcea City, Aegyssus, an ancient Roman Fortress, the door of the Danube Delta, affected by floods (Original photo, Proorocu V.G., 2005)

Energy from the sun drives the earth's weather and climate, and heats the earth's surface; in turn, the earth radiates energy back into space. Atmospheric greenhouse gases (water steamers, carbon dioxide, and other gases) trap some of the outgoing energy, retaining heat somewhat like the glass panels of a greenhouse.

Since the beginning of the industrial revolution, the atmospheric concentrations of carbon dioxide have increased by about 30%, methane concentrations have become more than doubled, and nitrous oxide concentrations have risen by about 15%. These increases have enhanced the heat-trapping capability of the earth's atmosphere. Sulfate aerosol, a common air pollutant, is cooling the atmosphere by reflecting light back into space; however, sulfates are short-lived in the atmosphere and vary regionally.

Why are greenhouse gas concentrations increasing? Scientists believe that the combustion of fossil fuels and other human activities are the primary reason for the increased concentration of carbon dioxide. Plant respiration and the decomposition of organic matter release more than 10 times the CO₂ released by human activities. But these releases have generally been in balance during the centuries leading up to the industrial revolution with carbon dioxide absorbed by terrestrial vegetation and the oceans.

Soil degradation

According to the French school of Soil Science, soil retrogression and degradation

are two regressive evolution processes associated with the loss of equilibrium of a stable soil. Retrogression is primarily due to erosion and corresponds to a phenomenon where succession reverts back to pioneer conditions (such as bare ground). Degradation is an evolution, different of natural evolution, related to the locale climate and vegetation. It is due to the replacement of the primitive vegetation (known as climax) by secondary vegetation. This replacement modifies the humus composition and amount, and impacts the formation of the soil. It is directly related to human activity. The soil represents the surface layer of the earth's crust.

At the beginning of a soil formation, only the bare rock outcrops. It is gradually colonized by pioneer species (lichens and mosses), then herbaceous vegetation, shrubs and finally forest. In parallel a first humus-bearing horizon is formed (the A horizon), followed by some mineral horizons (B horizons). Each successive stage is characterized by a certain association of soil/vegetation and environment, which defines an ecosystem.

After a certain time of parallel evolution between the ground and the vegetation, a state of steady balance is reached; this stage of development is called climax by some ecologists and "natural potential" by others. Succession is the evolution towards climax. Regardless of its name, the equilibrium stage of primary succession is the highest natural form of development that the environmental factors are capable of producing.

The cycles of evolution of soils have very variable durations, between a thousand-year-old for soils of quick evolution (A horizon only) to more than a million of years for soils of slow development. There are two types of ecological factors influencing the evolution of a soil (alteration and humification). These two factors are extremely significant to explain the evolution of soils of short development.

When the state of balance, characterized by the ecosystem climax is reached, it tends to be maintained stable in the course of time. The vegetation installed on the ground provides the humus and ensures the ascending circulation of the matters. It protects the ground from erosion by playing the role of

barrier (for example, protection from water and wind). Plants can also reduce erosion by binding the particles of the ground to their roots.

A disturbance of climax will cause retrogression, but, if given the opportunity, nature will make every effort to restore the damage via secondary succession. Secondary succession is much faster than primary because the soil is already formed, although deteriorated and needing restoration as well.

However, when a significant destruction of the vegetation takes place (of natural origin such as an avalanche or human origin), the disturbance undergone by the ecosystem is too important. In this latter case, erosion is responsible for the destruction of the upper horizons of the ground, and is at the origin of a phenomenon of reversion to pioneer conditions. The phenomenon is called retrogression and can be partial or total (in this case, nothing remains beside bare rock). For example, the clearing of an inclined ground, subjected to violent rains, can lead to the complete destruction of the soil. Man can deeply modify the evolution of the soils by direct and brutal action, such as clearing, abusive cuts, forest pasture, litters raking. Erosion is the main factor for soil degradation and is due to several mechanisms: water erosion, wind erosion, chemical degradation and physical degradation.

Agriculture increases the risk of erosion through its disturbance of vegetation by way of: overgrazing of animals, planting of a monoculture row cropping, tilling or plowing, crop removal, land-use conversion

Recent increases in the human population have placed a great strain on the world's soil systems. More than 5.5 billion people are now using about 10 % of the land area of the Earth to raise crops and livestock. Many soils suffer from various types of degradation that can ultimately reduce their ability to produce food resources. Slight degradation refers to land where yield potential has been reduced by 10%, moderate degradation refers to a yield decrease from 10-50 %. Severely degraded soils have lost more than 50% of their potential. Most severely degraded soils are located in developing countries such as Asia

and Africa.

The increase in the turbidity of water and the contribution of nitrogen and of phosphorus can result in eutrophication. Soils particles in surface waters are also accompanied by agricultural inputs and by some pollutants of industrial, urban and road origin (such as heavy metals). The ecological impact of agricultural inputs (such as weed killer) is known but difficult to evaluate because of the multiplicity of the products and their broad spectrum of action.

Soil degradation may involve the disappearance of the climax vegetation, the decrease in animal habitat, thus leading to a biodiversity loss and animal extinction. Problems of soil erosion can be fought, and certain practices can lead to soil enhancement and rebuilding. Even though simple, methods for reducing erosion are often not chosen because these practices outweigh the short-term benefits. Rebuilding is especially possible through the improvement of soil structure, addition of organic matter and limitation of runoff. However, these techniques will never totally succeed to restore a soil (and the fauna and flora associated to it) that took more than 1000 years to build up.

Sea buckthorn importance under the conditions of human health degradation

The new civilization means stress, untidy life, eye disabilities, artificial feeding, synthetically drugs, foods, drinks and vitamins.

Sea buckthorn is called by the Romanian peasants in Buzau County “berries of the Holy Virgin”. Romanian people used from hundreds of years the fruits for the treatment of anemia, diarrhea, rheumatism and rash. From fruits, they obtained food products: juice, vine, jam (with cherry, apples and plums), butter etc., they used it also as a textile colorant. In the Romanian “Medicinal and Aromatic Plants from A to Z” Guide Book, the two appreciate specialists Ovidiu Bojor and Mircea Alexan recommended sea buckthorn as a vitamin complex (C, B1, B2, PP) carotenes, folic acid, oil, izoramnethol, fitosterol. For this reason, Fructus Hippophae is deeply recommended in avitaminosis in

combination with Fructus Cynosbati (hip rose), Folium Urticae (stinging nettle), gooseberry, Folium Menthae (mint), Folium Rubi idaei (raspberry) and Folium Primulae (cowslip), as infusion, cooling drinks, syrups, gout as reach in vitamins and diuretic, pneumonia in combination with colt’s foot, linden tree, hyssop, cowslip, savory, elder tree, rickets Fructus Cynosbati (hip rose), Fructus Hippophae, Folium Primulae (cowslip), Folium Melissaе (balm mint), adjuvant in pulmonary tuberculosis in winter and spring for vitamins with Fructus Cynosbati (hip rose), Folium Urticae (stinging nettle), Folium Primulae (cowslip), uremia in combination with diabetes Folium Betulae (birch tree), Folium Myrtilli (bilberry) and Herba galegae (goat’s rue), xerophthalmia in combination with Fructus Cynosbati (hip rose), Folium Urticae (stinging nettle), Flores Tagetes (marigold) and Fructus Myrtilli (bilberry).

Sea buckthorn presentation

Sea buckthorn is an Euro-Asiatic species, classified in 1753 in “Speciae Plantarum” by Karl von Linné at the position 1023. The great botanist seems to be its godfather.

Hippophae rhamnoides has two significances. Now, because it has a positive significance, accepted in the etymology from Greek words: horse and shine. The Romanian specialists demonstrated the influence of sea buckthorn on animal health improving the skin aspect.

The second significance comes also from Greek: horse and poison, being reflected in the Western Europe tradition.

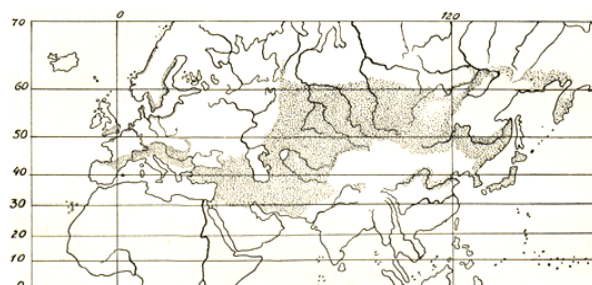


Fig. 216. Hippophae rhamnoides L. Verbreitungskarte unter Zugrundelage der Darstellung von Servetatz.

Fig. 1. Sea buckthorn area from Illustrierte Flora von Mittel - Europa (Gustav Hegi Munchen J.F. Lehmanns Verlag, 1926)

The Romanian specialists’ conception at the beginning of the XX century was the same: it

may be caudated by the plant's negative effect. Other opinions are related to the effect on the elimination of intestinal worms. The Romanian word "catina" seems to come from the Latin "catena", the image from the Roman invaders was a chain around rivers, the colour of leaves suggested them the silver. Its natural area was one of the largest in the world, from the Atlantic Ocean to the Pacific.

In Romania, the modern scientific statute of agriculture was founded in the inter-war period when, in 1938-1943, Constantin Filipescu coordinated a large staff and published "The Great Agricultural Romanian Encyclopedia".[2]"Any country with pretensions of civilization must have in the cultural treasure agricultural encyclopedia and dictionaries needed by anyone who is concerned by this millenary activity", said the author in the introduction. In the first volume of this work, sea buckthorn was largely described at page 710: "cătina albă" bot. *Hippophae rhamnoides* L. Fr. Saule epineux, germ. Sanddorn, engl. Sea buckthorn (sea, buck, thorn) a bush usually of 2-5 m which could become a little tree of 5-6 m. from slippery grounds of river's gravels. One year stems has silver scaly brush and ferruginous rust coloured down, early they get thorns, old stems has a great number of short stems transformed in thorns. The ovoid buds are covered by a small number of golden yellow scales with silver brush. Leafs are linear lancelet or narrow oblongs 4-5 (6) cm. long and 5-6 (10) mm. breadth, short petiolated, petiole of 1-3 mm., entered edge; superior face at first has silver scales, at maturity dark green, glabrous and only the long of principal nervure with down, inferior face is silver with scaly silver thread to golden yellow which at friction are taken on the fingers. Dioeciously flowers are little, less apparent, greenish, situated on annual stems on which it appear simultaneous with leafs by 2-3 at the base of inferior leafs which are hiding integrally. Male flowers sessile with yellow-green perigonium on intern face have silver scaly thread in tubular form, evidently separate at the extremity in two lobes on square disk. Female flowers in raceme specula form, with a perigonium evidently separate at the

extremity in two lobes, covered in exterior with scaly thread; unilocular pistil, one only ovule. It blossoms from April to May. Fruit is an achene covered in exterior with an indurion, seems that in the inferior part persists the perigonium which became fleshy. Fruit is ovoid like a pea bean brown-orange to golden yellow, the fleshy part has acidulous taste, contains a poisonous principia, which don't hinder birds to devour them after the snow fall. The pip, achene with solid brown shining cover, usually has one seed. The trunk may be strongly developed 4-6m. and at soil level it may be 10-15 cm. in diameter with many ramifications has lateral direction, sinuously, covered at the beginning with brown smooth bark, in time it has a rhizome dark brown scaly profoundly cracked. The hardwood yellow-brown, became by drying weighty, solid, may be polished, don't resist in air, the ashes are rich in potassium. The striking root is profound, because the pivoted part penetrates depth the soil and superficial by lateral roots parallels with the surface, from lateral roots in sands there are starting many suckers. In roots there are tuberosities in which leaves in symbiosis an Actinomycete capable to assimilate atmospherically nitrogen.

It is spread on marine dunes, alluvial sands along rivers and around lakes on stony versants and crumbling bank, coasts and cliffs, detritus degraded pasture lands, etc. Its principal area is the Central Asia from the Caucasian territory to North of Persia and the Ural, to the East of Asia.

In Europe, it is found along of the Scandinavian coasts, in the Baltic Countries to the North Sea, South of England to the South of Europe vegetating on a narrow band on the Mediterranean seashore in interior on valleys in the mountains or hills in North of Spain, South of France, North and Center of Italy, Yugoslavia, Down Austria, Hungary, South of Romania and Bulgaria.

In Romania, *Hippophae* is found in the hilly territories, in the Southern and Eastern Carpathians valleys of versants from Moldavia and in Muntenia it spreads along the valleys to plains and to the Danube. An insular center of sea buckthorn is in the

Danube Delta and at the Black Sea shore in the place called Cardon at North of Sulina (5 km.).

The optimum area is the Sub-Carpathian zone in the Ialomita River valley, Laculete, the Prahova valley and its affluents the Campina, Comarnic, Telega, Slanic, Teleajan valley, Homoraciu, the Buzau valley, Cislau, Nehoiasi, Ramnicu Sarat valley, valleys from Vrancea County etc. and it continues in all the basins to Bucovina.

In forestry, it is useful to fix the dunes or moving grounds supporting more salts in soil Na Cl, it may be the national essence for the restoration of Vrancea County and other regions Carpathian deforested regions wher the installation of new forests on salted soils is difficult. Its ample ramification and numerous thorns make it valorous for hedges. As a bush, it is considered a very ornamental plant, also with its silver leafs and its numerous orange fruits which last on branches after the snow fall.

It may be multiplied by seeds, slips, marcotage and suckers.

The first encyclopedia was set up during the first war as its authors declared.

The Romanian specialists have along experience in using *Hippophae rhamnoides* in soil improvement. In 2005, during the spring season, Romania was facing with floods at a large scale.

The economic phenomenon from the end of 19th century when forests were destroyed and sailed for the construction of railways in the Central Europe was the same in the legislative vide after 1990 and the situation in Romania is dramatic because the huge destruction. The mistake in the tackle of sea buckthorn is the attempt to define all varieties as one kind of assortment. It has a great variability and adaptability. The Romanian researchers had demonstrate that the species has the capacity to accumulate in its tissue a great level from some radioactive elements, characteristically for the soil and subsoil in its habitat zone. In soil and subsoil there are slowly transformations of radioactive elements, with variable times of halve which give to the crust a certain natural radioactivity. Alfa radioactivity results from the transformation

of radium in radon, the beta radioactivity is given in special by the isotopic form of potassium being in soil near K40 ions. Romanian measurements of fruits in regions which are known with the particularity of radioactivity, established that there were 34-37 less alfa global concentration compared to the maximum admitted limit in edible water and 2-3 times more beta radiations. This illustrated the capacity of fruits to indicate the presence of natural radioactivity in soil. The beta radiation from absorbed radioactive elements on soil particles were stored or dissolved in the soil solution.

There are other species like *Solanum nigrum*, Romanian "zarna", *Veratrum album* "stregoaie" which have toxic components influenced by the soil composition.

These explain many contradictions about the benefice or lethal effect of fruit utilization.

The authors of the Romanian Encyclopedia considered it like not recommended in feeding, their occidental formation and sources are explaining this opinion. The conclusion is that the variability of this species is the reason of many contradictions about the components concentration and its large utilization. [2]

The International Sea buckthorn Association should be the promoter of a scientific map-drawing of varieties at the global level, as a first step for research in the various domains of utilization.

The regional people's millenary experience under the conditions of maintaining the environmental parameters should be an important point of view in the research activity.

Hippophae rhamnoides L. has an opportunity to become the solution of the modern environment and feed global crises only under a global conception in research, production integration, processing, economic management and marketing.

The Viticulture Science - A study case

Viticulture (from the Latin word for vine) refers to the cultivation of grapes, often for use in the production of wine. When the grapes are used for winemaking, it is also known as viniculture.

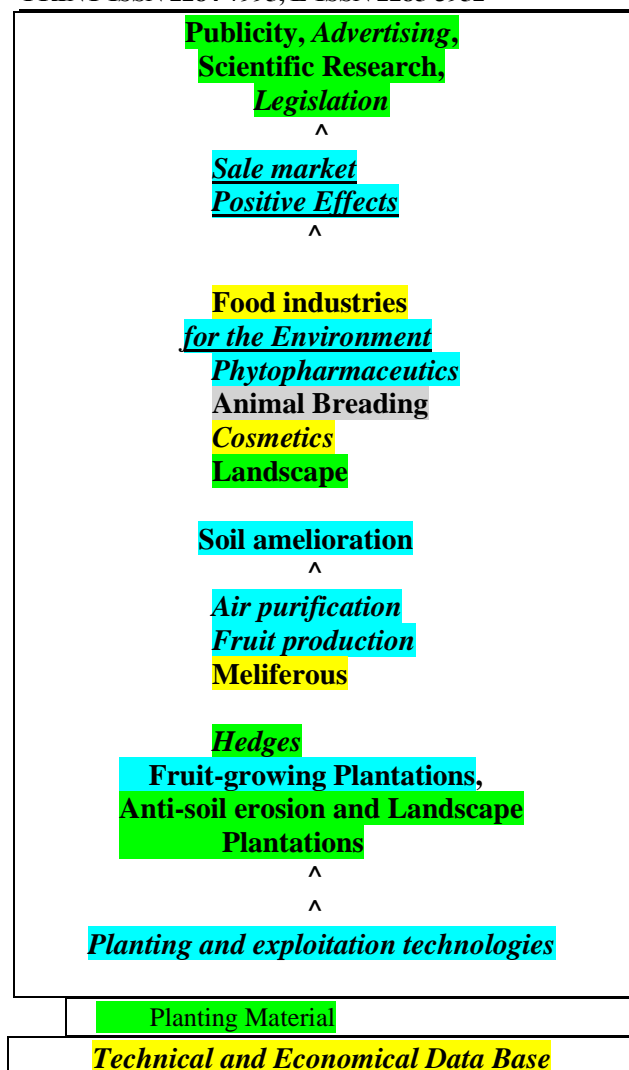


Fig. 2. The main aspects which should be taken into account for the scientifically implementation of sea buckthorn utilisation [16]

It is one branch of the science of horticulture. Viticulture is the science, production and study of grapes which deals with the series of events that occur in the vineyard. Grapes are grown for fresh fruit, dried fruit or for the grape juice, which can be used (amongst others) to produce wine. The viticulturalist's duties include: monitoring and controlling pests and diseases, fertilizing, irrigating, canopy management, monitoring fruit development and characteristics, deciding when to harvest and vine pruning during the winter months. Viticulturalists are often intimately involved with winemakers, because vineyard management and the resulting grape characteristics, provide the basis from which winemaking can begin. Viticulture is an example of scientifically approach of a

millenary human occupation with social, economical, habitual and ethnical aspects.

Vitis vinifera is a plant which changed the destiny of billion of people in their millenary existence. Viticulture is the basically occupation in Romania Cotnari, Husi, Panciu in Moldavia, Dragasani, Dealu Mare, in Muntenia, Niculitel and Murfatlar in Dobrogea, Pecica, Tarnave in Transylvania, France, Champagne, Portugal Porto also. It develops activities in aval: viticulture machines and implements, grape refrigeration, vinification industry equipment. Philoxera is an example of the importance of research activity in the maintenance of a millenary occupation. In France in 1863 cultures were destroyed. In Romania for example there were grafting centers at Tintea (Prahova County), Strehaia (Mehedinti County), Ceda (Arad County), Petresti (Vrancea County), in this mode appears a mosaic of varieties Cabernet Sauvignon, Muscat Ottonel, Riesling, Traminer, Sauvignon, Chasselas, Afuz Ali, Muscat de Hamburg a. s. o.

In the post-philoxeral period, in 1937, it was founded The Agricultural Research Institute where professor I.C. Teodorescu led the Horticulture Department. He was the promoter for the introduction of scientific and technical progress in the Romanian viticultural production. Political and social effects were in the period of prohibition, the illicit commerce won all public order measures.

Sea buckthornology - A need of modern times

In Romania, Popescu M. et al., in 1982, wrote "Pomicultura generală și specială" published by Didactical and Pedagogical Press House [24]. This was the first textbook of Tree culture which contained a chapter dedicated to the sea buckthorn technology, written by Profesor Victor Cireasa from Iasi Agricultural Institute who was the promoter of the culture and study of sea buckthorn in Romania.

Lupe Z. Ioan, Grigorescu Emanoil, Brad Ion, Cireasa Victor, Manea Stefan are some of Romanian specialists in forestry, horticulture, medicine, bio-chemistry with many studies and applications of sea buckthorn.

In Proceeding of the 1st Congress of International Sea buckthorn Association there are essays elaborated by specialists from Bolivia, Canada, China, Estonia, Finland, Germany, India, Italy, Latvia, Romania, Russia and Ukraine. At the 2nd Congress, other important research results were presented by experts from Azerbaijan, Bolivia, Canada, Korea, Finland, Germany, India, Italy, Japan, Latvia, Mongolia, Nepal, Nigeria, Pakistan, Russia, Sweden, Turkey, Ukraine, U.S.A. and from Romania too.

The main idea that everybody accepted was: the sea buckthorn is a plant which means hundreds of years of landscape architecture, research, experience, secrets, production, soil health, animal and human health, in a self-destructive human society of the 3rd millennium.

What displeased at those Conferences? The impossibility to put in order all the important and multidisciplinary information.

All the experts, no matter their field of activity: Botany, Geology, Marketing, Medicine, Biochemistry, Agronomy, Management etc. were deeply interested to get updated information. The conclusion was that the solution is to set up a statute of an interdisciplinary new science focused on "sea buckthorn" and the most important, a multilingual data base alphabetically ordered accessible for anyone interested is also needed.

As all the three congresses underlined, Seabuckthornology will be the science of the study of the biology of sea buckthorn and the rational and economical way of the culture of this plant for the soil recovery and human and animal medicine and feeding.

There are important domains where the sea buckthorn should be artificially introduced, to recuperate the negative role of modern technologies, modern conceptions and interests.

Food industry

Sea buckthorn is used in the composition of juice, tonic vine, jam (with cherry, apples and plums), butter etc. All products are very rich in vitamins. There are recommended for people with disabilities and sickness, mothers who are suckling children. In some countries,

sea buckthorn is used as a preserver and sauce for fish cooks.

As a meliferous species, it is interesting to evaluate the importance of picking from sea buckthorn flowers on honey composition.

For example, the Romanian experience could be reconsidered and in the research programs in this case we may obtain natural sorts of vines, vinegar, jams, marmalades, potato mash, juice and sweetness. Sea buckthorn is also a natural preserver. [3, 12]

Phytopharmaceutics

In Romania, the active principia from the sea buckthorn fruit oil are extracted by means of an original procedure resulting a natural food concentrate. The lipo-soluble components of the sea buckthorn oil represent a multi-vitamin complex with a regenerating action for the cellular metabolism. The active substances contained are, in principal: β -carotenes, D, E, F, K vitamins, therefore all the lipo-soluble vitamins, also o series of polyphenolic products with a strong anti-infectious impact. Also, it contains lecithin easy to be assimilated (calcium and magnesium salts), unsaturated fatty acids like β -linolic acid, a precursor of a lot of organic enzymes. It is has a tonic, antianemic, vitaminic and imuno-modulating effect, a synergic action with interferon. It also contributes to the synthesis of protein raw-material for interferon; it is also a coronary and anti-aterosclerosis protector; slowing down the process of ageing by consumption of undesirable free radicals; detoxifying the liver and assuring the trofic function for the hepatic cell; anticancer effect by the great content in β -carotene; externally used, it has a healing and dermo-regenerator, anti-inflammatory and nutritive effect as well; excellent protector against solar radiations or de other nature.

Prophylactic: It could slow down the process of ageing and also could fight against cancer, it is a general tonic in stress situations, and an imuno-modulator as well.

Adjuvant: internal treatment of some dermatological affections (psoriasis, skin diseases), ORL diseases with component atrophic and inflammatory, cardio-vascular diseases being a good coronary protector and

also for the digestive system. It is active in chronic hepatitis, uro-genital affections, neurological psychical affections, anti-anemia, excellent role in slowing down of some ocular affections (hemeralopy, presbytism, myopia, astigmatism, hipermetropy, glaucoma, cataracts) being rich in β - carotenes.

Extern use: local treatment of eczema, thermal and chemical burns, chilblains, alergic-dermias, psoriasis, lent recovery wound.

It is the only natural product recognised for the activity of protection against solar radiations or other nature.

Cosmetically use: antirid and nutritive creams, gels and lotions of protection and maintenance for all kinds of skin.

Plantavorel Piatra Neamt continued the traditions of The Vorel' pharmacists who in the 1880's initiated the so called "Green Pharmacy", and in 1942 produced 120 products. In 1983, Plantavorel Laboratory initiated a new research and production in the utilisation of the Romanian "Green Gold". Now, there are sea buckthorn homologated products like:(a) "Cevisol", a natural dietetic and food supplement extract of fruits. It is a general tonic for children, convalescents, and for the ones facing with an intellectual and physical effort;(b) "Vorisol pellets" is a natural dietetic and food supplement extracted from fruits of *Hippophae rhamnoides* and *Rosa* species. The pellets could be also used for tea, 2 spoons for 100 ml. water.(c)The "Hebe radix" cream including extracts from sea buckthorn, marigold and blackwort, used as volatile oil of mint, excipients, conservants. It is recommended in the treatment of the solar and thermo burns, contact dermatitis, etc. The Research programs recommended plants from "the Curvature Carpathians" as optimal areas for producing pharmaceutical products.

[1, 4, 6]

Animal husbandry

The effect of an antierosional, forest, tree culture or hedge culture is the utilization of fruits by animals and birds in their feeding. Also, the animals and birds are important in its natural extension. In the Danube Delta, the diversity of sea buckthorn is motivated by the

ways of birds migration. In 1989, in Romania it was elaborated "Polivitarom" from sea buckthorn fruits powder or granules. It has a good effect in the growth of chicken, hens, rabbits and pigs. For fur animals, the powder or oil of sea buckthorn introduced in feeding, make them to shine, this being one of the meanings of plants name. [8, 9]



Photo 2. Fruits of sea buckthorn are bird's favorite food, the seeds being dispersed at long distances (Original Photo, Proorocu V.G., 2005)

Cosmetics

Sea buckthorn is important in the composition of cosmetics. Sea Buckthorn oil has multiple benefits in the area of restorative and anti-aging skin care. Natural antioxidants and essential fatty acids help reverse damaging effects of sun radiation and minimize long term effects of sun exposure, like wrinkles, dryness, dark spots reduce skin inflammation, promote natural skin restorative processes. The oil is well tolerated by any type of skin and provides long term anti-inflammatory, restorative and revitalizing action. [7]

Landscape architecture



Photo 3. In Romania sea buckthorn was printed on stamps appreciating the importance of specie in modern pharmacology

Sea buckthorn is present in all manuals of landscape architecture. The yellow orange colour of flowers and fruits make a nice contrast with the silver colour of leaf.

It is present all the year and assures a self protection and protect areas with its spines. In the interior arrangements, colours and persistence assure the presence in many floral or plant arrangements. [13]

Forestry

Romania has many natural resources in all the domains of agriculture like hundreds of years in forestry, but we are isolated, due to many causes, mainly to the weak management. This makes sea buckthorn to be a solution for soil rehabilitation, and also a resource for the development of production of derivatives. In the Danube Delta, a research program running on 1,450 ha. and other surfaces demonstrated the capacity of the plant to be utilized in soil erosion protection. The actual situation needs thousand of environmental plantations, possibilities of rehabilitation are certified.

Landscape architecture

Sea buckthorn is present in all manuals of landscape architecture.

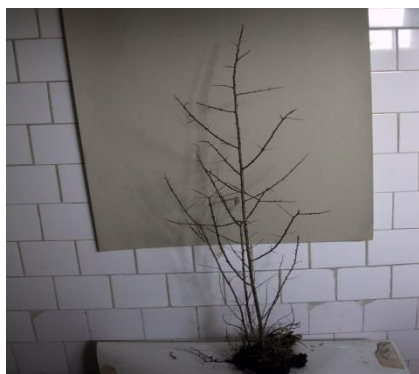


Photo 4. Plants of sea buckthorn cover in short time the zone of habitat (Original Photo, Proorocu A., 2003)

The yellow orange colour of flowers and fruits make a nice contrast with the silver colour of leaf. [10,11]

Land reclamation

Sea buckthorn is a very appreciated plant because it lasts just a short period of time and could take part with other species on denivelated lands, sloped river banks, see shores, coasts and cliffs. It is in symbiotically relation with *Frankia* sp. The effect in humus formation and vegetal cover is very rapid. It is

a pioneer species. After the improvement of soil fertility, it migrates to unfertile zones, being replaced by other pretentious species. In the consolidation works against erosion or in the denivelated zones, it is recommended to be used together with some other species.

An example of powerful collaboration between many nations is the case of the Danube Commission. The Danube River is vital for Germany, Austria, and Hungary in relation with the entire world, trade, military transports and communications. [5]

The Turkish had the power at the door of the Danube and modern nations obtained the control after the Convention from Paris in 1856. The Danube Commission, at present a political organization for the jurisdiction of the old river, was first organized with the participation of representatives from England, France, Italy and also from Russia, Turkey, Germany, Austria, Croatia, Serbia, Bulgaria, Romania, and other countries officials.



Photo 5. Nodules on roots of sea buckthorn demonstrate the symbiosis relation with *Frankia* sp. (Original photo, Proorocu Angel 2003)

One of the positive result of this Commission's activity was the shorten of Sulina Branch from 83.8 km to 62,6 km. in 1868-1902. In the actual times. Sulina is the only navigable branch of the three Danube Delta Branches. Sulina had a hydrological arrangement with sea buckthorn plants circularly planted surrounding the city. Many experiments in 20th century were achieved by the Romanian researchers with *Hippophae rhamnoides* alone or in combination with other plants, which could belong to that period of time.

The biodiversity of sea buckthorn in the Danube Delta was amplified by the share of billion of birds which hundreds of years travelled above the territory in their annual migration. [20]

Terminological aspects

Terminology is very important to be clear in this new domain of research.

Cristian Galinski and Gerhard Budin (1993) from Infoterm, University of Viena, Austria, mentioned: “Whenever and wherever specialized information and knowledge are created, communicated, recorded, processed, stored, transformed or re-used, terminology is involved in one way or another.

Subject-field communication has become a specific type of discourse with specialized texts differentiating into a whole array of text types. When we define terminology as a structured set of concepts and their designations in a particular subject field, it can be considered the infrastructure of specialized knowledge.



Photo 6. On roots of sea buckthorn appears many suckers (Original Photo, Proorocu A., 2003)

Technical writing and technical documentation are thus impossible without properly using terminological resources. Since the production of technical texts increasingly involves several languages, high-quality multilingual terminologies have become scarce and much desired commodities on the burgeoning markets of language and knowledge industries.

The development of terminologies, as a crucial part of special purpose languages, reflects scientific, technical and economic progress in the subject fields concerned. Due to different speeds in this dynamic co-

evolution of knowledge in the individual domains, specialized discourse continues to differentiate into more and more sectorized special languages and terminologies. But these communication tools become increasingly ambiguous, due to the sheer number of concepts to be designated and the limited linguistic resources of every natural language: terms are taken over from one domain (or language) into another, usually with varying meanings in the (productive) form of metaphors or analogies; new homonyms, polysemes and synonyms arise, motivating or even forcing subject specialists to standardize their terminology and harmonize them on the multilingual level in order to reduce and manage the constantly rising communicative complexity that faces their discourse communities.

Terminology management is primarily concerned with manipulating terminological resources for specific purposes, e.g., establishing repertoires of terminological resources for publishing dictionaries, maintaining terminology databases, or ad hoc problem solving in finding multilingual equivalences in translation work or creating new terms in technical writing.

For such purposes special computer programs have been developed (terminology database management programs), either commercially available on the international terminology market or developed as prototypes in academic research projects.” [21]

CONCLUSIONS

Seabuckthornology may be the science of the study of the biology of sea buckthorn and the rational and economical way of the culture of this plant for the soil recovery and human and animal medicine and feeding.

The new science will be studied in special schools of agriculture, manuals and technologies will be improved.

Also it is needed to establish the terminology and scientifically branches which are involved in the new science theory like: Biology, Botany, Agrotehnics, Food industry, a.s.o.

The computer and internet era could be helpful to store and disseminate information

collected in thousand years at global level about this plant.

The experience accumulated by Chinese, Tibetan, Russian, German, Romanian people etc. will be easily collected in a unitary textbook on Seabuckthornology presenting: origin, scope of culture, technology, environmental plantation, fruits plantations, landscape architecture, and forestry a.s.o.

Also, specific Seabuckthornology textbooks could be elaborated for every country and region, characterizing the local experience, traditions, technologies, a.s.o.

The experience and models created across the time in viticulture could be successfully used in the field of Seabuckthornology.

Besides the economical interests, the sea buckthorn role of panacea for the soil, the air and human and animal beings in actual conditions on the Earth should not be ignored.

The most important aspect is the permanent actualization of data base, in a moment so that any manager to be able to find many offers from the entire world, obtaining all parameters and prices in few minutes, the address, fax, e-mail, phone number etc. [17]

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