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**MEDICINAL AND AROMATIC PLANTS (MAP) – A CHAIN OF
COMPETITIVENESS IN ROMANIAN AGRICULTURE**

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MEDICINAL AND AROMATIC PLANTS (MAP) – A CHAIN OF COMPETITIVENESS IN ROMANIAN AGRICULTURE

Abstract

On agro-food products' market of the European Market a saturation of products has been reached, attaining the stage of limitation, by means of certain policies and specific levers, of the expansion of this market. Romania faced the situation of member state of EU, when, after year 2006, it entered a harsh competition, in which the predominant word is saturation. This is the reason for which the post-accession studies in agriculture must aim both at valorizing the natural potential of not-exploited or less exploited resources of Romania, and at finding out solutions to increase competitiveness of the field, in which Romania feels threatened, aiming first of all at the markets of traditional products. Competitiveness is based on criteria of economic efficiency, according to which an important place takes the rational and efficient exploitation of the natural resources, especially in agriculture.

In order to point out the significance of MAP cultures, we will make a comparison of some indicators of efficiency of the wheat, corn, colza cultures and several medicinal plants which were cultivated and studied. The comparison will be made taking into consideration both the data of average efficiency in case of MAP (using classical technologies, without applying the knowledge discovered by the researches of the field), and the maximal ones on the crops and MAP cultures (by application of knowledge resulted from agronomic research specific for the improvement of the technology of each species of MAP).

This field MAP is so much the more important for Romania as this country owns elements of environment favourable for a potential exploitation of the medical aromatic plants, without affecting the traditional cultures in the agricultural areas.

Medicinal and aromatic plants (MAP) chain in Romania

At present, in Romania, as everywhere in the world, a special interest is manifested for the use of medicinal and aromatic plants. The medicinal flora of our country is represented¹ by 800 species, of which 283 have indubitable therapeutic properties. Of the approximately 180 species studied from the pharmacodynamic point of view, for approximately 50 species, the basic elements of the culture technologies were established.

¹ Popescu Cristian George, Manole Victor, Boboc Dan, Economical and Healthy Efficiency of Naturist Treatments, international conference "Multifunctional Agriculture and Rural Development II - Rural Values Preservation", Beocin, December 2007, DIS PUBLIC D.O.O. Publishing House, Belgrad, ISBN: 978-86-82121-47-3, pp.496-504,

The cultivated medicinal and aromatic plants are represented by annual, biennial and perennial species, whose products are capitalized: flowers (flores), leaves (folium), grass or entire aerial vegetative part (herba), fruits (fructus), seeds (semen), roots (radix), etc.

Active therapeutical principles are a part of the chemical composition of the medicinal and aromatic plants. It should be specified that the active principles constitute peculiar, specific substances and they are of interest only when are formed in big quantities, that is their presence can justify the medical use of a plant. Among the active principles contained by the medicinal plants attention is drawn to the carbohydrates - glucose, starch, fixed oils, pectines, mucilages and gums, fixed oils, organic acids, glycosides, saponosides (saponines), tan materials (tannines), bitter principles, alkaloids, antibiotics, vitamins, essential oils and others.

MAP chain breaks through the pattern of the agricultural products, for several reasons:

- First of all, the vegetal resources originate in nature; starting from the peculiarity of spontaneous MAP (spontaneous flora) the cultivation of valuable species (from the point of view of their capitalization within the chain) was achieved. In our country, there are several institutes of MAP research.²
- Due to favourable environmental factors acting in our country³ we have a great diversity of plant species.
- Due to different MAP species from Romania, with many uses (both in field of human health and in other fields⁴) by exploiting such cultures (in association with or interchangeable with other agricultural productions), the farmer can create a permanent, competitive advantage, by capitalization of varieties of plants demanded on market. Also, MAP can have a double or triple role, in agricultural exploitation. Through the fungicide character of certain MAP species, they can be used both for the protection of different conventional cultures and for their capitalization (double role), but especially can be used with ecologic cultures aiming at environmental preservation, cultures protection against pests, and also their capitalization on the market (triple role).
- MAP, are cultures adaptable to peculiarities of agricultural exploitation of Romania
- Due to the geographical position, of the proportionalness of the environmental factors from our country, MAP represent a very important natural resource, derivatives of whom, being in the chain, can represent an area of niche on the markets of agro-food products from Europe. Massive exports of berries and other

² The following research resorts are concerned with this issue: SCPMA Fundulea, SCAZ Secuieni (Neamț), SCCC PN Dăbuleni (Dolj), resort „Stejarul” Pângărați-Piatra Neamț, ICCP București, ICCF

³ I have explained at full the diversification of the environmental factors from our country in the Intermediary Report

⁴ Brought back to present day, these species represent sources of raw material for extraction of active principles and essential oils, with an especial value for the drugs industry and

MAP registered by the Forests Grounds, once again prove this fact. Besides, these elements of efficiency will be developed more in my doctor's degree thesis.

- MAP represents a multidisciplinary, complex and dynamic field of knowledge. All this because the efficiency of the study of plant species, represents the work of many specialists from different fields (medicine, pharmacology, botanics, agronomy, economy).

Apparently, three big categories of products taking the path of MAP chain would be distinguished in Romania:

- Medicinal and aromatical plants represent an important source of raw material for the pharmaceutic industry (pharmaceutical products). Modern pharmacopoeia contain a minimum percentage of 25% medicines resulted from plants and many others, achieved on synthetic structures, on prototype compounds, isolated from plants. At this category, similar products with other destination besides the human consumption are added;

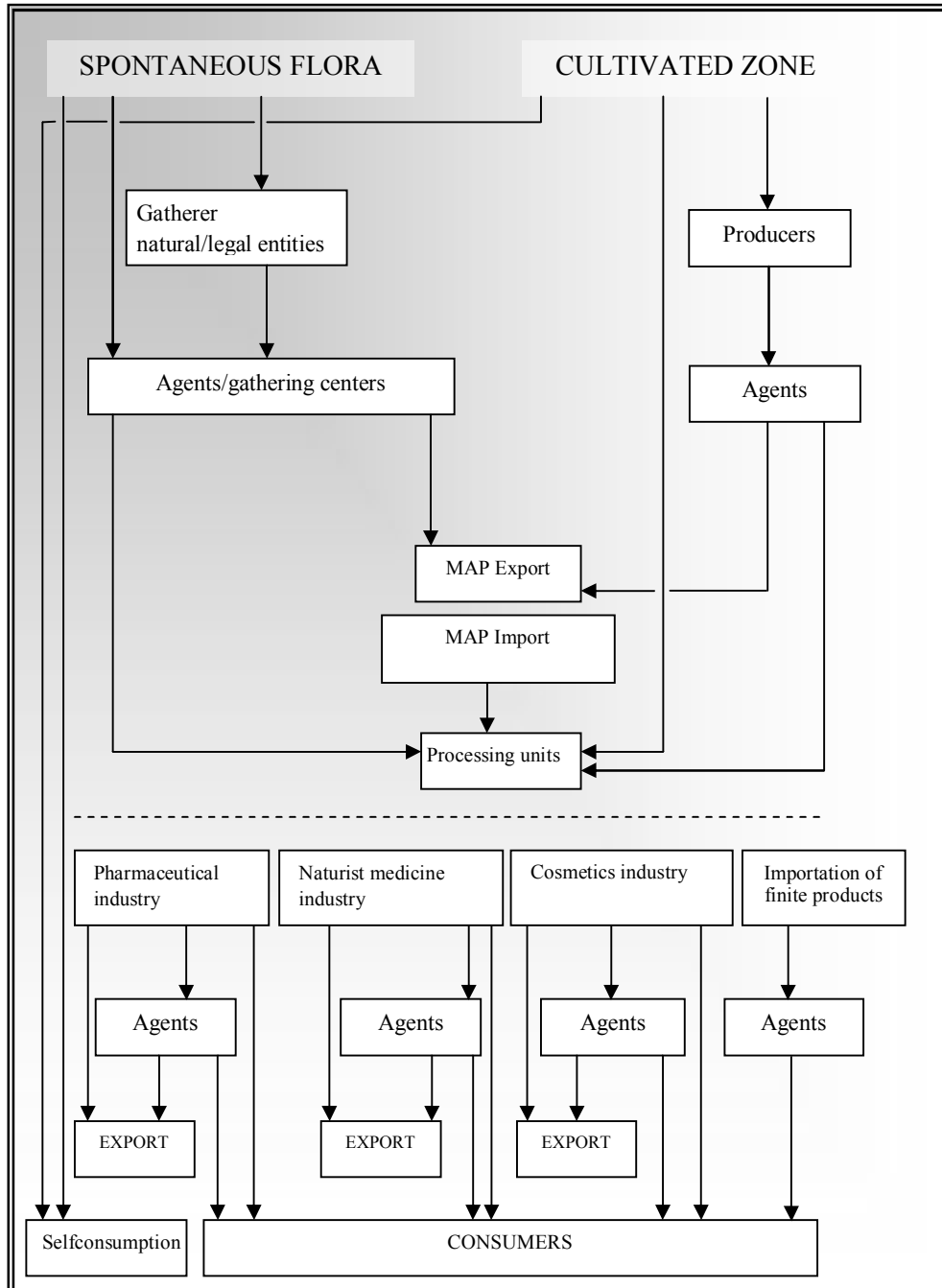
- Plants consumed fresh or the basic products resulted from MAP that have known a minimum degree of processing and are destined in a high proportion to self consumption. In this category enters the tea, but also other products as alcoholic extractions from plants of the type - tincture, bitter, and many others. Besides, phitotherapy (science concerned with treating diseases with herbs) is the most ancient treatment method mentioned also in ancient writs⁵. This category represents the shortest and best individualized chain. World Health Organization estimates that 80% of the population of the developed countries relies on traditional medicine⁶.

- Use of medicinal and aromatic plants in cosmetic industry.

The above mentioned, schematically, can be synthetized in the folowing manner:

⁵ to be uniquely identified the plants have a latin denomination, and the species of plants recognized as medicinal from ancient times, bear the name of officinalis

⁶ WHO Strategy for Traditional Medicine 2002-2005, Geneve, p.vi., September, 2002



In the first part of the chart, up to the processing units, MAP chain is formally presented.

Cultivated MAP efficiency – comparative study in some crops of social significance (wheat, corn, colza) and MAP cultures

Without doubt, one of the most important links of the chain of MAP derived products represents the agricultural producers. In order to point out the significance of MAP cultures, we will make a comparison of some indicators of efficiency of the wheat, corn, colza cultures and several medicinal plants which were cultivated and studied. The comparison will be made taking into consideration both the data of average efficiency in case of MAP (using classical technologies, without applying the knowledge discovered by the researches of the field), and the maximal⁷ ones on the crops and MAP cultures (by application of knowledge resulted from agronomic research specific for the improvement of the technology of each species of MAP).

| Crt.nr. | Plant denomination | Importance/Use ⁸ |
|---------|----------------------|--|
| 1 | Cassia angustifolia | Laxative, purgative |
| 2 | Echinacea spp. | Increases the selfdefence system of the body, inhibits multiplication of the viruses, antitumoral, healing up, antiinflammatory action – urologic, gynecological |
| 3 | Glycyrrhiza glabra | Treats ulcers, gastritis, has a mucolytic, antitussive effect, immunostimulator, treats the inflammation of the skin |
| 4 | Grindelia robusta | Antispastic, invigorating, with cardiac properties, regulates the beats of the heart - treatment of bronchitis, asthma, pulmonary emphysema, whooping cough |
| 5 | Melissa officinalis | Stimulates the digestion, treats aerophagia and flatulence, calms the gastric aches, treats insomnia, irritability |
| 6 | Plantago spp. | Treats external diseases of the skin, bronchitis, has expectorant, antiinflammatory, antispastic effect |
| 7 | Satureja montana | Stimulates digestion, indigestions, lack of appetite |
| 8 | Tropaeolum majus | Hepatobiliary drainer, external usage, fights hair loss |
| 9 | Veronica officinalis | Diuretic, expectorant, in migraines |
| 10 | Withania somnifera | Stimulates the immunity, antiinflammatory, general invigorator, treats the anxiety, in big doses induces sleep |

⁷ Data of maximum efficiency are taken from SC Aectra Inv. SA, having as object of activity the implementing and marketing of agricultural technologies with maximum outputs, as well as from the research data resulted from research resort for Medicinal and Aromatic Plants Fundulea.

⁸ According to some specialists in medicine: Chirilă P. (coord.), The Patient as Victim...Answer of the Naturist Medicine, Ed. Christiana, București, 2000.

Selected cultures:

- Wheat and corn: are the most spread cultures in Romania⁹ with particular social importance (wheat ensures the bread of the population, corn is the main fodder for the animals);
- Colza: has a special significance within the present context of global energetic crisis¹⁰
- Medicinal plants (table above).

The comparative study will be done on intensive cultures that will not depend on influence of the external factors, or the dependence is neglectable, so that we can compare the output of different cultures in different years.

Data related to lucrativeness of colza, wheat and corn culture will be extracted from a study I have made and published in collaboration with other authors, in year 2007, as well as from the studies carried out by SC Aectra SRL (on provided agricultural technologies), Cited data are average values registered in year 2006:

| Culture | Colza | Wheat | Corn |
|----------------------------------|-------|-------|-------|
| Costs | | | |
| Treated seed (€/ha) | 24 | 30 | 26 |
| Total treatments (€/ha) | 9.5 | 16.5 | 12 |
| Chemical fertilizers (€/ha) | 32 | 50 | 35 |
| Mechanic works (€/ha) | 95 | 125 | 150 |
| Other expenses (€/ha) | 40 | 20 | 50 |
| Total costs (€/ha) | 200.5 | 241.5 | 273 |
| Average production on ha (kg/ha) | 1,700 | 2,500 | 3,700 |
| Average price (€/t) | 240 | 100 | 85 |
| Capitalized production (€/ha) | 408 | 250 | 314.5 |
| Profit on exploitation (€/ha) | 207.5 | 8.5 | 41.5 |

Source: Victor Manole, Nicolae Istudor, Cristian George Popescu, Chiva Rogoz, the Prospect of Regenerable Energy and of Biofuels in Romania

An increased efficiency is noticed at the colza plantations as against the traditional crops under the terms of application of modern exploitation technologies. In the following table we have data collected from the reports of the Research Resort of Medicinal and Aromatic Plants Fundulea, by two categories of technologic efficiency:

⁹ According NIS the surfaces cultivated with wheat and corn were of 2476 and 2628,5 thousands ha respectively, in year 2005.

¹⁰ Work developed and presented by Victor Manole, Nicolae Istudor, Cristian George Popescu, Chiva Rogoz, The Prospect Of Regenerable Energy And Of Biofuels in Romania, in vol. International Symposium "CAP and Euro-regions Development Policies in EU 25/27, Agricultural Policy Modelling in the Pre and Post-Accession Period. Experiences and Expectations", Ed. ASE, Bucuresti, 2007, pag. 300-305

A. In normal technological conditions

| Year of prod. | Species | Used part | Estim. prod. (kg/ha) | Price (\$/kg) | Costs of prod. (\$/kg) | Incomes obtained (\$/ha) | Adherent expenses (\$/ha) | Profit of expl. (\$/ha) |
|---------------|----------------------|-----------|----------------------|---------------|------------------------|--------------------------|---------------------------|-------------------------|
| 1 | Cassia angustifolia | Herba | 700 | 2.2 | 2.8 | 1540 | 3080 | 860 |
| | | roots | 400 | 6.0 | | 2400 | | |
| 1 | Echinacea spp. | Herba | 1000 | 3.3 | 2.4 | 3000 | 2400 | 600 |
| 3 | | Roots | 500 | 8.0 | 5.0 | 4000 | 2500 | 1500 |
| 3 | Glycyrrhiza glabra | roots | 400 | 6.0 | 4.7 | 2400 | 1880 | 520 |
| 2 | Grindelia robusta | herba | 1500 | 1.8 | 1.2 | 2700 | 1800 | 900 |
| 2 | Melissa officinalis | leaves | 1500 | 3.0 | 1.8 | 4500 | 2700 | 1800 |
| 1 | Plantago spp. | Herba | 1500 | 1.1 | 1.15 | 1650 | 1851 | 569 |
| | | Roots | 110 | 7.0 | | 770 | | |
| 2 | Satureja montana | Herba | 1600 | 1.9 | 1.4 | 3040 | 2240 | 800 |
| 1 | Tropaeolum majus | Herba | 800 | 2.15 | 1.6 | 1720 | 1280 | 440 |
| 2 | Veronica officinalis | Herba | 430 | 2.5 | 1.13 | 1075 | 559 | 516 |
| 1 | Withania somnifera | Herba | 920 | 2.0 | 2.28 | 1840 | 2964 | 1460 |
| | | Roots | 380 | 6.8 | | 2584 | | |

B. In improved technological conditions

| Year /pro. | Species | Used part | Estim. prod. (kg/ha) | Price (\$/kg) | Costs of prod. (\$/kg) | Income obtained (\$/ha) | Adherent expenses (\$/ha) | Profit of expl. (\$/ha) | Estim. additional profit (\$/ha) |
|------------|----------------------|-----------|----------------------|---------------|------------------------|-------------------------|---------------------------|-------------------------|----------------------------------|
| 1 | Cassia angustifolia | Herba | 1100 | 2.3 | 2.8 | 2530 | 4620 | 1320 | 460 |
| | | roots | 550 | 6.3 | | 3410 | | | |
| 1 | Echinacea spp | Herba | 1350 | 3.2 | 2.5 | 4320 | 3375 | 945 | 345 |
| 3 | | roots | 630 | 9.0 | 5.8 | 5670 | 3654 | 2016 | 516 |
| 3 | Glycyrrhiza glabra | roots | 650 | 6.7 | 5.5 | 4355 | 3350 | 1005 | 875 |
| 2 | Grindelia robusta | herba | 1950 | 1.9 | 1.3 | 3705 | 2535 | 1170 | 270 |
| 2 | Melissa officinalis | leaves | 1970 | 3.4 | 2.1 | 6698 | 4137 | 2561 | 761 |
| 1 | Plantago spp | Herba | 1650 | 1.3 | 1.2 | 2145 | 2376 | 959 | 390 |
| | | roots | 170 | 7.0 | | 1190 | | | |
| 2 | Satureja montana | herba | 2000 | 2.0 | 1.5 | 4000 | 3000 | 1000 | 200 |
| 1 | Tropaeolum majus | herba | 1200 | 2.25 | 1.7 | 2700 | 2040 | 660 | 220 |
| 2 | Veronica officinalis | herba | 670 | 2.7 | 1.5 | 1809 | 1005 | 804 | 288 |
| 1 | Withania somnifera | Herba | 1060 | 2.0 | 2.5 | 2120 | 3250 | 1970 | 510 |
| | | roots | 450 | 6.8 | | 3060 | | | |

Source: data collected from Agral Program – Improvement and development of technologies at the Research Resort for Medicinal and Aromatic Plants Fundulea

Indicators of MAP cultures lucrativeness are calculated both under the terms of application of the classical technologies of culture, without taking into account the specific feature of each plant, but also in improved technological terms, but also considering the specific of the plant, as well as other research elements that after being implemented have had as a consequence the growth of production and finally the growth of the profit for each species of plant taken into consideration.

A. In normal technological conditions

| Year/ prod. | Species | Used part | Values updated rectified | | Values rectified transformed | |
|----------------|-------------------------|--------------|-----------------------------------|--|----------------------------------|---|
| | | | Profitul rectificat (\$/ha) | Rectified add. profit (\$/ha) | Rectified profit (euro/ha) | Rectified additional profit (euro/ha) |
| 1 | Cassia angustifolia | Herba | 980.4 | | 781 | |
| | | Roots | | | | |
| 1 | Echinacea spp. | Herba | 684 | | 545 | |
| 3 | | roots | 570 | | 454 | |
| 3 | Glycyrrhiza glabra | roors | 197.6 | | 157 | |
| 2 | Grindelia robusta | herba | 513 | | 409 | |
| 2 | Melissa officinalis | leaves | 1026 | | 818 | |
| 1 | Plantago spp. | Herba | 648.66 | | 517 | |
| | | roots | | | | |
| 2 | Satureja montana | Herba | 456 | | 363 | |
| 1 | Tropaeolum majus | herba | 501.6 | | 400 | |
| 2 | Veronica officinalis | herba | 294.12 | | 234 | |
| 1 | Withania somnifera | Herba | 1664.4 | | 1327 | |
| | | roots | | | | |

B. In improved technological conditions

| Yea/ prod. | Species | Used part | Profitul rectificat (\$/ha) | Rectified add. profit (\$/ha) | Rectified profit (euro/ha) | Rectified additional profit (euro/ha) |
|---------------|-------------------------|--------------|-----------------------------------|-------------------------------------|----------------------------------|--|
| 1 | Cassia angustifolia | Herba | 1504.8 | 524.4 | 1199 | 418 |
| | | roots | | | | |
| 1 | Echinacea spp | Herba | 1077.3 | 393.3 | 859 | 313 |
| 3 | | roots | 766.08 | 196.08 | 611 | 156 |
| 3 | Glycyrrhiza glabra | roots | 381.9 | 332.5 | 304 | 265 |
| 2 | Grindelia robusta | herba | 666.9 | 153.9 | 532 | 123 |
| 2 | Melissa officinalis | leaves | 1459.77 | 433.77 | 1164 | 346 |
| 1 | Plantago spp | Herba | 1093.26 | 444.6 | 871 | 354 |
| | | roots | | | | |
| 2 | Satureja montana | herba | 570 | 114 | 454 | 91 |
| 1 | Tropaeolum majus | herba | 752.4 | 250.8 | 600 | 200 |
| 2 | Veronica officinalis | herba | 458.28 | 164.16 | 365 | 131 |
| 1 | Withania somnifera | Herba | 2245.8 | 581.4 | 1790 | 463 |
| | | roots | | | | |

A high level of lucrativeness of MAP cultures (profit of exploitation varies between 304 and 1790 EURO) can be noticed, the most lucrative culture in improved technological conditions, is for *Withania somnifera*, whose profit can reach 1790 euro/ha, as against the colza culture (which takes the top place among the three crops), for which only 207.5 euro/ha are gained. Thus, a value of the profit from exploitation with up to 762.65% bigger in favour of the medicinal plant can be noticed. The advantage of the crops taken into consideration would be that the technologies are completely push button, being applicable on extended areas, while for MAP there is no complete push button technology, generally being cultivated on limited areas.

Conclusions

MAP has a special significance, being used under different forms, first of all for amelioration of human health. MAP, as raw material, on the path of the plant chain in our country takes three important directions (besides the export, as such):

- pharmaceutical industry;
- naturist medicine industry;
- cosmetics industry.

MAP collected from the spontaneous flora ensures a high level of self-satisfaction of own needs by self-consumption, but due to their credentials of being ecologic, they are equally demanded at export. MAP cultures have several advantages:

- MAP can have a double or triple role, in agricultural exploitations. Due to the fungicide character of some species of MAP, they can be used both for protection of different conventional cultures and then for their capitalization (double role), but especially can be used near the ecologic cultures aiming at environmental preservation, protection of the cultures against pests, and their capitalization on the market (triple role).
- They can be equally used in completion of other cultures, being good precursors, medicinal plants can be capitalized also on less productive lands, and ensure the cultivators significant incomes.
- They have a high lucrateness as against other crops, but most of them have non-mechanized or partly mechanized technologies, making their exploitation on bigger surfaces of land very difficult to achieve.

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