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VALORIFICATION OF HERBS IN PHYTOTHERAPY - AN ALTERNATIVE OF CHEMICAL TREATMENTS IN AGRICULTURE

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Abstract

In agricultural culture there are numerous weeds diminishing the production which are controlled by several methods. The most common and efficient method with the modern agriculture is the chemical method of controlling weeds, using a large range of herbicides. A great part of these herbicides have long lasting remanence, even over three years. A great part of the active substances of the herbicides pollute the soil and subsequently the waters, sometimes with disastrous action for the environment. Also, some pollutants can be metabolized by culture plants which, in their turn, by consumption, can adversely affect the people's health. The use of appropriate agronomic practices is essential while growing herbicide tolerant varieties if this technology is to remain effective. To this end, it is recommended the promotion and maintenance of careful management practices for growers who use these crops to minimize the development of multiple resistances. In spontaneous flora of Romania are many herb species that are used as medicinal plants. A significant part of these plants is found in the crops as weeds. In this paper, the main weeds with therapeutic properties from crops are presented. A description of each specie, as well as the main properties and uses for some illnesses are presented in this paper. This work also presents the main species considered as weeds in culture, the organs used, therapeutic applications and some techniques of use for such plants.

Keywords: agriculture pollution, alternatives, chemical treatments, phytotherapy, prevention measure

1. The use of chemicals in agriculture

1.1. Introduction

In agricultural culture there are numerous weeds diminishing the production which are controlled by several methods. The most common and efficient method with the modern agriculture is the chemical method of controlling weeds, using a large range of herbicides. A great part of these herbicides have long lasting remanence, even over three years. A great part of the active substances of the herbicides pollute the soil and subsequently the waters, sometimes with disastrous action for the environment. Also, some pollutants can be metabolized by culture plants which, in their turn, by consumption, can adversely affect the people's health. Harvesting prior to weeding some species of weeds proving medicinal features existing in the cultures, represents an alternative of controlling weeds from the cultures friendly against the environment. Also, this technological alternative can bring significant additional income to agricultural producers (Arbuckle and Server, 1998; Bane et.al., 1993).

With weeds as with many plant species the main or first level factor determining the area of distribution is a (complex) climatic one. As they have an artificially enlarged area of distribution, they have a huge border area (in an ecological sense), where the climate is not optimal for them, and where they have a narrow ecological and sociological amplitude and are especially sensitive to some measures of modern intensified agriculture. The extensive use of chlorotriazines as selective herbicides in agriculture and their relatively high persistence imply that these compounds are now present in the environment, contaminating soil, surface and groundwater. The measures of modern agriculture bring about a gradual extinction of sensitive species from the limit of their

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range towards their centre of distribution, where they can find refuge habitats in the natural vegetation. The sensitivity of such species (also against herbicides) seems to increase towards their limits. Resistant species occur with increasing densities after the removal of their competitors. In addition, they are able to enlarge their area and to invade sites, where they had not been able to compete before, or sites where they could not previously bear the environmental conditions together with the competition of the rich weed flora.

The use of herbicide-tolerant crops encourages the heavy use of herbicides in the crop field without damage the crop. At present, breeding crops for herbicide tolerance dominates about 41% of the research on genetically engineered organisms. Herbicide tolerance does not increase crop yields, but it does increase the use of herbicides in agriculture and the pollution of agroecosystems and other ecosystems (Pimentel and Ali 1998). There are three reasons to limit the use of pesticides to situations where significant benefits will result: they may harm human health, environment and may create problems in agriculture if used in excess.

1.2. Impact on agriculture

Impact on agriculture is arising from unintended adverse effects of herbicide use on plant life. Just as bacteria can become resistant to antibiotics, mosquitoes to insecticides and rats to warfarin, so can plants become resistant to herbicides. This resistance of plants to herbicides has become a global problem. Literature showed that 216 weed types in 45 countries were found to be resistant to herbicides. The term "selection pressure" refers to the fact that the more a living organism like a germ or a cancer cell is exposed to a toxin, the greater the likelihood that a strain resistant to that toxin will emerge. In an attempt to foil the emergence of resistant strains of weeds, combinations of herbicides are now often used in agriculture.

Weeds can develop multiple herbicide resistance creating another problem for the agricultural industry. One approach to minimizing the emergence of resistant strains is to limit the exposure of the target species to the chemical agent, hence reducing selection pressure. The current approach is now advocated to limit the use of herbicides in agriculture. The development of herbicide resistant crops began in 1995 with canola and has since been widely adopted in agricultural practice, allowing for the use of the appropriate herbicide for weed control without damaging the crop plants. Nevertheless the use of herbicide- resistant crops will remain an important agricultural approach for years.

Excessive use of pesticides in the urban setting could contribute to the weed resistance problem. It should be evident that the decision to use pesticides for cosmetic purposes should not be taken in isolation from their known and evaluate the impact on human health, environment and agriculture (LeBaron and McFarland, 1990; NAF, 1994; NASS, 1993).

1.3. Environmental impact

Environmental impact of pesticides use is a matter of considerable concern (Bane et.al., 1993; P2Pays, 1995, Robu, 2005, Robu and Macoveanu 2005a, b). A progress report of an ongoing study by the (U.S.) Environmental Protection Agency (EPA) on the presence of lawn pesticides in urban aquatic ecosystems found several at parts-per-billion levels in sediment and parts-per-trillion levels in water (Arbuckle and Server, 1998; Baldi, 1998; LeBaron, and McFarland, 1990). A study of well water showed that two or more pesticides were found in 11% of the wells including that of a non-user whose well had 5 different agents**.** It is known that pesticides can persist much longer in deep aquifers than in soil. For example the half-life of alachlor in soil is 20 days, but in deep aquifers the half-life is four years.

Most pesticides can affect the metabolism of many drugs and combinations of pesticides may be more potent than individual ones. It is little known about the possible subtle effects of environmental exposures to such combinations but, as noted above, evidence is mounting that combinations may be more toxic than single agents (Lee and Colt, 2005; Muir and Rattanamongkolgul, 2004).

1.4. Effects on human health

The effects on human health have been studied at low level exposures of humans to pesticides. The studies usually small, referred to the trace amounts of some pesticides, such as DDT, in human body fat. While definitive proof of adverse effects of low level exposures to pesticides on human health may be scanty, there is sufficient evidence to create a high index of suspicion that such exposures, over the long term, have adverse health effects. One epidemiological review of several human studies (Janzen et.al., 2003; Piementel and Ali, 1998; Sanderson and Talaska, 1997; Coombes and Grey-Wilson, 1997) found associations between pesticide exposure and cancer, especially cancers of the blood, neuro-toxicity such as Parkinson's-like symptoms, behavioral problems, and reproductive disorders such as birth defects, infertility, and birth mortality. Other studies have indicated that agricultural workers have an increased incidence of brain cancer. A recent study of farmers and farm workers in USA (Janzen et.al., 2003; Lee and Colt, 2005; Muir and Rattanamongkolgul, 2004,) found that spending 55 years or more on the farm was associated with large increases in the incidence of the brain tumor glioma and especially for certain herbicides and insecticides (paraquat, bufencarb and chlorpyrifos).

A review of epidemiological studies on the association between childhood cancer and pesticide exposure indicated that frequent occupational exposure to pesticides and frequent home use of pesticides were associated with an increased

incidence of childhood leukemia and brain cancer (leukemia occurs 6 times more often in homes were pesticides are used). It has been pointed out that exposures to pesticides rarely involve a single agent, and those studies based on a single agent alone may not adequately identify risk to human health. Evidence is emerging that toxicity may be significantly increased when more than one agent is present (Janzen et.al., 2003; Piementel and Ali, 1998).

2. Pollution prevention principle and agriculture sector

2.1. Pollution prevention in agriculture

Herbicide tolerance is the ability of a plant to survive the application of a specific herbicide. All crop plants exhibit natural levels of herbicide tolerance to specific herbicides which is why farmers are able to use herbicides to control weeds in their crops. Over the past two decades, tolerance to specific herbicides has been introduced intentionally, as a novel trait into a number of crop species to provide farmers with the additional means to control weeds without damaging their crops. Such products include canola varieties that have been developed for tolerance to the herbicide, imidazolin one. In recent years, biotechnology has been used in the development of other herbicide tolerant crops. For example, in Canada, herbicide tolerant canola varieties are commercially available with individual tolerances to herbicides containing bromoxynil, glyphosate, or glufosinate ammonium as the active ingredient.

Studies have shown that herbicide tolerant plants are no more invasive of cultivated or natural habitats than their herbicide susceptible counterparts, unless the relevant herbicide is used exclusively to eliminate competing vegetation (Downey, 1999; P2Pays, 1995).

Weeds resistant to herbicides are rapidly becoming important factors in crop production and agricultural technology. There has been a serious spread of weeds having multiple or cross resistances to various classes of herbicides and the need for research on the pollution prevention principle and management of herbicide resistance is obviously urgent. Herbicide resistant weeds may become a more serious economic problem within five to ten years than pest resistances to insecticides and fungicides due to the greater use of herbicides in agriculture. This is almost certain to be the case if we depend too much on only a few of the newer herbicides and discard the older ones. It is need all the tools that currently are, as well as those that modern technology can provide, to manage our weed pests while further reducing or eliminating soil tillage, and to conserve essential soil and water for future crop production and public use. Research on herbicide resistant weeds should complement biotechnology research aimed at developing herbicide resistant crops, but the strategy and objectives of the biotechnology research must be altered to some extent. In particular, efforts should be aimed at developing major crops resistant to many herbicides, rather than one or two. This would provide greater flexibility in rotating or alternating herbicides to prevent resistant weeds from evolving, and controlling those resistant populations that appear.

2.2. Management practices in agriculture

The use of appropriate agronomic practices is essential while growing herbicide tolerant varieties if this technology is to remain effective. To this end, it is recommended the promotion and maintenance of careful management practices for growers who use these crops to minimize the development of multiple resistances. There are a number of beneficial management practices (BMPs) which agricultural producers can incorporate into their farming practices to decrease their impact on greenhouse gas emissions. These BMPs can be placed into four management sectors: soil and land management, livestock management, crop management, and nutrient management (Bojor and Popescu, 2003; California University, 1992; Gulden and Entz, 2005; Janzen et.al, 2003; Riekman and Cavers, 2006).

2.2.1. Soil and land management

Reducing the number of tillage passes over a field decreases CO_2 emissions by both lowering total fuel consumption and sequestering, or storing, carbon in the soil. While zero tillage systems emit less carbon (C) through fuel and machinery use, they do exhibit greater herbicide use (Table 1); however, the use of herbicides in agriculture constitutes a very small portion of total carbon emissions (less than 7 percent/year).

Table 1. Comparison of carbon emissions (C/ha/yr) in conventional and zero tillage systems (Gulden and Entz, 2005)

	Conventional tillage (CT)	***Zero tillage (ZT)***	***ZT as % of CT***
Machinery	10.55	7.08	67.1
Fuel	22.56	14.57	64.6
N fertilizer	54.9	51.53	93.9
P fertilizer	7.7	7.34	95.3
Herbicide	4.52	5.87	129.8
Total	100.23	86.39	86.2

The carbon content of restored wetland basins increases at a rate 2 times greater than if the wetland basin was left in the cropping system (Walters, 2005). As well, the crop seeded in low-lying areas of the field often drowns out, building up N concentrations in the soil; therefore, the potential for N_2O emissions in these depression areas is high. Although seeding and harvesting around wetlands may be unfavorable to producers, including these areas in the cropping system is often a waste of seed

and fertilizer (Gulden and Entz, 2005; Riekman and Cavers, 2006).

2.2.2. Livestock management

Higher quality feed needs less time in the rumen for digestion, leading to a decrease in methane emissions from cattle. The Westman Agricultural Diversification Organization (WADO) carried out a study grazing cattle on pure alfalfa using a bloat reduction product called Alfasure. Although this type of grazing system requires more management, cattle grazed on pure alfalfa exhibit greater gains. WADO reported gains of alfalfa-grazed cattle ranging from 0.48-0.81 kg/cow/day (Westman Agricultural Diversification Organization, 2003). In 2005, cattle grazed on alfalfa at the MZTRA research farm gained an extra 0.14 kg/cow/day over a 100-day grazing period compared to cattle grazed on native grass. To decrease the risk of anaerobic decomposition of manure and lower CH_4 emissions, it is important to avoid stockpiling manure. The amount of bedding should also be kept to a minimum as the high C content of straw favors CH_4 production. Avoiding excessive manure applications may also prevent the build-up of N in the soil (Gulden and Entz, 2005; Riekman and Cavers, 2006).

2.2.3. Crop management

Establishing perennial forages is an important issue in agriculture sector. Perennial forages, such as alfalfa, require fewer tillage passes, extract N from deep in the soil and have the ability to sequester C deeper in the soil (due to the deep rooting habit of the crop). Growing the legume crops is an other appropriate practice that could be applied as best management practice in agriculture because the legume crops have the ability to "fix" their own N, thus requiring less N fertilizer during the season in which they are grown.

2.2.4. Nutrient management

Nitrogen source, rate, timing and placement should all be considered to match the availability of N to the requirements of the crop (use N fertilizer efficiently). Soil testing is a key part of this strategy as it informs the producer of N availability in the soil and N requirements for the subsequent crop. It is extremely important that residual N is not carried over through the winter, considering the potential for loss as N_2O during spring thaw (Gulden and Entz, 2005; Riekman and Cavers, 2006).

2.3. Challenges in establishing Beneficial Management Practices (BMP)

The major challenge with establishing full BMPs is in the lack of quantitative data on the impact that these practices have on greenhouse gas production. In many cases, it is assumed that BMPs will decrease greenhouse gas emissions, based on current knowledge of the processes creating the gases. In the case of N_2O, research is currently being carried out on the landscape element of these emissions, but understanding the effect of landscape on emissions is complex. Nowadays, the orientation is to decrease greenhouse gas emissions, and for this it is important that precise data be collected to better understand the potential of these BMPs and their impact on mitigating greenhouse gas emissions (Gulden and Entz, 2005; Riekman and Cavers, 2006).

3. Valorification of herbs in phytotherapy - an alternative for chemical treatments

Instead of using chemicals for various treatments in agriculture, the herbs could be used in phytotherapy (Bezzi and Aiello, 1997; Fisher, 1999; Schenk, 1998). From the most frequent weeds in crops, the following herbs have phytotherapeutic properties:

3.1. Agropyron repens

Currently it is found on cultivated or uncultivated grounds, sandy or argillaceous, on hay fields, grasslands, barren slopes, roads and woods borders, bushes, orchards and gardens, from the plain area to lower mountain area (Fig.1). The important part of this plant that can be used in phytotherapy; its rhizomes (*Rhizoma graminis*), are used as infusion or decoction, and has the following therapeutically recommendations**:**

- kidney and bladder disorders, cystitis, pielitis, urethritis, renal lithiasis, nephritic colics, urinarian infections, menopause, urinarian retention, uric acid in the blood, prostate, syphilis;
- gastrointestinal disorders, virotic hepatitis, icterus, ascites, gall calculosis, gall dyskinesia, constipation, indigestions, intoxications, haemorrhoids;
- breathing disorders, influenza, chills, coughs, bronchitis, respiratory catarrh, abundant sweat, aerophagia, tuberculosis;
- rheumatic conditions, gout, arthritis;
- cardiac insufficiency with oedemas (including ankle oedemas), hyper blood pressure, eliminating blood toxins;
- obesity, cellulitis, diabetes;
- skin diseases, fractures, eczemas, dermatosis.

3.2. Anagalis arvensis

Currently it is found as seeding, vineyards, orchards, grasslands, hay fields, chopped woods, etc., and the entire plants (*Herba anagalis*) can be used in phytotherapy as infusion, decoction, fresh juice and ointment (Fig.2). The therapeutically recommendations are**:**

- neurasthenia;
- calming the cough and the cardiac asthma;

- disinfectant for the wounds;
- varix ulcer;
- eczemas;
- aphrodisiac;
- gastric ulcer;
- stimulus for the renal and hepatic secretions.

Notes: exceeding the use may give a symptom of intoxication, manifested by hyper-excitability.

Fig.1. *Agropyron repens*

Fig.2. *Anagalis arvensis*

3.3. Amaranthus retroflexus

Currently it is found as seeding, on cultivating crops, vineyards, orchards, fertilized fields (Fig.3). The important parts of this plant that can be used in phytotherapy are roots, leaves, seeds (*Herba amaranthi*), used as infusion or decoction, and has the following recommendations:

- calming the cough and the cardiac asthma;
- aphrodisiac;
- menorrhagia;
- genital candidosis.

3.4. Aristolochia clematitis

This plant (Fig. 4) could be totally used in phytotherapy, it is found in vineyards, orchards, cultivating crops, and the therapeutically recommendations are**:** recent "in vitro" and "in vivo" researches in Romania have proved that the aristolochic acid extracted from the plant has an immunostimulating action.

This device is accomplished by the intensification of the phagocytosis, as result of the increased activity of the macrophages and granulocythes, while the effect on lymphocythes is insignificant.

Fig.3. *Amaranthus retroflexus*

It can be only used as herbal mixture made in specialized laboratories. It has to be mentioned that it is forbidden to use this plant empirically, because the aristholochic acids have also strong carcinogen and genotoxic properties.

Fig.4. *Aristolochia clematitis*

3.5. Capsella bursa-pastoris

It is found on grass fields, ditches, roads and walls borders, sunny or semi shady uncultivated grounds or gardens, common from the plain area to subalpine area, from arid to very moist soils (Fig. 5). The entire air part of the plant can be used in

phytotherapy, and the therapeutically recommendations are:

- gastric and intestinal hemorrhages, enterocolitis, calming abdominal aches, diarrhea and dysentery (due to its astrictionally properties), haemorrhoids;
- hyper and hypo blood pressure, atherosclerosis, angina pectoris, cardiac compensated insufficiency, regulating capillary's permeability;
- regulating the menstruation flux on puberty, increasing the tonus of uterin mucous membrane, irregulated menorrhea, metrorrhagia, hemorrhagical metritis, dismenorrhea, uterin hemorrhage, renal lithiasis, adjuvant in the gonorreea's treatement;
- wounds and sores continually bleeding, varix (due to its haemostatic properties).

It can be used as infusion, concentrated infusion, decoction, medicinally wine, macerate, essence, cataplasm, baths. Other uses are: in nourishment, leaves are consumed in spring for soups, salads, mash, or as filling for pies (in mixture with other vegetables).

Fig.5. *Capsella bursa-pastoris*

3.6. Convolvulus arvensis

Currently it is found in crops, seedings, cultivating crops, vineyards, orchards, very common in all areas (Fig. 6). The entire plant (*Herba convolvuli*) can be used as infusion, decoction, macerat, essence, powder or fresh leaves, and it has therapeutically recommendations, such as:

- laxative, haemostatic, memory stimulus;
- gall dyskinesia;
- constipation;
- neurasthenia;
- burns;
- hemorrhages;
- furuncles;
- cough.

3.7. Equisetum arvense

Status: it is native only in the Northern Hemisphere, in Europe, North America and Asia (Iran, China). The plant (Fig. 7) grows on moistly regions, argillaceous, and moors, hay fields, orchards, moist and sandy everglades, steep slopes, river borders, gradients, railroad embankments, from the plain area until the mountain area. As weed in the crops, it can be met only on the high-moisturized grounds.

Fig.6. *Convolvulus arvensis*

The recommended organs in phytotherapy are sterile stems, leafless and rootless (*Herba equiseti*), which have the following recommendations:

- kidney and bladder disorders, renal lithiasis with elimination of sand and stones, water retention in the pericardium, evoiding uterin hemorrhages and menorrhea, evoiding enuresis (involuntary urination while sleeping), nephritis, prostatitis and prostate adenoma;
- heart diseases, cardiac insufficiency with oedema, angina pectoris, activating the blood circulation, atherosclerosis, arteritis;
- gastric and intestinal dressing in the hyper-acid gastritis, gastric ulcers, intercedes in the absorption of abnormal fermentations;
- internal hemorrhages, diarrhea with dysentery, metrorrhagia and epistaxis (due to its haemostatic and astrictionally properties)
- noninflammatory arthritis, gout, chronic articular diseases with aids recovering, tendinitis, osteoporosis;
- the suppleness of tendons and blood vessels, with favourable effects on sportsmans (tennismans, runners, cyclists);
- tuberculosis, bronchitis, relieve expectoration and calming cough (due to the saponins);
- defensive effects against slowly exhaustion on aged persons, convalescence, general and post-operator anemia, precocious aging symptoms, depression, irascibility (due to its mineralization effects);
- prevents dental caries, nails fragility, bones fractures, by increasing the cojunctive tissues resistance;

- skin disorders (old wounds, eczemas, sores, warts, paronychia, chilblains, skin eruptions with nettle rash, stomatitis, aphta, anal fissures, haemorrhoids, haemorrhoidal nodules, skin cancer, reduces foot perspiration).

It can be prepared as infusion, decoction, concentrated decoction, macerate, essence, juice made of fresh green plants, hot cataplasm and baths, and can have other uses too, such as: in animal nourishment, exceeding the dietary may give digestion disorders and intoxication. Exceptions are the goats suffering from renal disorders.

Due to her high silica content, the plant it is used for polishing objects on noble wood or metal. It is very important to mention that do not mistaking for *Equisetum palustre* or *Equisetum sylvaticum* plants, which have high contents of toxic alkaloids producing hematuria.

Fig.7. *Equisetum arvense*

3.8. Fumaria officinalis

It is found (Fig.8) in areas from the plain area until the lower hills area, prefering very sunny grounds, road borders, ditches, stubbles, gardens, vineyards, and the entire plant (*Herba fumariae*) could be prepared as infusion, decoction, ointment or fresh juice being recommended in phytotherapy:

- depurative (oust the toxins);
- hyper blood pressure;
- gall dyskinesia;
- hepatic disorders;
- calming cough and cardiac asthma;
- wounds disinfectant;
- varix ulcer;
- dysentery, leprosy, eczemas;
- gingivitis, pulpitis, periodontitis (as antiplate agent).

Fig.8. *Fumaria officinalis*

3.9. Galega officinalis

This plant (*Herba galegae*) (Fig. 9) has therapeutically effects, it is found in orchards, moistly hay fields, and has the following recommendations:

- diuretic, cholagogue;
- diabetes;
- muscular cramps;
- furuncles;
- epilepsy, cerebellum diseases;
- intestinal worms.

It can be prepared as powder, fluidextract, tonic wine, but has to be used very carefully, because exceeding may give abundant salivation, coriza and cough. It can be administrated as laxatives in case of intoxication.

Fig.9. *Galega officinalis*

3.10. Portulaca oleracea

The entire plants (*Herba portulacae*) (Fig.10) have therapeutically effects, it is found on cultivated or uncultivated grounds, gardens, and can be prepared as infusions, fresh leaves in salads. This herb has the following recommendations:

- cystitis;
- renal lithiasis;
- intestinal worms;

- digestive tract inflammations;
- hemorrhages;
- constipation, scurvy;
- respiratory tract inflammations;
- gum inflammations.

3.11. Papaver rhoeas

Status: common in the entire country as weed on crops, on stubbles, road borders, uncultivated grounds, the edge of cornfields (Fig.11). The organs (petals from flowers, fresh or dried capsules) used as infusion, decoction, and different extracts have the followings therapeutically recommendations:

- migraines;
- intestinal inflammations (antiseptic);
- convulsive and irritating coughs, bronchitis (expectorant);
- insomnia (calming the nervous system);
- scarlet fever and rubeola (antiseptic);
- abscesses;
- gastritis, abdominal colics;
- pharyngitis, laringitis;
- hemorrhages;
- colorant in food industry.

Fig.10. *Portulaca oleracea*

It is necessary to mention that it can be mistaken for other *Papave* species, as *Papaver dubium*, therapeutically useless.

3.12. Verbena officinalis

This herb (Fig.12) is found in seeding, stubbles, uncultivated grounds, road borders, ditches. The entire plants (*Herba verbanae*), prepared as infusion, decoction, cataplasm, baths has the following therapeutically recommendations:

- bitter tonic, astringent, cholagogue, healing the scars;
- hepatic diseases;
- headaches;
- rheumatic aches.

3.13. Polygonum aviculare

Status: common on uncultivated stamped grounds, waste lands, stadiums, road borders, ditches, paths, gardens, courtyards, different crops (especially in the plain and hills area), and the organs - the aerial part of the plant (Fig. 13), with or without roots (*Herba polygoni avicularis*) are used as infusion, decoction, concentrated decoction or fresh juice.

Fig.12. *Verbena officinalis*

The therapeutically recommendations are:

- digestive disorders: diarrhea, dysentery, gastric and duodenum ulcer, dyspepsias, enteritis, internal hemorrhages, gall lithiasis, haemorrhoids, lost of appetite;
- cardiovascular system disorders: cardiac insufficiency, cardiorenal oedema, hyper blood pressure;
- genital diseases: urinarian infections, leukorrhea, metrorrhagia, uraemia, albuminorrhea, renal lithiasis, menorrhea, urinarian retention;
- rheumatic conditions, arthritis, gout;
- inflammating disorders of the respiratory tract, chills, hemoptysis;
- disinfecting and healing the sores, varix, phlebitis, bleeding wounds.

Fig. 13. *Polygonum aviculare*

3.14. Other species

Table 2 presents other species that have therapeutically recommendations.

4. Conclusions

The resistance of plants to herbicides has become a global problem. The current approach is now advocated to limit the use of herbicides in agriculture. The development of herbicide resistant crops began in 1995 with canola and has since been widely adopted in agricultural practice, allowing for the use of the appropriate herbicide for weed control without damaging the crop plants. Nevertheless the use of herbicide- resistant crops will remain an important agricultural approach for years. There has been a serious spread of weeds having multiple or cross resistances to various classes of herbicides and the need for research on the pollution prevention principle and management of herbicide resistance is obviously urgent.

Table. 2. Species of herbs, used in pyto-therapy

Plant	***Therapeutic recommendations***	***Type of uses***
Centaurea micranthos	Chest aches, chills, ocular disorders on animals	Leaf infusion
Sisymbrium officinale	Hoarseness, stomach colics	Flower decoction
Geranium pusillum	Varix, stitches, stomachaches	Decoction, infusion
Melandrium noctiflorum	Digestive disorders	Flower infusion
Sorghum halepense	Rheumatism	Whole plant decoction
Reseda luteola	Intestinal worms	Leaf decoction
Sedum acre	Acne, rheumatism	Cataplasm of fresh juice
Cynoglossum officinale	Pulmonary catarrh, pulmonary hemorrhage, dysentery hemorrhoids, skin diseases	Decoction, infusion
Linaria vulgaris	Hemorrhages, hepatic disorders, genital disorders	*Herba* decoction, Flower infusion
Atriplex tatarica	Cough, diabetes, wounds, sores	Leaf decoction, fresh leaves
Bryonia alba	Migraines, scabies, ulcer, pulmonary disorders, rheumatism	Essence, oil extracts from roots
Lepidium ruderale	Eczema, insecticide, fevers	Whole plant decoction
Cirsium arvense	Rheumatism, typhus, amygdalate	Whole plant decoction
Erodium cicutarium	Rheumatic aches, stitches	Decoction
Thlaspi arvense	Depurative, diuretic, insecticide	Whole plant decoction
Raphanus raphanistrum	Heart diseases, chest and liver disorders	Fresh juice
Cerastium vulgatum	Hemorrhages, rheumatism	Decoction, whole plant essence
Sonchus arvensis	Skin diseases, constipation	Decoction, fresh leaves
Lamium purpureum	Rheumatism, epilepsy, tachycardia	Flower decoction
Hibiscus trionum	Furunculous, toothaches, gastric disorders	Whole plant decoction

The use of appropriate agronomic practices is essential while growing herbicide tolerant varieties if this technology is to remain effective. To this end, it is recommended the promotion and maintenance of careful management practices for growers who use these crops to minimize the development of multiple resistances.

Within the crops of Romania, the weed resource is relatively large due to the application of deficient technologies. Most of these weeds have proved therapeutic proprieties being used in numerous affections. Gathering the weeds for phyto-therapeutic uses, especially on small surfaces from households, decreases the seeds reserve from soil and meanwhile the weeding degree of the crops. In ecological agriculture the weed harvesting on medicinal purposes eliminates the herbicide treatment and soil and crop pollution, respectively. Gathering and putting to good use of some of this species may be an income alternative in the rural environment; on relatively small areas or in gardens, weeds with medicinal features can be harvested prior to weeding thus decreasing the expenses generated by the entertainment works.

Instead of using chemicals for various treatments in agriculture, the herbs could be used in phytotherapy. From the most frequent weeds in crops, some herbs, about 20 species have phytotherapeutic properties that are described herein. The use of these plants could be an alternative of chemical treatments in agriculture sector, so that the herbicides use can be avoided, and the soil and ground water pollution with chemicals is prevented.

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