

TWO DECADES FROM THE INAUGURATION OF *HOP AND MEDICINAL PLANTS CROP RESEARCH CENTER*, AT UNIVERSITY OF AGRICULTURAL SCIENCES AND VETERINARY MEDICINE CLUJ-NAPOCA

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Abstract. The University of Agricultural Sciences And Veterinary Medicine Cluj-Napoca, has an outstanding tradition in research on hop-, medicinal- and aromatic plants. Beginning in 1993, research in this field at the University Of Agricultural Sciences And Veterinary Medicine Cluj-Napoca has been carried out within the Head of the *Hop and Medicinal Plants Crop Research Center* founded at this institution and it is quoted as <<centre of excellence>> by the University's Senate. There follows that this acceptance be granted by the respective national authorities. The results obtained within the Centre are published in "*Hop and Medicinal Plants*", a publication started in 1993 by the University of Agricultural Sciences And Veterinary Medicine Cluj-Napoca in cooperation with the Association of Hop – Plants growers of Romania and the Faculty of Pharmacy Cluj-Napoca, as well as Plafar units at Cluj-Napoca and Braşov. The report introduces the main research fields as well as the results obtained by the Centre.

Key words: hop; medicinal and aromated plants; research centre.

Hops and medicinal plants represented a systematic study for the first time in Romania at the Agronomical School in Cluj, the results obtained being known and appreciated in the country and abroad. Here it was established in 1904 the first resort for medicinal plants in the world (2, 7), included as M. Chirişescu – Arva 1927 – mention between the institutions within the academy of Agriculture in Cluj. The research station had a field for experiences, laboratories to analyze and to distil medicinal plants, systematic drying with artificial heat for medicinal plants and hops (1). The quoted author mentions the fact that The Academy of Agriculture in Cluj owned a „hops garden”, belonging to the department of Plant culture, being used for teaching assignment and also for study (1).

- **In the domain of hops culture**, research in our country was sporadic up to 1972, there are to be mentioned the biology studies and hops quality taken in Cluj beginning with 1958. In 1972, A.S.A.S. established a

national research program for hops culture, included in the thematic plan of ICCPT Fundulea and attributed for its achievement to our university, having as a main goal the introduction of the scientific and technical progress in the field of hops culture, enlarge the plantations in the favorable areas, assuring the necessary of hops for the beer industry from internal production and avoiding the imports (3, 6, 8). For this goal there was developed a strong material base and there were formed competent teachers. The research program at this plant developed gradually, taking into consideration different aspects which aims biology, ecology, breeding, cultivation technology and the quality of hops cones, the results of the research being written in the volumes edited at the national symposiums regarding hops culture in Romania (kept at an interval of three years beginning with 1975) and other scientific publications in the country and abroad.

Among the special results obtained within this program we mention: establishing the ecological areas in Romania, which stayed at the base for plantations enlargement; establishing the most valuable ones in the world and the creation of the first Romanian hops cultivars (Aroma, Napoca, Transilvania, Alfa, Productiv și Superalfa de Cluj); the study of diseases and pests and the control methods; the elaboration of modern culture technologies; the study and adaptation of several machines and specific tools for hops culture, including the optimal drying and cones conservation regime; establishing the economical efficiency index at this culture. By introducing the obtained results in production within this program, and also the achievement in the domain of hops in other countries, it was accounted at superior parameters at the technical material base in the agricultural units which cultivate hops in our country, the production and the quality increasing from year to year (6, 8).

- **In the domain of cultivating and valorification of medicinal and aromatic plants**, besides those shown above, we mention that with the activity of the research centre for medicinal plants in Cluj, there were established the basis of experimental research in the domain of medicinal plants used for health belonging to the spontaneous flora in our country. At Agronomy in Cluj, in 1970, research in the domain of medicinal and aromatic plants started again on the base of research contracts, initially with the Terapia Cluj medicine factory, and in 1975 with research contracts for many species, with SCPMA Fundulea, than with the Ministry of National Education, Faculty of Pharmacy Cluj and Plafar Cluj. The research contained bioecology aspects, introduction in culture, breeding and cultivation technology of several species of medicinal and aromatic plants, among: *Solanum laciniatum* Ait, *Colchicum autumnale* L., *Papaver*

bracteatum Lindl., *Herniaria glabra* L., *Adonis aestivalis* L., *Gentiana lutea* L., *Aconitum napellus* D.C., *Angelica archangelica* L., *Hypericum perforatum* L., *Valeriana officinalis* L., *Echinacea pallida* Nut., *Echinacea purpurea* (L.) Moench. etc. At several species, among those mentioned, the biology and technology research are closed and the recommendations for the cultivation, and others are to be researched (2, 7). We mention the fact that at the Plants Culture Department in Cluj there was organized a complete selection of medicinal and aromatic plants cultivated or to be cultivated in Romania, among which many species are from the spontaneous flora and several exotic species of perspective for pharmaceutical industry .

Hop and Medicinal Plants Crop Research Center within U.S.A.M.V. Cluj-Napoca, functions, in the base of Senate Decision U.S.A.M.V Cluj-Napoca on 6.12.1993 (9) and was finalized and accredited in Senate of U.S.A.M.V. Cluj-Napoca, on 25.10.2005 (10). Since 1993 it has been edited - under this center aegis – the magazine „*Hops and medicinal plants*”. We mention that the center organized five scientific symposiums, of which two (in 1993 and 1996) with research in the field of hops, and in the next four (in 1999, 2002, 2005 and 2008), there were presented also scientific papers in the domain of culture and valorification of medicinal and aromatic plants.

Studies made within The research center are according to the development plan of The University of Agricultural sciences and Veterinary Medicine Cluj-Napoca, having as perspective objectives, at **hops**: genetic, amelioration, biotechnology, minibuds free of viruses production, fertilization optimization, weeds, diseases and pests integrated control; harvest optimization, drying and cones storage; and at **medicinal and aromatic plants**: studies of biology and introduction in the culture of new species, optimization of the culture technology on ecologic principles, amelioration of the species of *Echinacea*, *Valeriana*, *Papaver*, *Angelica*, *Colchicum*, *Melissa*, *Tagetes*, *Calendula*, *Cynara*, *Ocimum* genus etc. (2, 5, 6, 7).

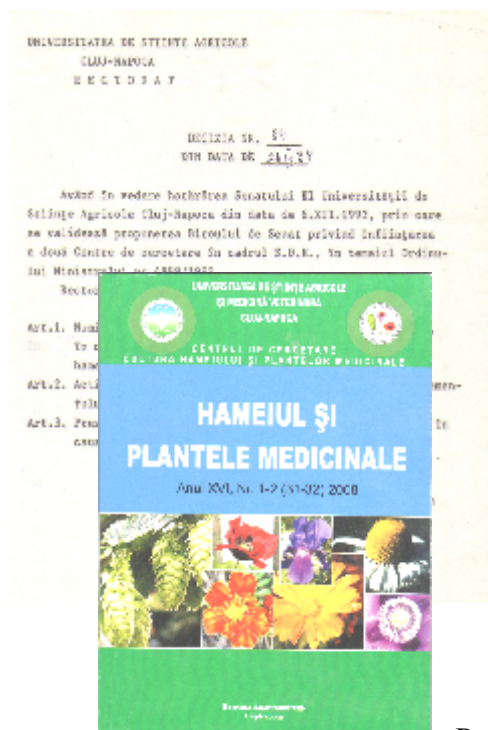
The Research Center has its activity in an adequate space, within U.S.A.M.V. Cluj-Napoca. The Research Center has the necessary material equipment to research in the field: research laboratories, equipment (tools and machines), greenhouse, climatic chamber, experimental fields, germplasm collection and documentation facilities. The Research Center has acces to the material base of other laboratories (departments) within U.S.A.M.V. Cluj-Napoca and U.M.F. Cluj-Napoca – Faculty of Pharmacology.

For the both main research domains (hops and medicinal plants), The Research Center maintains collaborations with units in the field from the

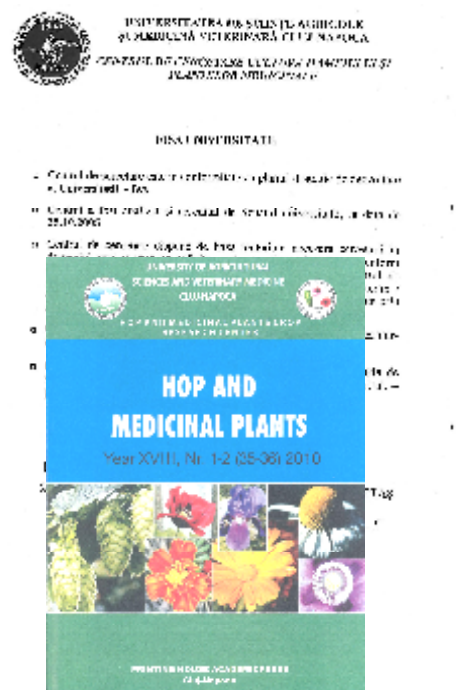
country and overseas regarding the problems of bio ecology, amelioration and crop technology of these plants on ecological bases.

Hop and Medicinal Plants Crop Research Center in U.S.A.M.V. Cluj-Napoca has been nominated since 2004 to make hops certificate and determinations regarding the quality of cnes, with the help of Agriculture Ministry (published in Official Monitor nr. 84/30.01.2004).

Research results within the research center and its extension in production are published in the magazine called Hops **and medicinal plants**, printed since 1993 by ***Hop and Medicinal Plants Crop Research Center*** in USAMV Cluj-Napoca, in collaboration with The Association of hops cultivars in Romania, Faculty of Pharmacology Cluj-Napoca and Plafar units Cluj and Braşov. The magazine contains other research regarding hops culture and medicinal plants made in different research units in the country and overseas, and also different aspects which interest scientists in this field of research. It is a scientific, technical and managerial way of communication for all those who work in the field, including beer and pharmaceutical industry. Papers in the field of hops and medicinal plants achieved within the research center are published in the Scientific Bulletin of USAMV Cluj-Napoca or other internal and international publications. In the last 20 years, collaboratories at the research programs within the research center, elaborated and published in scientific magazines a large number of scientific papers; sustained PhD thesis, in the field of hops and medicinal plants; they published over ten books (monography, treats and university booklets) in which contain own results and novelty obtained in the world in the field of hops and medicinal and aromatic plants. We mention the fact that a part of the members of the research center take part in the editing staff of several scientific publications in the country; they lead or are members of several national scientific national organizations; they are the beneficiary of several scientific prizes, among which there are prizes of the Romanian Academy and ASAS. The member of the research center achieved several international research collaborations in the field of hops and medicinal and aromatic plants, with perspective of develop for the future.



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**ACTE ALE ORGANELOR DE SPECIALITATE
ALE ADMINISTRAȚIEI PUBLICE CENTRALE**
MINISTERUL AGRICULTURII, PĂDURILOR, APELOR ȘI MEDIULUI

ORDIN
privind organismele de certificare și controlul certificării
în vederea denumirii de origine a hameiului

Văzând Referatul de aprobare nr. 130.351 din 12 decembrie 2003,
având în vedere prevederile art. 27 al Legii nr. 627/2002 privind producerea și comercializarea hameiului,
având în vedere prevederile Ordinului ministrului agriculturii, silviculturii și pădurilor nr. 172/2003 privind normele
de bonitate și certificare a hameiului,
în temeiul Hotărârii Guvernului nr. 739/2003 privind organizarea și funcționarea Ministerului Agriculturii, Pădurilor,
Apelor și Mediului,

ministru agriculturii, pădurilor, apelor și mediului emite următorul ordin:

Art. 1. — Certificarea hameiului în vederea denumirii de
origine se realizează de Centrul de cercetare a hameiului
și plantelor medicinale din cadrul Universității de Științe
Agricole și Medicină Veterinară Cluj-Napoca, denumit în
continuare *Organismul de certificare a hameiului*.

Art. 2. — Organismul de control al certificării este
Autoritatea pentru hamei din cadrul biroului pentru culturi
specializate care se înființează în cadrul Direcției generale
de implementare și reglementare.

Art. 3. — Activitatea de certificare a hameiului se reali-
zează în baza regulamentului de certificare a hameiului,
elaborat de Organismul de certificare a hameiului și apro-
bat prin ordin al ministrului agriculturii, pădurilor, apelor și
mediului.

Art. 4. — Se abrogă prevederile art. 1 alin. (8) și (9)
din Ordinul ministrului agriculturii, pădurilor, apelor și mediu-
lui nr. 172/2003 privind normele de bonitate și certificare a

hameiului, publicat în Monitorul Oficial al României, Partea I,
nr. 275 din 18 aprilie 2003.

Art. 5. — (1) Determinările fizico-chimice și organolep-
tice ale conurilor de hamei și produselor derivate, astfel
cum sunt prevăzute la art. 1 din Legea nr. 627/2002, se
realizează de Laboratorul de chimie a hameiului din cadrul
Universității de Științe Agricole și Medicină Veterinară Cluj-
Napoca, Laboratorul fermentații din cadrul Institutului de
Cercetări Alimentare București, Laboratorul bere din cadrul
Universității Ouzăria de Jos Galați și Institutul de
Coresurse Alimentare.

(2) Rezultatele determinărilor fizico-chimice și organolep-
tice stau la baza încadrării în clasele de calitate stabilite
prin normele tehnice de clasificare a hameiului, aprobate
prin ordin al ministrului agriculturii, pădurilor, apelor și
mediului.

Art. 6. — Prezentul ordin va fi publicat în Monitorul
Oficial al României, Partea I.

p. Ministrul agriculturii, silviculturii și pădurilor.

Petre Osea,
secretar de stat

București, 26 ianuarie 2004.
Nr. 74.

GENERAL OBJECTIVE OF THE RESEARCH CENTER

- The promotion of several research in the field of hops and medicinal plants in a representative network integrated in the national and international network, in order to develop an interdisciplinary research program which to obtain scientific and technological results applicable in the domain.
- Developing several research systems for long term which can identify the culture measures for hops and medicinal plants on ecological bases.
- The elaboration of concepts and technological solutions adapted to the pedo-climatic and socio-economical conditions, competitive on national and international level, in concordance with sustainable agriculture and a superior quality of life.
- The development of biology, amelioration and culture on ecological bases research regarding hops and medicinal plants.
- The development of research potential in the domain of crop and hops industrialization, medicinal and aromatic plants; the constitution of a performant networks of production units, capable to apply specific technologies for sustainable agriculture.
- Elaboration of extension projects and valorification of the research results in the field, units and pilot farms in which the results of the studies

made to be applied.

- Participation as partners with rights and equal attributions at national and international research.

Objectives of the sub domains:

<p>HOPS CULTURE AND AMELIORATION continuing the biology and ecology studies for hops, with special reference to the new cultivars in our country;</p> <ul style="list-style-type: none"> ➤ Research regarding the hops genetics and the continuation of amelioration works in order to create new cultivars which are more productive, with a high content in sour elements and with a fine flavor, resistant to diseases and pests, applicable to mechanized harvest; ➤ Perfectioning the system of producing the material for sowing free of viruses, through meristems cultures and adequate techniques for field cultivation; ➤ Approaching new research aspects to modernize hop cultivation technology, based on ecological principles, reducing the pesticides consume (to prevent the cones and environment pollution) and those of work and energy for hops fields; ➤ Establishing the most adequate machines systems and rationalizing tillage work in hops fields (soil tillage, cuttings etc); reducing the number of machines passing; ➤ Optimizing the fertilization system (doses and methods of appliance of fertilizers on soil and of foliar fertilizers etc) and those regarding the integrated control of pests and weeds (rationalize pesticide consumption and appliance moments); 	<p>CULTURE AND AMELIORATION OF MEDICINAL AND AROMATIC PLANTS:</p> <ul style="list-style-type: none"> ● Introducing in the culture of new species of medicinal and aromatic plants from spontaneous flora of the country or new plants for our country; ● Studies of biology and ecology of several species and cultivars of medicinal and aromatic plants introduced in culture; ● Research regarding the dynamic of active principles accumulation depending on the biological material cultivated and applied technologies; ● Developing amelioration work for several species of medicinal and aromatic plants; ● Establishing the way of breeding and the main technological measures for new medicinal and aromatic plants introduced in culture; ● Establishing the moment and the harvest way to obtain higher production of vegetal material rich in active principles; ● Developing the biology and cultivation technologies research for medicinal and aromatic plants specific to the ecological conditions near Cluj;
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<ul style="list-style-type: none"> ➤ Rationalize harvest works and drying system and hops cones storage; ➤ Different aspects regarding the economic efficacy of hops crop, production and cones quality etc. ➤ Developing profile collaboration relations in the country and abroad. 	<ul style="list-style-type: none"> ● Establishing several technological measures, based on ecological bases, reducing the pesticide consumption to prevent environment and vegetal material pollution; ● Collaboration with Romanian research units in the field of medicinal and aromatic plants and vegetal material valorification; ● Achieving several international collaboration regarding bio ecological problems, amelioration and cultivation technology for medicinal and aromatic plants.
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Hop and Medicinal Plants Crop Research Center proposed as „center of excellence” by USAMV Senate Cluj-Napoca, in the meeting on 9th November 1998 (based on MEN nr. 3373 on 10th March 1998 and CNR Decision on 16th October 1998) regarding the scientific performance of the center, research potential of the staff, scientific competitive programs in which it activates, relevant tradition and the significant contribution to the extent of knowledge in the field of hops and medicinal plants, confirmed nationally and internationally cooperation.

On the occasion of two decades since the ***Hop and Medicinal Plants Crop Research Center*** was established and since the establishment of the magazine *Hop and Medicinal Plants*, we congratulate all the members of the center, and also all the our collaborators and readers of our magazine. The same congratulations to all who activate in the research of hops and medicinal plants, industrial plants of high importance for the national economy, and all those who understand to support the effort and the intentions of the publishing staff.

**Cultivars has been created at Hop and Medicinal Plants Crop
Research Center USAMV Cluj-Napoca (1993-2003) (Brief presentation
and awards)**

**THE HOP CULTIVAR „ARDEAL”
(NEW NAME OF “CLUJ SUPERALFA” CULTIVAR)**

**Authors: L.S. Muntean, S. Cernea, Al. Salontai, G. Morar, D. Vârban,
L. Muntean, M.M. Duda, S. Muntean, Rodica Vârban, Maria Tofană**

The “Ardeal” hop cultivar (*Humulus lupulus* L., ssp *europaeus* Ryb.) was created at “Hop and Medicinal Plants Crop Research Center” - U.S.A.V.M. Cluj-Napoca through clonal selection from the Hallertauer Magnum cultivar (temporarily called CN 21/96).

Among the morpho-physiological, productivity and quality features of this hop cultivar some ought to be mentioned: it is semilate, with an average vegetation period of 138 days (90 days – the vegetative phase and 48 days the generative phase); 35 days from the coming up until the appearance of the lateral offshoots, 37 days until budding, flowering after 18 days, cone formation after 28 days and reaching technological maturity after 12 days; the habitus of the plant is cylindrical, the vines are green, the length is 8-10 m, with internodes of 15-23 cm and green offshoots of 70-120 cm; the leaves have 3-5 dark-green lobes; the cones are oval, uniform, dense, big, round-pointed; the blossom stem is of medium fineness, the bracts are large-medium, tightly fixed to the stem, oval pointed yellow-green, rich in lupuline (the lupuline is orange); in yield trials the average yields were of 2.5-2.8 t/ha dry cones; it is one of the bitter (superalfa) cultivars, medium-flavoured, with a high content of alfa acids (13.8-14.5%); the content of alfa-acids – 340-360 kg/ha – is much higher than that of other hop cultivars cultivated in our country; it is resistant to mildew-powder, manna, and tolerant to aphides.

Awards: „Diploma of Excellence and Gold Medal”, given to the cultivar at the International Saloon for Inventică Pro Invent, the VI edition, 2008, Cluj-Napoca and “Diploma of Excellence and Silver Medal” patent of “Ardeal” (“Superalfa”) cultivar - International Saloon for Inventică Pro Invent, the VII edition, 2009, Cluj-Napoca, “Diploma of Excellence and Gold Medal” for Cultivar “Ardeal”, at the International Saloon Proinvent, the XI – edition, Cluj-Napoca 2013.

“NAPOCA” CULTIVAR OF *ECHINACEA PALLIDA* NUTT.

**Authors: L.S. Muntean , M. Tămaș, D. Vârban, L. Muntean,
S. Muntean, S. Cernea, G. Morar, M.M. Duda,
Rodica Vârban, Ilioara Oniga**

The “Napoca” cultivar (*Echinacea pallida* Nutt.) has been created at Hop and Medicinal Plants Crop Research Center U.S.A.M.V. Cluj-Napoca through repeated mass selection from echinacea that had been imported to our country and studied in yield trials (with the temporary name of CN 11/992).

Here are some of the morpho-physiological, productivity and quality features of this cultivar: it is semilate, with a vegetation period of 134-145 days in the second and third years, in the first year the root system is formed, and also a leaf rosette and flower stems with a reduced number of flowers, the complete flowering only beginning in the second year of vegetation; it have a tap root, with 1-3 vertical gray-brownish main roots (which are the actual raw material, harvested in the year 2-3); the part above the soil looks like a bush with 80-120 cm long stems, sometimes with branches, 6-8 mm thick, with 8-12 internodes, the last one being 30-40 cm long, ended with a inflorescence; the leaves from the rosette are linear lanceolate with a petiole of 8-18 cm length, with a blade of 8 cm length and 3-6 cm width, with three nervures on the dorsal side; the inflorescence is ovoid, thorny when dry with involucral leaflet at the bottom (in two rows), conical receptacle (1,5-2 cm high, with a diameter of 2-3 cm); the ray flowers are pink-violet in colour, sterile (5-8 cm length and 2-5 mm in width); the disc flowers are tubular, orange and hermaphrodite (4-6 mm in length); the flowering takes place in July-August, pollination is made by insects, the fruit is a sided achene, 2-4 mm in length, whitish with rudimentary pappus; the whole plant is covered with rough hair, 1.8-2 mm long (made of 3-5 cells), wider-bottomed and narrow-ended, that give rigidity to the plant; the raw root yield is of 4,5-5,2 t/ha (1,3-1,5 t/ha when dry); the content of active principles is high: imuno stimulent polysacharides (6,1-6,4 g %), phenil-propanic derivates (0,5 – 0,6 g %), volatile oil (0,9-1,2 ml/100g) etc., which enhance the immunity system, the raw material being used for obtaining anti-virus, imunostimulents, antitumorale products etc.

Awards: „Diploma of Excelence and the Golden Medal”, given fot the cultivar at the National Saloon Inventică Pro Invent, the V-edition, 2007, Cluj-Napoca and at the International Saloon for Inventică Pro Invent, the VI-edition ,2008, Cluj-Napoca, “Diplomă de Excelentă and Medalia de argint for Brevet Cultivar “Napoca” at the International Saloon Pro

Invent, Cluj-Napoca, 2009, Diploma “Gold Medal”, International Saloon “Inventica 2010”, Iași (9-11.06.2010). “Diploma of Excellence and the Golden Medal” given of the cultivar at the International Saloon for Inventica Pro Invent, the X-edition, 2012, Cluj-Napoca, “Diploma of Excellence and Gold Medal” for Cultivar “Napoca”, at the International Saloon Proinvent, the XI – edition, Cluj-Napoca 2013.

„CLUJ” CULTIVAR OF *ECHINACEA PURPUREA* (L.) Moench

**Authors: L.S. Muntean, M. Tămaș, D. Vârban, L. Muntean,
S. Muntean, S. Cernea, G. Morar, M.M. Duda,
Rodica Vârban, Illoara Oniga**

The “Cluj” cultivar (*Echinacea purpurea* (L.) Moench, has been created at Hop and Medicinal Plants Crop Research Center USAMV Cluj-Napoca through repeated mass selection from echinacea that had been imported to our contry and studied in yield trials (with the temporary name CN - 15/92). The biological material from which the “Cluj” cultivar was obtained was presented in terms of morpho-psysiological features, content of active principles in our former papers . The breeding activities connected to this cultivar were initiated in 1992 by the Hop and Medicinal Plants Crop Research Center from USAMV Cluj-Napoca and developed after 1995. In 2006 the “Cluj” cultivar was registred for the examination by the National Institute for Cultivar Testing and Certifying in order to be certified and included in the Official list of cultivars.

Here are some of the morpho-physiological, productivity and quality features of this cultivar: it is semi late, with a vegetation period of 155-160 days in the second and third years, in the first year the root system is formed and also o leaf rosette and flower stems with a reduced number of flowers, the complete flowering only beginning in the second year of vegetation; it has fibrous roots, gray-brownish; the part above the soil looks like a bush with 100 (120) cm long stems, with branches, with 8-12 internodes, the last one ended in an inflorescence; the leaves of the rosette are oval lanceolate, with a petiole of 6-12 cm, with a blade of 12-16 (20) cm in length, and 4-8 cm in width, with 5 nervures on the dorsal side; the leaves bush are oval lanceolate, with a short petiole (3-9 cm), a blade of 10-15 (18) cm long, and 4-8 cm wide, with 5 nervures on the dorsal side; the inflorescence (8-15/pl) is ovoid, flat, with an involucre leaflet at the bottom (in 3 - rows), conical receptacle (3-4 cm high, with a diameter of 3-5 cm), the ray flowers are bright red in colors, sterile (4-7 cm in length and 2-4 mm in width), the disc flowers are tubular, orange and hermaphrodite (5-8 mm in length); the flowering takes place in July-August, pollination is made by insects; the

fruit (180-210/infl.) is a sided achene, 3-5 mm in length, whitish with rudimentary pappus; the whole plant is covered with rough hair; the yield of herba is 18-22 t/ha; the content of active principles is high in phenil-propanic derivates (2,3-2,5 g %), immunostimulent polysacharides (1-1,5 %) etc., which enhance the immunity sistem, the row material being used for obtaining anti-virus, immunostimulent products etc.

Award: “Diploma of Excelence and the Golden Medal” given of the cultivar at the International Saloon for Inventica Pro Invent, the X-edition, 2012, Cluj-Napoca, “Diploma of Excelence and Gold Medal” for Cultivar “Ardeal”, at the International Saloon Proinvent, the XI – edition, Cluj-Napoca 2013.

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