

# ASPECTS OF THE HOP CULTURE IN ROMANIA

**Leon Sorin Muntean**

Head of the "Hop and Medicinal Plants Crop Research Center" - USAMV Cluj-Napoca

## **Origin use and taking in culture of hops**

The center of origin for hops, as different authors consider, is located in the mountain area of the Mediterranean Seaside (*N.I. Vavilov, 1935 quoted by N. Ceapoiu and A.S. Potlog, 1960*); Europe and Central Asia (*P.M. Jukovski. 1953*), Eurasia (*V. Velican, 1965*), fertile area in Caucaz and Black Sea's shore (*L.Vent et alii. 1963 etc*), the last opinion being more accepted today. From this genetic center of species, hops spread mainly in the Central European and West European area (2nd – 5th centuries B.C.) by means of migrating peoples and mainly of Slaves who used it in aromatizing drinks made of barley.

**Hops** like many other plants are used by Man until Antiquity, first of all harvested from the spontaneous flora then as cropped plant. Since ancient times cones (female inflorescences) of spontaneous hop were used in producing beer as well as in medicine for treating some disorders. This is a fact attested by numerous archeological and written documents remained from ancient human civilizations and underground sprouts not greened started from the head of the log from cords and stools were used in different forms as food (soups, salads a.s.o.) (*V. Linke and A. Rebl, 1958 etc*).

Hop cones were used in preparing some drinks 3-5 thousands years B.C. by Babylonians, Egyptians (*V. Linke and A. Rible, 1958 etc*). Indo-European populations used hops in preparing beer since pre-historical times. In ancient writings it is mentioned the use of hops as vegetable plant (offshoots) and in preparing some drinks by ancient peoples. 3-4 thousand years ago in Syria on clay plates were recorded beer receipts. Antic writers (*Vergilius, Georgica, III, 379-380 and Athenaios, Deipnosophistai, X, 67, p. 447c Hellanicos, Fragmenta historicorum Graecorum, I, 59*) inform us that Thracian-Scythes used barley to produce beer (*Al. Suceveanu, 1998 and Maria Bărbulescu, 2001*) maybe with hops from spontaneous flora or cultivated. Pliniu the Old (23-79 A.C.) makes the first written mention regarding hops culture in Europe, in his work "*Naturalis Historia*"

(Natural History), mentioning also the domains of using young offshoots (in form of salad) and of cones (in preparing some refreshing drinks).

Romans, as Greeks, knew the beer but this drink was less appreciated than wine which was consumed long time before. For the Germans in the north of Roman Empire beer was the favorite drink; prepared from barley, cortices of oak tree and wild hops. Those days it was used hops harvested from spontaneous flora and during the further periods cultivated hops. Hop grows spontaneously and it has been taken into culture in temperate climate of the Northern Hemisphere, Europe, Central Asia and North America.

**First hops cultures** were initiated in center and west side of Europe since 7<sup>th</sup> century, being then attested in written form also. A document dated year 736 mentions the existence of a hops culture on Hallertau area (Germany) another one in year 768 make references to a hops culture from France (Paris area), other documents refer to hops cultivated in Spalt area (8<sup>th</sup> century), as well as in Bohemia (859) etc. (V. Linke and A. Riblé, 1958). Further on hops culture was signaled also in Russia (10<sup>th</sup> century), England (12<sup>th</sup> century) and North America (1629) etc. (Al. Salontai et alii. 1983, L.S. Muntean et alii., 1995, 2004 etc.).

As the beer industry developed, surfaces cultivated with hops gradually increased, mainly in the areas more wet and chill in Europe, at the periphery of cultivation of grape vine, where the last gives weaker results (V. Velican, 1965). During 14<sup>th</sup> -15<sup>th</sup> centuries, bigger surfaces cultivated with hops are consigned in Bohemia, Bavaria and Belgium where an important brewery industry also develops. In 19<sup>th</sup> century a significant development of brewery and an extension of hop cultivated surfaces in different countries is recorded consequently to War World II. (P. Berzescu et alii., 1981, Al. Salontai, 1999, L.S.Muntean, 2001, 2002 etc).

**Hop culture** is linked to the existence of brewery although the plant has also other uses (*Lupuli strobuli* is used in medical and aromatic purpose etc) (L.S. Muntean, 1990, 2007 etc.) Beer is and will be a drink consumed by a great part of global population (in moderate quantities), due to its characteristics: low alcohol content, pleasant taste, nutritional value, diuretic effect and sedative of the nervous

system. Because female inflorescences (cones) of hops represent an indispensable raw material in brewery, hops became one of the most significant technical plants. Hop cones give the known features of beer: foam, taste and specific flavor, color and limpidity and ensuring also its capacity of conservation. Those features are given mainly by the lupulin produced by cones, which contains bitter substances (bitter acids and resins), volatile oils and tannins (great quantities of tannins are also in ralis) etc. The importance of hops also results from the fact that no chemical substance (natural or synthetic) could replace lupulin from the cones of this plant in order to achieve the physic-chemic and taste features of beer. (*H. Kohlman, A. Kastner, 1975, P. Berzescu et alii., 1981, Al. Salontai et alii. 1983, 2002, L. S. Muntean, 1993, 2003, V. Rybacek et alii., 1980 etc*).

### **Documents that attest the oldness of hop use in Romania**

As in countries in Centre and Western Europe in Romania, it was used first the hops in spontaneous flora then cultivated hops. The Latin poet Virgil (Publius Vergilius Maro, 70- 19 B.C.) signalizes in *Georgica*, III, 379-380 etc., that Thracians, among whom Get-Dacians (on north of the Danube) prepared and consumed beer, a drink made of barley, (*Al. Suceveanu, 1998 and Maria Bărbulescu, 2001*), to which they added hops either from the spontaneous flora or cultivated in garden system. After the conquest of Dacia by the Romans, it is mentioned that the last brought also with them the agricultural expertise, the culture and use of some plants. It is possible that in those days in Dacia was also have been used hops harvested from spontaneous flora or from culture; a system practiced by Romans as Pliniu the Old (23-79 B.C.) and other ancient authors mentioned.

The use of hosp harvested from spontaneous flora and then of that obtained from culture is mentioned in writings since 14th century in Transylvania, then in Moldavia (15th century) and in Romanian Country (16<sup>th</sup> c.). Written documents regarding hop culture in our country are dated in the 16<sup>th</sup> century (1570) although maybe the first garden-system cultures were founded in the 14<sup>th</sup> -15<sup>th</sup> centuries in all three Romanian princedoms (*Al. Salontai and L.S. Muntean, 1973, 1990, Al. Salontai, 1987, L.S. Muntean, 1993, 2000 2tc.*).

The first written attestation regarding beer and brewers in our country is dated in the year 1366 in a document from Transylvania in which it is mentioned the participation of “*Andrei the Miller and Iacob the Brewer from Cluj*”) in a mutiny of peasants from Floresti commune (nearby Cluj) and of craftsmen from Cluj (St. Bălan and St. N. Mihăilescu, 1985). In a monographic study, St. Pascu 1974 recorded that in Middle Ages “*Cluj [n.t. Klausenburg] inhabited by a numerous German population could not go without beer and brewers. And indeed it didn't go without, because brewers (braxatores) from Cluj are reminded in '366*”, as it has been mentioned above. Further on, he shows that “*their number will increase in the following centuries*”, so that in the 16<sup>th</sup> century “*brewers are on the same line in as number and activity as the bakers. Brewers number is increasing as well as the quantity of beer; cheap beer on behalf on the more modest population*” (St. Pascu et alii, 1974). By the beginning of the 18<sup>th</sup> century the first beer factories (breweries) are founded on the territory of Romania (N. Iorga, 1927 etc).

Written documents referring to the preparation of beer are known in Moldavia since the year 1402, in a paper of Alexandru cel Bun [Alexander the Good] through which the lord ceded to Moldovița Monastery among others an installation for brewery, and in Romanian Country since the year 1522 when Radu from Afumați received from people from Brașov significant quantities of beer. (St. Bălan and St. N. Mihăilescu, 1985).

### **Taking into culture of hops in Romania**

The first hop cultures re mentioned in Transylvania during 16<sup>th</sup> century on feudal or church domains, where beer was also produced with hops from the spontaneous flora, from cultures or brought from other countries. So it is consigned that at Alba-Iulia Archbishopric (in 1520) “*beer was produced at the Court*”, and on Satu-Mare domain (in 1570) “*there is also a brewery (Domus braxatoria), the house for boiling beer in which there are big butts (dolea maiora)*” (D. Prodan, 1968).

A first written mention that attests the cultivation of hops in garden-system is that from the records of Satu-Mare Domain in the year 1570, in which it is consigned the procurement of hops for the

production of beer, from acquisitions and from the “hop garden” (ex. horto lupulario), and in the year 1572 hops was used also from “the garden nearby Someș from Satu-Mare” (D.Prodan, 1968).

The name “hop garden” was also used in the coming centuries. So, by the end of 19<sup>th</sup> century G. Maior wrote in a work about “the foundation of hops garden” (G. Maior, 1898).

In Moldavia, Dimitrie Cantemir refers to hops in “*Descriptio Moldaviae*” (1716), and in Romanian Country, Ion Ionescu of Brad in “*Project of culture for the exploitation of the manor of Pantelimon*” (1865) and in “*Elementary Lessons of Agriculture*” (1870).

In the work “*Descriptio Moldaviae*” (1716), D. Cantemir presenting (in chapter 18) marital habits in Moldavia shows that in the church the priest says a marriage prayer, change rings, put crowns on two spouses’ heads, then he walks them through the church until singers are rising the ordinary chant for this habit. “*During this time relatives spread among present people coins, nuts and dried hops, to show by such ensamples that they are praying to God-Live Giver for the fruitfulness of nuts and hops*”(D.Cantemir, 1716), fact having perhaps here the sense of fruitfulness of plant useful for human being, in general. Among these symbols hops is also registered hops that surely represented something in village inhabitants’ life in those days, being probably even cultivated in gardens by some of them.

Ion Ionescu de la Brad in “*Elementary Lessons of Agriculture*” (1870), after mentioning that “*hops is a plant that is cultivated for his flowers of female side*”... *Flowers of male side are useless*”, makes some references to plant’s biology and demands as well as to the manner of culture, concluding with the specification that: “*The most bitter hops is the best*” (Ion Ionescu de la Brad, 1865 and 1870). Ion Ionescu de la Brad sustained the introduction of hops in culture in our country, fact proved by the proposal to found a hop plantation, made in “*Project of culture for the exploitation of the manor of Pantelimon*” (1865).

Among the first hops plantations in our country we mention that of 0.58 ha founded around year 1860 with high quality hops brought from abroad on the domain that passed into the property of Agricultural Teaching in Cluj on the same time the latter was founded (1869) (M.Chirițescu-Arva, 1927, M.Șerban, 1938.) M. Chirițescu-

Arva, 1927, mentions that Cluj Agricultural Academy owns a “hops garden” belonging to the Chair of Phytotechny, used in didactic and study purposes as in laboratory for analysis, systemic driers with artificial heat for drying medicinal herbs and hops. (*M.Chirițescu-Arva, 1927, L.S.Muntean, 1999*). The production of hop cones.

The production of hop cones was put in value by selling it to the breweries in Cluj, being well appreciated from the qualitative perspective. So, in a hop exhibition in Budapest there were high lighted (they obtained third price) cones belonging to the bred *Golding*, also named *Earlier of Brambling*, belonging to the group of white-greenish hop (*V. Velican, 1965*).

Hops, also called “*the vine plan of the North*” (*M.Popovici, G.Cipăianu, 1912 etc.*) referring to climatic demands, meets favorable conditions for culture in more wet and chilly areas, conditions under which were founded the first cultures also in our country. Quoted authors refer to the importance of hop female plants (which produce the lupulin in the fabrication of beer and they mention they mention the breds in culture: De Saaz (Boemia), De Stiria (Austria) and De Spalt (Bavaria). Meanwhile in Roumanian Country existed beer factories and maybe hop cultures.

On Târnava Mare Valley, in Sighișoara’s area, hops was brought and cultivated mainly by Saxons since around year 1870, “*where its culture spread well and a bigger and bigger dimensions*” pointed out G. Maior in 1898, and further on he notes that: “*For Transylvania autumnal hops of Wurtemberg proved to be superior to that of Saaz and superior even to the original one, cultivated in Wurtemberg. Its culture occupies in present days in Transylvania only 237 cadastral yokes*”. The same author shows that by the end of the 19<sup>th</sup> century: “*the consumption of beer increases in all countries and all states from one year to another and above all consequently to the depredation of vines by the phylloxera.*” (*G. Maior, 1898*).

### **Hops culture at the beginning of the 20<sup>th</sup> century**

Hop was extended in culture in our country until the beginning of the First World War, the surfaces being between 70 and 140 ha in the period 1890-1910. In 1907, it is recorded that around Sighișoara 142 hectares were cultivated with hops. (*I. Borzea and I. Ursu, 1975, P. Abraham and I. Ursu, 1975*). Consequently the surfaces were

reduced „*due to the weak interest manifested by the agricultural bodies after 1918*” as well as due to the attack of diseases and varmint.

In the period just before the First World War, the surface cultivated with hops in Romania was around 400 hectares, located in outskirts of Sighișoara. During the First World War and consequently, in the period between the Wars, the surface cultivated with hops was very much reduced due both to the weak interest manifested by agricultural bodies and to the massif attack of manna in 1926. *“Hops cultivators were obliged to remake the destroyed plantations introducing in culture new offshoots resistant to manna and in the same time they needed to fight against manna using the means available to them”* (P. Abraham and S. I. Ursu, 1957).

### **Situation of hop culture between the two World Wars**

In the period between the two world wars, during 1929 – 1934 there are mentioned in culture 16 -107 hectares with hops and cones productions were between 3 to 12 q/ha (Great Agricultural Enciclopedy, volume III, 1940). After the data communicated in her doctorate thesis by Veronica Unțanu (1980), in the year 1936 hops was cultivated in Romania on 50 hectares, with an average production of 6,8 q/ha.

Due to the weak maintenance of hop plantations and above all due to the attack of diseases and varmint the culture of this plant was very much reduced, reaching in 1939 at around 20 ha, the whole surface being located in Târnava Mare county, around Sighișoara. Hops remained in culture on restricted areas until the end of the interwar period (the surface on fruit being between 8 and 20 ha) as well as after that (until 50's), reaching in the year 1948 at only 8.8 ha, which from 4 ha at IAS [n.t. Sighișoara State Agricultural Enterprise] and 4.8 ha in the private sector. (P. Abraham and S. I. Ursu, 1957; I. Borza and I. Ursu, 1975).

The situation reached by hop culture in the interwar period in Romania was determined also by brewers' position to the autochthon production of cones, as it results from the followings, given after P. Abraham and S.I. Ursu, 1957: *“Brewers interests on those times were divided and made that hop plantation were not remade on a healthy*

*basis. So, some brewers wanted to obtain production of cones as big as possible, because beer factories needed hardly this raw material and the quantities produced in our country were very small. For these brewers it was much more advantageous to acquire hop cones produced in the country, although they were of low quality, because for them the price was smaller than for imported cones. Other brewers, on the contrary, sustained the import of hop cones because consequently to imports they enlarged their personal revenues. Moreover, the imported hop cones were custom-tax free and hop cones produced in the country, in case of export, were subjected to custom-tax. This situation maintained very low the price of indigene hop cones, many times even bellow the cost, fact that determined the producers to neglect the quality and to produce only bigger and bigger quantities. This situation led to the increasing degradation of hop plantations, the cone production being of inferior quality. So it was formed brewer technicians' opinion that indigene hop is valueless and does not deserve to be used in making beer, although both the land and the climate of our country offered favorable conditions for this culture".*

After the Second World War, by the beginning of 1948 there were found in culture 8.8 ha of hops, which from 4 ha at IAS Sighișoara and 4.9 ha in the private field (*I. Borzea and I. Ursu, 1975*).

### **Hops culture during the period 1950-1970**

Between 1950 and 1965 come into being the first big plantations of hops, in state agricultural enterprises Rupea (Brașov county), Sighișoara and Albești (Mureș county) and Dumbrăveni (Sibiu county), realizing a total of 800 ha (*I. Borzea and I. Ursu, 1975; C. Rusu, 1978, Al. Ioanid, 1973*), but those plantation had no technical-economical study and they were not placed on the most favorable fields (from 800 ha with hops, around 750 were planted on slope fields, weakly productive and with no possibilities of irrigation (*I. Borzea and I. Ursu, 1975*). Seeding biological material for those plantations was brought from Belgium and Czechoslovakia, in some cases of low quality (*Sanda Cernea et alii. 1967-1968, Al. Salontai et alii. 1969 etc.*). In time grapes got ill, the viruses' attack spread on

around 80% of the plantations, leading to the degeneration of planted material and the apparition of gaps in plantations (*I. Borzea and I. Ursu, 1975*). Plantations founded until the year 1965 had as sustaining system wood pillars, not-impregnated (that rotten in 5-6 years). The distance between rows was in average of 1.67 m and the works were done manually of with animals. The productions realized during 1950 -1965 were included in the interval 170 -670 kg/ha due to the mentioned causes.

### **Development of hops culture between 1970 and 1990**

Between 1970 – 1976 a big volume of investments is done based on the program for developing brewery industry in Romania, program elaborated by the Ministry of Agriculture and Food Industry, having as effect the apparition of *more then a thousand ha* of new plantations, with new sustaining system, in metal espalier, which allowed the introduction of mechanization on a large scale (*C. Rusu, 1978*). Based on this program were also developed systemic researches at this plant, within a **national program**, since 1972 (*Al. Salontai et alii 1983, 2002, L.S. Muntean 1993, 2008 etc.*). Presently the researches are included in the *frame of Hop and Medicinal Plants Crop Research Center (L.S. Muntean 1993, 2008 etc.)*.

New plantations were realized with productive imported breeds. Excepted for Saaz breed the other ones are imported. Northern Brewer, Huller Bitterer, Record and Brewers Gold gave good productions, with high content of bitter acids. During the period 1971 -1984 the surface with hops in Romania increased with around thousand hectares, as it can bee found out in the following data (*after C. Rusu, 1984*):

Year:	1971	1975	1977	1982	1984
Surface (ha)	746	907	1050	1566	1750
Production (kg/ha)	452	352	1160	1200	1225

In 1977 was made a salt regarding the average production on hectare, as a result of the introduction in the cultivating technology of the achievements of local and foreign scientific research.

The surface with hops in Romania increased until 1990, when it reached at 2620 ha, which from 2350 ha on fruit, with average productions on the country of 11.2 q/ha, some units obtaining productions of 15-20 q/ha. In 1990 Romania was one of the great hop cultivator countries, being placed on the 8 place in the world.

### **Hop culture in the period 1990-2015**

Unfortunately, after 1990, the surface cultivated with hops in Romania decreased gradually (table 1) (*Al. Salontai and colab. 2002, L.S. Muntean 2014*). The surface and the hops production in Romania up to 2014 is presented in table 2 (A.E. Mora, 2015).

Table 1

Dynamic of the surface and hops production in Romania (1960-2010)

year	Surfaces (ha)	Total cones production (t)	Production on ha :		Average content in alpha acids (%)
			Cones (t/ha)	Alpha acids (kg/ha)	
1960	536	225	0,5	15	3
1970	867	234	0,3	12	4
1980	1400	1470	1,1	68	6,5
1990	2350	2650	1,1	77	6,4
1995	1727	1657	1,0	70	6,5
2000	230	332	1,2	85	6,8
2010	240	300	1,2	85	6,8

Romania has areas with favorable pedo climatic conditions for hops, which assures high and qualitative productions. Hops patrimony in our country is an important source of income for the agricol commercial societies and internal source of assuring the vegetal material (hops dry cones, or concentrated liquid extract) for the beer industry. Romania has areas with favorable pedo climatic conditions for hops, which assures high and qualitative productions.

Table 2

Surface and production of hop in Romania (2014)  
(Association of Hop Producers from Romania, 2015)

	Surface (ha)				Cones production (t)				
	total	An I	An II	On pro-duction	An II	On pro-duction	total	t alfa	% alfa
1	2	3	4	5	6	7	8	9	10
<b>Jud.Mureş</b>									
SC Moragroind SRL	<b>131</b>	<b>0</b>	<b>17</b>	<b>115</b>	6.5	106.7	113.2	11.66	10.3
SC Hoptrade SRL	<b>55</b>	<b>0</b>	<b>4</b>	<b>51</b>	3.2	46.4	54.6	5.65	10.3
	<b>186</b>	<b>0</b>	<b>21</b>	<b>166</b>	<b>9.7</b>	<b>153.1</b>	<b>167.8</b>	<b>17.3</b>	<b>10.3</b>
From which:									
<i>SC Moragroind SRL</i>	-	-	-	-					
Magnum + Ardeal	46		9	37	4.5	40.7	45.2	5.42	12%
Merkur	21		3	18	1.5	18	19.5	2.34	12%
Brewers Gold	20			20	0	20	20	1.66	8.3%
Perle+Aroma	25		5	20	0.5	18	18.5	1.48	8%
HB	20			20	0	10	10	0.76	7.6%
	<b>132</b>	<b>0</b>	<b>17</b>	<b>115</b>	<b>6.5</b>	<b>106.7</b>	<b>113.2</b>	<b>11.66</b>	
<i>SC Hoptrade SRL</i>	-	-	-	-					
Brewers Gold	18			18		18	18	1.53	8.5%
Huller Bitterer	0			0		0	0	0	0%
Perle	5			5		0	5	0.39	7.8%
Magnum	24		4	20	3.2	22	25.2	3	12%
Merkur	8		0	8	0	6.4	6.4	0.7	11%
	<b>55</b>	<b>0</b>	<b>4</b>	<b>51</b>	<b>3.2</b>	<b>46.4</b>	<b>54.6</b>	<b>5.65</b>	
<b>Jud. Alba</b>									
<i>Horticola Aiud SRL</i>	-	-	-	-					
Brewers Gold	35			35			35	2.6	7.5%
HullerBitterer	5			5			4	0.28	7%
Magnum	3			3			3	0.36	12%
	<b>43</b>			<b>43</b>			<b>42</b>	<b>3.27</b>	

1	2	3	4	5	6	7	8	9	10
<b>Jud. Sibiu</b>									
<i>Agrosiro Serv Impex SRL</i>	-	-	-	-					
Brewers Gold	14			14			14	1.08	7.7%
Huller Bitterer	6			6			5.4	0.41	7.5%
	<b>20</b>			<b>20</b>			<b>19.4</b>	<b>1.48</b>	
<b>Total Romania</b>	<b>250</b>	<b>0</b>	<b>21</b>	<b>229</b>			<b>229.2</b>	<b>22</b>	<b>9.6</b>
On cultivars:	-	-	-	-					
Magnum + Ardeal	<b>73</b>	<b>0</b>	<b>13</b>	<b>57</b>			73.4	8.81	-
Merkur	<b>29</b>	<b>0</b>	<b>3</b>	<b>26</b>			25.9	3	
Brewers Gold	<b>87</b>	<b>0</b>	<b>0</b>	<b>87</b>	IH GC	IHGC kg α	87	6.89	
<i>Bitter total</i>	<b>189</b>	<b>0</b>	<b>16</b>	<b>170</b>	160	13.5	<b>186.3</b>	<b>18.7</b>	
Perle+Aroma	<b>30</b>	<b>0</b>	<b>5</b>	<b>25</b>			23.5	1.87	
HB	<b>31</b>	<b>0</b>	<b>0</b>	<b>31</b>			19.4	1.45	
<i>Aromatic total</i>	<b>61</b>	<b>0</b>	<b>5</b>	<b>56</b>	50	3.5	<b>42.9</b>	<b>3.32</b>	
<b>TOTAL</b>	<b>250</b>	<b>0</b>	<b>21</b>	<b>226</b>	<b>210</b>	<b>17</b>	<b>229.2</b>	<b>22.1</b>	

Hops patrimony in our country is an important source of income for the agricol commercial societies and internal source of assuring the vegetal material (hops dry cones, or concentrated liquid extract) for the beer industry. This patrimony is situated in a favorable pedo climatic area and sums up a high value of investments (metallic support, machines tools for the technological flux and buildings), offering good conditions to achieve the strategic goal proposed, to fully insure, from the internal production, the necessary quantity of dry cones for Romanian beer industry and eliminating this way the imports.

**Remaking the hops patrimony** and developing the culture of this plant in our country, must be made taking into account the present situation at hops farms, taking the imposed measures, differently from case to case. So, in all the situations it has to be accomplished: large plantations, so that they can be mechanized and the necessary equipment to process up to the finite product (dry cones packed or

processed as granules); planting autohtone and foreign cultivars recommended for our country, using rooted material, free of viruses; applying the cultivation technologies which allow the achievement of average productions of 1500 kg/ha. It is imposed the urgent replacement of the equipment, with new ones, performant, among which machines to control diseases and pests, and also drying installation of cones. It must be introduced the machines to cut (which replace the labour and reduce the time to execute the work), of harvest machine, modernizing the drying machines and changing (modernizing) the packing machine for dry hops. There are preferred special installations to mill the cones and transforming in granules, packed in vide recipients (which assures the maintains the quality for three years), and for hops with inferior quality the transformation in concentrated liquid extract (with storage for 1-2 years), both products assuring a more dosage and low specific consumption (beer preferred products and large in the mondial commerce with hops).

**In 2005 was made a national plan to restart of hops culture** and barley in Romania, under the aegis of „Association of Hops Producers in Romania” (APHR), „Patronage of Independent Societies of Beer Producers in Romania” (PSIPBR) and „League of the Agricol Beer Producers Associations in Romania” (LAPAR) transmitted (on 11 February 2005) Ministry of Agriculture, Forests and Rural Development (*Ministry of Agriculture, 2005*).

The program contains, in annex 1, the surfaces proposed for planting during 2005-2010 (on production society), with flavor and bitter cultivars, the total productions (cones and alpha kg) estimated (flavor and bitter cultivars) and estimated costs. In annex 2 it is estimated the necessary of hops of the association affiliated PSIPBR (on units, hops and alpha, in tones). Annex 3 includes the proposals to support hops culture: an explicite nomination of hops in all the documents specific to agricol cultures, the evaluation of the required necessary to restart hops culture. In annex 4 there are presented bitter and flavored cultivars, estimated to be cultivated in Romania (*Ministry of Agriculture, 2005*).

Among the proposals to support the rebuilding of hops plantations in Romania (registered in annex 3 in the program), we

remind here: subsidies on the product, on fuel, for cuttings, eliminating the custom taxes at the hops cuttings import, subsidies to replant the surfaces with present support system with superalfa and flavored cultivars, support to unite the fields under the hops support system, co interest from the beer factories if they use hops produced in Romania.

In the national program regarding the replantation of hops culture there are estimated the following measurements (*Ministry of Agriculture, 2005, L.S. Muntean, 2009*):

- Assuring by the societies which cultivate qualitative hops at UE standards, by cultivating the cultivars (flavored and bitter) mentioned in annex 4 at the program (table 2) and the appliance of technologies which assure qualitative parameters.
- Accomplishing the necessary quantity of hops needed by the societies members PSIPBR, by achieving the planting program mentioned in annex 1 at the program (table 2) by the societies which cultivate hops.
- Processing the hops cones with the help of modern technologies (SAPARD project), at S.C. MORAGROIND SRL.
- Finalizing the privatization process of hops farms (with the help of MAPDR): clarifying the juridic regime of the hops farms;
- Co interest of the land owners to unite these fields within the existent farms.
- Applying the law regarding the hops, by organizing the Consultative Council for hops (through MAPDR, APHR, PSIPBR).
- Developing the internal market for hops, with annual internal hops collecting (with 6,8 % alpha acids) in the UE quality conditions, with annual contracts and perspectives ones (through PSIPBR, APHR).
- Improving the Finance Code for the societies in the beer industry and those who take action in the program, with: using a percent of paid accizele by the beer factories and by the hops farms and the introduction of hops on the list of subsidiary products (by MAPDR and Ministry of Public Finance).
- Assuring the necessary funds for hops cuttings import necessary for the cultivating hops societies (through MAPDR). Assuring the necessary funds for research, in order to certify hops cultivars; evaluation of the technological features of different hops cultivars and

determining the bitter substances content on the technological flux ro produce beer (MAPDR, USAMV Cluj-Napoca, Institute for Alimentary Research, University of Galați). We mention that the research in the filed of hops culture will be finalized within The Research Center Hops and Medicinal Plants Culture from The University Of Agricultural Sciences and Veterinary Medicine Cluj-Napoca.

### References

1. Abraham, P., Ursu, I., 1957, **Cultura hameiului**, EAS, București
2. Bălan, St., Mihăilescu, St.N, 1985, **Istoria științei și tehnicii în România** – date cronologice, Ed. Academiei, București
3. Bărbulescu Maria, 2001, **Viața rurală în Dobrogea romană** Muzeul de Istorie Națională și Arheologie, Constanța, p. 204 etc.
4. Berzescu P. și colab., 1981, **Tehnologia berii și malțului**, Ed. Ceres București
5. Borzea I, Ursu I, 1975, *Lucrările primului Simpozion Cultura Hameiului*, România, p. 7-13
6. Camentir D, 1716, **Descriptio Moldaviae** (Descrierea Moldovei, Ed. Minerva, 1981).
7. Ceapoiu, N., Potlog, A.S, 1960, **Ameliorarea plantelor agricole**, vol. I, EAS, București
8. Cernea Sanda, Salontai, Al., Muntean, L.S., 1967-1968, *Lucrări științifice* Inst. Agr. Cluj, seria Agricultură, vol. 23-24, p. 233-245
9. Chirițescu-Arva, M., 1927, **Academia de Agricultură, l'Academie d'Agriculture** Cluj, Roumanie, Tipografia "Cartea Românească", SA Cluj
10. Ionescu I. de la Brad, 1865 ȘI 1870, în **Opere agricole**, vol. I, de A. Vasiliu și colab. 1968, Ed. Academiei, București
11. Ioanid Al.,1993, *Lucrările celui de-al VII-lea Simpozion Cultura hameiului în România*, p. 28-32
12. Iorga, N., 1927, **Istoria industriilor în România**, București
13. Jukovski, P.M., 1953, **Botanica**, Ed. de Stat, București
14. Linke V., Rebl A., 1958, **La culture de houblon**, DUNOD, Paris
15. Kohlman, H., Kastner, A., 1975, **Der Hopfen** verlag Wolnzach, Germania

16. Maior, G., 1898, **Manual de agricultură rațională**, *Fitotehnia sau cult. speciale a plantelor*, București-Brașov.
17. Mora, A.E., 2015. Surface and hop production in Romania (2014), Association of Hop Producers in Romania.
18. Muntean, L.S., 1990, **Plante medicinale și aromatice cultivate în România**, Ed. Dacia.
19. Muntean, L.S., 1993, **Fitotehnie**, vol. II, Tipo Agronomia Cluj-Napoca
20. Muntean, L.S., 1993, *Hameiul și plantele medicinale*, an I, nr. 1, p. 8-15
21. Muntean, L.S., 1993, *Hameiul și plantele medicinale*, an I, nr. 2, p. 9-20
22. Muntean, L.S., 1995, *Hameiul în Fitotehnie* (L.S. Muntean și colab.), Editura Didactică și Pedagogică, București.
23. Muntean, L.S., 1996, *Hameiul și plantele medicinale*, an IV, nr. 1-2(7-8), p. 9-18
24. Muntean, L.S., 1999, *Hameiul și plantele medicinale*, an VII, nr. 1-2(13-14), p. 9-16
25. Muntean, L.S., 2000, *Buletinul USAMV Cluj-N.*, Vol. 54, seria Agricultură, p. 5-10
26. Muntean, L.S., 2000, *Hameiul și plantele medicinale*, an VIII, nr. 1-2 (15-16), p. 5-17
27. Muntean, L.S., 2001, *Buletinul USAMV Cluj Napoca*, Vol. 55-56, seria Agricultură, p. 207
28. Muntean, L.S., 2001, *Hameiul și plantele medicinale*, an IX, nr. 1-2 (17-18), p. 5-17
29. Muntean L.S., 2002, *Hameiul și plantele medicinale*, an X, nr. 1-2 (19-20), p. 13-34
30. Muntean, L.S., 2001 și 2003, *Hameiul în Fitotehnie* (L.S. Muntean și colab.), Editura "Ion Ionescu de la Brad", Iași.
31. Muntean, L.S. , L. Muntean, S. Muntean, 2003., **Mic tratat de Fitotehnie**, vol. 3, Ed. Risoprint, Cluj-Napoca
32. Muntean, L.S., Cernea, S., Ghizdavu, I., Florian, V., Mihaiu, I., Duda, MM, 2004, **Cultura hameiului**, Ed. Gee, București.
33. Muntean, L.S., 2005, *Hameiul și plantele medicinale*, an XIII, vol. 1-2 (25-26), p.11-30

34. Muntean, L.S., 2008, *Hameiul și plantele medicinale*, an XVI, vol. 1-2 (31-32), p.56-60
35. Muntean, L.S., Tămaș M., Muntean S., Muntean R., Duda M., Vârban D., Florean S., 2007, **Tratat de plante medicinale cultivate și spontane**, Ed. Risoprint Cluj-Napoca
36. Muntean, L.S., 2009, Situation of Hop Culture in Romania, Hop and Medicinal Plants, year XVII, no. 1-2, p. 7-9
37. Muntean, L.S., 2008, *Hameiul în Fitotehnie* (L.S. Muntean și colab.), Ed. Academic Pres Cluj-Napoca
38. Pascu, ST., și colab., 1974, **Istoria Clujului**, I.P. Cluj
39. Popovici, M., Cipăianu, G., 1912, **Manual de agricultură**, București
40. Prodan, P., 1968, **Iobăgia în Transilvania în secolul al XVI**, vol. II, Ed. Acad., București
41. Rusu, C., 1978, *Lucrările celui de-al II-lea Simpozion Cultura Hameiului în România*, p. 7-11
42. Rusu, C., 1984, *Lucrările celui de-al IV-lea Simpozion Cultura Hameiului în România*, p. 9-15
43. Rybacek, V. și colab., 1980, **Chmelasrtvi**, Praha
44. Salontai, Al., Cernea Sanda, Muntean, L.S., 1969, *Lucrări științifice* Inst. Agr. Cluj, seria Agricultură, vol. XXV, p. 159-162
45. Salontai, Al., Muntean, L.S., 1973, *Probleme agricole*, nr. 6, p. 34-40
46. Salontai, Al., Bobeș, I., Perju, T., 1983, **Cultura hameiului**, Ed. Ceres, București
47. Salontai, Al., 1987, *Lucrările celui de-al V-lea Simpozion Cultura Hameiului în România*, Tipo. Agronomia, p. 13-20
48. Salontai, Al., Muntean, L.S., 1987, *Lucrările celui de-al V-lea Simpozion Cultura Hameiului în România*, Tipo. Agronomia, p. 27-34.
49. Salontai, Al., Muntean, L.S., 1990, *Lucrările celui de-al VI-lea Simpozion Cultura Hameiului în România*, Tipo. Agronomia, p. 9-16.
50. Salontai, Al., 1999, *Hameiul și plantele medicinale*, an VII, nr. 1-2(13-14), p. 17-28
51. Salontai, Al., Muste S., Tofană M., Puia C., Bunescu H., 2002, **Hameiul**, Ed. Risoprint, Cluj-Napoca.

52. Suceveanu, Al., 1998, **Fântânele** - contribuții la studiul vieții rurale în Dobrogea romană, Ed. Academiei Române, București, p. 73 etc
53. Șerban, M., 1938, **Dare de seamă**, 1918-1939, Academia de Înalte Studii Agronomice Cluj.
54. Unțanu Veronica, 1980, Teză de doctorat, Institut. Agronomic Cluj-Napoca.
55. Velican, V., 1965, *Hameiul în Fitotehnie*, vol. II, EAS, București
56. Vent, L. și colab., 1963, **Chmelarstvi**, Praha
57. xxx Decizia Rectorului USA Cluj-Napoca, nr.84, din 24.03.1994
58. x x x *Anuarul statistic al României, 1980-2008.*
59. x x x *Production Yearbook, FAO Roma, vol.62, 2008.*
60. x x x *National plan to restart the hop culture in Romania, under the aegis of Asociation of Hop Producers in Romania (APHR), Paronage of Independent Societies Associations in Romania (PSIBR) and League of the Agricol Beer Producers Associations in Romania (LAPAR), (Ministry of Agriculture, 2005).*