RESEARCH CONCERNING VEGETATIVE MULTIPLICATION AT *CACTUS* GENERA

CERCETĂRI PRIVIND ÎNMULȚIREA VEGETATIVĂ LA GENURI ALE FAMILIEI *CACTACEAE*

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Abstract. *Cacti inhabit diverse regions, from coastal plains to high mountain areas. Cacti have a variety of uses: some species are used as ornamental plants, others are grown for fodder or forage, others for food (particularly their fruit). The studies and researches conducted in this work has tried to highlight the technological and environmental factors influence the rooting of cuttings Cactaceae genera: Opuntia, Mamillaria, Cereus taking into account their length, the substrate used in planting and processing with different rizogene products containing substances to stimulate root cuttings. Throughout the research were aimed to ensure the optimum environmental factors that influenced rooting cuttings. In period 2010-2012 were made numerous observations and measurements necessary to characterize the biological material used for interpreting the results of rooting cuttings, on 30 plants from each variety. The study found that the results best results were obtained for short cuttings using perlite + sand and sand substrate, making root of 17 cuttings from 30. Average was calculated for the statistical analyze using LSD test.*
Key words: rooting, cuttings, genus, substrate, diversification

Rezumat. *Cactuşii trăiesc în diverse regiuni, de la câmpiile de coastă până în zonele înalte. Cactuşii au multiple utilizări: unele specii sunt utilizate ca plante ornamentale, altele sunt cultivate pentru furaje iar altele pentru produsele alimentare (în special fructele lor). Prin studiile şi cercetarile efectuate în cadrul experienței s-a incercat să se evidențieze influenta factorilor tehnologici şi de mediu asupra înrădăcinarii butaşilor de cactacee din genurile: Opuntia, Mamillaria, Cereus, luând în considerare lungimea acestora, substratul folosit la plantare şi tratarea cu diferite substanțe rizogene în vederea stimulării inrădăcinării butaşilor. Pe parcursul cercetarilor s-a urmărit asigurarea la valori optime a factorilor de mediu care au influențat înrădăcinarea butaşilor. S-au făcut o serie de observații şi determinări necesare pentru caracterizarea materialului biologic folosit şi pentru interpretarea rezultatelor privind inrădăcinarea butaşilor, în perioada 2010-2012, pe 30 de butaşi din fiecare variantă. În urma studiului s-a constatat că rezultatele cele mai bune s-au obținut în cazul folosirii butaşilor scurți în substrat de perlit+nisip şi nisip, înrădăcinând în medie 17 butaşi din 30. Mediile au fost utilizate pentru interpretarea statistică, folosind testul DL.*
Cuvinte cheie: înrădăcinare, butaşi, genuri, substrat, diversificare

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INTRODUCTION

Cactus is a member of the family *Cactaceae*. *Cactaceae* are original plant on the American continent, occupying a vast phytogeographic area.

Cacti first came from North America or South America. Cristopher Columbus brought the first cactus to Europe (Copaceascu, 2001).

Scientist and gardeners became very interested in cactus. From the start of the 20th century interest in cactus has grown. Every year, scientists discover new kinds of cactus. A bad effect of this bigger interest has been the digging up of many cacti from the wild, making some kinds endangered. Family *Cactaceae* contains more than 200 genera (Toma, 2009). Some of them are very common: *Cereus, Echinocactus, Mammillaria, Opuntia, Schlumbergera* etc.

There are some 1.500–1.800 species of cacti, most of which fall into one of two groups of "opuntias" (subfamily *Opuntioideae*) and "cactoids" (subfamily *Cactoideae*) (http://ro.wikipedia.org/wiki/Cactus).

There are many shapes and sizes of cacti. Some are short and round; others are tall and thin. Many cactus flowers are big and beautiful. Some cactus flowers bloom at night and are pollinated by month and bats. Some cactus fruits are brightly coloured and good to eat (Draghia and Chelariu, 2011). Cacti are commonly grown as houseplants. They are pretty and easy to grow. Some cacti are grown in gardens, especially in dry areas (Cantor and Pop, 2008). Cactus can be used as a living fence. The wood of dead cactus is sometimes used for building. People eat the fruit of some kinds of cactus.

MATERIAL AND METHOD

The researches where made on the didactical collection in greenhouse of Floriculture Department of UASVM Cluj-Napoca in the period of 2010 – 2011.

The objectives of the experiment were to establish the best method for vegetative multiplication (rooting substrate, length of cuttings etc) of cactus and in order to extend the culture of some genus.

Biological materials were represented by three species*: Cereus* sp., *Mammillaria* sp. and *Opuntia* sp.

***Cereus* sp.** - is a cacti with very elongated bodies, including columnar growth (fig.1).

***Mammillaria* sp.** - the plants are usually small, globose to elongated, the stems from 1 cm to 20 cm in diameter and from 1 cm to 40 cm tall (fig.2).

***Opuntia* sp.** – is a globular plant or having cylindrical form, rather than flattened, stem segments with the large barbed spines. The most commonly culinary species is the *O. ficus-indica* (fig.3).

Data were synthesized by LSD test analysis to illustrate the differences between these varieties (Ardelean et al., 2007).

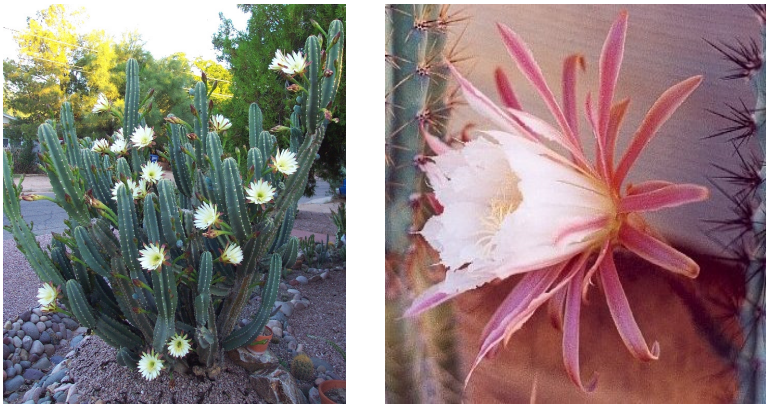

Fig. 1 - *Cereus* sp. plants and flower

Fig. 3 - Plants and flower of *Mammillaria sp.*

Fig. 3 - *Opuntia* sp. buds, flowers and fruits

RESULTS AND DISCUSSIONS

The results obtained in the experiment were presented in the next tables.

Table 1

The influence of cuttings length and culture substrate on cacti genera

No. crt.	Genera	Length of cuttings	Culture substrate	No. cuttings	Rooted cuttings
1	*CEREUS* sp.	Long	peat+sand	30	11
2			perlite+sand	30	13
3			sand	30	12
4		Short	peat+sand	30	19
5			perlite+sand	30	21
6			sand	30	20
7		Medium	peat+sand	30	13
8			perlite+sand	30	15
9			sand	30	14
10	*OPUNTIA* sp.	Long	peat+sand	30	15
11			perlite+sand	30	17
12			sand	30	16
13		Short	peat+sand	30	20
14			perlite+sand	30	21
15			sand	30	19
16		Medium	peat+sand	30	18
17			perlite+sand	30	20
18			sand	30	19
19	*MAMILLARIA* sp.	Long	peat+sand	30	11
20			perlite+sand	30	16
21			sand	30	14
22		Short	peat+sand	30	18
23			perlite+sand	30	20
24			sand	30	19
25		Medium	peat+sand	30	13
26			perlite+sand	30	15
27			sand	30	14
	Average			30	17

The analysis of the table 1 shows that in terms of rooting was founded to have rooting cuttings in an average of 17 cuttings of 30 for cacti genera, and variability is between 11 *Cereus* sp. - V_1, *Mamillaria* sp. - V_{19}) and 21 (*Opuntia* sp. - V_{14}).

Analyzing the influence of length of cuttings and substrate, the data from table 2, shows that short cutting present significant difference of 5.8 cm comparing with the control (long cuttings). If the data are compared with the average of experiment, result that short variant archive positive difference of 3.3 cm, but is not assured statistically.

Table 2

Influence of length of cuttings of rooting capacity

Variants	Absolute Number	Relative %	± d	Significant difference	Relative %	± d	Significant difference
Long (Control)	13,9	100	-	-	84,8	-2,5	-
Short	19,7	141,7	5,8	*	120,2	+3,3	-
Medium	15,7	112,9	1,8	-	95,7	-0,7	-
Average of experiment (Control)	16,4	-	-	-	100,0	-	-

LSD 5% = 5.6 LSD 1% = 9.2 LSD 0.1% = 17.3

In the table 3 are presented the data concerning the influence of rooting substrate of cacti genera.

Statistical interpretation shows that distinct significant differences are registered in case of perlite+sand (2.2 cm), comparing with the control of experiences (peat+sand). The substrate consist in sand achieve significant differences.

When the data are compared with the average of experiences, can conclude that distinct significant difference are registered only in case of perlite+sand (1.1 cm). The other substrates achieved negative differences.

Table 3

Influence of culture substrate of rooting capacity

Variants	Absolute Number	Relative %	± d	Significant difference	Relative %	± d	Significant difference
Peat+sand (Control)	15,3	100	-	-	93,3	-1,1	-
Perlite+sand	17,5	114,4	2,2	**	106,7	+1,1	**
Sand	16,3	106,6	1	*	99,4	-0,1	-
Average of experiment (Control)	16,4	-	-	-	100,0	-	-

LSD 5% = 0.36 LSD 1% = 0.6 LSD 0.1% = 1.1

CONCLUSIONS

1. Using perlite + sand mixture as rooting substrate caused an increase of 10% of the total number of rooted cuttings compared with control, sand substrate.

2. Use small cuttings (short) increase the number of rooted cuttings.

3. To obtain biological material for multiplication having quality and good percentage of rooting, the use of small cuttings and the rooting substrate, perlite + sand or sand are recommended.

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