TECHNOLOGICAL ASPECTS CONCERNING PRODUCTION ON ASEXUAL TRACK OF ORNAMENTAL CULTURE OF ALOE ARBORESCENS

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Abstract
Research conducted in culture of Aloe arborescens Mill., in conditions of protected area (greenhouse), had to watch some of technological aspects to obtain some in pot ornamentals plants, competitive plants for european market. Experience has included plants of Aloe arborescens Mill., aged 1-5 years, obtained by vegetative multiplying, asexual. Production technology was applied to aloe plants (multiplying, transplanting, maintenance), taking into account the ecological requirements of specie and possibilities of using automated artificial factors influencing microclimate (shading, ventilation, cooling) of production space. Researches has established technological aspects concerning production of plants, to satisfy requirements of specie, for obtained some specimens by superior decorative quality. The results of experienced technology indicate quality of morphological characters, growth increases important of decorative elements (height, leaves, shoots), appearance of flowering at plants aged two years. Culture of Aloe arborescens Mill. in pot, can be practiced all year, just in conditions of protected areas. This culture, realized in the purpose for obtain decorative plants, is a valuable activity of horticulture.

Keywords: aloe, vegetative multiplication, technology, greenhouse

1. INTRODUCTION

Aloe is known in antiquity by the Egyptians (since 4000 b.C.), Sumerians (2100 b.C.), Chinese, Japanese, Indians, Romanians, etc. (Mutulescu, 2010). This is mentioned along with other plants in the Orthodox Bible, being used during of rituals (St. John's Gospel, chapter 19). Aloe spp. comprises about 300 species, originating from the African continent. Apparently, *Aloe arborescens* Mill. is the most cultivated species of aloe in the world, being used for decorative purposes, due the aspect to the beautiful tree. Scientific research has demonstrated the medical and cosmetic effects of this species. (Bakuridze et al., 2009). This species has 50-100 cm high, vigorous stalk, leaves lanceolate, blue-green, with thorns on edge and flowers grouped in red-orange inflorescences (Selaru, 2000). Between 1700-1800, in England appeared greenhouses with succulent plants, different species, including aloe. In our country, *Aloe arborescens* Mill. is known as a perennial ornamental plant, cultivated in inside conditions, in pot and for production of leaves cultivata in the medical purposes. Cultivation of *Aloe arborescens* Mill. species in pot as an ornamental plant for sale, is a floricultural activity, relatively simple; the multiplication is realized easily on vegetative, asexual track, in all the months in optimal environmental conditions (greenhouse). This culture is different from that made for medical purposes, are used chemical fertilizers, pesticides to obtain decorative plants.

2. MATERIAL AND METHOD

The researches were performed in the Laboratory of protected cultures from ICDIMPH-Horting Bucharest, during 2009-2012 period, in a specialized greenhouse in producing seedlings, cuttings and plants in pots. This greenhouse have usable area of 1450 m^2, 4,5 m high, is covered with polyethylene anticondensation double foil, with layer of insulating air under pressure, equipped with automatic control systems of microclimate (shading, ventilation, cooling). The maintenance works were carried out mechanically. The biological material was represented by *Aloe arborescens* plants with aged between 1 and 5 years.

The vegetative multiplication has been achieved as follows:
- by cuttings - vigorous fragments of stalk, with healthy tissue, are cut below the node, its were placed to rooted in pots (6/6 cm) filled with peat and heavily watered with a fungicidal solution (0.1%). The cutting was realized on the biological material - plants with aged 1-5 years;
- by division (separation) of the mother plant in several fragments; new plant has stalk, leaves and roots. This work was done with a disinfected knife. Multiplication of plants by division was made on specimens older than 3 years.

After achievement to cuttings and division, new plants were placed in heat (20-22^{0}C) and high humidity (R.U.= 98%). The sunlight on plants and the stagnation of water in pots were avoided. The transplantation of plants was performed as 1 year, at which time the root included the entire space of development (figure 1), in appropriate pots; in a peat substrate, enrichment with macro and microelements.

Figure 1. Aloe arborescens plants prepared for transplantation

Between autumn-winter (October-February), the plants were passed through a semirepaus period, at a temperature of 8-10^{0}C and 1-2 irrigation/month without fertilization. The fertigation was applied in March-September, with a frequency of 1-2 applications/month, depending age of the plants:

- 0-1 years - one fertilization/30 days with a nutritive solution 0.1%;
- 1-2 years - one fertilization/15 days with a nutritive solution 0.1%;
- 2-5 years - one fertilization/15 days with a nutritive solution 0.15%.

It was used complex chemical fertilizer ($N_{19}P_{19}K_{19}$ + ME), soluble in water. The organization of experience is shown in table 1.

Table 1. Mode of maintenance and multiplication of decorative culture of Aloe arborescens, in conditions of greenhouse

Version	Age of aloe plant (years)	Fertigation (March-September) frequency (applications/days)	concentration (%)	Method of vegetative multiplication
V_1	0-1	1/30	0.1	cuttings
V_2	1-2	1/15	0.1	cuttings
V_3	2-5	1/15	0.15	cuttings, division

3. RESULTS AND DISCUSSIONS

All the plants formed rooted. Production technology (multiplication, transplanting, maintenance) of the *Aloe arborescens* species in pot, sold as an ornamental plant led to obtaining specimens, with quality morphological characters (table 2). Analyzing the results in table 2, we see an important increase of decorative elements (height, number of leaves and shoots, inflorescence emergence) directly proportional to plant age:
- plant height recorded a important growth between 1-2 years of life (17 cm), between 2-5 years aloe develops more in diameter, taking the aspect of bush and less in height (3 cm);
- number of main shoots ranged from 1 shoot/plant (V1, V2) to 3 shoots/plant (V3) and number of

secondary shoots/plant increased from V1 (1 shoot) to V2 (3 shoots) and V3 (20 shoots) - figures 2, 3, 4;

Table 2. Qualitative results of Aloe arborescens plants under the influence of experienced technology

Version	Morphological characters (mean values)				
	height (cm)	shoots M^1+S^2	leafs (no.)	inflorescences (no.)	aspect
V_1	18	1+0	12	-	tree
V_2	35	1+3	22	0,5	tree
V_3	38	3+20	50	-	bush

[1]M – main shoots; [2] S – secondary shoots

Figure 2. Aloe – V_1

Figure 3. Aloe – V_2

Figure 4. Aloe – V_3

- average number of leaves/plant increased from a variant to another V1 (12), V2 (22), V3 (50), arranged in compact shoots;
- inflorescence (figures 5, 6) was formed at plants older than 2 years, on the main shoot;

Figure 5. Inflorescence (bud) - V_2

Figure 5. Inflorescence - V_2

- the plants aspect investigated has changed: V1, V2 - the characteristic aspect of little tree, V3 - bush aspect.

4. CONCLUSIONS

The production technology of *Aloe arborescens* plants in a modern space (greenhouse) led to obtaining a 100% percent of plants rooting. In conditions of greenhouse, the transplanting of plants was realized annually, in all seasons. At 1-2 years of life, the plants look like a small tree. From the third year of culture, the plants made a aspect like a bush, with approximately 3 main shoots. Flowering appeared at plants older than 2 years. Plants appearance, shape, color of leaves and inflorescences - were characteristic *Aloe arborescens* species (tree, bush). The maintenance works were carried out at the optimum time, resulting a positive evolution of the decorative elements - important increases of plant height, number of shoots and compact leaves from one year to another. Production technology of *Aloe arborescens* plants, feature succulent plants group, had an optimal influence on the investigated plants. This technology allows obtaining of *Aloe arborescens* plants with characteristics that fit into the marketing standards in EU markets in all months of the year for different ages. *Aloe arborescens* plants obtained in a decorative culture for commercial purposes can not be used for medical remedies, cosmetics, etc.

5. REFERENCES

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