

## **LOPHANTHUS ANISATUS, A MULTI – PURPOSE PLANT, ACCLIMATIZED AND IMPROVED AT VRDS BUZAU**

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### **Abstract**

*VRDS (Vegetable Research and Development Station) Buzau has tradition for acclimatization of new vegetable species, there being obtained new varieties of Momordica charantia, Cucumis metuliferus, Cichorium crispum, Cichorium latifolium, Momordica conchinchinensis, etc. Biodiversity conservation and crop extention for the new species through acclimatization and breeding have become a major necessity nowadays. The aim of this study was to give special attention to the acclimatization of a new species, e.g. Lophanthus anisatus. It is a native to Asia, is spread in almost all world crops, known by other names (Agastache foeniculum, Lophanthus agastache) and its food, medicinal and melliferous properties are widely recognized by scientists but, however, until now there has not been cultivated in Romania. The research started in 2010 with the documentation and purchase of the basic genetic material (seeds, seedlings). After completing these steps, in 2012 were cultivated the first purchased genotypes. After the first year of study in the crop was observed that there were no major phenotypic differences between cultivars. Genotype L3, from Bulgaria, demonstrated higher uniformity in terms of the main characters expressiveness and high adaptability to environmental conditions. In descending, 2013-2014 was cultivated and studied only this genotype, to avoid contamination by pollination with other cultivars. The results are positive, the species has adapted very well, can be grown successfully in Romania. Research will continue for genetic stabilization and marked characteristics for distinctibility in order to approval and registration at SIVTR (State Institute for Variety Testing and Registration).*

**Key words:** adaptability, biodiversity, genotype, melliferous, medicinal.

### **INTRODUCTION**

*Lophanthus anisatus* study was taken from VRDS Buzau in 2010. In the world is known under several names (*Agastache Foeniculum*, *Lophanthus Agastache*) or lofant popular.

“*Agastache* is a small genus of *Lamiaceae*, comprising 22 species of perennial aromatic medicinal herbs. In this article, we review recent advances in phytochemical, pharmacological, biotechnological and molecular research on *Agastache*.” (Zielinska, 2014) This is a multi-purpose plant, in the world it is known as a medicinal plant, aromatic, spicy, and even ornamental and melliferous.

“This species is a candidate for large scale, domestic cultivation as a source of nectar for honey bees and as aromatic plant with wide

variation in the composition and content of its essential oils.” (Fuentes Granados, 1995)

Because of its genetic capacity to adapt to environmental conditions, is cultivated and known worldwide.

“The genus has gained importance in America, Asia, and Europe as a component of tea mixtures and as a flavouring in confections.” (Fuentes Granados, 1997)

The main objectives of the Laboratory of Genetics Breeding and Biodiversity Conservation from VRDS Buzau are getting new biological creations, competitive, as required by growers and consumers; rehabilitation of neglected plants in culture; acclimatization of new species and promote their culture.

The research undertaken in this species is within the target three priority of the research laboratory.

## MATERIALS AND METHODS

The research for this species has been carried out according to an established plan, covering four main stages. The first phase focused on documentation and studies and to obtain basic biological material or seeds from reliable sources and distant geographical areas. The seeds used were from America, Asia and Europe.

In the second stage we worked to acclimate the species in the climatic conditions of our country. In this stage were detained genotypes that have shown adaptability and genetic uniformity descent and those who have demonstrated higher sensitivity and variability of the characters have been removed from the breeding program. Genotypes have passed acclimatization entered the third stage of work aimed at improving the species in order to obtain varieties of genetically stabilized according to international norms.

In the fourth stage has developed specific technology for acclimatization and improved genotypes.

## RESULTS AND DISCUSSIONS

Following evaluation, the process of acclimatization acquired genetic material found to L3 coming from Bulgaria best adapted to the climatic conditions of our country and also showed uniformity and genetics. The other origins were removed from the acclimatization process, because this species is entomofila very much preferred by insects, especially bees, contamination risk and prolongation of acclimatization and improvement.

After this genotype has successfully passed acclimatization phase, has undergone extensive improvement works in order to obtain a new variety.

In the process of improvement to follow the main character restriction variability and meeting international standards distinctibility, uniformity and stability (DUS).

Genotype L3 obtained the best results and improvement works ended with getting a new variety and the main features of genotype L3 (table1)

Table 1. The main features of L3 genotype

Studied feature	Variability limit	Average value
Plant height	87-105	90 cm
Shrub diameter	47-55	51 cm
Main shoot no.	10-16	13 buc
Secondary shoot no.	29-38	34 buc
large inflorescences no.	17-24	22 buc
Small inflorescence no.	22-30	26 buc
Inflorescence large	15-21	18 cm
lenght medium	9-15	12 cm
small	4-6	5 cm
Leaf stalk lenght	1.5-2.5	2 cm
Sesil leaf lenght	5-7	6 cm
Leaf diameter	3-4	3.5 cm
Large leaves no./main shoot	11-17	14 buc
Small leaves no./main shoot	35-41	38 buc
Stem lenght	3-5	4 cm
Stem diameter at the basis	13-17	15 mm
Shoots diameter	2.5-3	2.8 mm
Inflorescence diameter	2-2.4	2.2 cm
Floral floors no. large	14-18	16 buc
Medium	10-14	12 buc
small	5-7	6 buc
Flower diameter	1.8-2.2	2 mm
Seed diameter	0.8-1	0.9 mm
Seed lenght	1.4-1.6	1.5 mm
Total weight of the green inflorescence	3.7-4.1	3.9 g
Total weight of dry inflorescence	0.9-1.2	1.1 g



Figure 1. Crop detail

Leaf sections have edges, sharp tip, slightly porous surface, similar to the *Urtica dioica*. (figure 1 and 2)



Figure 2. Leaves detail

Stems and shoots are grooved with square cross-section (figure 3)



Figure 3. Shoots detail

Nr. stamens in flower- 4 including two long and two short.

The blooming period is very long and is made in instalments from June until the coming of frost and plant specialists is ranked among the top bee plants in the world. Potential production per unit area is very high, of over 600 kg/honey per hectare. (figure 4).



Figure 4. Flower details

After completing the program of improvement, research has been channelled to developing specific technology culture. After research it was found that the species shows great flexibility in terms of culture technology but the best results were obtained from the culture seedling establishment.

It was found that a plant that is highly resistant to cold, frost resistant up to its limits and during periods of heat stress (cold) leaves change colour in green-purple due to anthocyanin pigments accumulation. (figure 5). The best time for sowing seedlings is after February 20, it is recommended furrow sowing in hard or peat pots or directly in alveolar blades. If the bed is sown, it should work in palaces alveolar subculturing or pots and if is sown directly in pots palaces is recommended to rare the seedlings, leaving one plant in the alveola. Sowing is recommended close to the surface very carefully because the seeds are very small, less than 0.5 mm deep. Sunrise is

done in 10-15 days, if factors are insured optimum vegetation.

Planting seedling stage reached after 60 days of emergence (figure 6).



Figure 5. Termic stress, low temperatures



Figure 6. Seedlings details

The establishment of culture are taken into account several factors: the irrigation system used system used for maintenance vehicles that culture and space needed nutrition and development. It was found that the species supports several options for setting up culture technology but the best option checked in the research undertaken (figure 7 and 8) with 70 cm between rows and 30-35 cm between plants / row.

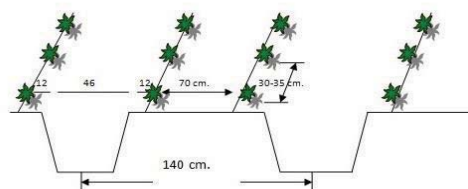


Figure 7. Open field planting method-shaped soil

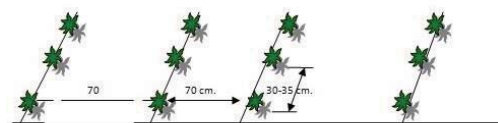


Figure 8. Open field planting method on plan soil

Establishment of culture can be done in a long time, depending on climatic conditions, starting April 15 and ending in late May.

It was found that culture are growing very well in the second and even third year. It can be said

that it behaves as a perennial in our country conditions (figure 9).

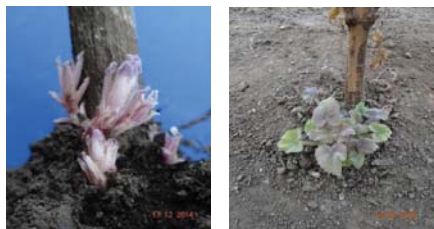


Figure 9. Crop in the second year

Care works are common to all specific vegetable plant has outstanding technological requirements, no high demands from the ground, can be cultivated throughout the country, it is recommended to perform one or two mechanical hoeing and hand hoeing one or two depending on the physical condition of the land and its degree of weed.

Regarding water supply plant species fall into the group claims to moderate water. In the absence of rainfall is recommended to apply watering rules between 250-350 m<sup>3</sup> of water / ha. The absence of water leads to the maturation of the plant and forced induction phenomenon dwarfs.

Research undertaken so far have shown that diseases and pests do not cause significant damage this species was reported only damaging nematode but found that even in areas heavily infested with nematodes, plants have survived, not significantly diminished production (figure 10).



Figure 10. Nematodes attack

Seed maturation is made in stages, starting from the base to the summit blossom. A 2520 gram seed = seed. A 17.5 g plant seeds with a total of over 44 100 units. A well developed

and carefully harvested plant can produce one hectare of crop seed required.



Figure 11. Dry inflorescences

Harvesting can be done only once or in stages. If the plants are harvested once mature, production per hectare is 18-22 t vegetative mass but if harvesting is done in stages, by cutting the shoots and regenerating bush, production can increase significantly.

The variety can be grown successfully in the ecological system or to protect other crops that are exposed to rodents (mice, rabbits, deer, etc.) strong flavor nook at the touch of all vegetative parts of the plant creates rodent repellent, protecting crops successfully .

## CONCLUSIONS

The research was completed with success. The species can be grown successfully throughout Romania. In the process of breeding a new variety was obtained, which was signed at L3 SIVTR for approval, since 2015, as Aromat de Buzau. To develop specific culture technology has been a significant amount of seeds produced and performed by diffusion and culture.

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