

**PRELIMINARY STUDIES REGARDING THE PLANT'S
QUANTITATIVE FEATURES AS PREMISE FOR THE
UTILISATION OF A GENOTYPE OF *CHRYSANTHEMUM
CINERARIIFOLIUM* (TREVIR) VIS) SPECIE IN THE CONTROL
OF PESTS, THROUGH METHODS SPECIFIC FOR
ECOLOGIC AGRICULTURE**

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***Abstract:** At VRDS Bacau, the cultivation of *Chrysanthemum cinerariifolium* (Trevir) Vis) specie, started in 2005 year. The establishment of the crop was done utilising an autochthon biological material, a biotype with a large genetic variability. This perennial specie is known as a plant with multiple uses (can be decorative, in China is utilised also as medicinal, especially for vermifuge proprieties) but is recognised as a plant that plays an important role in biologic agriculture practice as a prime material for the extraction of pyrethrin, especially from flowers. In gardens, only the presence of this plant keeps away the insects from the plant from near-by thus being repellent. The plant can be dried and utilised latter because the dried plant conserve the insecticide and repellent proprieties of fresh plant. The study focuses on the possibility to adapt to the agro-pedologic conditions from the East of Moldavia as well as for cultivation in ecologic conditions. Due to the fact that one of the most important technological links in the cultivation of this specie is harvesting and drying of plants, the experimental variants are concentrated on the optimal moment for flower's harvest, the position of flower on plants (central or marginal). The quantitative study refers to the determination of fresh and dried flower weight per plant, determining also the ratio dried weight/fresh weight.*

***Rezumat:** La SCDL Bacău s-a început cultivarea speciei *Chrysanthemum cinerariifolium* (Trevir) Vis), din anul 2005. Înființarea culturii s-a făcut cu material genetic provenit din țară și este un biotip cu o mare variabilitate genetică. Aceasta specie perena este cunoscută ca o plantă cu utilizări multiple (poate fi decorativă, în China se folosește și ca medicinală, în special pentru proprietățile vermifuge), dar este recunoscută ca având un rol important în practicarea agriculturii ecologice, ca materie primă pentru extragerea piretrinei, din flori. În grădină, numai prezența acestei plante îndepărtează insectele de pe speciile din apropiere, fiind repelentă. Planta poate fi uscată și utilizată mai târziu, deoarece își păstrează proprietățile insecticide și repelente. Studiile întreprinse se referă la adaptabilitatea la condițiile agro-pedologice ale zonei de Est a Moldovei și a cultivării în condiții ecologice. Deoarece una din cele mai importante verigi tehnologice în cultivarea acestei specii este recoltarea și uscarea florilor, variantelor experimentale se referă la momentul de recoltare al florilor, numărul de recoltări, poziția florilor pe plantă (centrale sau marginale). Cantitativ, s-au determinat greutatea masei de flori proaspete și uscate pe plantă, determinând și raportul de masă uscată/masă proaspătă.*

Key words; biotype, the control of pests, ecologic, quantitative study

The specie *Chrysanthemum cinerariifolium* (Trevir) Vis), is a perenial plant, known as a plant with multiple uses (can be decorative, in China is used also a medicinal especially for its vermifuge properties) but also is recognized for the important role that is played in ecologic agriculture as a prime material for the extraction of piretrine (natural insecticide) from flowers. In the gardens only the presence of this plant keeps the insects away, being repellent. The plant can be dried and utilized lately because it maintains its repellent and insecticide properties.

The utilization of some natural extracts from plants represents a method that is allowed by the law, and a natural piretrine is one of the most efficient and required product utilized for the control of a large spectrum of damaging insects.

At VRDS Bacau the experimentation was focused toward the study of a genotype of *Crysanthemum cynerariifolium* (Trevir) Vis) cultivated in the experimental polygon for biologic agriculture for the establishment of the optimum moment of harvesting of inflorescence and the identification of qualitative of this biotype, in order to obtain a maximum content in piretrine and the utilization of the extract in the control of pests from vegetable crops cultivated ecologically.

MATERIAL AND METHOD

At VRDS Bacău the cultivation of *Crysanthemum cynerariifolium* (Trevir) Vis) specie started in 2006 year. The establishment of the crop was accomplished generatively from a biotype originally from our country. It seems that the biological material origin is in a population with a large genetic variability. During the spring of 2006 year, seedling was produced and in May the collection of perennial plants was planted in the experimental polygon for biological material. In the first year of cultivation only two plants blossom. The technology applied was specific to “bio” cultivation: without chemical amendmets or pesticides, the maintaining of cleanliness of crops. In 2007 and 2008 years the crop overwintered well, the protection of the plants being not necessary. The studies are concentrating over the adaptability to agro-pedologic condition from the East area of Moldavia and “bio” cultivation.

The experimental variants. Because one of the most important technological link in the cultivation of this specie is the flower’s harvesting and drying, the experimental variants (Table 1 and Table 2) refers to the date’s of harvesting of flowers, number of harvest, position of flowers per plant (central or marginal), the way in which the plant is prepared in order to dried. Quantitatively the weight of dried and fresh flowers weight per plant was determined, calculating also the ration dry weight per fresh weight.

In 2007 year, the first one with the fully blossom of plants, the biological material was studies for the determination of the quality of plants as insecticide plant, in order to establish the modality in which the preparats must be prepared and their application on other vegetable crops from “bio” polygon. The harvesting of flowers was accomplished at fully opening of flowers, after 5 days from the beginning of blossoming, according with the experimental variants.

Table 1.

The experimental variants

V1 - three harvests/plant*
V2 - two harvests/plant*
V3 - two harvests/plant
- V3.1 – central flowers

- V3.2 – marginal flowers
V4 – two harvests, flowers harvested with cane, kept for 24 hours in water
V5 - two harvests, flowers harvested with cane, kept for 48 hours in water
V6 - two harvests, media for 41 plants
V7 - one harvest, media for 28 plants

Table 2.

The date for flower's harvesting, on experimental variants:

Variants		**Date of harvesting the flowers		
V1		30.05.2007	07.06.2007	15.06.2007
V2			07.06.2007	15.06.2007
V3			07.06.2007	14.06.2007
V4			13.06.2007	20.06.2007
V5			18.06.2007	25.06.2007
V6			07.06.2007	15.06.2007
V7				18.06.2007

After the harvest the flowers were numbered and weight fresh and also after drying. At dried flowers, the volatile oils compounds were determined utilizing specific methods.

RESULTS AND DISCUSSIONS

It is important to know firstly the specie and this is the reason why, we will present some characteristics regarding the origin presentations, requirements toward environmental conditions, utilization, and few details regarding the cultivation.

1.1 The presentation of *Chrysanthemum cinerariifolium* (Trevir) Vis) specie – dalmation pellitory.

The active principle extracted from this plant is piretrum or piretrine (which in fact is represented by six natural compounds), with insecticide properties, term that is utilized in the production and selling, referring in this peculiar case to the powder made from dried flowers of piretrum.

Names in different languages: English – dalmation pellitory; French – pyrèthre de Dalmatie; German – Asehenkrautblättrige Wucherblume

Family: *Compositae*

Synonym: *Tanacetum cinerariifolium* (Trevir), *Pyrethrum cinerariifolium* (Trevir) Vis), *Chrysanthemum cinerariaefolium*

Origin: The native area is in the east of Europe and in the Caucasian area, near the ex-Yugoslavia but is well spread also in China, Iraq, Turkey, Spain, and Italy. In the present the dalmatian chrysanthemum is cultivated mainly in commercial purposes, in the mountain area of Kenya, Tanzania and in Ecuador. The plant is also cultivated in Canada, but the production is small and is more frequently utilized in small farms and family gardens. Although the commercial production of pyrethrum is in the Ecuadorian

mountain area, the plant can grow also in our region, although the concentration of pyrethrum and the number of harvests/year is much lower than in native regions.

Prezention. The dalmation pellitory is a perennial plant, of 0.45 – 0.65 m high. It blossom from July till September, the flowers are hermaphrodite and are pollinated by bees and butterflies. The utility rate of plant is 2 : 5. The flowers are middle typical, white colored on the edge and in the central area the tubular, fertile flowers are yellow. The floral canes are powerful and rigid. The leaves from the entire plant are green-blue.

The plant prefers relatively dry, heavy and calcareous soils. The area that is in shadow should be avoided, because only in full sun the quantity of pyrethrum is at maximum level. It grows well also in soils that are rich in humus, humid climate but the concentration of pyrethrine will be lower.

The multiplication of plant can be made through the plant's division or through seeds. The seeds are sown in the spring, February – March, in greenhouse and germinates at temperatures of almost 20 - 22° C, are pricked out and seedlings are produced at palettes or small pots. The definitive plantation in the field can be made when the plants are well branched and rooted. Vegetative can be multiplied through the division of shrubs on autumn or spring, with plantation at definitive place. Or small parts of plants can be planted in small pots at shadow and moderate temperature for rooting and then are planting in the field during summer or the next autumn. The density realized in the field is of almost 9 plants/m².

Cultivation. The plants doesn't require strong fertilizations, doesn't respond to nitrogen, but the presence of phosphor in quantities sufficient for the plants leads to an increase in the flower's production. During cultivation there are no special problems with the pests and pathogen attack, the only exception is sometimes with the trips that can appear in the flowers

Utilization

	<i>Culinary.</i> Is not recognized as edible plants.
	<i>Ornamental.</i> The plant is not decorative, but due to its multiple utility can be utilized in the garden near flower and utile species, conferring a pleasant aspect.
	<i>Medicinal.</i> The specie is not considered as medicinal, but the flowers have an antibiotic activity, being utilized in China against helminthes.
	<i>In biologic agriculture.</i> The most important utilization is as prime material for the extraction of pyrethrine, from flowers (especially from the tubular flowers from inflorescence); the biggest concentration is in the floral buds (1.22 %). In the garden, only the presence of this plant acts as a repellent for insects from nearby. The plant can be dried and utilized much latter because it maintain its insecticide and repellent proprieties.

1.2 Results obtained

The results of the studies regarding the production of flowers fresh and dried on experimental variant are presented in Table 3. We have to mention that the first harvest was accomplished after 5 days from the opening of flowers, the second at 7 days, and the last after 8 days.

Table 3.

The production of flowers per experimental variants in open field
at VRDS Bacau, 2007 year

Nr. crt.	Variants	Nr. of flowers/plant	Fresh flowers	Dried flowers	Rapport
		media	mv-g.	mu-g.	mu/mv
1	V1 - three harvests/plant*	722	352.89	103.41	29.30
2	V2 - two harvests/plant*	429	193.68	52.30	27.00
3	V3 - two harvests/plant	311	152.71	41.49	28.17
	- V3.1 – central flowers	102	55.29	15.79	28.55
	- V3.2 – marginal flowers	209	97.42	25.70	26.37
4	V4 – two harvests, flowers harvested with cane, kept for 24 hours in water	401	231.47	65.23	28.77
5	V5 - two harvests, flowers harvested with cane, kept for 48 hours in water	478	343.64	98.60	28.69
6	V6 - two harvests, media for 41 plants	150	118.74	34.40	28,97
7	V7 - one harvest, media for 28 plants	130	129.82	46.69	35.97
The media of experimental variants		419	239.38	69.09	28.86

The analysis of the present date's regarding the obtained production of flowers shows that:

- the best results were obtained on variant with 3 harvest/plant, the first being made on 30.05.2007, with a media of 722 flowers/plant, with 352,89 g/plant green weight (mv), 103,41 g/plant dried weight (mu), with a ratio mu/mv of 29,30. From the presented results is seems that the number of harvest per plant influence the production results:

- a large number of flowers harvested per plants was obtained also on variants V5 (478 flowers/plant) and V2 (429 flowers/plant), and the smallest were registered at variants V7 (130/plant) and V6 (150 flowers/plant);

- the quantity of fresh flowers vary on large limits between the experimental variant from 352,89 g/pl at V1 (3 harvest per plant) and 118,74 g/pl at V6 (media of 2 harvest from 41 plants); good results was obtained also on variant V5 with 343,64 g/plant;

- the best results resulted at weight dried flowers/plant were obtained at variants V1 (103,41 g/pl) and V5 (98,6 g/plant the smallest at V6 (34,40 g/pl) and V3, respectively V3.1 (41,49 g/pl, V3.1 – 15,79 g/pl);

- the ration dried weight per fresh weight vary between 35, 97 at variant V7 and 27,00 at V2; a good drying ratio was obtained also at variants V1 (29,30), V6 (28,97) and V5 (28,69).

CONCLUSIONS

1. The best results were obtained at variant with three harvest per plant the first being done on 30.05.2007, realizing a media of 722 flowers/plant, with 352,89 g/plant green weight (mv), 103,41 g/plant dried weight (mv), with a ratio mu/mv of 29,30. From the presented results it seems that the number of harvest per plant influence the production results.

2. The analyze of the dates registered at flower's harvesting on experimental variants, shows that the largest number of flowers can be obtained after the second harvest, than at the first harvest, the worst results being obtained at the third harvest.

3. In the following years, the studies will continue in order to accomplish a correct characterization of the behavior of this biological material in the agro-pedoclimatic conditions from VRDS Bacau, the crop that is in the first years of harvest of flowers and the second one of cultivation in biologic agricultural conditions.

4. The analysis accomplished regarding the compounds of volatile oils for the 7 experimental variants, at biotype of *Chrysanthemum cinerariifolium* (Trevir) Vis cultivated at VRDS Bacau after the norms and principles of ecologic agriculture shows that 22 compounds were identified, from which three are pyretrine: Cinerin I, Piretrin I and Jasmolin I.

5. The preliminary studies regarding the quantitative and qualitative characteristics of the biotype *Chrysanthemum cinerariifolium* (Trevir) Vis cultivated give the hope of their utilization in the obtaining of natural pyretrine and preparations for the control of pests through the methods specific for ecologic agriculture.

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