

CORRELATION BETWEEN *THRIPS TABACI* ATTACK DEGREE AND MORPHOLOGICAL FEATURES OF *CALENDULA OFFICINALIS* L. FLOWERS

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Abstract: The marigold is a very ornamental plant that is commonly grown in the flower garden, and occasionally as a culinary herb. Marigolds had an important economic values, its cropping knew a continual increase in the last years thanks to its usage in a more and more large area in the pharmaceutical and cosmetic domain. Thrips tabaci are feeding drains underlying cells, leaving air-filled spaces which impart a silvery sheen and cause distortion during growth and reduction in photosynthetic capacity. In the West Plain of the country relative existed a few investigations about that pest attack on the marigolds crop, an important crop both from medical point of view and culinary point of view. The purpose of that work was to determine the correlation of pests attack degree and flowers diameter to 10 local population of *Calendula officinalis* L. from Arad district. In the thrips experiments, the results showed that flowers with bigger attack degree were smaller compared to flowers with smaller attack degree. This difference in flower diameter was due

to deformations of the flowers and was more pronounced at a bigger density of common thrips. The flowers deformation and its decrease in diameter implied also the production increase, but the obtained quantity of flowers was lower. The results obtained through correlation between Thrips tabaci attack degree and morphological features of *Calendula officinalis* L. flowers permitted the identification of frequency and intensity of attack, and connection between them and density of the pest. Accordingly, tobacco trips produced great damages in *Calendula officinalis* L. crop depreciating from a qualitative point of view, the diminution and bending flowers diameter and qualitative speaking the production decreased. The present paper belongs to a big work which had like study "Resistance testing of some species of *Calendula officinalis* L. to Thysanoptera pest attack through different methods/techniques of analysis concerning the improvement of raw material quality", that represented the theme of postdoctoral-dissertation.

Key words: marigold flowers, correlations, morphological features, tobacco thrips attack

INTRODUCTION

Marigolds were annual and biennial medical plants, met in the gardens, and on terrains without crop. Marigolds had a pleasant balmy smell. In phytotherapeutic purpose it was used or the airy part of the plant with inflorescences, or the leaves or only the marginal flowers (flowers without shanks).

Calendula officinalis are very rich in vitamins and minerals and are similar to *Taraxacum officinale* in nutritional value. When eaten they first of all impart a viscid sweetness, followed by a strong penetrating taste of a saline nature. Fresh petals are chopped and added to salads (FACCIOLA, 1990). The dried petals have a more concentrated flavour and are used as a seasoning in soups, cakes etc. High in vitamins A and C. (DUKE and AYENSU, 1985). An edible yellow dye is obtained from the petals. A saffron substitute, it is used to colour and flavour rice, soups etc. It is also used as a hair rinse, adding golden tints to brown or auburn hair. A tea is made from the petals and flowers, that made from the petals is less bitter. There is no record of the seed being edible, but it contains up to 37% protein and 46% oil. (ORGAN, 1960).

The leaves can be used fresh or dried, they are best harvested in the morning of a fine sunny day just after the dew has dried from them. The flowers are also used fresh or dried, for drying they are harvested when fully open and need to be dried quickly in the shade. A tea of the petals tones up the circulation and, taken regularly, can ease varicose veins. (CHIEJ, 1984). An application of the crushed stems to corns and warts will soon render them easily removable. The leaves, blossoms and buds are used to make a homeopathic remedy. It is used internally in order to speed the healing of wounds (CASTRO, 1990).

One of the base elements of marigolds production constituted the flowers diameter which hadn't a decorative value but had influenced also the raw material production at hectare. Investigations from domain confirmed the fact that between flowers diameter and raw material production at hectare, it existed a positive closed correlation (VERZEA and STOIANOV, 2001; BRÂNZILĂ, 2005).

One of the factor that determined differences of flowers diameter had been those deformation, because of great density and strong attack of *Thrips tabaci* pest.

Thrips tabaci are primarily an agricultural pest, but can cause damage to several ornamental species as well and cause spotting, streaking, and drop of leaves and flowers. (ZIMMERMAN, 1948; CLAUSEN, 1978).

Common thrips are the most damaging insect pest of *Calendula officinalis* L.. Thrips have a very peculiar feeding behavior. They start the feeding by piercing and rasping the leaf or flower surface with their mouth parts to release the liquids from the plant cells. In this process, thrips release substances that help predigest the plant tissue. Later, with their mouth they suck up the plant content.

Thrips tabaci prefer to feed on the young plant tissue. The damage produced by the thrips enlarges, leaving empty spaces in the surface of the leaf or flower. The appearance of the damage is silvery patches or streaks that shine in the sun. When damage is severe, these small patches can occupy most of the surface of the leaf and the plant cannot adequately photosynthesize. The plant loses more water than normal through the damaged tissues and plant pathogens penetrate the injured plant easily. In severe attacks the whole plant can turn white or silver and leaves can wither. (ANDALORO and SHELTON, 1983).

MATERIAL AND METHODS

The present study proposed itself to follow attack degree of tobacco thrips and the way in which this is correlated and influenced the morphological features of marigold flowers.

In the experiment were studied 10 local population of *Calendula officinalis* L. from Arad district as it followed: Arad, Semlac, Seitin, Nadlac, Fantanele, Frumuseni, Vladimirescu, Mandruloc, Vinga, Manastur.

Study regarding correlation between *Thrips Tabaci* attack degree and morphological features of *Calendula officinalis* L. flowers was realized to experimental field from Didactical Base fields of USAB Timisoara (figure 1.).

Thrips tabaci are easily detected by visual inspection of the *Calendula officinalis* L. plant. Commercial monitoring of thrips is done by inspecting individual plants in the field. For thrips populations analysis, from marigolds culture, it was applied the jarring method of plant organs which had presented species of analyzed. For each plant the number of thrips and the amount of tissue damage should be recorded. The insects collecting were made in the morning between 8-9 o'clock when the temperature was situated between 20-25 degree C and the humidity 65-70%.



Figure 1- Experimental field of *Calendula officinalis* L.-Didactical Base of USAB Timisoara

The biometrical measures of flowers diameter infected were made by the ruler (figure 2.).



Figure 2- Morphological analysis of the diameter of *Calendula officinalis* L. flowers

The flowers infected were manually cultured, in 12-23 reprises on the seeding surfaces, in the beginning of blooming over 2-3 days after nine o'clock, when the dew was removed, and the ligulate flowers occupied an horizontal position, or when, at least, an half from the rows with ligulate flowers of opened inflorescences were bloomed.

RESULTS AND DISCUSSIONS

From the results obtained, differences between local populations taken in study had been observed not only the attack degree, but also from the point of view of flowers diameter.

Data concerning to attack degree of tobacco trips showed a different behavior of the marigolds local populations to the attack of that pest on plants flowers.

The local populations of Arad were significantly affected by the attack degree of the pests. (table 1.).

The local populations of Nadlac and Arad had the attack degree the highest, over the percentage 50%.

In case of the local populations of Frumuseni and Seitin, those ones presented the lowest attack degree, 12.00%, respectively 12.37%.

From figure 3 it could be observe that to all the local populations taken in study, the flowers diameter decreased in the same time with the attack degree. Thus, the biggest diameter of the flowers registered to the local populations of Frumuşeni, which had presented the most decreased attack' degree, and the smallest diameter it could observe to local populations of Arad, with the highest attack degree of tobacco trips, being the most sensitive to that pest.

Table 1

Attack degree, flowers diameter- *Calendula officinalis* L. – Arad district

No. crt.	District	Local population	Attack degree (%)	Flowers diameter (cm)
1.	Arad	Arad	73.88	3.1±0.1
2.		Semlac	20.83	4.6±0.2
3.		Şeitin	12.37	5.1±0.3
4.		Fântânele	17.47	5.0±7.5
5.		Frumuşeni	12.00	5.3±2.1
6.		Vladimirescu	35.91	4.5±0.1
7.		Mândruloc	36.00	4.4±0.2
8.		Nadlac	67.63	4.0±0.2
9.		Vinga	51.18	4.2±0.4
10.		Mănăştur	43.66	4.3±0.1

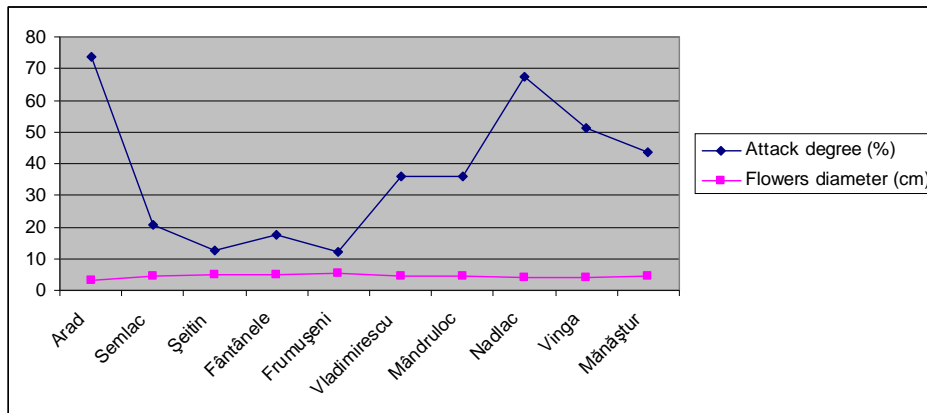


Figure 3- The flowers diameter of *Calendula officinalis* L. in function of the attack degree of tobacco trips

The correlation coefficient indicated the binding between the two values. Correlation coefficient indicated proportion of the variant, as the percentage where the relation flowers diameter-attack degree appeared.

In our study $r^2=0.88$, namely 88% from the variant observed was met in reality, so the relation between the flowers diameter and attack degree was present to 88% from local populations taken in study (figure 4.).

The dependence between the flowers diameter and attack degree was positive, a attack degree increasing meant an decrease of the flowers diameter. 88% from variation of

flowers diameter thanked to linear relation with attack degree. Residual variation of flowers diameter was 12%.

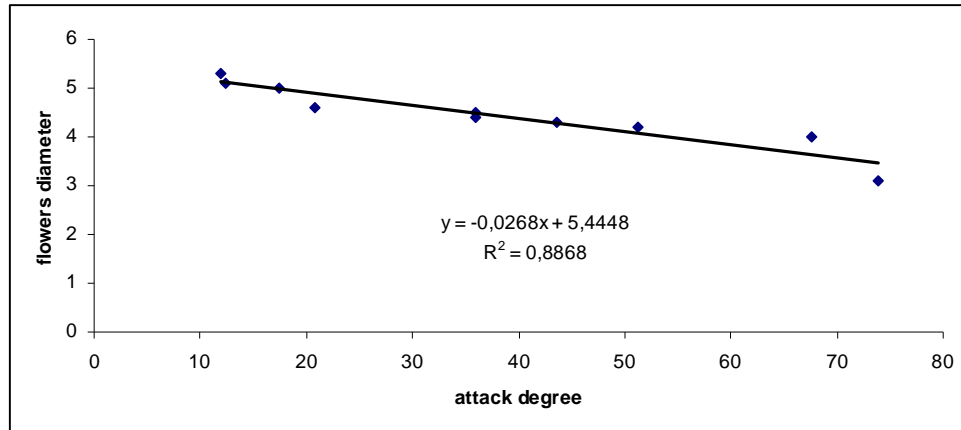


Figure 4- Correlation between flowers diameter and tobacco thrips attack degree of *Calendula officinalis*

CONCLUSIONS

In the thrips experiments, the results showed that flowers with bigger attack degree were smaller compared to flowers with smaller attack degree.

This difference in flower diameter was due to deformations of the flowers and was more pronounced at a bigger density of common thrips.

After the investigations made it observed that to all the 10th local populations taken in study had a bigger attack degree than 10%.

The local populations of Arad and Nadlac presented the biggest attack degree of tobacco trips, 73.88%, respectively 67.63%, followed by the local populations Vinga (51.18%) and Manastur (43.66%).

The smallest attack degree observed to local populations Frumuseni (12.00%) and Seitin (12.37%), values that had broken a little the percentage of 10%.

Local populations from district Arad had a flowers diameter between 3.1 ± 0.1 cm (Arad locality) and 5.3 ± 2.1 cm (Frumuseni locality).

Because $r^2=0.88$, in case of flowers diameter and attack degree, we appreciated that had existed a linear binding, strong and direct between the two variables.

Finally, we concluded that it had meant a significant correlation between flowers diameter and attack degree to local populations of *Calendula* taken in study.

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