

## Investigation the influence of various levels of nitrogen and water on the morphological and physiological features of medicinal herb of *Tanacetum parthenium*

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### ABSTRACT

*Tanacetum parthenium* is a perennial and gramineous plant belonging to the Asteraceae family. All aerobic parts (shoots) and growing corpus of this plant have been mentioned as a medicine in the valid pharmacopoeias. Since, ecological conditions play an important role in the growth, the nurturing, performance and quality of effective substances in medicinal herbs, therefore the aim of this research is investigating impact of different levels of water and nitrogen on the growth, the yield of the growing body and the amount of essence in *Tanacetum parthenium*. This study was conducted between April of year 2008 to September 2008 in the laboratory of Research Center of the Medicinal Herbs and spices and aromatic plants in Islamic Azad University of Shahrekord. This experiment was attempted in a case of factorial in a completely randomized design with the three repetition. We investigated 5 levels of nitrogen fertilizer (0, 500, 1000, 1500 and 2000 mg in each pot) and three levels of humidity (0, 25 and 50 percent of soil moisture depletion). Based on the obtained results in this study, different levels of the nitrogen have no significant influence on number of leaf, chlorophyll and the amount of the essence of the *Tanacetum parthenium*, but it shows a meaningful effect on the shoot dry weight.

**KEY WORDS :** *Tanacetum parthenium*, nitrogen, water levels, morphological features, medicinal plants

### 1. INTRODUCTION

*Chrysanthemum parthenium* or *Tanacetum parthenium* with local and scientific name of *Tanacetum parthenium* (L.) Schultz. Bip belongs to family of Asteraceae. *Tanacetum parthenium* is diploid plant that the number of its chromosomes is  $2x=2n=18$  (Brown, 1996). The origin of the *Tanacetum parthenium* is Kazakhstan, Central Asia and Mediterranean regions (Zargari, 2002) and has widely distributed in Europe, Asia and America (Chevallier, 1996). This plant is also seen in different regions of north, west, high mountainous areas, in central and eastern regions of Iran. The *Tanacetum parthenium* in some countries is used as ornamental plant. This plant is cultivated in wide levels for medicinal purposes (Hasani, 2004).

One of the important methods of protection of medicinal plants is planting and growing them in out of the natural habitats (Omidbeygi, 1996). Characteristics such as growth, development and performance in plants have always been under the influence of genetic factors and environmental (ecological) conditions and interaction between them. Being far from optimal ecological conditions in plants led to the occurrence of the environmental tensions such as dryness, cold, heat, the shortage of food and etc. (Ardekani, 2004). Among the ecological factors the following elements are more important: 1) weather conditions (climatic) such as moisture, temperature, light, and 2) soil conditions (edaphic) especially nutrient substances like the amount of access to the nitrogen in comparison with other ecological factors (Koochaki and Nasiri Mahallati, 1996). So far countless researches have been done in association with investigation of influence of ecological factors like food substances and Drought stress on growth and development and yields of agricultural and garden plants, but studies in the field of studying the effects of ecological factors on the growth, quantitative and qualitative performances of non- agricultural or wild plants which are applied as medications, have rarely been done therefore, present research has been conducted in order to investigate and study impact of different levels of water and nitrogen on the growth and performance of the growing body and the amount of plant essence of the *Tanacetum parthenium*.

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## 2. MATERIALS AND METHODS

### 2-1. Location of conducting the experiment

This study was done in greenhouse and under controlled conditions during a period of 6 months from April 2011 to September 2011 in the Medicinal Herbs Research Center, Islamic Azad University of Shahrekord. for the provision of light needed for photosynthesis process and growth of plants, of the flurescent lamps were used with light to dark ratio of 14 to 10 hours. Also, for making measurements and recording of two important meteorological parameters, such as weather temperature and humidity, we applied Opus10 model of thermohygrometer made in Germany with recording ability of every 15 minutes. According to obtained estimates, the average daily temperature of the growth chamber during the interval of trial was  $20 \pm 5$  degrees celcius and mean of relative humidity was  $55 \pm 5$ . Before the starting the experiment, a sample of used soil in the test, which had been prepared from topsoil (depth of zero to 30 centimeters) for analysis of its physical and chemical characteristics has been transferred to Sabz Azmay Laboratory of Pedology in Isfahan. Results of chemical and physical analysis of the soil has been given in the table 1.

### 2-2. The manner of preparing seed

Seed of medicinal Plant of *Matricaria aurea* was provided from Pakan Bazr Company of Isfahan which is confirmed by botany experts. The provided seeds, for cold induction (in order to increase the possibility of breaking of physiological dormancy and percentage of sprouting) for 15 days in the temperature of 1 to 5 degrees centigrades were stored. It should be mentioned that before decreasing temperature, seeds were soaked for 12 hours in a distilled water.

physical characteristics				chalk (%)		Potassium Conc.	Phosphorus Conc.	nitrogen (%)	organic carbon (%)	Acidity	Salinity
Texture	clay %	Silt %	Sand %	Gyps %	K ppm	P ppm	N %	OC %	T. N.V%	PH	EC
SLCL	32	50	18	0	4. 97	13. 2	. 90	. 90	40	8. 00	1. 5

Table 1- results of chemical and physical analysis of soil

### 2-3. The way of seeding

for doing both tests separately, the plastic pots (units of experiment) with the volume of 1 kg were utilized. Then in order to be sure about the lack of contamination, pots were rinsed with water and became disinfected with fungicide Benomyl 5 in thousand. Then washed gravel of the riverbed with the ratio of 25 percent and farm soil with ratio of 75 percent were mixed. After disinfecting of pots and pouring the mixed soil inside of them, seeding was performed in the date March 20, 2008 with the method of wet planting and with the depth of 1 to 1.5 cm (about 50 number of seeds in each pot). Wworth mentioning that, before the seeding action in order to prevent the fungal diseases especially decaying of root and stem, seeds were disinfected with fungicide Benomyl 2 in thousand. The first irrigation was done two days after the action of seeding. After emergence of the plants in pots with 2 to 4 leaf stages, action of thinning was performed to reduce intraspecific competition. Intervals between bushes were set in each pot with 5 to 7 cm distance from each other.

### 2-4. Studied treatments

The present study has been attempted in order to investigate the effects of important ecological factors such as nitrogen on some of traits of medicinal plant of *Tanacetum parthenium* in the greenhouse conditions. In this regard, a factorial experiment in a completely randomized design (RCD) has been conducted to study the nitrogen factor with 5 various levels.

#### First factor: different levels of nitrogen fertilizer

N<sub>0</sub> : Control group (lack of receiving nitrogen)

N<sub>1</sub> : The amount of 500 mg pure nitrogen in each pot

N<sub>2</sub> : The amount of 1000 mg pure nitrogen in each pot

N<sub>3</sub> : The amount of 1500 mg pure nitrogen in each pot

N<sub>4</sub> : The amount of 2000 mg pure nitrogen in each pot

### **Second factor: different levels of soil moisture**

W<sub>0</sub> : zero percent of Soil moisture depletion, in conditions of Field capacity (FC), in the lack of Drought stress

W<sub>1</sub>: 25 percent of soil moisture depletion, in conditions of Field capacity (F.C) with applying Drought stress

W<sub>2</sub>: 50 percent of soil moisture depletion, in conditions of Field capacity (F.C) with applying Drought stress

In order to investigate the factor of nitrogen on the growth and performance and some features of *Tancetum parthenium*, we used urea fertilizer containing 46 percent nitrogen. For this purpose, consumption of nitrogen fertilizer based on experimental treatments has been applied in two stages of vegetative growth stage and early stemming. In order to reduce the toxic effects of nitrogen fertilizer on the growth of plant, introduction of the considered amount of fertilizer has been done in two stages of plant growth and during three phases of each irrigation.

### **3. Evaluated characteristics (traits)**

#### **3-1. Morphological traits**

Of the most important studied morphological features in this test can be listed as height of bushes, the number of side branches, the number of flowers, the number of branches, weight of fresh and dry flowers, weight of fresh and dried shoot (shoot dry weight or shoot fresh weight) and etc. In order to estimate weight of fresh and dry flowers and the shoot dry matter after flowering of each unit of experiment, we attempted to picking and weighing of them. Flowers were dried for 72 hours in 50 degree temperature in the dry oven. For drying aerobic parts (shoots), samples were inserted inside of oven for 72 hours in a temperature 75 degrees centigrade. In order to weighing fresh and dried flowers and shoots, a digital scale with accuracy of 0.001 gram (Sartorius CP3235 model) made in Germany was used.

#### **3-2. Physiological traits**

Chlorophyll content of leaves and accumulation of dry matter were the most important physiological traits in this research. In order to determine number of chlorophyll after Drought tension and applying the treatments of nitrogen fertilizer, the chlorophyll meter Hansatech model made of Britain was utilized.

#### **3-3. Essence and its yield (performance)**

In order to determine essence and its performance, Clevenger device made of Iran (company of Ashke Shisheh) was used. For this purpose, after picking flowers of chamomile we started to extract (making flower essence). In this regard, harvested flowers have been poured in the 250 mili metric flask along with a distilled with the ratio of 1 to 10 and making essence was performed for 2 hours. In the continuation, the water along with the essence was separated by buret funnel and the amount of essence was measured according to millimeters.

#### **3-4. statistical analysis of data**

In order to analyze the data statistically we used variance analysis software Mstat-C. In order to compare the mean, Duncan method in the probability level of 5 percent was applied with the help of Mstat- C software. For drawing the charts, Excel office 2007 software was used.

## **4. RESULTS AND DISCUSSION**

In this study, effect of nitrogen fertilizer and water on the growth and raising, the growth yield, the amount of essence in *Tancetum parthenium* was assessed. The variables such as **number of leaves**, content of chlorophyll, the amount of essence and dry weight of plant were investigated. The multiple range test of Duncan was used to compare the averages.

### **4-1. Effects of different levels of nitrogen in different features of the *Tancetum parthenium***

#### **4-1-1. Influence of different levels of the nitrogen on the number of leaf of the *Tancetum parthenium***

According to the obtained results of variance analysis in on the case of effect of the nitrogen on the number of leaf in the *Tancetum parthenium*, it has been cleared that various levels of nitrogen have had no significant influence on this feature (table 2). Of course results of mean comparison of experiment have been also indicated a lack of meaningful difference among treatments with different levels of nitrogen and control groups. However, treatment N4

with 5.22 leaves and treatment without consuming nitrogen with 4.55 leaves have had the highest and the least number of leaves, respectively.

Table 2- Variance analysis of influence of different treatments on the number of leaves in the *Tancetum parthenium*

Change sources (S.O.V)	Degree of Freedom (d.f)	The mean squares (M.S)	F
Different water levels	2	25.15	15.94**
different levels of nitrogen	4	0.86	0.54 ns
The interactive effects between water and nitrogen	8	0.35	0.22 ns
Error	30	1.57	

\*\* indicates a very significant difference in the level of 1 percent probability

ns indicates lack of meaningfulness

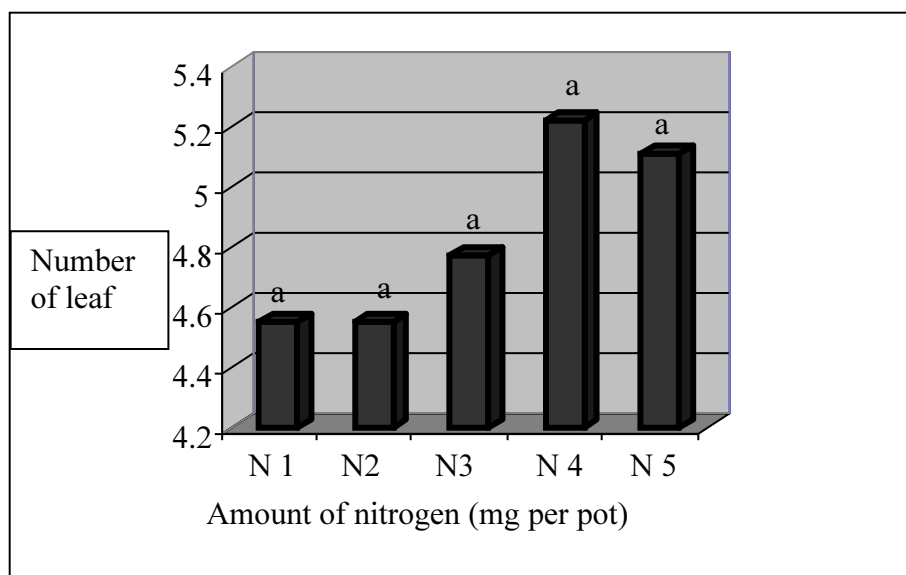


Figure 24- The influence of different levels of nitrogen on the plant leaf of the *Tancetum parthenium* (similar letters indicates a lack of significance)

#### 4-1-2. The impact of various levels of nitrogen on the content of chlorophyll

In the case of the effect of nitrogen on the content of chlorophyll, it was clear that different levels of nitrogen have no meaningful influence on the chlorophyll content of the *Tancetum parthenium*. However, the results of the comparison of the average with using of Duncan test shows a significant difference among the treatments, in a way that highest and the lowest chlorophyll content are allocated to the treatment with consumption of 2000 mg nitrogen ( $N_5$ ) with 4.97 chlorophyll in each leaf and the treatment with lack of consuming nitrogen ( $N_1$ ) with 3.71 chlorophyll in every leaf, respectively. Later result is consistent with the acquired results regarding to the positive effect of nitrogen on chlorophyll content of leaf in *Matricaria aurea* medicinal herb (Ghani Dehkordi and colleagues, 2011). In such a way that the increase in nitrogen consumption results in the linear and significant increase ( $R^2 = 0.89$ ) in the content of chlorophyll in leaves of the *Tancetum parthenium* (Diagram 1).

Table 3- Variance analysis of influence of various treatments on the chlorophyll content of leaf in the *Tancetum parthenium*

Change sources (S.O.V)	Degree of Freedom (d.f)	The mean squares (M.S)	F
Different water levels	2	26.61	32.15**
different levels of nitrogen	4	2.08	2.51 ns
The interaction between of water and nitrogen	8	3.59	0.45 ns
Error	30	24.83	

\*\* indicates a very significant difference in the level of 1 percent probability

ns indicates lack of meaningfulness

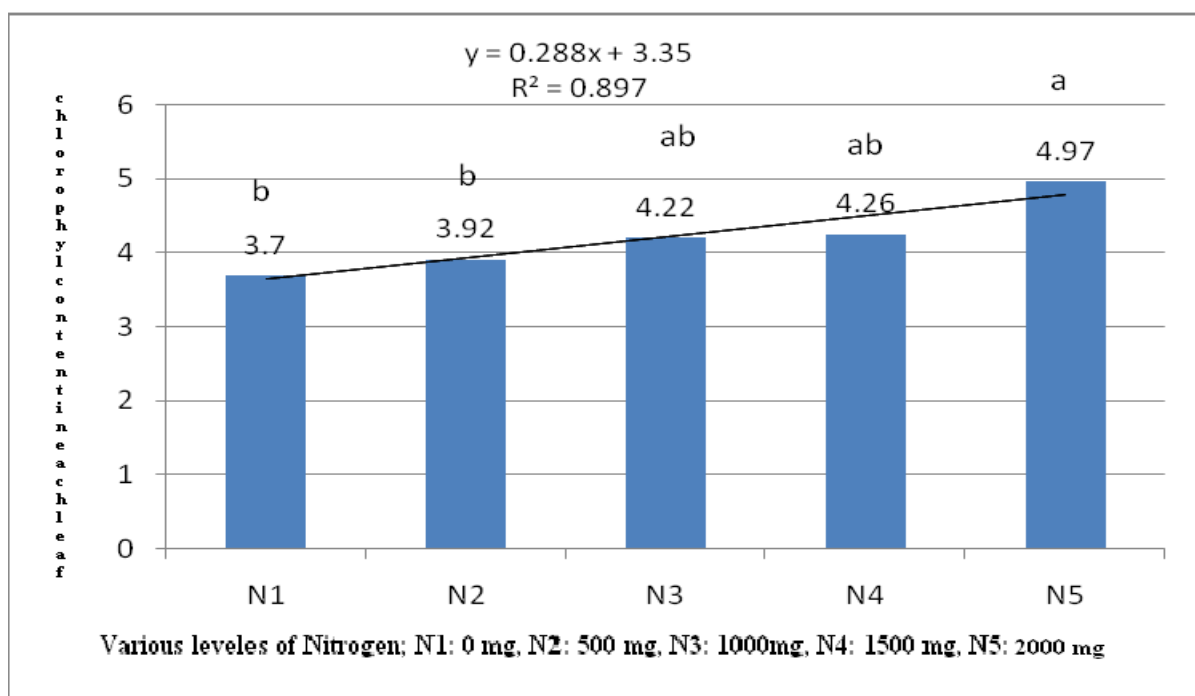


Diagram 1- influence of various levels of nitrogen on the chlorophyll content of leaf in the Tancetum parthenium (similar letters indicates a lack of significance)

#### 4-1-3. Influence of various levels of nitrogen on the essence percentage of leaf in the Tancetum parthenium

According to the obtained results from the variance analysis about influence of various levels of nitrogen on the percentage of leaf essence of the Tancetum parthenium is not significant (table 4). Additionally, the results of comparison of the means also show that all treatments are in a same statistical group. However, treatment N5 with the amount of 1.15 percent of essence has the highest amount of essence production. Results of Hasani's survey (2004) shows that treatment with using 150 kg nitrogen per hectare with efficiency of 0.52 percent has produced the highest essence and the control with efficiency of 0.35 percent has the lowest level in this regard.

Table 4- Variance analysis of influence of various treatments on the amount of essence of leaf in the Tancetum parthenium

Change sources (S.O.V)	Degree of Freedom (d.f)	The mean squares (M.S)	F
Different water levels	2	1.18	23.96**
different levels of nitrogen	4	0.07	1.54 ns
The interaction between of water and nitrogen	8	0.03	0.60 ns
Error	30	0.04	

\*\* : indicates a very significant difference in the level of 1 percent probability

ns : indicates lack of meaningfulness

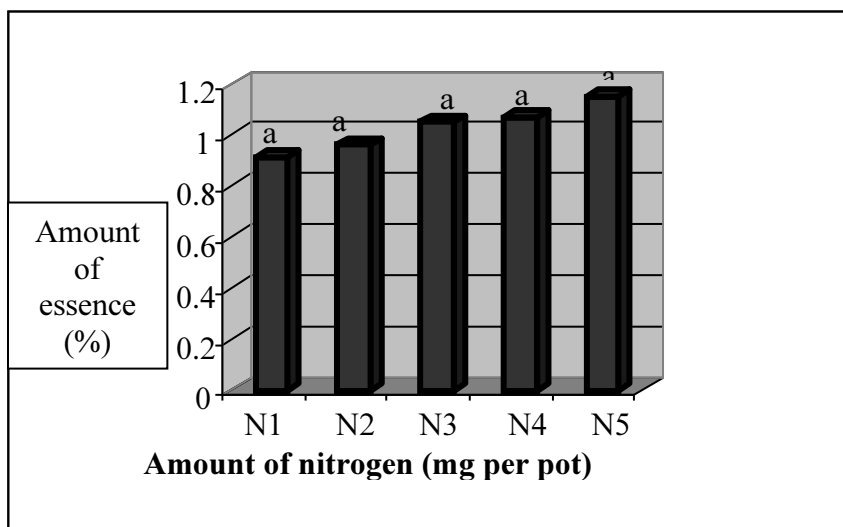


Figure 28- influence of various levels of nitrogen on the essence content of the Tancetum parthenium plant (similar letters indicates a lack of significance)

#### 4-1-4. Influence of the different levels of nitrogen shoot dry weight of the Tancetum parthenium

The results of variance analysis associated with the influence of nitrogen on shoot dry weight of the Tancetum parthenium show that various levels of nitrogen on this feature has a meaningful effect in probability level of 1 percent (table 5). In a way that treatment N5 and treatment N<sub>4</sub> with 19.76 gram and treatment N1 with 14.69 gram have produced the maximum and the minimum dry weight of shoots, respectively (diagram 2). These results are similar to the effect of different levels of nitrogen on the shoot dry weight of the *Matricaria aurea* (Ghani Dehkordi and colleagues, 2011).

Table 5- Variance analysis of influence of various treatments on the shoot dry weight of the Tancetum parthenium

Change sources (S.O.V)	Degree of Freedom (d.f)	The mean squares (M.S)	F
Different water levels	2	221.96	65.71**
different levels of nitrogen	4	38.53	11.40**
The interactive influence of water and nitrogen	8	.92	.27 ns
Error	30	3.37	

\*\* : indicates a very significant difference in the level of 1 percent probability

ns : indicates lack of meaningfulness

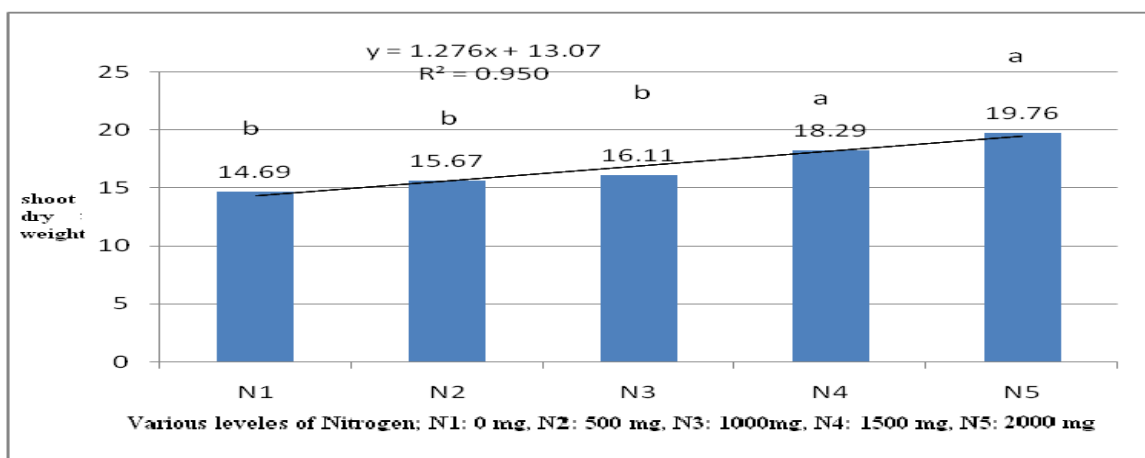


Diagram 2- influence of various levels of nitrogen on the shoot dry weight of the Tancetum parthenium (similar letters indicates a lack of significance)

#### 4-1-5. Influence of different levels of water on the content of the chlorophyll of the leaves in the *Tancetum parthenium*

The results of test variance analysis indicates that different levels of the soil moisture on the chlorophyll content has a very significant influence ( $P \leq 0.01$ ) (table 1). In such a way that the average comparison show that treatment without drought tension ( $W_1$ ) with 5.46 chlorophyll and treatment with drought tension ( $W_3$ ) with 2.81 chlorophyll in each leaf have had the least and the highest chlorophyll (Diagram 1), respectively.

As it is visible in diagram 1, an increasing in drought stress causes a reduction in chlorophyll content like in a separate experiment for plant of *Matricaria aurea* ( $R^2 = 0.99$ ).

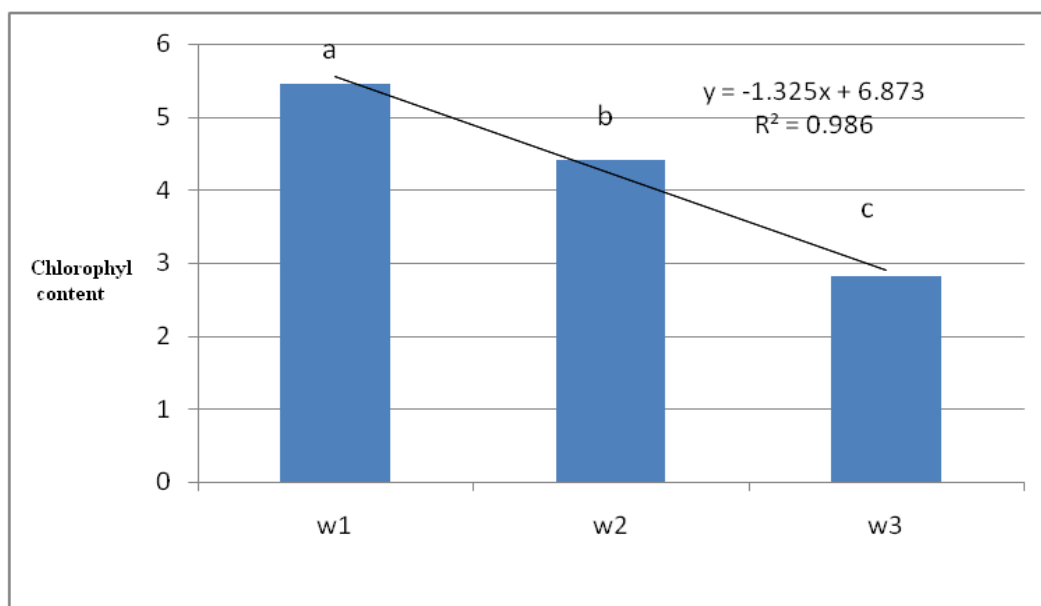


Diagram 1- influence of different levels of humidity on the chlorophyll content of leaf in the *Tancetum parthenium* (similar letters indicates a lack of significance)

#### 4-1-6. Effect of various levels of water on the amount of leaf essence of the *Tancetum parthenium*

The obtained results from the study regarding the amount of essence in the samples based on shoot dry weight show a very meaningful influence ( $P \leq 0.01$ ) of different levels of moisture on the essence percentage of leaves (table 4 -11). So, treatment with lack of drought stress  $W_1$  with the amount of 1.28 percent and the treatment  $W_3$  with the amount of 0.73 percent respectively have had the highest and lowest percent of essence in leaves (Diagram 2), respectively. According to the report of Solinas and colleagues in 1996, in the wild and agricultural species of Rosemary, percentage of essence has decreased under conditions of water stress. However, most of the conducted studies show an increase in the percent of essence under drought conditions.

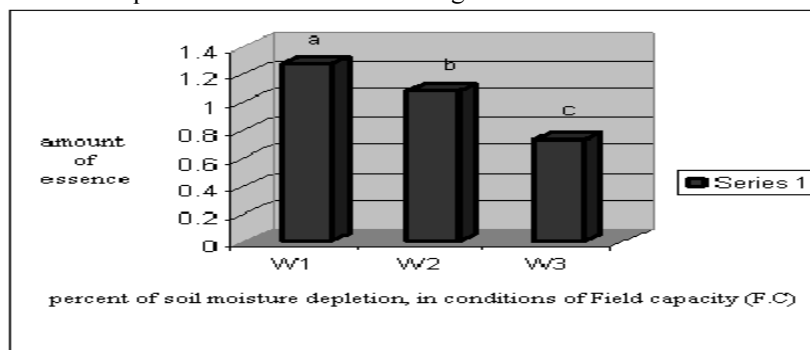


Diagram 2- influence of various levels of humidity on the essence percentage of leaf in the *Tancetum parthenium* (similar letters indicates a lack of significance)

#### 4-1-7. Impact of different levels of water on shoot dry weight of the *Tancetum parthenium*

The results of the variance analysis regarding effect of different periods of the irrigation on performance of shoot dry weight of the *Tancetum parthenium* showed that different levels of irrigation on the aforementioned features has probably a very high significant influence. Comparing the results of achieved averages using of the Duncan test shows that the highest shoot dry weight moisture is allocated to the level of  $W_1 = 20.94$  gram and the lowest amount is related to  $W_3$  with 13.28 mg (diagram 3). Recent result has been corresponded with obtained results for *Matricaria aurea* plant and also with the results of influence of the drought stress on the reduction of the shoot dry weight in medicinal plant of anise or pimpinell (Zehtab-Salmasi *et al.*, 2001).

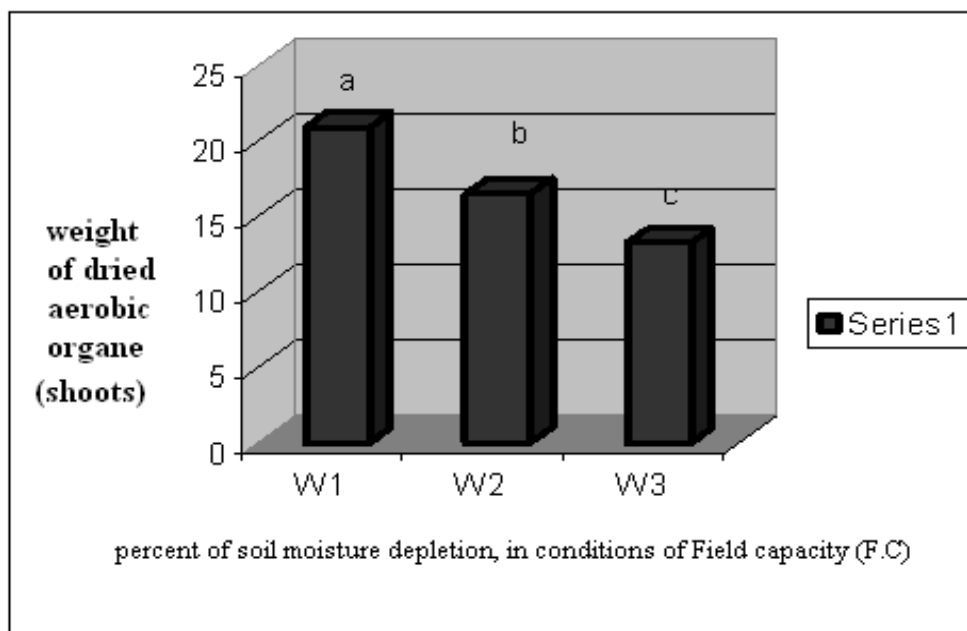


Diagram 3- influence of various levels of humidity on the weight of dried aerobic organe (shoot dry weight) in the *Tancetum parthenium* (similar letters indicates a lack of significance)

#### 4-2. Interactive effects of different levels of the nitrogen and water on different features of the *Tancetum parthenium*

##### 4-2-1. Interactive effects of nitrogen and water the number of leaf in the *Tancetum parthenium*

The results of this research show that there is no meaningful difference between the interactive effects of nitrogen  $\times$  water on the number of leaves. The results of the average comparison show that the treatment with interactive influence of the 2000 mg nitrogen  $\times$  lack of drought stress ( $N_5W_1$ ) with 6.66 leaves and the treatment without consumption of nitrogen  $\times$  moderate drought stress ( $N_1W_2$ ) with 0.41 leaves have had the highest and lowest number of leaf, respectively (see the following table).

##### 4-2-2. Effect of interaction between nitrogen and water on the content of the chlorophyll

The results of variance analysis in this study indicate that there is no meaningful difference among the effects of interaction between nitrogen and water on the content of the chlorophyll. But the obtained result of the comparison of the averages shows that both nitrogen and moisture factors affect on the chlorophyll content in the leaf of the *Tancetum parthenium* like such an impression on the medicinal herb of the *Matricaria aurea*, in a way that the highest chlorophyll content is allocated to the treatment with consumption of 2000 mg nitrogen  $\times$  lack of moisture stress ( $N_5W_1$ ) (table 1).

##### 4-2-3. Interactive effects of nitrogen and water on the amount of essence of the leaf in the *Tancetum parthenium*

The achieved results of the variance analysis show that there is no significant difference between the interactive effects of nitrogen and water on the amount of essence. The results upon the average comparison show that the



treatment N4W1 with the amount of 1.43 percent has the greatest amount and treatment N1W3 with amount of 0.60 percent has the least percent of essence in the leaf (table 1).

**Table 1- Comparison of mean of the interactive influences of treatments with different levels of nitrogen and water on some traits of the *Tanacetum parthenium* (similar letters indicates a lack of significance)**

Treatments	Number of leaves	Content of chlorophyll	The amount of essence	Shoot dry weight and shoot fresh weight
N1 W1	4.55 ab	4.76abcd	1.05 abcde	18.37cd
N2 W1	4.55 ab	5abc	1.20ab	19.57bc
N3 W1	4.77 ab	6.03ab	1.37ab	19.90bc
N4 W1	5.22	5.20abc	1.43a	22.43ab
N5 W1	5.11	6.30a	1.36ab	24.43a
N1W2	4.41	4.13cde	1.10abcd	14.30ef
N2 W2	4.66	3.96cde	1.04abcde	15.20de
N3 W2	4.66	4.06cde	1.04abcde	15.23de
N4 W2	4.66	4.36bcde	1.12abc	18.23cd
N5 W2	6.66	5.46abc	1.13abc	19.47bc
N1 W3	4.66	2.23f	0.60f	11.40f
N2 W3	4.33	2.80ef	0.70def	12.23ef
N3 W3	4.66	2.63ef	0.72def	13.20ef
N4 W3	4.33	3.23def	0.67ef	14.20ef
N5 W3	4.66	3.16def	0.95bcdef	15.37de

#### 4-2-4. Interaction between nitrogen and water on the shoot dry weight of the *Tanacetum parthenium*

In this study, a meaningful difference was not observed in the shoot dry weight correlating to the interactive effects of nitrogen and water. But the results of the average comparison determine that treatment N<sub>5</sub>W1 with 24.43 gram and the treatment N1W3 with 11.40 gram have produced the highest and the lowest values of shoot dry weight, respectively.

### 4-3. Final conclusion

#### 4-3-1. Effects of different levels of nitrogen on different traits of the *Tanacetum parthenium*

Results of the mean comparison in this study also indicates that a lack of meaningful difference between the different treatments of the nitrogen and the control, but the treatment with consumption of 1500 mg nitrogen (N<sub>4</sub>) with the number of leaves about 5.22 have the highest and treatment with the lack of nitrogen consumption with 4.55 leaves has allocated the least number of leaves. The highest content of chlorophyll is obtained from the treatment with the consumption of 2000 mg nitrogen (N<sub>5</sub>) with 4.97 chlorophylls in each leaf and the lowest value of it is related to the treatment without consumption of nitrogen (N<sub>1</sub>) with 3.71 chlorophyll contents in each leaf. Treatment with consumption of 2000 mg nitrogen (N<sub>5</sub>) with amount of essence of 1.15 percent has produced the highest amount of essence. The treatment with consumption of 2000 mg nitrogen (N<sub>5</sub>) and the treatment with consumption of 1500 mg nitrogen (N<sub>4</sub>) have produced the greatest value of shoot dry weight with 19.76 gram and the treatment N1 with 14.69 gram has the least shoot dry weight.

#### 4-3-2. Interactive effects of applying both moisture and nitrogen on different traits of the *Tanacetum parthenium*

The treatment with interactive influence of the 2000 mg nitrogen × lack of drought stress (N<sub>5</sub>W1) with 6.66 leaves and the treatment without consumption of nitrogen × drought stress of 25% moisture depletion (N1W2) with 0.41 leaves have had the highest and lowest number of leaf, respectively. Both nitrogen and moisture factors affect on the chlorophyll content in the leaf of the *Tanacetum parthenium* like such an impression on the medicinal herb of the *Matricaria aurea*, in a way that the highest chlorophyll content is allocated to the treatment with consumption of 2000 mg nitrogen × lack of water stress (N<sub>5</sub>W1). The treatment with the consumption of 1500 mg nitrogen × lack of drought stress (N<sub>4</sub>W1) with the amount of 1.43 percent has the greatest amount and the treatment without consumption of nitrogen × drought stress of 50% water depletion (N<sub>1</sub>W<sub>3</sub>) with the amount of 0.60 percent has the least percentage of essence in the leaf. The treatment with consumption of 2000 mg nitrogen × lack of water stress (N<sub>5</sub>W1) with 24.43 gram and the treatment without consumption of nitrogen × drought stress of 50% water depletion (N1W3) with the amount of 11.40 gram have produced the highest and the lowest values of shoot dry weight, respectively.

#### 4-3-3. The influence of humidity on different traits of the *Tanacetum parthenium*

The treatment with lack of drought stress ( $W_1$ ) due to the positive effects on leaves index with 6.26 leaves has the highest and the treatment with the drought stress of 50% water depletion ( $W_3$ ) with the number of 3.73 leaves has produced the least number of the leaf in the *Tanacetum parthenium*. The treatment with the lack of drought stress ( $W_1$ ) with 5.46 chlorophylls in each leaf and the treatment with the drought stress of 50% water depletion ( $W_3$ ) with 2.81 chlorophylls in each leaf have the least and the greatest content of chlorophyll, respectively. The treatment with lack of drought stress ( $W_1$ ) with the rate of 1.28 percent and the treatment with the drought stress of 50% water depletion ( $W_3$ ) with the amount of 0.73 percent have respectively the highest and lowest percentage of essence in the leaf. The maximum shoot dry weight is associated to moisture level of 0 percent ( $W_1$ ) about 20.94 and the minimum is allocated to the treatment with the drought stress of 50% water depletion ( $W_3$ ) with the value of 13.28 gram.

#### Conclusion

In this study, 5 different levels of nitrogen (0, 500, 100, 1500 and 2000 mg in each pot) and three levels of moisture (0, 25 and 50 percent soil moisture depletion) have been investigated. Based on the obtained results in connection with the *Tanacetum parthenium* plant, although different levels of nitrogen have no meaningful impact on the the number of leaf, chlorophyll, the amount of essence but its influence on the shoot dry weight was significant. Different levels of the water don't affect significantly on all the considered variables and interactive effect between nitrogen and water in this plant was also insignificant.

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