BEHAVIOR OF SOME GENOTYPES OF MEDICAGO SP. IN THE WESTERN REGION OF ROMANIA

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Abstract: *Lucerne (Medicago sativa L.) is a forage species widely cultivated in temperate regions around the world. The numerous varieties of alfalfa currently available on the European market, create a great difficulty for farmers in choosing the most suitable variety for their needs. Precise information on the morphological characters of the varieties existing on the market and their behavior in relation to the environmental conditions, greatly helps the farmers to make their management decisions. Lucerne (Medicago sativa L.) is one of the most valuable crops of fodder plants due to the high production of green table and the superior quality of the fan, being a very popular fodder culture in Romania. The lucerne fan contains 80% calcium, 0.18% phosphorus, 1.23% potassium, 0.22% magnesium and 0.2% sulfur, mineral salts that recommend it for use especially in dairy cows. Lucerne has a wide variety of uses, being one of the most popular herbs, but also a plant widely used in natural treatments. Lucerne has been grown since ancient times in the territory of our country. Lucerne has been cultivated for millennia. Ancient civilizations, such as Mesopotamia, used to cultivate it. Then it was brought to ancient Greece, Africa and eventually to America, through Spanish colonists. The benefits of growing alfalfa. Lucerne has a great capacity to adapt to various climatic conditions. Due to its long roots, the lucerne can absorb a large amount of water. The objectives of this study were to measure and compare the differences in morphological characteristics of the three different varieties of Medicago sativa L. in three years of cultivation in the Jimbolia area. In the area of Jimbolia there are several lucerne growers, being the only fodder plant cultivated in the area in 2019, and establishing a precedent of measurements and comparisons would help these growers and those in the future to determine if their culture is in the standard norms.*

Keyword: Alfalfa, genotypes, morphology.

INTRODUCTION

Medicago sativa L. (Alfalfa or Lucerne) is a perennial legume. It is native to the Mediterranean basin and southwestern Asia and was one of the first cultivated feed (Cook, B.G. et all. 2005) and it is cultivated in many countries. Farmers mainly cultivate native germplasm (Benabderrahim, M.A. et all., 2015), because they pro-duce their own seeds, but also frequently exchange seeds between them (Julier, B. et all., 2010). Lucerne (*Medicago sativa* L.) is a desired plant in pastures in all temper-ate regions, due to its ability to produce a large amount of feed with a high nutritional quality (even over summer), with a high capacity to fix nitrogen and a root system that has a high level of drought tolerance (Bittman, S, McCartney, DH (1994). Alfalfa can be adapted to different environmental conditions due to its variable genetic basis (Radovic, J. et all., 2009). Morpho-logical measurements, chemical analyses or mechanical harvesting may not al-ways predict the palatability of a feed and, subsequently, the preference of grazing animals for that feed (Baumont, R., 1996; Cougnon, M, et all., 20181). To determine genetic diversity, high-throughput molecular marking techniques and independence from environmental factors can be used to detect variability between populations at the level of ADN. The genetic diversity of alfalfa has been evaluated with different molecular marker systems, including amplified fragment length polymorphism (Keivani, M. et all., 2010), random amplified polymorphism (Nagl, N. et all., 2011), simple

sequence repetition (Sakiroglu, M. et all 2010), and sequence-related amplified polymorphism (Al-Faifi et all., 2013).

Due to its high nutritional quality, alfalfa is one of the most important legumes. The characteristics of lucerne have been improved in the last period, firstly by increasing the capacity of resistance to diseases and stress conditions, such as resistance over winter, resistance to drought and salinity. Lucerne hybrids are a source of chemical compounds with multiple pharmacological activities (Barnes, J. et all., 2002), many chemical compounds present in lucerne being used in the preparation of pharmaceutical products (Massiot, G. et all., 1991).

MATERIAL AND METHODS

Lucerne (*Medicago sativa* L.) is an autotetraploid perennial plant ($2n = 4x = 32$) being a plant belonging to the Fabales order, the Fabaceae family, the *Medicago* genus. Today, alfalfa is considered one of the most widespread and valuable fodder legumes, its nutritional value being of great importance for meat and milk production (Veronesi, F. et all., 2010; Hela Ben Rhouma et all., 2017).

The morphological characters of the plants directly express the genetic construction of a type of plant. The morphological characteristics of flowers, fruits and seeds were the basis of the different classification systems (Smith, S. et all., 1991).

Purpose of the work. The purpose of the paper is to determine the differences of different varieties of Medicago sativa L. in different years of cultivation on the same soil type.

The experimental variants used in this work were:

V1 - Theodora variety in the first year of culture

V2 - Cezara variety found in the third year of culture

V3 - Mihaela variety in the fourth year of culture

The objectives pursued for the three studied variants were the following:

-determination of root diameter and root length in Medicago sativa L. varieties

-determining the height of the plants and the number of shoots in the varieties of *Medicago sativa* L.

-determination of leaf length and width in Medicago sativa L. varieties

RESULTS AND DISCUSSIONS

Height growth in varieties *Medicago sativa* L.

It can be observed in figure 1 during the first period a tall plant can be requested or they are the Cezara variety (67 cm), a variety that is cared for in the third year of culture, compared to the varieties Theodora and Mihaela. The value increases were adequate, during the second period, the highest value or are still in Caesar. It may remain constant, because Theodora had a smaller lung growth in the first period (40.40 cm) compared to Mihaela soil (47.83 cm), during a II period for Theodora variety had a growth of 2 cm larger than the Mihaela variety.

In figure 1 it is observed that in the third period the greatest growth is the variety Theodora (36.67 cm) which is in the first year of cultivation, followed by the Cezara variety (33.00 cm) and the Mihaela variety which had the smallest growth (31.50). In period IV it is noted that the Mihaela variety had the highest growth, of 26.33 cm, he being the variety with the smallest growth in the third period, and the variety Theodora, the one that had the highest growth in period III, recorded a length value of 22.83cm. The smallest value of the length, for the IV period, had the Cezara variety of only 19.40 cm.

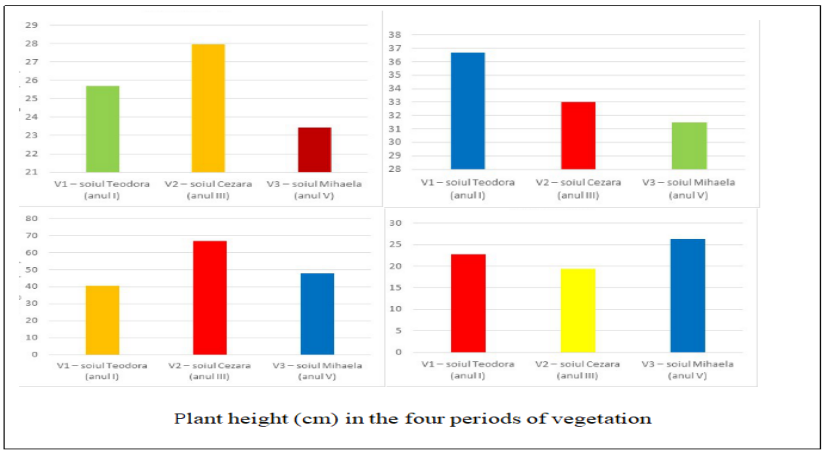

Fig. 1 Height increase in *Medicago sativa* L. varieties during observation periods III and IV

Root growth in roots of *Medicago sativa* L. varieties

It is noted in figure 2 that the largest value of the root diameter, in the first observation period, is the Mihaela variety (year V), of 1.63 cm. The smallest value is recorded in the Teodora variety (year I), 0.26 cm, while in the Cezara variety (year III), the root diameter is 0.97 cm. During the observation period, compared to the first period, it can be observed that the increases in diameter were between 0.05 cm (Teodora variety) and 0.10 cm (Mihaela variety). The Cezara variety had an increase of 0.06 cm.

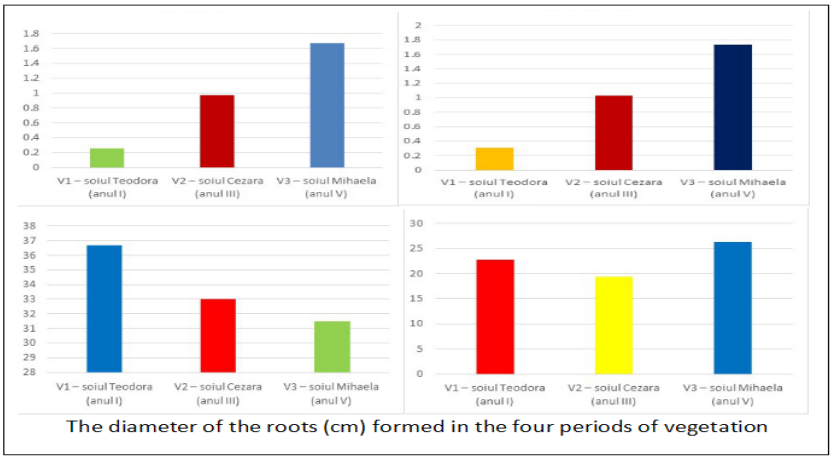

Fig. 2 Root growth in diameter in *Medicago sativa* L. varieties during periods I and II of vegetation

In figure 2 it is observed that the highest value of the diameter of the root in the third period has all the variety Mihaela (1.70 cm), and the smallest value has the variety Teodora (0.33 cm), while the variety Caesar presents a diameter of 1.13 cm. In the IV observation period, compared to the third period, it is observed that the increases in diameter were between 0.02 cm (Teodora variety) and 0.10 cm (Cezara variety). Although the Cezara variety recorded the largest increase in diameter in the interval of the two periods, the largest diameter was, in period IV, the Mihaela variety (1.73 cm), and the smallest in the Theodora variety (0.35 cm).).

Taking into account the diameter of the roots, it is noted that this one is smaller for the variety Theodora, varieties that are in the first in culture, while for the variety Mihaela (V year of culture) the diameter records the highest values. The variety Cezara presents a value of the diameter intermediate to the other two varieties, but in this variety, which is in the third year of cultivation, it can be observed that, on average, the increases in diameter between the studied vegetation periods, are the largest, of 0, 08 cm while in the other two varieties, the growths. In diameter between periods, do not exceed, on average 0.05cm.

Root growth in *Medicago sativa* L. varieties

It is noted in table 3 that the highest value of the root length, in the first observation period, is the Mihaela variety (year V), 44.90 cm. The smallest value is recorded in the Teodora variety (year I), of 14.37 cm, while in the Cezara variety (year III), the root length is 29.57 cm. In the second observation period, compared to the first period, it can be observed that the increases in length were between 0.53 cm (Theodora variety) and 4.00 cm (Mihaela variety). The Cezara variety had an increase of 1.56 cm.

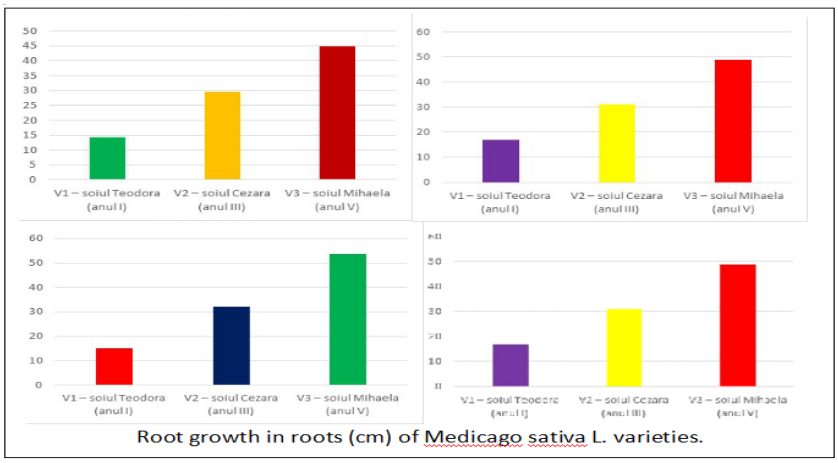

Fig. 3 Root growth in length in populations of Medicago sativa L. during periods I and II of vegetation

In figure 3 it is observed that the highest value of the root length in period III has all the variety Mihaela (53.73 cm), and the smallest value has the variety Theodora (15.00cm), while the Cezara variety presents a length of 32.03 cm. In the IV observation period, compared to the third period, it is observed that the increases in length were between 1.37 cm (Teodora variety) and 1.84 cm (Cezara variety). The Mihaela variety shows a lower value than in the third period, due to the degradation of the measured individuals. Although the Cezara variety recorded the largest increase in diameter in the interval of the two periods, the largest diameter, in the fourth period, was observed in the Mihaela variety (46.60 cm), and the smallest in Theodora variety (16.37 cm).

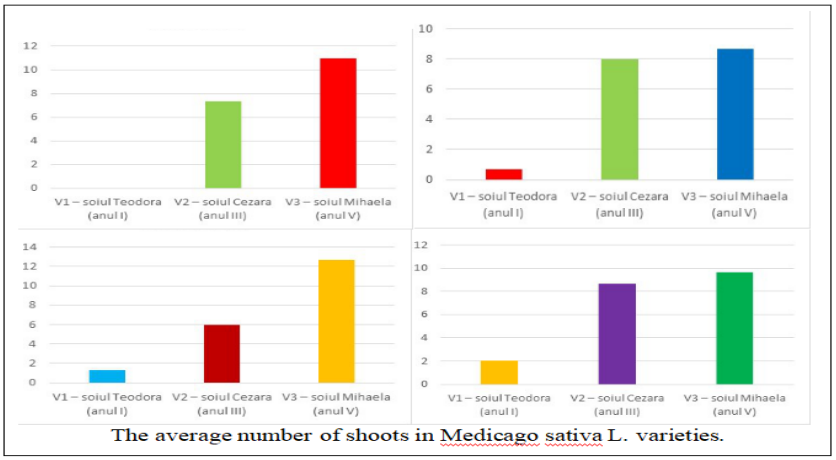

Fig. 4 The average number of shoots in *Medicago sativa* L. varieties during observation periods I and II.

MEDIUM NUMBER OF LEAVES IN VARIETIES OF *Medicago sativa* L.

For this feature, the average number of shoots/plant, we calculated the average of the sprouts sprouted for three plants with the related shoots, for each variety.

Table 4 shows that the average number of shoots in the first period has the variety Mihaela (11.00), followed by the variety Cezara (7.33). It is also noted that the variety Theodora had no shoots during this period. In the second period the number of shoots increases, on average, for the varieties Teodora and Cezara by 0.67, but decreases to the variety Mihaela by 2.33.

In figure 4 it can be observed that the lowest value for the average number of shoots, in the third period, is recorded in the variety Theodora (1.33), and the highest value in the variety Mihaela (12.67), while Cezara variety has an average number of 6 shoots. In the fourth period it is observed that the entire Mihaela variety has the highest value of the average number of shoots (9.67), although unlike the varieties Theodora, (at which the value increased by 0.67) and the Cezara variety (at which the value increased by 2.67), at the Mihaela variety the number of shoots decreased.

Figure 4 The average number of shoots in *Medicago sativa* L. varieties during observation periods III and IV.

The fact that the average number of shoots in the first crop year appeared only after the first crop represents a response of the plant to mowing.

It can also be noted that for the variety that is in the fifth year of culture (Mihaela), the average number of shoots decreases both after the first mowing and after the second.

LENGTH AND WIDTH OF APIC LEAVES IN *Medicago sativa* L. varieties.

Length of apical leaflets in *Medicago sativa* L. varieties. In figure 5 it is observed that the highest value for the length of the apical leaflets in the first period is recorded in the Teodora variety in the first year of culture (3.10 cm), and the smallest value is recorded in the Mihaela variety in the fifth year. of culture (1.20 cm), and the variety Cezara has a value of 2.83 cm. In the second period, the Mihaela variety recorded the lowest value (1.23 cm), but at the same time the only value that increased (0.03 cm), with the varieties Teodora (2.77cm) and Cezara (2.63cm) recording decreases of the value of 0.33 cm, respectively 0.20 cm.

Figure 5 shows that the highest value for the length of the apical leaflets in the third

period is recorded in the Teodora variety in the first year of cultivation (3.00 cm), and the smallest value is recorded in the fifth variety Mihaela. year of culture (1.53 cm), and the Cezara variety has a value of 2.87 cm. In the fourth period, the Mihaela variety has the same value as in the third period (1.53 cm), and the varieties Teodora (2.87cm) and Cezara (2.57cm) have decreases of 0.13cm and 0.30 cm respectively.

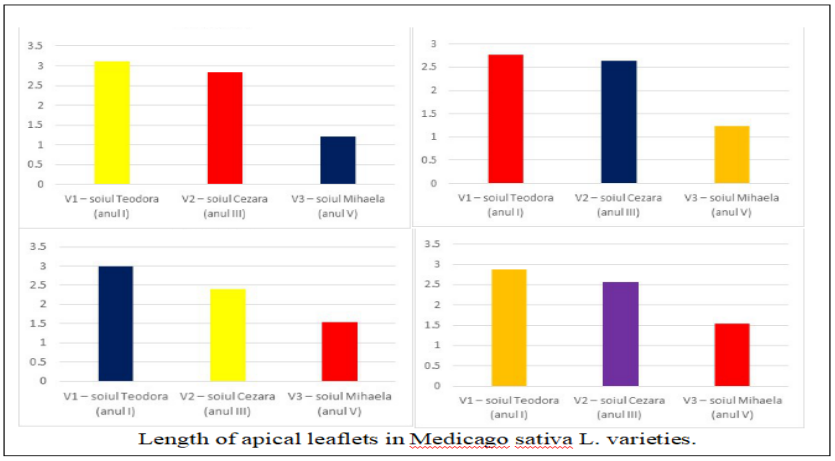

Fig. 5 Length of apical leaflets in *Medicago sativa* L. varieties during observation periods I and II

Length of apical leaflets in *Medicago sativa* L. varieties during observation periods III and IV.

Width of apical leaflets in *Medicago sativa* L. varieties. In figure 6 it is observed that the smallest value for the length of the apical leaflets in the first period is recorded in the Mihaela variety in the fifth year of cultivation (0.63 cm), and the highest value is recorded in the Teodora variety in the first year of culture. (1.53 cm), and the Cezara variety has a value of 1.23 cm. In the second period, all Mihaela varieties recorded the smallest value (0.72 cm), but at the same time the only value that grew (0.09 cm), the varieties Teodora (1.40 cm) and Cezara (1.03 cm) recording decreases of 0.13 cm and 0.20 cm respectively.

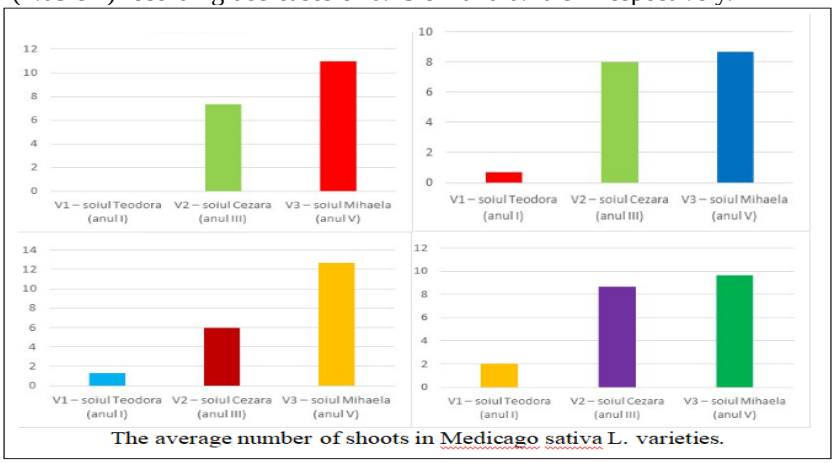

Fig. 6 The width of the apical leaflets in the varieties of *Medicago sativa* L. during the observation periods I and II

Figure 6 shows that the highest value for the width of the apical leaflets in the third period is recorded in the Teodora variety in the first year of cultivation (1.43 cm), and the smallest value is recorded in the Mihaela variety in the fifth. year of culture (0.73 cm), and the Cezara variety has a value of 1.07 cm. In the fourth period, the varieties Teodora (1.30 cm), Cezara (1.03 cm) and Mihaela (0.70 cm) have low values compared to the third period with 0.13 cm (Theodora), 0.04 cm (Caesar), respectively 0.03 cm (Mihaela).

Figure 6 The width of the apical leaflets in the varieties of Medicago sativa L. during the III and IV observation periods. It can be noticed that the size of the leaflets reaches the largest size only before the first mowing, after which the plant generates smaller leaflets. Also, it can be noted that the size of the apical leaflets is inversely proportional to the number of shoots of the plant.

CONCLUSIONS

The highest increase in height of the plants had before the first sowing after the exit of winter, the highest growth being recorded in the variety that is in the third year gives culture (Cezara).

Both after the first and after the second crop, the growths are approximately equal regardless of the variety and the year of cultivation.

The increase in the diameter of the roots for the Teodora variety, which is in the first year of cultivation, is on average smaller compared to the other two varieties, Cezara and Mihaela, which are in the third year, respectively V of culture.

Root diameter increases are more evident after the first sowing compared to the second sowing, in all varieties.

Root length increases are less evident for Theodora variety found in the first year of cultivation, being 2 cm between period I and period IV (from 14.37 cm to 16.37 cm).

The growths are much higher for the varieties in cultivation for several years, they are about 4 cm for the Cezara variety (the third year of cultivation), respectively about 12 cm for the Mihaela variety.

The average number of shoots is growing especially for the first two varieties, Teodora and Cezara, which are in the first and third year of cultivation. For the Teodora variety, the average number of shoots increases from 0 (period I) to 2 (period IV), and for the Cezara variety, from 7.33 (next period) to 8.67 (period IV).

The average number of shoots for the Mihaela variety decreases after each seam, the mowing negatively affecting the average number of shoots.

Both the length and the width of the leaflets are always greater, regardless of the period, for the variety Theodora (first year of cultivation), compared to the other two varieties. The lowest values for these two characteristics for the Mihalea variety (5th year of culture).

Considering that the number of shoots and the leaf surface (the length and width of the leaflets) greatly influence the biomass production it is recommended that after the fifth year, at least for the Mihaela variety, the crop should be returned because the number of shoots decreases both after the first crop, and after the second stitch. Also, even though the leaf surface is almost constant, from one studied period to another, this is always lower compared to that of the varieties found in the first year (Teodora) and III (Cezara) of culture. and by default, the production decreases.

All these aspects negatively influence production, and maintaining culture under these conditions entails additional costs that are not economically justified.

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