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ASPECTS ON THE INFLUENCE OF CROP TECHNOLOGY ON ALFALFA PRODUCTION

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Abstract
Feed production in the context of environmental protection has a special role in sustainable agriculture. The constant monitoring of soil parameters and promotion of integrated fertilization in the farms from Dambovita county are efficiently from agro-productive and agro-ecological points of view. The alfalfa, often called by botanists "the parent of all plants", is considered one of the most valuable fodder crops in the world, being nicknamed the "green feed of the millennium". This name reflects not only its nutritional value, also reflects its significant contribution to the sustainability of agricultural systems. Through its regenerating capacity, improve soil structure and reduce dependence on chemical fertilizers, the alfalfa has an essential contribution for an ecological and efficiently agriculture system. This study reflects aspects related to the influence of crop technology, especially soil fertilization, on the production of alfalfa in the agroecosystem of Nucet village, in Dambovita county.

Keywords: efficient utilization, energy system, energy

1. INTRODUCTION

In the current context, marked by the continuous growth of the global population and the increasing effects of climate change, feed production represents an strategical importance in supporting of the livestock sector. Both globally and in Romania, feed production is an essential component for ensuring adequate animal nutrition, but this must be carried out with respect for the principles of sustainable development. Thus, environmental protection and biodiversity conservation become fundamental objectives in the development of feed crop technologies.
In Romania, the areas occupied by perennial grassland species are considerable, being well adapted to local pedoclimatic conditions.
These species capitalize efficiently the potential of the soils and climate, leading to high and quality productions. The choosing of the right varieties, adapted to the specific biotope of each region, has a significantly contribution on the stability and productivity of agricultural systems. Pratological species, especially perennial legumes, play a crucial role in the structure of agricultural crops due to the multiple benefits they offer.
They are frequently included in agricultural rotations, fulfilling the role of jumping piece of soil, due to the positive influence on the physical, chemical and biological soil properties.
Their presence in crop rotation ensures a natural regeneration of the soil and reduces the need for chemical inputs. A major advantage of pratological legumes is that their ability to fix atmospheric nitrogen, through a symbiosis with bacteria from the Rhizobium gender.
In Romania, from the many available forage species, the largest cultivated areas are occupied by alfalfa (Medicago sativa) and red clover (Trifolium pratense).
These two species are extremely valuable from a fodder point of view, offering a constant production of green biomass with a high nutritional value throughout the growing season. The feed obtained from these species are distinguished by excellent palatability and superior digestibility, being appreciated by most domestic animal species.
In addition to nutritional value, the choice of species and varieties must meet the requirements regarding feed quality, tolerance to the variable climatic conditions and resistance to diseases and pests.
Also, the cultivation technology must be adapted to local resources – soil, water, equipment, labor force– so as to maximize economic efficiency and ensure sustainable profit. Achieving of a maximum yields requires careful crop management, starting with soil preparation, sowing, crop maintenance and up to the moment of harvesting and preserving the biomass under optimal temperature and humidity conditions, in the form of hay, silage or air-dried hay. Due to its valuable chemical composition, alfalfa (Medicago sativa L.) is considered a plant with multiple benefits, being used since antiquity times both for medicinal purposes and as a basic fodder plant in animal feeding. This species stands out for its rich content of bioactive substances, which gives it an important role in nutrition and health.
The bioactive compounds in alfalfa include natural enzymes, which support digestion and metabolism, as well as beta-carotene, a powerful antioxidant and precursor to vitamin A, which plays a role in maintaining healthy skin, vision, and the immune system. Alfalfa is an excellent source of essential minerals, such as: calcium and magnesium.
This chemical composition makes alfalfa a plant with recognized therapeutic properties, having been used throughout time in phytotherapy to combat anemia, support digestion, reduce inflammation and balance hormones.
Currently, alfalfa extracts are used in dietary supplements, tinctures, teas and products for detoxifying the body. In addition to its nutritional and medicinal value, alfalfa stands out for its high ecological plasticity, which means that it can be grown in a wide variety of pedoclimatic conditions.
This adaptability contributes to its spread in various geographical regions, including areas with a drier climate

or less fertile soils. From the over 60 known species of alfalfa, approximately two-thirds are perennial species and one-third are annuals, which offers varied possibilities for use and integration into agricultural systems, depending on the producer's objectives.
Of all these species, the most important and widely cultivated, both globally and in Romania, is blue alfalfa – Medicago sativa L. In Romania, Medicago sativa L. is the most widespread perennial prairie species, occupying large areas due to its high yields and superior nutritional value of the biomass obtained.

2. STUDY OBJECTIVES

- The assortment diversifying of the alfalfa varieties, by introducing and evaluating genotypes with high productive and adaptive potential;
- Reducing the use of external inputs by capitalizing on the natural capacity of alfalfa to improve soil fertility, due to the biological nitrogen fixation;
- The efficient use of local fertilizer resources, especially organic ones, in order to support sustainable agriculture;
- Correlating production objectives with vegetation factors specific to the agroecosystem in which the observations were made, for a better integration of crop technology into the local environment;
- Expansion of alfalfa genotypes with superior traits – such as high productivity, superior nutritional quality and increased ecological adaptability – based on the determination of general and specific combinative capacity;
- Promotion and consolidation of a sustainable agricultural system, which combines economic efficiency with environmental protection;
- Evaluation of the profitability of alfalfa cultivation following the application of different types of fertilizers, in order to substantiating of some efficient decisions in fertilization management;
- Impact analysis of the of the application of organic and mineral fertilizers on the quantity and quality of alfalfa production in the agro-ecological conditions of the Nucet village, Dambovita county.

3. BIOLOGICAL MATERIAL AND WORKING METHOD

The experiment was monofactorial, arranged according to the block method.
A Factor: - Medicago sativa varieties: a_1 –Giulia; a_2 –Gea; a_3 –Letizia
B Factor: - crop system: b_1 – unfertilized crop; b_2 – crop fertilized with GG (30 t/ha), b_3 – crop fertilized with N:P:K (kg/ha), b_4- crop fertilized with P_2O_5 and K_2O (kg/ha), b_5- crop fertilized with GG, P_2O_5 and K_2O (kg/ha)

The main varieties of alfalfa grown in Romania – characteristics, performance and prospects

In Romania, alfalfa is one of the most important perennial forage crops, due to its high nutritional value, excellent regeneration capacity and benefits to the soil.

The diversity of cultivated varieties reflects the constant concerns for improvement and adaptation to the varied agro-ecological conditions of the country.
Among the Romanian alfalfa varieties registered in the Official Catalogue of Varieties are Luxin, Luteti, Gloria, Triumf, Adonis, Magnat, Sandra, Madăaina, Daniela, Roxana, Catinca, Mihaela, Teodora, Cezara and Europe. These were imposed in production due to their stability, disease resistance and good yields in various environmental conditions.
The Magnat variety is one of the most cultivated light varieties in Romania, due to its high productivity and consistent quality of fodder. It was highly appreciated by farmers and represented, in 2006, 32% of the total alfalfa seeds produced in the country.
Magnat is made up of six genetic components, three of them come from Romanian germplasm and three from American varieties (W.L. 316, Maverick, Armor).
The Daniela variety, registered in 2000, is an early variety, flowering approximately 5 days earlier than Magnat. It has a high production capacity, both in terms of green mass and forage quality, being especially recommended for pure cultivation.
The Catinca variety, registered in 2006, is characterized by good regeneration capacity, disease resistance, persistence and high productivity. It produces approximately 90 t/ha of green mass and 18 t/ha of hay, with 19.69% protein, 1.03 NU and 72% digestibility. It is suitable for both pure cultivation and mixtures with perennial grasses.

Table 1. The characteristics of the studied alfalfa varieties

Variety	Earliness	Green mass (t/ha)	Hay (t/ha)	Crude protein (% of U.S.)	Digestibility coefficient (%)	Main observations
Magnat	Semi-late	>90	18–20	–	–	Spreading, very productive
Daniela	Precocious	Great	–	–	–	Flowers 5 days earlier than Magnat
Catinca	–	~90	18	19,69%	72%	Recommended in mixtures

D.U. = Dry matter
NU = Nutrient units
Precursor plant: winter wheat.

In the autumn, the soil was prepared for sowing, so the soil was plowing and disking, followed by a tine harrow tillage, equipped with a leveling bar.
The fertilization with chemical fertilizers was carried out as follows: at spring planting, 50 kg/ha of concentrated superphosphate with 42% a.s. was administered; in the

spring, before preparing the seedbed, nitrogen fertilizer was administered in a dose of 50 kg/ha of ammonium nitrate with 33.5% a.s.; in the spring, year 2, as soon as it was possible to go out into the field, nitrogen fertilizer was administered in a dose of 50 kg/ha of ammonium nitrate with 33.5% a.s. Very early in spring, organic fertilizers (manure) were applied to a depth of about 5 cm. At the beginning of March, sowing was carried out, by uniform spreading. Uniform emergence of the plants was observed on April 15.
Harvesting was carried out during the period of full flowering of the plants.
Determinations:
→ *green mass and dry matter production;*
→ *biometric determinations: plant height at the 1st sickle, by measurements on 20 plants, from the base to the lower part of the inflorescence;*
→ *production components of alfalfa plants;*

4. EXPERIMENTAL RESULTS

Green mass production in alfalfa (t/ha) – influences and comparative results

Green mass production (G.M.) expressed in tons per hectare (t/ha) is an essential indicator in evaluating the agronomic performance of alfalfa varieties intended for feeding. It is directly influenced by a series of biotic and abiotic factors specific to the agroecosystem in which the crop is located.
Among the most important factors are:
• Vegetation factors: soil, precipitation, temperature, light and humidity regime;
• Socio-economics factors: access to resources, technical equipment, level of investment in technology and agricultural inputs;
• Applied crop technology: inclusion in rotation, type of fertilization, irrigation regime, plant density, time and frequency of mowing;
• The cultivated variety, with its own genetic production potential, regeneration capacity and tolerance to biotic and abiotic stresses.
In this study, the green mass productions recorded in three alfalfa varieties cultivated for feeding were analyzed. The Magnat variety was used as a control, due to its stable agronomic behavior and recognized morphoproductive qualities.
From a productive point of view, all three studied varieties were distinguished by an excellent capacity for regeneration after mowing, plant uniformity, dense foliage and high ecological adaptability.

Table 2. MV production (t/ha) - Year 1

No. lime	Variant (variety)	Scythe I	Scythe II	Scythe III	Mediate	% compared to control
1	Magnat	34,1	30,1	14,6	26,26	100
2	Daniela	33,8	28,1	13,5	25,13	96
3	Catinca	32,0	26,8	14,1	24,3	93
4	Average per scythe of the 3 varieties	33,3	28,3	14,0	25,3	-
5	Production breakdown by scythe (%)	44,0	37,41	18,57	100	-

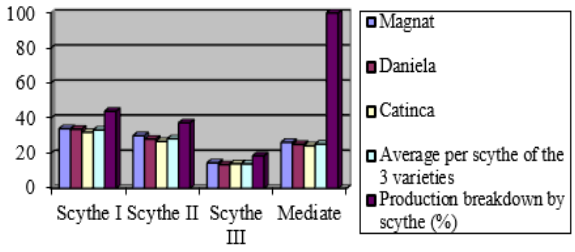

Figure 1. MV production (t/ha) - Year 1

In the first year of observations, 3 mowings were carried out on all cultivated alfalfa varieties.
Compared to the control variety (Magnat variety), the annual increases in M.V. production were lower by approx. 4-7%, the highest amount of biomass being recorded for all varieties at the first mowing, due to favorable weather conditions.
From a quantitative point of view, as well as the good regeneration capacity, it is found that at the second mowing the values were significant compared to the last mowing.
At the third mowing the values recorded were half of the first mowing.
If we analyze the evolution by varieties, the Magnat alfalfa variety stands out with a production of 26.26 t/ha of green mass (average of the three mowings), followed by the Daniela variety with 25.13 t/ha.
The total annual average of the 3 varieties is 25.3 t/ha, totaling a total of approx. 80 t/ha.
The evolution of biomass production in the first year of analysis is also observed in the figure above.
Also, unfavorable weather conditions determined reduced quantities of green fodder production at the last mowing.
The table 2 presents the values of green mass production (t/ha) obtained in the three successive harvests for three alfalfa varieties: Magnat (control), Daniela and Catinca. The total average per variety, the general average per harvest and the percentage distribution of production per harvest are also shown.
The experimental variants show:
1. *Magnat variety* – control variant.
It recorded the highest values in all three harvests, the average production was 26.26 t/ha, thus establishing a standard of 100% in relation to the other varieties. Its balanced and constant behavior in all harvests emphasizes its vegetative vigor and high regeneration capacity.
2. *Daniela variety* it recorded a total average of 25.13 t/ha,

i.e. 96% compared to the control.
Although close to Giulia, it shows slight decreases at each mowing, especially at the second and third (28.1 and 13.5 t/ha). It is a variety with good potential, but slightly more sensitive in the post-mowing recovery phases.
3. *Catinca variety* Total average: 24.3 t/ha – 93% compared to the control.
Although it has a slightly better harvest III than Daniela (14.1 t/ha), it records lower values in harvests I and II.
It may be indicated in crop systems with a lower rate of exploitation or in combination with grasses.

Table 3.
Average production per scythe and percentage distribution

Scythe	Average production (t/ha)	Percentage of total (%)
Scythe I	33,3	44,0%
Scythe II	28,3	37,41%
Scythe III	14,0	18,57%
TOTAL	75,6	100%

It is observed that the first scythe contributes decisively to the total production, with almost 45% of the green mass, followed by the second scythe with 37%, and the third scythe brings only 18.5% of the total. This distribution is typical for alfalfa, reflecting the gradual loss of vigor during the season and the negative influence of high summer temperatures on regeneration.
Thus, Magnat remains the most productive variant, suitable for intensive exploitation and frequent scythe, due to its good regeneration capacity, and the Daniela and Catinca varieties, although less productive, can be used in moderate technological systems or in association with adapted fertilization, to optimize the quality of the forage. The exploitation strategy should focus on the maximum use of the first scythe, which concentrates almost half of the total production.

Evolution of biomass production in the second year of observation

Similar to the first year of study, the control variety Magnat stood out in the second year of observations by having the highest biomass production among the three varieties analyzed.
The analysis of production per scythe highlights the fact that the first scythe generated the highest amounts of green mass, while the fourth scythe was the least productive for all experimental variants.
According to the data presented in the table below, the total average production for the four scythes was 26.32 t/ha, a value calculated on the three varieties studied. For all varieties, scythe I contributed the highest share in the annual production, while scythe IV had the lowest values, which can be explained by the gradual reduction of vegetative vigor and the decrease in regeneration potential in the second part of the growing season.
Regarding the differences between varieties, the control variety consistently outperformed the Daniela and Catinca varieties, recording higher yields in the second year of observation ranging from 2-10%, depending on the scythe. This difference reflects the superior genetic potential of the control variety, but also its better adaptability to local agroclimatic conditions.
The distribution of total production by scythe, expressed as a percentage, was as follows: scythe I: 32%, scythe II: 27%; scythe III: 28%; scythe IV: 13% of total production;
A slight increase in production is observed in the third scythe compared to the second scythe (+1%), an aspect explained by the favorable meteorological conditions, especially the abundant rainfall in the period preceding the third scythe, which supported the regeneration of plants and the accumulation of vegetative mass.
In the second year of observations, the green mass production of the three alfalfa varieties was influenced by climatic and technological factors, but also by the particularities of each variety.
The Magnat variety, which was used as a control due to its longevity and stability, had the highest total biomass production, with an average of 27.42 t/ha, registering a percentage of 100% compared to the control.
In harvest I, the control variety obtained 34.3 t/ha, followed by the Daniela variety with 35.4 t/ha. In this first harvest, the control variety and Daniela had similar yields, while the Catinca variety obtained a lower value of 31.8 t/ha. Harvest II showed a decreasing trend in production for all varieties, and the control variety remained the best performing, with 30.4 t/ha, followed by the Daniela variety with 28.1 t/ha and the Catinca variety with 27.1 t/ha. Harvest III recorded a different behavior compared to the previous harvests, with a similar production between the Magnat and Daniela varieties (31.8 t/ha for the control and 29.9 t/ha for Daniela), and Catinca obtained the lowest value, 27.2 t/ha.
At harvest IV, all varieties recorded significantly lower yields, with the control having 13.2 t/ha, Daniela 14.0 t/ha and Catinca 12.7 t/ha, which aligns with the natural decreasing trend of production during this period. The average green mass yields for the three harvests were 26.32 t/ha (for all varieties).
The average production per scythe was 33.8 t/ha at scythe I, 28.5 t/ha at scythe II, 29.7 t/ha at scythe III and 13.3 t/ha at scythe IV. These data confirm the general trend of decreasing production as the season progresses, with the exception of scythe III, which recorded a slight increase compared to scythe II.
The distribution of green mass production per scythe was as follows: scythe I: 32%, scythe II: 27%, scythe III: 28%, scythe IV: 13% of the total production.
These percentages indicate that the first two scythes (I and II) had a significant share in the total production, and scythe IV, being one with much lower production, contributed only 13% to the annual total.
Regarding the comparison between varieties, the control had a constant and superior performance, with an average annual production of 27.42 t/ha, followed by Daniela with 26.85 t/ha and Catinca with 24.70 t/ha.
The Magnat variety recorded the highest percentage of

total production, with values of approximately 100% (control). Letizia, although less productive, presented a constant decrease in production in each mowing, with a difference of approximately 10% compared to the control variety. Thus, the control variety Magnat remains the most productive and most adaptable under the observed conditions, and Daniela could represent a good alternative for farmers who want a high production of fodder.
The Catinca variety behaved more modestly, which suggests that it is not as efficient compared to Giulia and Gea, but could be considered for areas with less favorable conditions.
In general, the productions observed this year were significantly influenced by climatic conditions and the technology applied, and the results show a general trend of decreasing biomass production as the season progresses, with the best yields obtained in the first cut.

Table 4. MV production (t/ha) - Year II

No. var.	Variant (varieties)	Scythe I	Scythe II	Scythe III	Scythe IV	Mediate
1	Magnat	34,3	30,4	31,8	13,2	27,42
2	Daniela	35,4	28,1	29,9	14,0	26,85
3	Catinca	31,8	27,1	27,2	12,7	24,70
4	Average per scythe of the 3 varieties	33,8	28,5	29,7	13,3	26,32 (total ≈105)
5	Production breakdown by scythe (%)	32	27	28	13	100

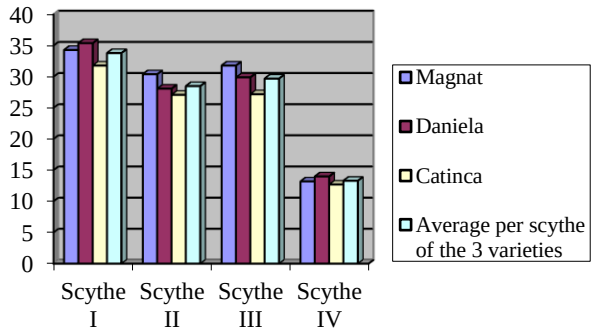

Figure 2. MV production (t/ha) - Year II

Alfalfa plant height –an important factor in assessing productive potential

Plant height is an essential agronomic indicator, directly influencing both the volume of biomass and the quality of the forage obtained.
This characteristic varies considerably depending on the variety cultivated, the environmental conditions specific to each agricultural year, but also on the technology applied in the crop (fertilization, density, irrigation, etc.).
Taller alfalfa plants tend to develop a greater number of branches and leaves, which generally leads to an increase in the quantity and quality of green mass. In addition, a well-developed plant has the ability to accumulate more crude protein, thus presenting a higher nutritional value in fodder. To assess plant height, direct measurements were taken on 20 plants from each experimental variant.
The measurement was performed 1–2 days before harvest, in order to accurately reflect the final stage of plant development, avoiding last-minute influences caused by weather phenomena or technological interventions. Height was determined from the base of the plant to the lower part of the inflorescence, a standard method used in pratological research for the morphological characterization of alfalfa varieties.
The recorded values highlighted clear differences between the analyzed varieties, as well as variations between years, influenced by: water availability (natural precipitation or irrigation); average temperature during the active growth period; level of fertilization applied; plant density and the degree of competition between them.
The control variety Magnat, known for its vegetative vigor and tall habit, recorded the highest values of average height, thus demonstrating its superior production potential. This aspect is also reflected in the total green mass production, where the control was consistently the leader. In contrast, the varieties Daniela and Catinca presented slightly lower heights, but still corresponding to the requirements for a valuable forage alfalfa. The differences are not only quantitative, but also influence the distribution of mass between leaves and stems, which can have effects on the digestibility and palatability of the resulting forage.
Plant height is a relevant agronomic parameter, which closely correlates with the biomass volume and forage value of alfalfa varieties.
The differences between varieties provide useful information for the choice of genotypes depending on production objectives (quantity vs. quality).
The Magnat variety remains a benchmark in terms of plant height and overall agronomic performance.
It is recommended that height be analyzed annually, in parallel with other parameters (density, number of stems/m², protein content) for a complete evaluation of the crop.

Table 5. Plant height (year 1) – Magnat variety

No. crt	Harvest cycle	Harvest date	Harvest height (cm)
1	Scythe I	14.05	120
2	Scythe II	18.06	95
3	Scythe III	11.09	77

Table 6. Plant height (year II) – Magnat variety

No. crt	Harvest cycle	Harvest date	Harvest height (cm)
1	Scythe I	13.05	118
2	Scythe II	11.06	111
3	Scythe III	05.08	96
4	Scythe IV	25.09	81

During the two years of observations, the Magnat alfalfa variety showed significant variations in plant height from one harvest to another. This variability is determined

primarily by the genetic peculiarities of the variety, but is also deeply influenced by the ecological factors specific to each vegetation period – in particular the precipitation regime, air temperature and soil water reserves.

The influence of climatic factors on plant height

In the spring (May), at the first mowing, the highest plant heights were recorded. This is explained by the fact that the plants benefit from sufficient water reserves in the soil, accumulated during the winter; temperatures are moderate, favoring an active growth rate; plant density and vigor are maximum after regeneration from the cold season.

During the summer period (July-August), when the air temperature increased considerably and precipitation was low or non-existent, a significant reduction in plant height was observed. Water stress slowed down the growth process, leading to shorter stems and weaker vegetative development.

The last mowing, carried out in September, was characterized by the lowest height values. This is a normal trend, considering:

- the reduction in day length and the decrease in temperatures;
- the biological effort accumulated by the plants during the vegetation season;
- the low water and nutrient reserves in the soil, after several vegetation cycles.

Plant height is closely correlated with biomass yield:

Taller, well-branched plants contribute to a higher density of green mass;

The high shoot-forming capacity of the Giulia variety, together with its considerable height in the first part of the season, determines high forage yields;

This morphological characteristic recommends the Giulia variety for intensive crops and the Magnat variety is distinguished by a high average height (~90 cm) and good ecological plasticity, adapting efficiently to various climate and soil conditions.

Maximum height values are constantly recorded in the first part of the season (May), when vegetation conditions are optimal.

Limiting factors, such as thermal and water stress, negatively influence growth in the summer months.

Plant height remains an important indicator for estimating production and forage quality, being an essential criterion in the selection of varieties for commercial crops.

Table 7. Alfalfa plant height, Magnat variety (consecutive years)

No. crt	Scythe	Harvest date (Year I)	Height (cm) – Year I	Harvest date (YearII)	Height (cm) – Year II
1	I	14.05	120	13.05	118
2	II	18.06	95	11.06	111
3	III	11.09	77	05.08	96
4	IV	–	–	25.09	81

In both years, the first mowing (May) recorded the highest plant height, confirming that the beginning of the growing season offers the best ecological conditions for growth: fertile soil, moderate temperatures, long light period.

The height of the plants gradually decreased in the following mowings, which is normal, due to:

decrease in soil fertility after successive harvests.

In the first cut, the difference in height between years is insignificant (only 2 cm), which suggests that the ecological conditions (especially climatic) were similar in March–May in both years.

In the second cut, however, a significant difference of 16 cm is observed in favor of year II – a sign that during June, in the second year, the plants benefited from better hydration and more balanced temperatures.

For the third cut, year II provided a significantly higher growth (96 cm compared to 77 cm) – a clear indication that rainfall was more abundant in July of the second year.

The fourth cut occurs only in year II, being possible due to a longer growing season or an adapted cutting strategy. Although the average height was lower (81 cm), this additional harvest contributes to the total annual production.

Thus, the Magnat variety is distinguished by a high average height (over 100 cm at the first two mowings), which makes it valuable from a fodder point of view. Annual variations in height reflect the impact of meteorological factors – especially precipitation – on the morphological development of alfalfa. Year II was, overall, more favorable for vegetative development, especially in June and August. The possibility of a fourth mowing in the second year indicates a prolonged vegetation period or efficient plant regeneration, which increases the profitability of the crop.

Morphophysiological peculiarities of observed alfalfa varieties. The impact of leaves and stems on the production and quality of fodder

Alfalfa leaves and stems play a fundamental role in determining both the quantity and quality of forage production. Cultivation technology, including fertilization and irrigation, influences the dynamics of the leaf/stem ratio.

Leaves are the most important component of the alfalfa crop, as they represent a large part of the total harvested biomass, having a higher nutritional content than stems.

Leaf-based feed is much more valuable from an animal nutrition point of view, having a direct impact on the growth and development of animals. A rich and well-developed foliage leads to a significant increase in the amount of leaves harvested, therefore a better quality of the feed. A dense and healthy foliage not only enriches the feed with essential nutrients, but also contributes to higher digestibility.

Leaves can also significantly influence yields, as their structure allows for efficient gas exchange and greater sunlight capture. These processes are essential for photosynthesis, generating a higher biomass product.

The stems are not as valuable as the leaves in terms of their nutritional content, as they have a fibrous structure and are harder than the leaves, having a lower content of nutrients.
They are less digestible and less valuable from a nutritional point of view, however, they are important for completing the vegetal mass of the crop and for obtaining a high forage production.
The Magnat variety, which has a high sprouting capacity, regenerates quickly after each mowing and produces large amounts of green mass, having a high-quality leaf structure.
It is a variety with rich leaves and thin stems, which can positively influence the production of fodder and significantly increase its nutritional quality.
Leaves, stems, cultivation technologies, such as irrigation and organo-mineral fertilization, are determining factors that can increase alfalfa production, especially in terms of plant vigor and rapid foliage regeneration. Also, the genetic peculiarities of alfalfa varieties, such as the Magnat variety, are also essential for obtaining high yields of high-quality forage.

Table 8. Morphophysiological characteristics of alfalfa varieties (year 1)

No. crt	Variant	Vigore♣	Regeneration after mowing♣	Winter hardiness♣
1	Magnat	3	3	2
2	Daniela	2	3	2
3	Catinca	2	3	2

♣ *Grades from 3 (good) to 0 (poor)*

Table 9. Morphophysiological characteristics of alfalfa varieties (year II)

No. crt	Variant	Vigore♣	Regeneration after mowing♣	Winter hardiness♣
1	Magnat	2	3	1
2	Daniela	2	3	1
3	Catinca	2	3	1

♣ *Grades from 3 (good) to 0 (poor)*

The alfalfa plants had good vigor and regeneration in the second year of cultivation. The crop also showed better winter resistance in the second year, especially in the organo-mineral, DASR and N:P:K fertilized variants.

Dry matter production (t/ha)

The production of S.U. (t/ha) depends on the variety used, the cultivation technology, the vegetation factors and varies from one year to another within the same variety. A higher amount of dry matter was recorded in the second year of cultivation.
The average S.U. (t/ha) for the three varieties of alfalfa was 15.82 t/ha, with small variations from one variety to another, but large from the unfertilized to the organo-mineral fertilized variant

Table 10/ S.U. production (t/ha)

No. crt..	Variant	S.U. (t/ha)	% compared to control
1	Magnat	16,22	100
2	Daniela	15,85	97,71
3	Catinca	15,40	94,94

Influence of fertilizers on dry matter production (t/ha)

Following the analysis of dry matter (D.M.) production during the two years of observation, for the Magnat variety, results were obtained that clearly reflect the influence of different types of fertilization on the yield. Thus, from the average of the two years, the following distribution of D.M. production was found for variant V1 - unfertilized soil and for the other fertilization variants.
The maximum production was recorded in the organically fertilized variant with 30 t/ha of manure. This variant produced the best yields in terms of dry matter. Fertilization with manure was effective due to the supply of organic nutrients and the improvement of soil structure, which allowed for a healthier and more vigorous growth of the alfalfa plants.
The production increase obtained in this variant proved to be significantly higher compared to other variants, confirming the importance of organic fertilization in optimizing alfalfa production.
The lowest production was recorded in the mineral-fertilized variant with phosphorus and potassium (N:P:K). Although mineral fertilization can add essential nutrients, especially for root and stem development, the results were more modest compared to the organic variant. This suggests that, in the case of alfalfa, nutrients from organic fertilizers can contribute more effectively to improving yield and quality of production, due not only to the supply of nutrients, but also to improving the soil's ability to retain water and support microbiological activity. Based on observations from the two years of experimentation, organic fertilization with 30 t/ha of manure proved to be the most effective in stimulating dry matter production in the Magnat variety, recording the best yields. In contrast, mineral fertilization with phosphorus and potassium (N:P:K) had a less significant impact, providing low yields compared to the organic variant.
These results emphasize the importance of organic fertilization as a priority strategy for obtaining high and quality yields in alfalfa crops, recommending its use instead of exclusively mineral fertilization to maximize the agricultural potential of the soil.

Table 11. Influence of fertilizers on U.S. production (t/ha)

No var.	Variant*)				Production (t/ha)	%	d (t/ha)
	GG (t/ha)	N (kg/ha)	P (kg/ha)	K (kg/ha)			
1	-	-	-	-	12,35	100	-
2	30	-	-	-	15,10	12,4	2,75
3	-	50	50	50	12,92	104,6	0,57
4	-	-	50	50	12,10	97,9	0,25
5	10	-	50	50	13,00	105,2	0,65

*) P and K doses are expressed in P_2O_5 and K_2O

Following the observations and measurements carried out in the experiment, it was found that organic fertilization had a significant impact on alfalfa production, compared to the control (unfertilized) variant. More precisely, plots fertilized with 30 t/ha of well-fermented manure recorded a significant increase in production, of approximately 22% compared to the control variant.

This confirms that organic fertilization contributes considerably to increasing the amount of dry matter and, implicitly, to improving the productivity and quality of the forage.

The organically fertilized variant with 30 t/ha of well-fermented GG recorded the best results, with a production increase of approx. 22% compared to the control variant, which underlines the efficiency of manure as a natural fertilizer, which provides not only essential nutrients, but also a significant improvement in soil structure.

Additional benefits of organic fertilization include enriching the soil with organic matter, which increases water retention capacity and improves soil microbiological activity.

In the case of the organo-mineral fertilized variants with organo-mineral fertilizer mixtures, the yield increases were smaller but significant compared to the control variant. This suggests that mineral nutrients had a positive effect on production, but organic fertilization alone had a greater impact on overall plant health and forage production.

The N:P:K fertilization variant had the lowest yield increase compared to the other fertilization variants. Although this combination of mineral fertilizers had positive effects on plant development, the results suggest that exclusively mineral fertilization is not sufficient to achieve the highest yields, especially in the context of alfalfa, which benefits significantly from organic fertilizers.

Organic fertilization with well-fermented manure proved to be the most effective in increasing alfalfa production, with a significant increase of about 22% compared to the control variant, while organo-mineral and N:P:K fertilizers generated smaller increases. This result highlights the importance of organic fertilization in maintaining healthy soil and obtaining higher quality yields, especially for crops such as alfalfa, which benefit from the supply of organic matter.

5. CONCLUSIONS AND RECOMMENDATIONS

Following the theoretical and experimental study carried out on the alfalfa crop, the following essential conclusions and recommendations were drawn for improving feed production, as well as for efficient management of the crop in the ecological conditions of the region:

1. Performance in the second year of cultivation

In the second year of cultivation, all three alfalfa varieties recorded higher yields compared to the first year, due to favorable factors such as:

• Good plant regeneration capacity.

• Very good winter hardiness, which allowed a rapid resumption of vegetation in spring.

• Favorable ecological conditions, especially appropriate temperature and precipitation.

These factors contributed to high productivity in the second year of cultivation, which demonstrated the potential of the varieties to adapt to variable climatic conditions.

2. Uniformity of dry matter production

Regarding dry matter production (t/ha), it was uniform throughout the two years of observation, with close values each year. This uniformity suggests a stability in the productive behavior of the varieties and indicates that the applied cultivation technology was adequate for obtaining constant yields.

• The share of dry matter production per scythe showed annual and between varieties variations. In general, the first scythe had the highest dry matter yields, and the scythes in the summer recorded lower quantities due to drought and more difficult weather conditions.

3. Behavior of the Magnat variety / control

The Magnat variety (control) showed a decrease in plant height throughout the growing season, which is a natural behavior of the plant as it ages and consumes stored resources. This was more pronounced in the second part of the growing season, especially in the June, August and September harvests, when ecological conditions became more challenging.

4. Impact of organic and mineral fertilizers on production

The Magnat variety was studied under the influence of organic and mineral fertilizers, and the results demonstrated the following:

• In the first year of experimentation, dry matter production was lower, compared to the second year, suggesting a cumulative effect of long-term fertilization.

• In the second year, dry matter production was significantly higher, with the best results obtained in the variant fertilized with 30 t/ha of manure. This confirms the importance of organic fertilization for maximizing alfalfa production, especially in regions where the soil benefits from organic matter input.

5. Winter hardiness and regeneration vigor

All the studied varieties had very good winter hardiness, which ensured rapid regeneration in spring and efficient recovery after each mowing. Also, good regeneration vigor, which suggests an excellent ability of the varieties to sprout quickly and reach large sizes, even after repeated harvesting.

6. Recommendations for agricultural practices

Based on the results obtained, the following recommendations are formulated for the improvement and expansion of alfalfa cultivation in Dâmbovița County and beyond:

• Organic fertilization with 30 t/ha of fermented manure is extremely effective and should be encouraged in regions where this type of fertilization is available. Organic fertilization adds essential nutrients and improves soil structure.

• Periodic irrigation during drought periods will ensure higher forage yields and higher quality, especially in summer climatic conditions.
• It is recommended to expand the cultivation of alfalfa varieties with a high capacity for green mass and seed production, such as indigenous varieties, which are resistant to drought and extreme temperatures.
• These varieties, adaptable to local conditions and with superior perenniality, can significantly contribute to increasing cultivated areas and increasing the production of quality fodder, which can support animal husbandry in a sustainable way.
• Mixtures between alfalfa and grasses are recommended to obtain a more resilient crop and a more diversified fodder product. These mixtures will ensure faster growth and better productivity throughout the season.

The study highlights the importance of applying appropriate alfalfa cultivation technology, with an emphasis on organic fertilization, irrigation and the choice of high-performance varieties. By implementing these measures, a sustainable increase in fodder production and an improvement in their quality can be ensured, which will contribute to the development of efficient and sustainable agriculture in Dâmbovița County and other similar regions.

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