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The influence of mixture structure and management on competitiveness and productivity of some forage species

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✓ INTRODUCTION

Seeded grasslands are an important source of forage which in adequate technological condition can lead to an important increase in forage productivity and quality but also to the sustainability of the agricultural system.

On the establishment of sown grassland one must take into account and to analyze the peculiarities of each species participating in the mixture.

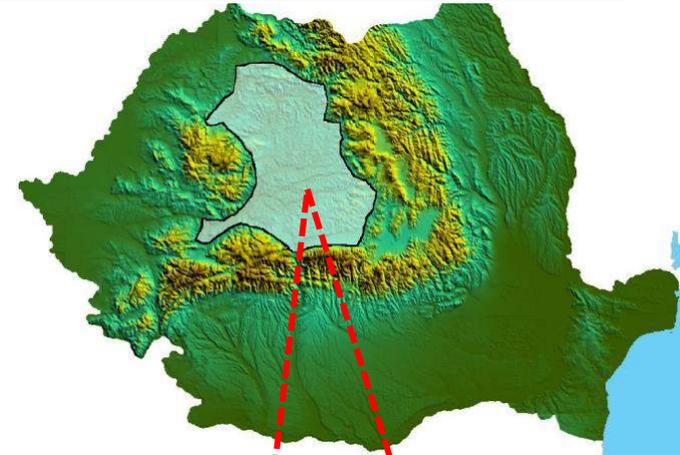
Understanding the competition phenomena, especially for nutrients and space (space dimension) is an important issue leading to technology improvement.

WHY THIS RESEARCH TOPIC?

The climatic conditions specific to Transylvania Plain has drawn a proper environment for the development of agriculture which constitutes the second area as percent and importance in the local economy.

In Transylvania Plain studies are still required in order to highlight the most suitable forage mixture for the soil-climatic condition specific to this area.

This are needed to help the farmers especially in the actual context when both plant and animal sectors have good perspectives for development.





Mixture structure

Feeding space (species were sown on two different distances between rows: 12,5 cm and 25 cm)

Nutrients consumption (the experimental plots were treated with mineral fertilizer (NPK))



✓ MATERIAL AND METHODS

BIOLOGICAL MATERIAL

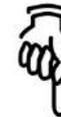


Two forage mixtures:

➤ *Trifolium pratense* (15%), *Lolium perenne* (20%), *Festulolium* (25%), *Phleum pratense* (15%) and *Dactylis glomerata* (25%)

➤ *Trifolium pratense* (10%), *Medicago sativa* (30%), *Lolium perenne* (10%), *Festulolium* (25%), *Phleum pratense* (15%) and *Dactylis glomerata* (10%)

RESEARCH METHODS



- Productivity -> GRAVIMETRIC METHOD
- Floristic composition
- Statistical interpretation -> POLIFACT



The experience was installed in the spring of 2012 in the field of Agricultural Research-Development Station, Turda, Romania.



The experimental field was installed after the subdivided parcel method in 16 variants / 4 replications.



The forage mixtures were sown on two different distances between rows, namely 12,5 cm and 25 cm and were fertilized with NPK in four doses as follows (Figure 1):



V₁- control variant,
unfertilized

V₂ – fertilized
with N₅₀P₆₀K₈₀

V₃ – fertilized with
N₇₅P₆₀K₈₀

V₄ – fertilized with
N₁₀₀P₆₀K₈₀



Figure 1. Aspects din campul experimental

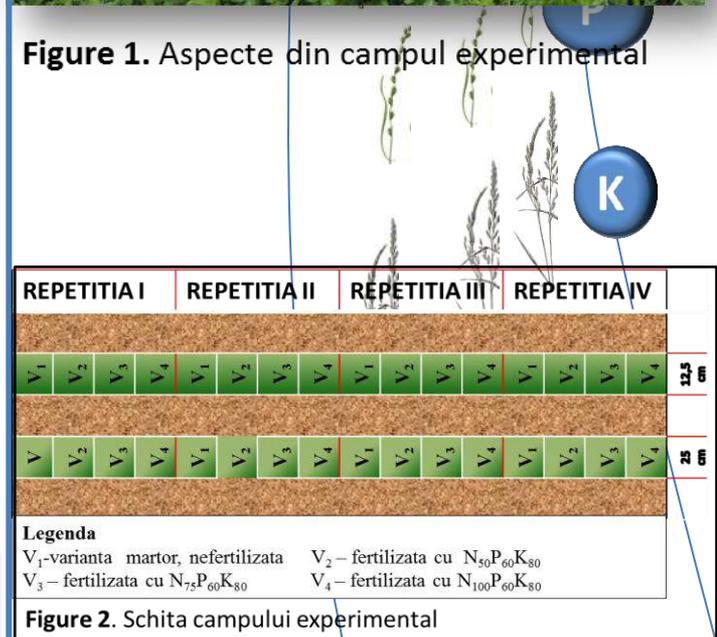


Figure 2. Schita campului experimental



✓ CLIMATIC CONDITIONS

GENERAL CLIMATIC CONDITIONS

CLIMATIC CONDITIONS SPECIFIC TO THE YEAR 2013



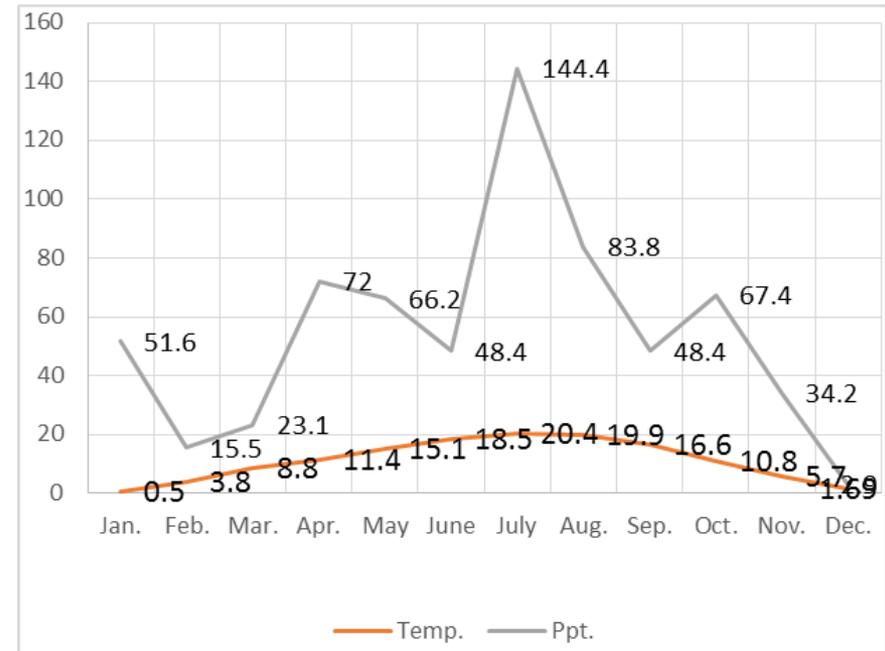
➤ Annual medium temperature of 10.4°C.



➤ Annual precipitations of 523.2 mm.



➤ The soil type is phaeozem argilo iluvial vertic





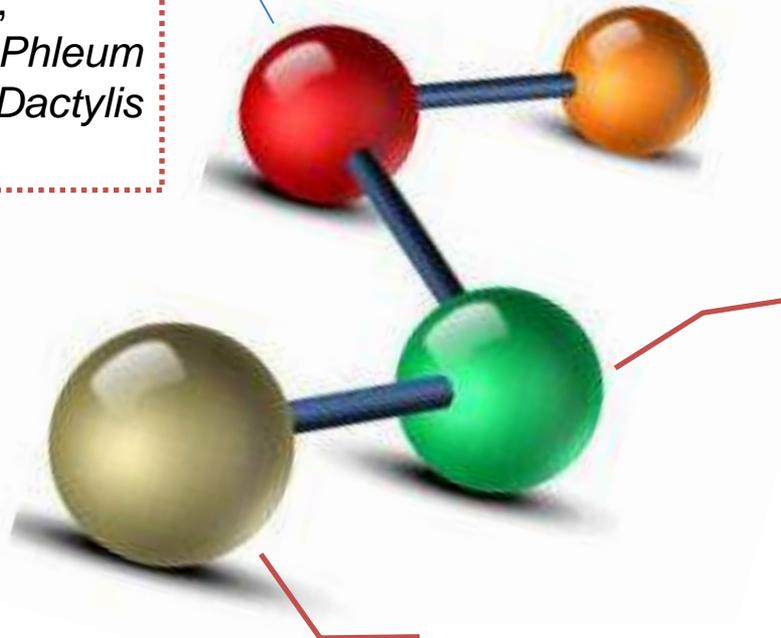
✓ RESULTS

FIRST MIXTURE

- *Trifolium pratense* (15%),
Lolium perenne (20%),
Festulolium (25%), *Phleum pratense* (15%) and *Dactylis glomerata* (25%)

SECOND MIXTURE

- *Trifolium pratense* (10%),
Medicago sativa (30%),
Lolium perenne (10%),
Festulolium (25%), *Phleum pratense* (15%) and *Dactylis glomerata* (10%)



DM PRODUCTION

FLORISTIC COMPOSITION

➤ DM PRODUCTION ON 12,5 cm BETWEEN ROWS

Table 1: DM harvest registered on **FIRST MIXTURE**

Experimental plots	Dry matter production [t/ha]	Percentage [%]	Difference [t/ha]	Significance
V ₁ - 0 kg/ha	12.14	100.0	0.00	Mt.
V ₂ - N50P60K80	12.96	106.8	0.82	*
V ₃ - N75P60K80	12.68	104.4	0.54	*
V ₄ - N100P60K80	15.25	125.6	3.11	***

The highest DM production (15.25 t/ha) was obtained on the variant V4, fertilized with the maximum amount of N.

DL (p 5%) 0.54

DL (p 1%) 0.99

DL (p 0.1%) 2.18

Table 2: DM harvest registered on **SECOND MIXTURE**

Experimental plots	Dry matter production [t/ha]	Percentage [%]	Difference [t/ha]	Significance
V1- 0 kg/ha	12.34	100.0	0.00	Mt.
V2- N50P60K80	14.88	120.6	2.54	**
V3- N75P60K80	14.05	113.9	1.71	**
V4- N100P60K80	13.80	111.8	1.46	**

The highest DM production (14.88 t/ha) was obtained on the variant V2, fertilized with 50 kg/ha N.

DL (p 5%) 0.75

DL (p 1%) 1.37

DL (p 0.1%) 3.04

➤ DM PRODUCTION ON 25 cm BETWEEN ROWS

Table 3: DM harvest registered on **FIRST MIXTURE**

Experimental plots	Dry matter production [t/ha]	Percentage [%]	Difference [t/ha]	Significance
V ₁ -0 kg/ha	10.33	100.0	0.00	Mt.
V ₂ - N50P60K80	11.95	115.7	1.62	*
V ₃ - N75P60K80	11.68	113.1	1.35	*
V ₄ - N100P60K80	13.45	130.2	3.12	**

DL (p 5%) 0.98

DL (p 1%) 1.81

DL (p 0.1%) 4.00

The highest DM production (15.25 t/ha) was obtained on the variant V₄, fertilized with the maximum amount of N.

Table 4: DM harvest registered on **SECOND MIXTURE**

Experimental plots	Dry matter production [t/ha]	Percentage [%]	Difference [t/ha]	Significance
V ₁ -0 kg/ha	11.61	100.0	0.00	Mt.
V ₂ - 50P60K80	13.78	118.7	2.17	**
V ₃ - 75P60K80	13.16	113.4	1.55	**
V ₄ -N100P60K80	13.67	117.7	2.06	**

DL (p 5%) 0.82

DL (p 1%) 1.50

DL (p 0.1%) 3.33

The highest DM production (14.88 t/ha) was obtained on the variant V₂, fertilized with 50 kg/ha N.

➤ FLORISTIC COMPOSITION

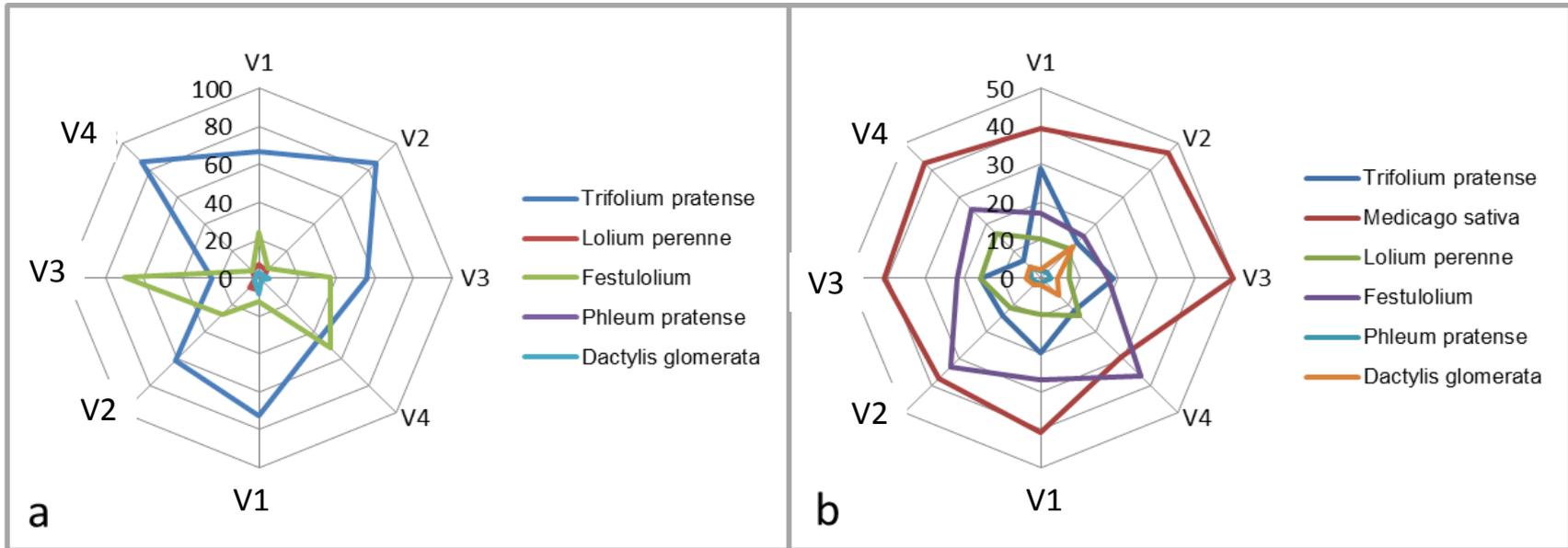


Figure 1a. Floristic composition of the mixture formed by *Trifolium pratense* (15%), *Lolium perenne* (20%), *Festulolium* (25%), *Phleum pratense* (15%) and *Dactylis glomerata* (25%)

Figure 1b. Floristic composition of the mixture formed by *Trifolium pratense* (10%), *Medicago sativa* (30%), *Lolium perenne* (10%), *Festulolium* (25%), *Phleum pratense* (15%) and *Dactylis glomerata* (10%)



✓ CONCLUSIONS

Analyzing *the influence of management on mixtures productivity* we observed that the highest DM productions were obtained on the variants sown on 12,5 cm (on both forage mixtures).

Analyzing *the influence of technological inputs on mixtures productivity* we observed that the two forage mixture reacted different to mineral fertilizer.

Analyzing *the floristic composition of the two forage mixtures studied* we observed that the leguminous sp. showed the highest capacity for competition, dominating grass sp. on almost all experimental variants.



✓ CONCLUSIONS

The results obtained showed a direct relationship between mixture productivity and its floristic composition.

The highest DM production of the first forage mixture studied (15.25 t/ha) was registered on the variant fertilized with the maximum amount of N, variant where ***grass species occupied the highest percent of participation in the grassy carpet.***

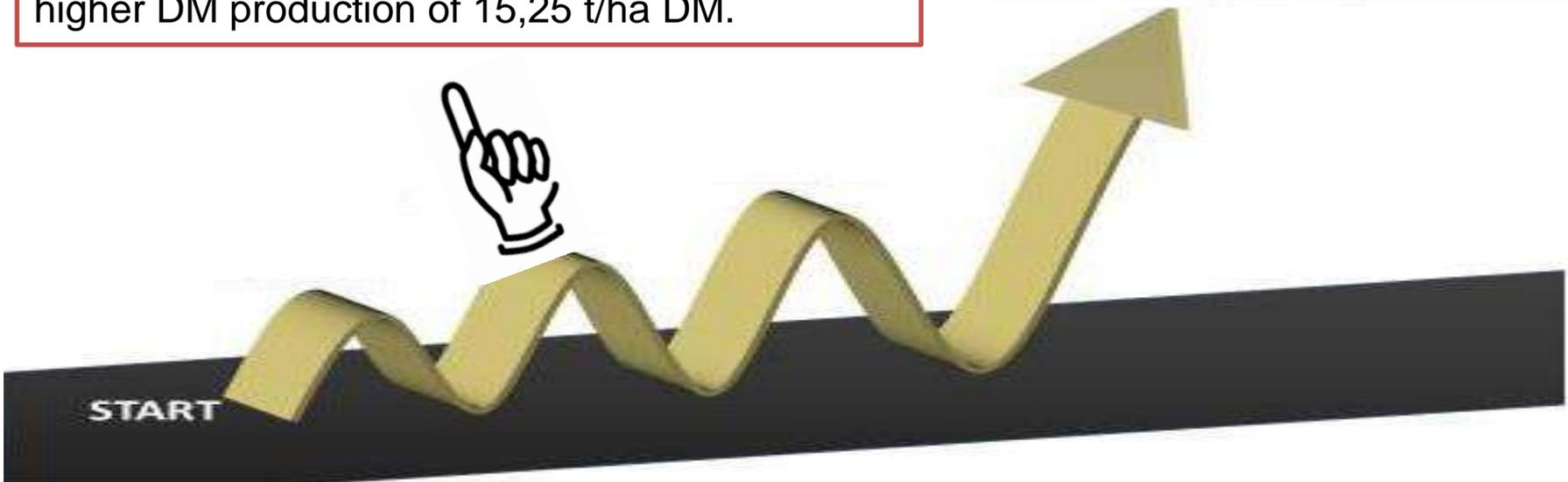
The highest DM production of the second forage mixture studied (14.88 t/ha) was registered on the variant fertilized with 50 kg/ha N, variant where ***grass species occupied the highest percent of participation in the grassy carpet.***



✓ RECCOMENDATION

The results registered showed that the most productive mixture was the first mixture formed by red clover (*Trifolium pratense* (15%)), perennial ryegrass (*Lolium perenne* (20%)), festulolium (*Festulolium* (25%)), timothy (*Phleum pratense* (15%)) and cocksfoot (*Dactylis glomerata* (25%)) on which we reached the higher DM production of 15,25 t/ha DM.

As a technological measure we recommend sown on 12,5 cm distance between rows on which we reached the highest DM yields on all of the experimental plots and fertilization with N100P60K80.





**THANK YOU FOR YOUR
ATTENTION!!!**

