

**UNIVERSITY OF CRAIOVA**

**THE DOCTORAL SCHOOL OF  
*ENGINEERING OF ANIMAL AND VEGETABLE  
RESOURCES*  
FACULTY OF AGRONOMY**

**Eng. DOBRE CLAUDIUS MARIAN**

**Thesis abstract**

**CONTRIBUTIONS ON THE OPTIMUM FERTILIZATION  
SYSTEM AND THE AMENDMENTS DEMAN TO  
TEMPORARY PASTURES IN THE HILLS OF OLTENIA**

**SCIENTIFICALLY COORDINATOR  
Prof. univ. dr. COTIGĂ CONSTANTIN**

**CRAIOVA**

**2019**

## ABSTRACT

**Key words: temporary pasture, fertilization, amendments, system, efficiency**

The research has been emphasized the results of the doctoral thesis topic reached previously, both worldwide and in experimental area, considering as important to improve the technology of temporary pastures.

On the present paper there come together a lot of information on this „sensitive” topic that can be very useful to all those interested in growing yield and temporary pastures quality.

The research has been focused on many aspects, as follow:

- the study of fertilizers and amendments on yield and temporary pastures quality;
- the effect of manure doses and applying method of organic fertilizer on the temporary pastures yield;
- the effect of applying method of nitrogen fertilizers on yield and annual scheduled of temporary pastures.

Between 2016-2018, on the luvisol from A.R.D.S. Simnic – Craiova were laid down the following field trials:

Field Trial 1. The study of the fertilizers and amendments on yield and temporary pastures quality.

The field trial was laid down in spring 2015 at A.R.D.S. Simnic- Craiova and had three factors and four replications.

Factor A – mixture type, with two graduations:

a<sub>1</sub> – *Dactylis glomerata* 60% + *Medicago sativa* 40%

a<sub>2</sub> – *Dactylis glomerata* 30% + *Festuca pratensis* 15% +

*Lolium perenne* 15% + *Medicago sativa* 40%

Factor B – background with three graduations:

b<sub>1</sub> – CaCO<sub>3</sub> 6 t/ha

b<sub>2</sub> – manure 40 t/ha

b<sub>3</sub> – manure 20 t/ha + CaCO<sub>3</sub> 3 t/ha

Factor C – nitrogen fertilization with four graduations:

c<sub>1</sub> – N<sub>0</sub>

c<sub>2</sub> – N<sub>60</sub>

c<sub>3</sub> – N<sub>120</sub>

## Contributions on the optimum fertilization system and the amendments demand to temporary pastures in the hills of Oltenia

---

c<sub>4</sub> – N<sub>180</sub>

The size of each variant were 6 m length, 4 m width, total area 24 m<sup>2</sup> and yielding area 15 m<sup>2</sup>.

The manure well chopped and CaCO<sub>3</sub> amendmants were applied in the previous year autumn by hand spreading and then burried by tillage.

The fertilizing system with phosphorus and potassium (P<sub>50</sub>K<sub>50</sub>) was applied in the previous year autumn and burried by tillage, also.

In 2015 spring, before sowing (near 2 days) it was prepared seed bed using harrow and the combinator.

Sowing was done with mechanical drill SUP-21 on the 12th March after the drill was checked previously.

The seed quantity was calculated (C) kg/ha for each plant specie following the relationship:

$$C = N \times K / 100, \text{ where:}$$

N = seed rate in pure culture (kg/ha)

K = participation percent (%)

Thus, for simple mixture *Dactylis glomerata* 60% + *Medicago sativa* 40% were used next seed rates:

*Dactylis glomerata* – 16,2 kg/ha

*Medicago sativa* – 8,0 kg/ha

For complex mixture *Dactylis glomerata* 30% + *Festuca pratensis* 15% + *Lolium perenne* 15% + *Medicago sativa* 40% were used next seed rates:

*Dactylis glomerata* – 8,1 kg/ha

*Festuca pratensis* – 5,4 kg/ha

*Lolium perenne* – 4,5 kg/ha

*Medicago sativa* – 8 kg/ha

The distance between rows was 12,5 cm. For the mixture were used the next plant varieties:

*Medicago sativa* – soiul Sandra

*Dactylis glomerata* – soiul Olimp

*Lolium perenne* – soiul Marta

*Festuca pratensis* – soiul Postăvar

On the first growin season were harvested two yields of 10 t/ha green mass (g.m.), which was not considered for statistics, but only for economic efficiency.

The nitrogen was splitted applied for each mower. The trial was harvest as fodder using mowing machine.

After mowing of side and frontal areas of the plot which could influence the experimental results, were taken two average samples of 2 kg g.m. each for every variant – replication for dry matter determination and for laboratory analysis.

The results were statistically analized on 2016, 2017, 2018 years using the analysis of varaince for three factors.

Because the luvo soil from A.R.D.S. Simnic has a low humus content on first 20 cm deep (1,8%) and very low in depth (0,48%), it was considered that organo-mineral fertilization is a must.

Using manure exclusively on 40t/ha rate, the yield on three years average was 6,9 t/ha d.m. (dry matter), with a very significant yield increase of 1,8 t/ha d.m. comparatively with the control. On the variant where manure (20 t/ha) was applied together with CaCO<sub>3</sub> t/ha, the yield on three years average was 7,4 t/ha d.m. with a yield increase of 2,3 t/ha comparatively with the control.

Even were applied organic fertilizers and amendments it is necessary to apply nitrogen at 100-150 rate, splitted in 2-3 replications which lead to 8 t/ha d.m. yield. Missing these nitrogen rates, the temporary pastures yield is going to decrease starting with the third year to 2-3 t/ha d.m.

Also, it was observed that legumes keep proper percent of participation on the mixture only in the first two years, then decreasing dramatically to 15-20% in the favor of weeds.

Considering the results of laboratory analysis it was noticed that organic and chemical fertilizers together with amendments lead to the two type of mixtures to considerable improve of fodder quality.

Thus, for the simple mixture (*Dactylis glomerata* 60% + *Medicago sativa* 40%) the raw protein content ranged between 13,6 to 17,3% (average value 15,5%), while for complex mixture (*Dactylis glomerata* 30% + *Festuca pratensis* 15% + *Lolium perenne* 15% + *Medicago sativa* 40%) the raw protein content ranged between 13,8-17,7% (average value 16,1%). Also, the complex mixture has reacted better to organic and mineral fertilization comparatively with simple mixture, the yield difference between them being significant.

## Contributions on the optimum fertilization system and the amendments demand to temporary pastures in the hills of Oltenia

---

Field Trail 2. The effect of manure doses and applying method of organic fertilizer on the temporary pastures yield.

The field trail was laid down in spring 2015 at A.R.D.S. Simnic- Craiova following splitted plots method and had two factors and four replications.

Factor A – the manure applying method with two graduations:

a<sub>1</sub> – under plow

a<sub>2</sub> – sub disk

Factor B – manure doses with four graduations:

b<sub>1</sub> – 0 t/ha

b<sub>2</sub> – 20 t/ha

b<sub>3</sub> – 40 t/ha

b<sub>4</sub> – 60 t/ha

The size of each variant were 6 m length, 4 m width, total area 24 m<sup>2</sup> and yielding area 15 m<sup>2</sup>.

The manure well chopped was applied half in the previous year autumn under plow and the rest of it was applied in the next spring in 2015.

The fertilizing system with phosphorus and potassium (P<sub>50</sub>K<sub>50</sub>) was applied in the previous year autumn and burried by tillage, also.

In 2015 spring, before sowing (near 2 days) it was prepared seed bed using harrow and the combinator.

Sowing was done with mechanical drill SUP-21 on the 12th March after the drill was checked previously.

The seed quantity was calculated (C) kg/ha for each plant specie following the relationship:

$$C = N \times K / 100, \text{ where:}$$

N = seed rate in pure culture (kg/ha)

K = participation percent (%)

The complex mixture included:

*Dactylis glomerata* – 30%

*Festuca pratensis* – 15%

*Lolium perenne* – 15%

*Medicago sativa* – 40%

For complex mixture *Dactylis glomerata* 30% + *Festuca pratensis* 15% + *Lolium perenne* 15% + *Medicago sativa* 40% were used next seed rates:

*Dactylis glomerata* – 8,1 kg/ha

*Festuca pratensis* – 5,4 kg/ha

*Lolium perenne* – 4,5 kg/ha

*Medicago sativa* – 8 kg/ha

The distance between rows was 12,5 cm. For the mixture were used the next plant varieties:

*Medicago sativa* – soiul Sandra

*Dactylis glomerata* – soiul Olimp

*Lolium perenne* – soiul Marta

*Festuca pratensis* – soiul Postăvar

The biological material are originated by N.A.R.D.I. Fundulea, A.R.D.S. Simnic and A.R.D.S. Caracal.

On the first growing season were harvested two yields of 10 t/ha green mass (g.m.), which was not considered for statistics, but only for economic efficiency.

The nitrogen was splitted applied for each mower. The trial was harvest as fodder using mowing machine.

The results were statistically analyzed on 2016, 2017, 2018 years using the analysis of variance for two factors.

In the first year after mowing of side and frontal areas of the plot which could influence the experimental results, were taken two average samples of 2 kg g.m. each for every variant –replication for dry matter determination and for laboratory analysis.

The dry matter was determined by drying plant samples in the oven at 105°C during 5 hours.

Analysing the results of the effect of manure applying method on the yield of temporary pasture, these ranged between 6,1 t/ha d.m. when the manure was buried under plow and 6,3 t/ha d.m. when the manure was buried under disk. No significant difference was noticed.

Once manure doses have increased, the yield increased also. Thus, at 40 t/ha manure the yield was 8,8 t/ha d.m., while the yield value has decreased slowly once manure doses have increased.

Field Trail 3. The effect of applying method of nitrogen fertilizers on yield and annual schedule of temporary pastures.

The field trial was laid down in spring 2015 at A.R.D.S. Simnic- Craiova following block method with four replications.

Factor A – doses and nitrogen splitted with five graduations:

a<sub>1</sub> – 100 kg/ha N, spring

a<sub>2</sub> – 150 kg/ha N, spring

a<sub>3</sub> – 100 kg/ha N, spring + 50 kg/ha N after the 1st mower

a<sub>4</sub> – 75 kg/ha N spring + 75 kg/ha N after the 1st mower

a<sub>5</sub> – 50 kg/ha N spring + 50 kg/ha N after the 1st mower+ 50 kg/ha N after the 2nd mower

The size of each variant were 6 m length, 4 m width, total area 24 m<sup>2</sup> and yielding area 15 m<sup>2</sup>.

The manure well chopped was applied half in the previous year autumn under plow and the rest of it was applied in the next spring in 2015.

In 2015 spring, before sowing (near 2 days) it was prepared seed bed using harrow and the combinator.

Sowing was done with mechanical drill SUP-21 on the 12th March after the drill was checked previously.

There was used the same complex mixture and varieties as for the field trial no.2

On the first growin season were harvested two yields of 10 t/ha green mass (g.m.), which was not considered for statistics, but only for economic efficiency.

The nitrogen was splitted applied for each mower. The trial was harvest as fodder using mowing machine.

After mowing of side and frontal areas of the plot which could influence the experimental results, were taken two average samples of 2 kg g.m. each for every variant – replication for dry matter determination.

The dry matter was determined by drying plant samples in the oven at 105<sup>0</sup>C during 5 hours.

The rainfed temporary pastures, as those from experimental area, give the first fodder yield in May-June and till the autumn plants groweth is almost insignificant.

Chemical nitrogen fertilization using doses and proper mixtures, determines yield increases which lead to annual scheduling plan.

Considering individual influence of nitrogen fertilization, the best recomandation is the dose of N<sub>150</sub> kg/ha leadig to the highest fodder yield. Between the two nitrogen doses

N<sub>150</sub> and N<sub>100</sub> kg/ha, both applied in the spring, the highest yield increase was given by N<sub>100</sub> kg/ha.

Also, the nitrogen dose of N<sub>150</sub>, applied in the spring, lead to lower yields comparatively with the case of splitting the same nitrogen dose. Thus, the yield increases ranged between 1,7 -2,0 t/ha d.m.

Considering the economical efficiency of different plant mixtures, backgrounds and nitrogen doses, the highest profit of 1471 lei/ha was recorded by complex mixture on the background with 40 t/ha manure and N<sub>120</sub>.

About the applying method of manure and its dose, it can be considered that the profit is almost the same no matter the manure burring method, respectively 1282 lei/ha under the disk and 1122 lei/ha under the plow.

High fodder yield are difficult to be obtained in the rainfed experimental area conditions, due to the high temperatures and low rainfalls during plants growing season.