

EFFECT OF FERTILIZATION WITH NITROGEN AND WITH OR WITHOUT THE APPLICATION OF ENDOMYCORRHIZAE IN PLANTING ON THE YIELD AND QUALITY OF FLUE-CURED TOBACCO

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INTRODUCTION



- The main flue-cured tobacco area is in northern Croatia, where this tobacco type is grown on sandy soil on about 5.000 ha and it is exported or used by tobacco industry in Croatia (TDR which is owned by BAT).
- Nitrogen has an important role in nutrition of tobacco, since it has the strongest effect on tobacco ripening, yield and quality
- In this respect, during two years period 2014 and 2015, the influence of increasing rates of nitrogen in fertilization and of the application of endomycorize in transplanting in agroecological conditions in Croatia on yield and quality was investigated.

MATERIAL AND METHODS



- **Stationary field trials were carried out at random block method in four repetitions which included four treatments:**
 - 1. Control**
 - 2. 20 kg N ha⁻¹**
 - 3. 40 kg N ha⁻¹**
 - 4. 60 kg N ha⁻¹**
- **Phosphorus and potassium rates applied in the trial were constant and amounted to 50 kg P₂O₅ and 150 kg K₂O per ha.**

MATERIAL AND METHODS



- In the second experiment beside the same nitrogen fertilization (0, 20, 40, 60 kg ha⁻¹ of NH₄NO₃) tobacco transplanting were treated with special vaccine MYKOFLOR[®] (mycorrhizal mycelia).
- The size of experimental plots was (4.4 × 20) m
- Four rows of tobacco were planted and the yield and the other properties were measured on the two middle rows on each plot.

RESEARCH OBJECTIVE

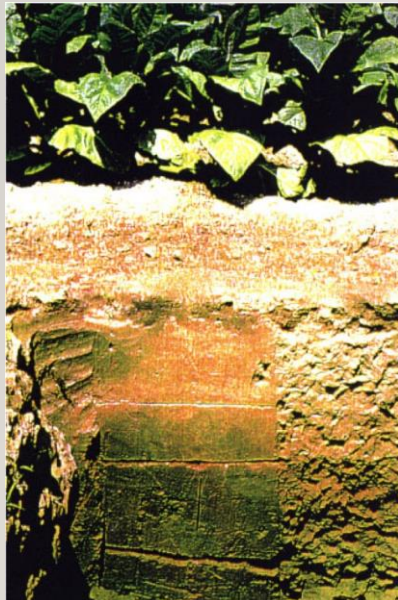


- **To determine the influence of increasing rates of nitrogen in fertilization in agroecological conditions in Croatia on yield and quality of virginia tobacco with and without endomycorrhizae application in tobacco transplanting.**

RESULTS



Field trials were carried out on the soil types that are characteristic for the flue-cured tobacco growing area in northern Croatia.



- **TEXTURE:** Sandy loam
- **BULK DENSITY:** 1.46 gcm⁻³
- **HUMUS:** 1.31 %
- **TOTAL NITROGEN:** 0.07 %
- **pH = 5.7**

CLIMATE



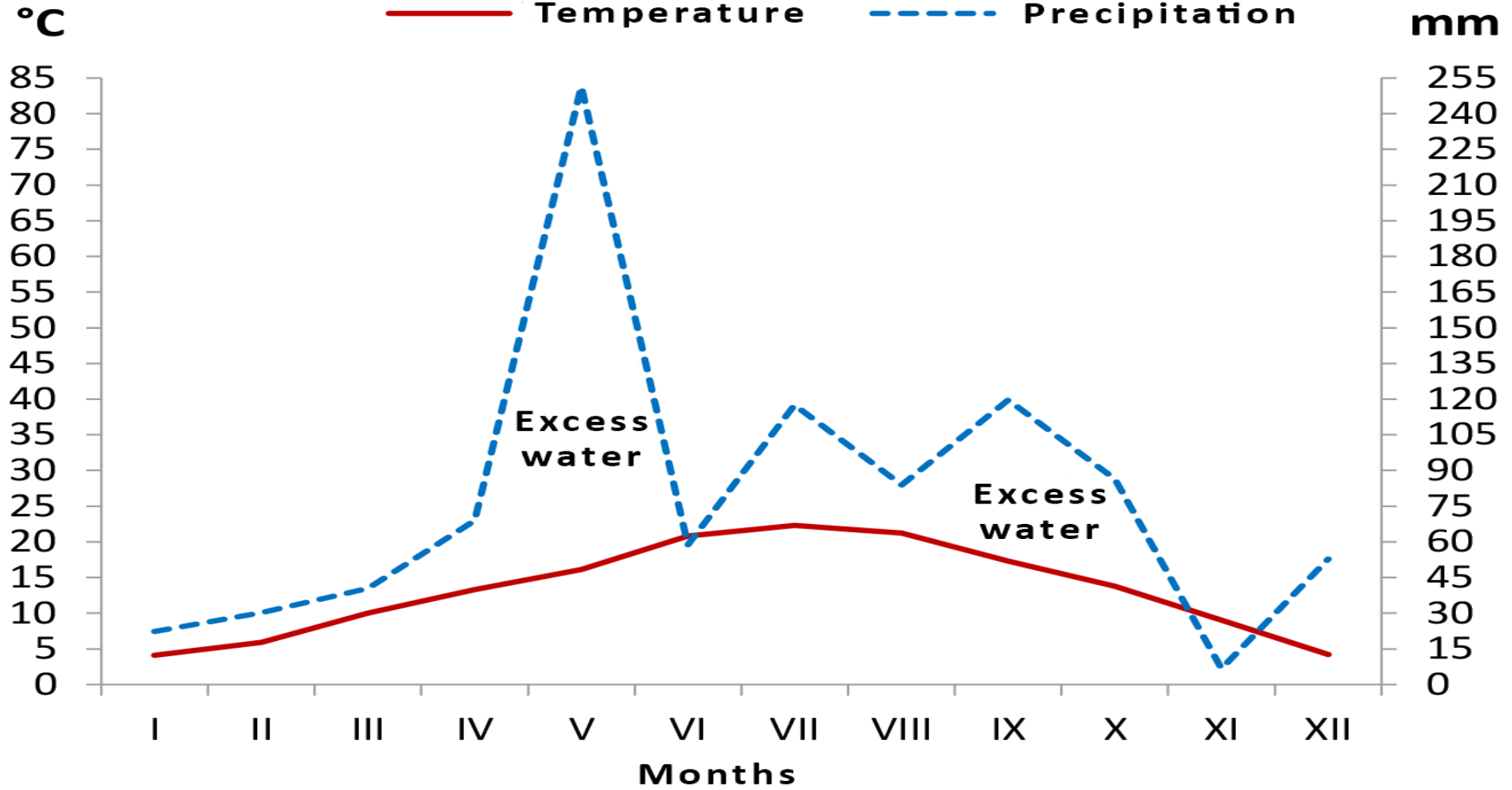
- The climate of the tobacco growing region in Croatia has the characteristic of continental climate. The precipitation deficiency is frequently occurred in July and August requiring irrigation to conserve tobacco quality.
- Climate conditions had a significant impact on the results of research in two hydrologically very different years.
- Negative temperatures in late spring or early autumn, *i.e.*, during the tobacco vegetation period (May to September) no registered.

CLIMATE



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- In the first year (2014) of investigation 717 mm of precipitation fell during the vegetation period (Figure 1).
 - Excess precipitation was registered in every month which is rare appearance in multi-annual average.

2014

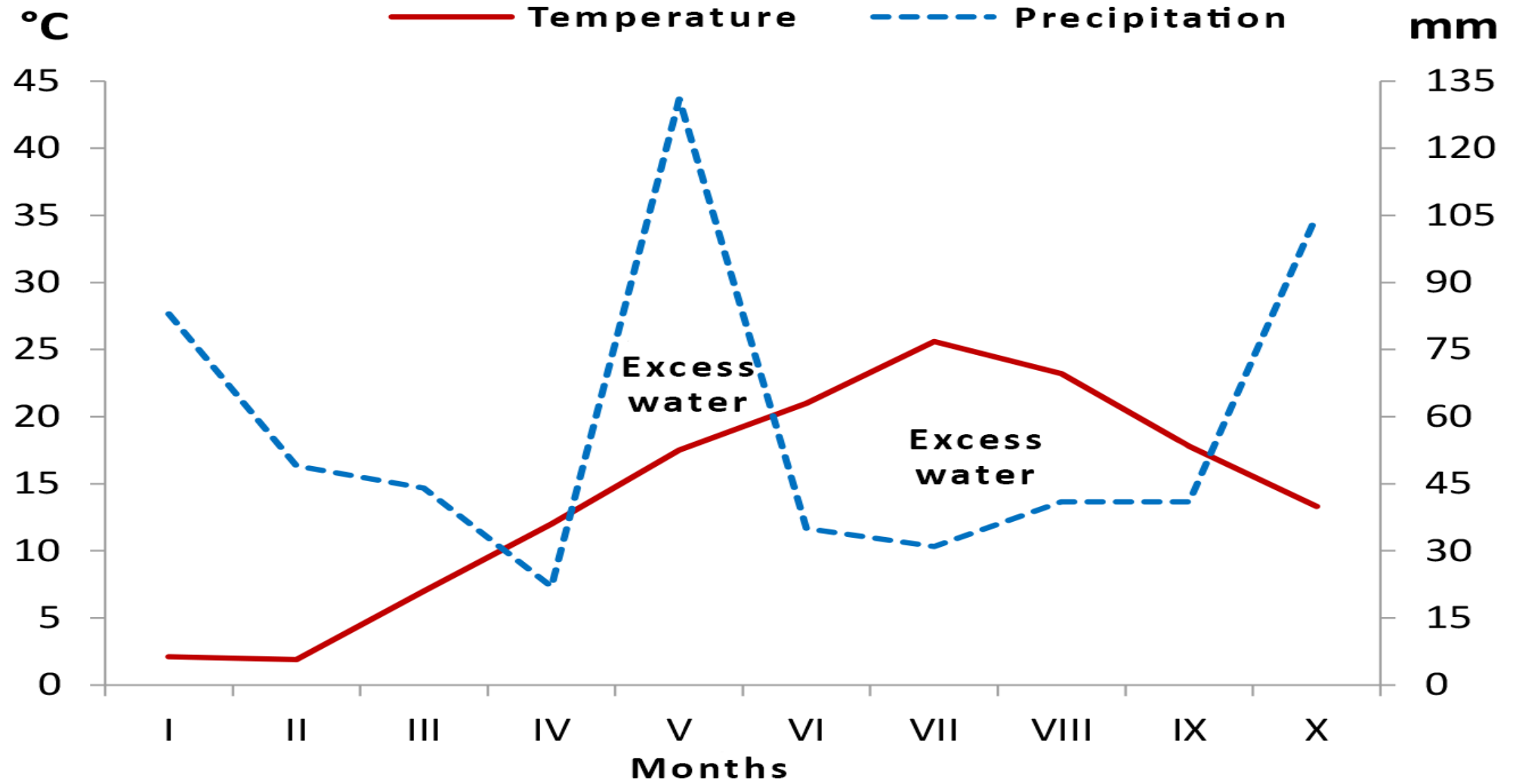


CLIMATE



- **The second year of study was very dry.**
- **In the vegetation period of second year only 384 mm of precipitation was recorded.**
- **Therefore, there was a significant shortage of water in the soil, which affected the results of this research.**

2014



CLIMATE



Year	May to September
2014	717,7 mm
2015	384,0 mm

CLIMATE



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- **Tobacco treated with endomycorrhizae had significantly higher yield and better quality.**
 - **In a dry year of 2015, tobacco treated with endomycorrhizae had stronger developed root system and a grater possibility of taking water and dissolved macro and micro elements from the soil.**



WITH ENDOMYCORRHIZAE

WITHOUT ENDOMYCORRHIZAE

EFFECT OF NITROGEN FERTILIZATION ON THE YIELD AND QUALITY OF FLUE-CURED TOBACCO 2014 - 2015

Fertilization	Yield kg ha ⁻¹		Quality index	
	2014	2015	2014	2015
N – P – K				
0 – 50 – 150	2030	1850	100	100
20 – 50 – 150	2490	2010	115	111
40 – 50 – 150	2805	2250	124	118
60 – 50 – 150	2960	2480	75	67
LSD, 5 %	267	215	15	18

- In both years as the rate of nitrogen increased from 0 to 60 kg ha⁻¹ of N yield increased.
- At the same time with increased fertilization from 40 to 60 kg ha⁻¹ of N significantly decreased the leaf quality.

EFFECT OF NITROGEN FERTILIZATION AND ENDOMYCORRHIZAE APPLICATION ON THE YIELD AND QUALITY OF FLUE-CURED TOBACCO

Fertilization kg ha ⁻¹ + MYKOFLOR®	Yield kgha ⁻¹		Quality index	
	2014	2015	2014	2015
N – P – K				
0 – 50 – 150	2450	2500	100	100
20 – 50 – 150	2510	2680	121	131
40 – 50 – 150	2668	3410	130	145
60 – 50 – 150	2810	3650	89	91
LSD, 5 %	NS	276	19	23

- Tobacco treated with endomycorrhizae had a significantly higher yield and better quality, especially in the dry year of 2015 compared to untreated tobacco.

CONCLUSION



- **Untreated tobacco had lower yield and quality of the dried leaf depending on the level of nitrogen fertilization.**
- **In a very arid year of 2015 higher nitrogen fertilization of tobacco without the application of mycorrhiza increased the nicotine content and reduced sugar content which greatly affected the quality of flue-cured tobacco.**

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