

THE SPECIFICS OF THE WATER REGIME OF THE SOILS ON THE EAST-SLOVAKIAN LOWLAND

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Summary

The specificity of the soil relations on the East-Slovakian Lowland reside in the predominance of the soils with the glei soil-forming processes which include up to 65% of the agricultural soil.

The results of the dynamics of the supply of soil humidity and its influence on the yields of the field crops hint at the limiting effect of the high supply of the soil humidity at the beginning of the vegetation period as well as at the limiting effect of its deficiency in the second half of the vegetation period on the same soil stand.

The respect of the specifics of the economy with the soil humidity require the increase of the function efficiency of the built hydromelioration plants, the restructuring of exploitation of agricultural soil, the restructuring of the plant production and the differentiated agricultural procedure in the case of respect of the soil conditions.

Key words: soil conditions of the East-Slovakian Lowland, the supply of soil water, the economy with the soil humidity

Introduction

The characteristic phenomenon of the East-Slovakian Lowland is the representation of soil types. The older works mention relatively high representation of Eutric fluvisol (up to 29%) as well as Albic luvisol (9%). However, the latest data from the soil evaluation (VILČEK, 1998) demonstrate that the acreage of the typical Eutric fluvisols is only about 7%. The predominance of the soils with the glei soil-forming processes (Fluvi-eutric gleysols, Fluvi-mollic gleysols, Gleic planosols, Eutric gleysols). The mentioned soil representatives cover up to 65% acreage of the agricultural soil of territory. The dynamics of the soil water as a result of the activity of natural factors, which has in time and space characteristic course, is termed a water regime of the soil (FULAJTÁR 1986, BEDRNA 1977, ŠÚTOR et al. 1982). It is influenced by antropogenic factors, e.g. hydromelioration, plant cover and the systems of tillage (ŠÚTOR et al., 1995).

Material and methods

In the contribution demonstrated outputs and results were obtained as a result of the solution of several scientific and technological projects coordinated by the Research Institute of Agroecology in Michalovce. The long-term stationary field trials have been established since the year 1970 on the prevalent soil types of the East-Slovakian Lowland - Eutric fluvisol, Fluvi-eutric gleysol and Albic-gleic luvisol. The arrangement of the trials makes possible to evaluate production environment and the resultant production from the point of view of the quantity of experimental variants.

Results and discussion

The limiting factor of the yield level of the field crops on the East-Slovakian Lowland are the delayed terms of seeding of the spring crops not only in the damp year. The similar situation was observed in the case of heavy rainfalls in the spring (especially in March) in the years which are in the next course of the vegetation period typical as the dry years eventually very dry (e.g. 2000) as far as the rainfall conditions is concerned.

The influence of the delayed terms of seeding on the reduction of the crop yields of spring barley, peas, sugar beet and maize for grain from the statistical set of 25-years is demonstrated in

Table 1: The dependence of the reduction crop yields on the term of seeding (t/ha)

| crop | optimal term of seeding | delay of the term of seeding in comparison with the optimum (days) | | | | | | |
|-----------------|-------------------------|--|------|------|-------|------|------|------|
| | | 5 | 10 | 15 | 20 | 25 | 30 | 35 |
| spring barley | 10.3. | 0,02 | 0,32 | 0,68 | 1,02 | 1,32 | 1,72 | 2,08 |
| peas | 15.3. | 0,23 | 0,57 | 0,95 | 1,37 | 1,82 | 2,30 | |
| sugar-beet | 10.4. | 0,81 | 2,55 | 8,07 | 25,46 | | | |
| maize for grain | 20.4. | 0,53 | 0,96 | 1,40 | 1,83 | 2,27 | 2,70 | 3,14 |

There was observed the limiting effect of the long term decrease of the content of soil water below the values of the optimal supply of plants with the water in the second half of vegetation period. As far as the time duration and absolute

values is concerned, the higher decrease below the mentioned values was observed not only in the dry years, but also in the years with the rainfall conditions at the level of the long-time normal (Fig. 1).

The water mode of the soils is significantly influenced by the grain composition of the soils which is a stabile sign of the soil fertility. It is possible to change it only at the expense of excessively high financial costs. The grain composition is the decisive factor of the hydrophysical characteristics of the soils as well as many others phenomenons which cause their space and time variability.

Fig. 1: Time course of the soil water supply on the East-Slovakian Lowland in the typical years

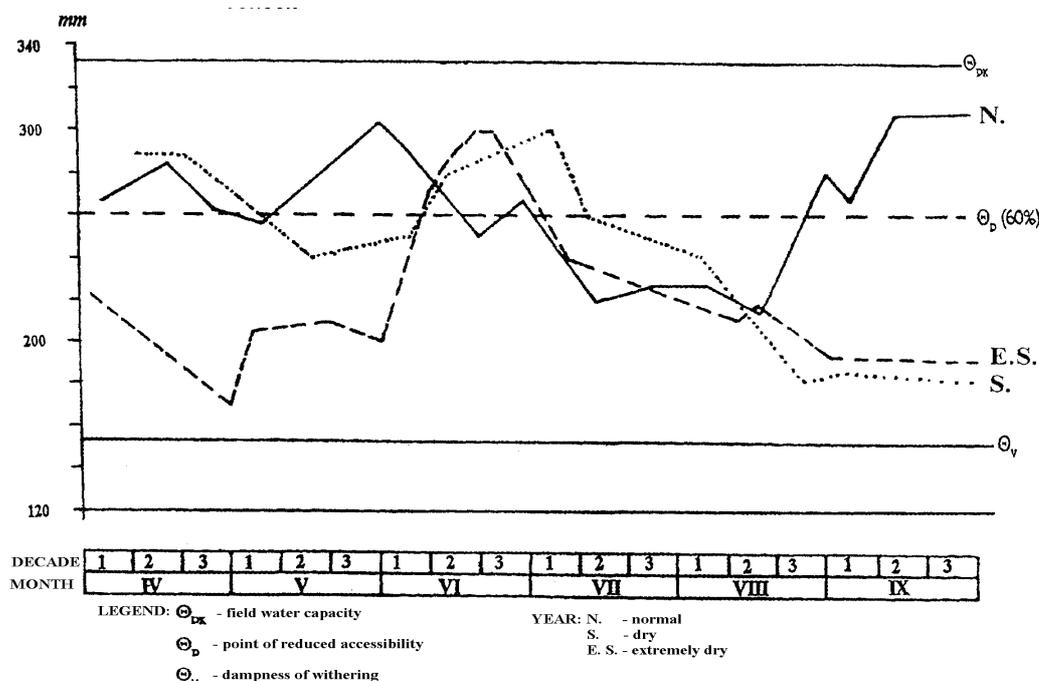


Table 2 The grain composition of the decisive soil types on the East-Slovakian Lowland

| Soil type | Soil Type | microstructure in % | | | |
|--------------|------------|---------------------|---------------|---------------|--------------|
| | | Σ I-II | III | IV | V |
| Fluvi-eutric | Mould | 37,543-65,761 | 22,316-39,587 | 6,819-21,001 | 0,414-4,655 |
| Gleysol | Undermould | 33,196-65,696 | 22,199-42,500 | 8,962-30,793 | 0,185-8,335 |
| Eutric | Mould | 21,482-40,573 | 24,286-34,286 | 28,410-48,963 | 0,011-5,024 |
| Fluvisol | Undermould | 8,957-46,488 | 9,919-46,053 | 10,609-77,470 | 0,002-31,157 |
| Albic-gleyic | Mould | 32,551-45,456 | 37,658-54,613 | 7,333-22,950 | 1,367-5,944 |
| Luvisol | Undermould | 31,943-49,514 | 33,949-53,401 | 6,122-20,484 | 0,878-7,855 |
| Eutric | Mould | 78,482-86,767 | 6,164-13,446 | 6,353-7,887 | 0,558-0,775 |
| Gleysol | Undermould | 85,102-90,305 | 5,055-11,914 | 1,802-5,550 | 0,124-0,564 |

As far as the hydrophysical characteristics of the selected soil types on the East-Slovakian Lowland is concerned, there is resulting that the limiting effect of the surplus as well as deficiency of the soil humidity on their fertility in the very heavy soil (Fluvi-eutric gleysols and Eutric gleysols) is manifesting via the low to very low values of the utilizable water capacity of the high values of the point of withering, the low values of the minimal air capacity, the low till very low conductivity of the soil saturated with water as well as unsaturated soil and the low to very low drainage ability. On the contrary the Eutric fluvisols are considerably lighter as far as the grain structure is concerned and they belong to the light up to medium heavy soils. In the case of Eutric fluvisol in the whole soil profile and Albic-gleyic luvisol in the mould the values of the utilizable water capacity are significantly higher. However, in the case of Albic-gleyic luvisol more expressively is manifesting the insufficient air capacity. The hydraulic conductivity is in these soil types increased up to high and the dewatering ability is good up to very good.

In the case of intensive agricultural exploitation of the territory of the East-Slovakian Lowland the decisive task play the waterworks regulations not only in the protection against flood, but especially for taking the internal waters in the required level mode as well as time mode and the systematic drainage and the irrigation at the regulation of the conditions of humidity in the soil.

In continuity with the rational exploitation of the production potential of the soils the most important claim is the covering of the very heavy Pseudogleysols and Eutric fluvisols with the grass vesture to coherence with their unfavourable water mode. The localities of the peripheral regions represent particularly Albic luvisols, Eutric cambisols and Plano-gleyic luvisols. Typical is the late start of the spring field works and significant shortage of the soil water supply in the summer period. Therefore, they require the specific structure of the plant production with the orientation to winter cereals and winter rape.

Concerning the complex natural but especially economic conditions it is not possible the universal recipe as far as the optimalization of the relation between water and air is concerned as well as the whole system of farming on the East-Slovakian Lowland. However, the worked-out programme of the agricultural development on the East-Slovakian Lowland up to 2005 indicate the possible aim and the efficiency.

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ECONOMICAL ASPECTS OF ALFALFA CROPPING (*MEDICAGO SATIVA L.*) UNDER DIFFERENT TILLAGE AND NUTRITION INTENSITY

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Introduction

Raising production of the vegetal mode is in simultaneity fastens in essentially composite economy stipulation, as it was 80-s. In practise it means to make more with scarceness of working powers, on low acreage soil and with a little cubage intensified resources. From this point of view the growing of whichever crops, mainly economically eminent, isn't actual without respecting intensified factors, with provide suitable harvest and its qualitative indicators.

A matter of fact sits about the economic stature perennial fodder crops, that form the orientation acreage cca 1.500.555 ha arable soil in Slovakia steady engaged 10-14 % (table 1), along there is a visible acreage decline in after-transformation period against before-transformation. By its 45 -59 % alfalfa stands as a dominating crop within the frame of perennial fodder crops, by relatively deuces productions. Despite of its biological strangeness, thus meaning monumental and profound radical system with nitrogen – assimilating bacteria competent to swab and release some nutrients also from and from the lesser accessible forms and more profound layers as well as to bind the airy nitrogen, is nourishment, e.j. a yearly phosphorus and potassium requirement as well as startup nitrous amount, the most intensified factor for alfalfa growing. In latter conception besides there is also tillage system of soil, which confirms a manifest interest in about economy or minimum alternatives also in a case "garden set-out exigent" alfalfa.

Material and methods

In this work, we to decline the exact scientific results gained by the variant growing of alfalfa, considering more extensive and intense style growing, in sense of nutrition as well as processing system soil, heading to the fall in value or to the increase in value of the true profitability and profit, or to the loss formation. This work also shows the real production figures of the alfalfa, the variety PALAVA of seeding 5 mil. germinate grains.ha⁻¹, as well as the levels of own costs under three tillage system:

- 1, Conventional – ploughing 24 cm + classic seedbad preparation
- 2, Reduced - without ploughing + in spring by tiller rotor depth 10 cm
- 3, No-tillage - seeding to untilled and uncultivated soil seedbad preparation nourishment level (allowances pure nutrients NPK in kg⁻¹)
 - 1, intensive (V1) - N - 30, P - 36, to - 115
 - 2, effective V2) - N - 30, P - 32, to - 102
 - 3, nonfertilized control (V3) - with out nutrition