

The productive and economic parameters of the Gemer region agricultural soils

Produkčné a ekonomické parametre poľnohospodárskych pôd regiónu Gemer

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Abstract: On the basis of structure and qualitative parameters of agricultural soils, there are only 23.4% non profitable soils for the winter wheat growing in the total area of the Gemer Region. The same percentage for the corn maize growing is 78.7%, for the sugar beet growing 80.0% and for winter rape growing 46.0% of the total agricultural soils area in the mentioned region. Generally, for the crop production, it can be stated, that without production subsidies, at the present economic situation there are 65.9% soils non-profitable, 23.0% low profitable, 6.3% medium profitable and 4.8% high profitable in the Gemer Region. The calculated economic parameters can be used for a more effective production allocation and soil utilisation in different regions.

Key words: soil productivity potential, soil parameters, soil profitability

Abstrakt: Získané údaje potvrdzujú, že produkčný i ekonomický potenciál poľnohospodárskych pôd Gemera zaraďuje túto oblasť k menej efektívnym agroekosystémom. Naplnenie predpokladaných parametrov je tu do značnej miery závislé od potenciálu ľudského faktora a to tak v hraniciach regiónu, ako aj mimo neho. Z tohto pohľadu je potrebné viac pozornosti venovať poznaniu vhodnosti pôd pre pestovanie tej, ktorej poľnohospodárskej plodiny a tým aj produkčne i ekonomicky efektívnej rajonizácii poľnohospodárskej výroby. Na základe štruktúry a kvalitatívnych parametrov poľnohospodárskych pôd je na Gemeri pre pestovanie pšenice ozimnej nerentabilných len 23,4 % pôd. Pri kukurici na zrno je to však už 78,7 %, cukrovej repe 80,0 % a repke ozimnej 46,0 % poľnohospodárskych pôd. Bez dotácií je pre pestovanie rastlín pri súčasných ekonomických pravidlách 65,9 % pôd nerentabilných, 23,0 % málo rentabilných, 6,3 % stredne rentabilných a 4,8 % vysoko rentabilných. Vypočítané ekonomické parametre môžu slúžiť k efektívnejšej rajonizácii poľnohospodárskych plodín.

Kľúčové slová: produkčný potenciál pôd, pôdne parametre, rentabilita pôd

INTRODUCTION

Similar as many other countries, also Slovakia is not rich in the non-renewable resources, therefore the country is limited by the possibilities of the natural resources use. It is important to make proper decisions – how to utilise the resources in a rational way, so that the needs of society and individuals should be satisfied at the least possible harm to the environment (Demo, Bielek, Hronec 1999). At such decision-making, it is necessary to know these resources properties and potential, respectively. For agriculture, the decisive resource is soil and its properties. The present agricultural system development does not fully respect natural conditions and is primarily oriented at the production maximum evaluation, whereby soil productivity potential is not utilized optimally (Vilček, Džatko 1995).

Land is a medium for financial resources generation. Every subject using land for his purposes makes his best to farm in such way, that he obtained profit. To this target, there are submitted the structure and ways of land use. Presently, there are not rare the cases, when seeing

a phantom of a rapid profit, the entrepreneurs neglect, or directly disturb the well-known principles of proper technology of maintaining and increasing soil productivity potential. Although in such a short-sighted “exploitative” way it is possible to gain momentary financial effect, however, consequently the soil degradation takes place, the remedy of which will require high investments in the future. With respect to the sustainable farming methods, it is more efficient to use soil in harmony with the principles of its productivity potential preservation.

Economic results level in agriculture is narrowly linked with the manner of landscape use. It is logical that also in the case of best soil productivity potential use, it will be depending on the soil conditions heterogeneity; there exist also the reached yields and economic results differentiation on a given soil. The Gemer Region introduces in this aspect a soil and climate specific part of Slovakia.

This paper content and target is to show the optional potential of natural and economical efficacy of the Gemer Region soils, as well as the soil categorisation with respect to the selected crops growing profitability.

MATERIAL AND METHODS

Our objectives were based on the following issues:

- Database of the Soil Science and Conservation Research Institute data on the Bonity Pedo-Ecological Units, and their point expression on 100 point scale (Džatko 1979)
- Soil quality parameters categorization (Linkeš, Pestún, Džatko 1996)
- Economic parameters database of the Bonity Pedo-Ecological Units of Slovakia (Vilček 1999).

Natural parameters were determined based on the purposeful software for farmland use and arrangement optimisation – PEDOPT 2000 (Vilček 1999). By the means of the Geographic Information System ARC INFO on the background of vector bonity map in the scale 1 : 5 000, potential rate of crop production and selected crops on the soils of Slovakia were differentiated and classified. Soil parameters of the Gemer Region were, with respect to the different pedoclimatic conditions, differentiated on the level of present districts (i.e. Rožňava, Revúca, Rimavská Sobota).

RESULTS AND DISCUSSION

The Region Gemer, in spite of various discussions on its most effective economic utilization, was/is a typical agrarian ecosystem. Agriculture intensity in this Slovakian region is, with respect to the local climatic, soil and

water management conditions, more than in other regions, depending on anthropogenic factors (infrastructure, inputs into production) that in considerable rate affects the level of economics and life in this part of Slovakia. Irrespective of the present economic situation and financial flows into agro-sector and their redistribution in the region, it can be stated, that the soil of the Gemer is, considering its rational agricultural use, capable to produce commodities that are interesting both from the qualitative and quantitative, as well as from the economic point of view.

Soil situation analysis shows, that there is 31% of the soils – type Cambisols. Most soils are located in the warm, very dry to dry basin-like continental climatic region (67.2%). They are mostly located in lowlands to medium slopes (71.8%). Soils are mostly deep (75%) and texturally medium heavy – loamy (48.2%). Skeletonless soils represent 47.6%, heavy skeletal 38.4%. The average point value is 37.7 points (Rožňava 25.3, Revúca 35.4, Rimavská Sobota 43.8 points). Soils with water erosion risk include even 79% of agricultural land (of it, 38% severe risk). Regarding soil productivity categories, prevailing are medium productive arable soils (22%), together with productive permanent grassland (19%). In the agricultural land area, there are incorporated approximately 6, 000 ha not suitable for agro-ecosystems that could be more effectively used as a non-agricultural land. The recommended area of arable land is approximately 59% (Rožňava 41%, Revúca 57%, Rimavská Sobota 67%).

Table 1. Recommended cropping system structure on arable land in %

Crop	District			Region Gemer
	Rožňava	Revúca	Rimavská Sobota	
Small grain cereals	43.2	44.4	44.6	44.4
Maize	3.0	4.9	5.9	5.3
Leguminous plants	4.3	4.3	4.3	4.3
Row crops	5.8	6.0	6.2	6.1
Oil crops	5.4	5.6	5.6	5.6
Annual fodder crops	12.1	11.1	10.7	10.9
Perennial fodder crops	24.8	22.1	20.8	21.7

Table 2. Yield potentials of soil in Gemer Region in t/ha

Crop	District			Region Gemer
	Rožňava	Revúca	Rimavská Sobota	
Winter wheat	4.82	5.02	5.12	5.05
Winter rye	4.25	4.34	4.33	4.31
Spring barley	4.70	4.89	4.99	4.93
Maize	4.39	4.57	4.61	4.58
Pea	2.40	2.52	2.57	2.53
Sugar beet	33.39	34.45	34.62	34.50
Potatoes	21.34	22.04	22.41	22.16
Winter rape	2.40	2.46	2.48	2.46

With respect to the local soil quality, from the view of the existing productive agricultural land potential sustainability, a suitable arable land structure is presented in Table 1.

In Table 2, there is presented the possible yield potential of soil with respect to the existing pedo-ecological conditions, by present technologies and manner of production and respecting the crop requirements for available nutrients.

It is logical that the heterogeneous yield-forming potential of agricultural land is regularly reflected in the crop production economic parameters differentiation. From this aspect, there is surely interesting the review of the agricultural land share from the view of the crops economic profitability. For comparison, we present also the average reached in Slovakia (Table 3).

It is obvious that, while in Slovakia there are e.g. 36% soils non-profitable growing for winter wheat, in the Gemer Region, it is only 23.4%. At other crops studied, this ratio is not in favour of the Gemer Region. At grain maize,

this is approximately 60% to 78%, at sugar beet 61 to 80% and at winter rape 31% to 46%.

Generally, for all the crop production it can be stated that without subsidies according to the present economic principles, even 65.9% of agricultural land is not profitable, 23.0% low profitable, 6.3% medium profitable, and only 4.8% farmland is highly profitable for the whole agricultural production. Very highly profitable soils do not occur here. The mentioned soil productivity potential in comparison to similar categorization for the whole Slovakia gives a less positive picture for the Gemer Region.

Therefore, the existence and effective action of agriculture should be financed subsequently from the means of government (production subsidies). This fact is also documented by the potentially optional economic parameters that can be reached on local farmland. In average, the per hectare costs of 9 138 SKK and the revenues on the level of 9 008 SKK/ha can be expected, what is without subsidies representing the loss of 130 SKK/ha (profitability rate -1.42%).

Table 3. The share of soils from the point of view of costs profitability of grown crops (%)

Profitability category	Winter wheat	Maize	Sugar beet	Winter rape	Crop production total
<i>Rožňava</i>					
Soil non profitable	46.0	98.8	97.9	82.1	85.3
Soil low profitable	16.9	0.1	–	14.3	13.5
Soil medium profitable	23.5	0.8	1.0	3.6	0.9
Soil highly profitable	13.5	0.3	1.0	–	0.3
Soil very highly profitable	0.1	–	–	–	–
<i>Revúca</i>					
Soil non profitable	25.1	84.6	85.7	40.8	69.5
Soil low profitable	14.9	4.2	–	47.2	23.6
Soil medium profitable	32.5	7.1	5.2	10.5	2.6
Soil highly profitable	25.2	4.1	9.1	1.4	4.3
Soil very highly profitable	2.3	–	–	–	–
<i>Rimavská Sobota</i>					
Soil non profitable	13.3	68.4	70.7	32.3	56.6
Soil low profitable	8.0	8.3	–	47.6	26.8
Soil medium profitable	38.7	16.4	11.2	17.8	9.7
Soil highly profitable	35.7	6.9	18.1	2.2	6.9
Soil very highly profitable	4.4	–	–	–	–
<i>Gemer</i>					
Soil non profitable	23.4	78.7	80.0	46.0	65.9
Soil low profitable	11.4	5.6	–	39.4	23.0
Soil medium profitable	33.9	10.9	7.6	13.1	6.3
Soil highly profitable	28.4	4.8	12.3	1.6	4.8
Soil very highly profitable	3.0	–	–	–	–
<i>Slovak Republic</i>					
Soil non profitable	36.3	59.5	61.0	31.3	54.4
Soil low profitable	15.8	3.1	1.3	31.2	13.9
Soil medium profitable	13.7	12.9	3.4	17.3	7.3
Soil highly profitable	21.4	15.4	22.4	13.6	10.6
Soil very highly profitable	12.8	9.1	11.9	6.6	13.8

Table 4. Potential economical parameters of the Region Gemer farmland (SKK/ha)

Economical parameters	District			Region Gemer
	Rožňava	Revúca	Rimavská Sobota	
Costs	6 572	8 675	10 291	9 138
Sales	3 562	5 634	7 248	6 094
Revenues	6 124	8 462	10 424	9 008
Profit	-448	-213	134	-130
Profitability rate (%)	-6.82	-2.46	1.30	-1.42

CONCLUSION

The obtained data confirm that both productive and economic potential of agricultural soils of the Gemer Region inserts this region to the less effective agroecosystems. Fulfillment of expected parameters depends on human factor potential both in the frame of region and outside of it. From this point of view, it is necessary to give more attention to knowledge of soil suitability for individual plant growing and for economical effects spacing of agricultural production.

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