LIMITATION FACTORS OF THE AGRICULTURAL PRODUCTION IN CACICA VILLAGE, SUCEAVA

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Abstract: *The Cacica village area has according to the mayor office documents a total surface of 6755 ha, from which 3067 ha are agricultural areas. The mapped surface has 224.74 ha and represents the entire agricultural surface taking on account the terrain of the neighboring places and the non productive terrain surfaces.*
Among the limitative factors of the agricultural production the most important are: the with 1389.77 ha affected land (61.97% of the mapped surface), the strongly acid and acid reaction (80.60% of the mapped surface), the water erosion with 831.11 ha affected land (37.06% of the mapped surface), the landslides with 589.72 ha affected land (26.29% of the mapped surface) and the depth erosion (160.83 ha – 7.17% of the mapped surface).
For the eroded fields we recommend the avoiding of pasturage in the humid times, the over seeding with perennial herbs mixtures in which the vegetables predominate, the establishing of a small number of cattle admitted for pasturage/ ha. In the case of the fields affected by strong and very strong erosion there are recommended protection crops.

Keywords: *water erosion, affected land, eroded fields, protection crops*

1. Introduction

Cacica (Polish: Kaczyka) is a village situated in Suceava county, Romania, 21.7% of its inhabitants are Polish, who began settling there at the turn of the 19th century. The commune is composed of five villages: Cacica, Maidan, Pârteştii de Sus (the commune center), Runcu, Soloneţu Nou [1].
The Cacica village area due especially to the climate factors and to the pedological and relief factors has a low plowing potential of the soil instead having a high one for the pastures and hays [2].
The limitative factors that cannot be modified and that limit the agricultural production are: climate, relief, exposure and solidification rocks. Thus, the characteristics of the soil, temperature and rainfall quantity constitute the main factors that determine the way of using the fields as hay or agricultural field [3].
Besides the above mentioned factors we can also add the geological and geomorphologic (the slope) ones [4].
The main enhancing measures that are imposed for decreasing the limitative action of the above factors are: collecting the costal springs, drainage, capital leveling, draining, limestone arrangement, radical fertilization, and damming water course regularization, terracing, anti erosion arrangement and anti erosion systems, protection crops, ploughing in parallel with the level curve.

2. Materials and methods

The object of the present paper is the study of the limiting factors of the field area of

Cacica village, Suceava County. The study refers to the field situated in terrain.

The purpose of the study is establishing, identifying, setting the boundaries for and classifying the types of soil/ land degradation, establishing the land restrictions for different purposes and the agro pedo ameliorating and anti erosion proper measures. At these we can add the differentiation between the agro technical and enhancing measurements, the establishing of the agro productive potential of the soil and the total or temporary exclusion of certain fields from the agricultural circuit.

The way in which the paper was elaborated and presented had as purpose the fact that the pedological study would become a working instrument for the farmers offering them the best information and measures for a good managing of the fields at the plots, household, farm and village level.

The Universal Equation of Soil Loss (USLE), soil erosion is a factor "K" whose value is determined quantitatively both, by direct measurements in standardized parcels, and indirectly through mathematics [5].

Erosion factor that K is the USLE soil loss due to raindrops and surface flow concentrated in the appropriate field of rainfall erosion index unit as measured in standard plots for flow control. This factor includes of soils to be eroded, and flow rate, measured in terms of standardized plots [6].

Taking on account the utility type the mapped area is divided in:

Table 1
The use of land

Utility	Agricultural surface (ha)
Ploughing land	1138.85
Pastures	376.24
Hays	692.02
Orchards	10.24

3. Results and discussion

The human involvement in decreasing the limitative factors of the agricultural production can be made in the case of the edaphic factors. Taking the right measures we can intervene upon them the final result being the increasement of the evaluation marks and the opportunity for different crops. According to the nature and intensity of the limitative factors the fields can be grouped as it follows:

Surface erosion limitations. Due to the relief conditions (high slope) but also to the improper using the water eroded fields have a high percentage (37.06% of the mapped surface) from which 254.42 ha with low erosion, 254.50 ha with moderate erosion, 259.23 ha with high erosion, 62.96 ha with very strong erosion. The slopes can be hardly affected by depth erosion and landslides. Direct methods for estimating soil erosion know a great variety, which are grouped by Moţoc M. and Morărescu V. (2000) as follows:

- Physical research laboratory models revealed that erosion mechanism drops and gullies and erosion resistance of soils with different properties;
- Research in the field using mobile Sprinkler systems of different sizes. They are used to calibrate erosion models to estimate and quantify its;
- Research plots with drainage [7].

The eroded surfaces taking on account the degrees of erosion are presented in table 2.

Depth erosion limitations. These limitations were identified on the sides with big slopes where the conditions favourable for the erosion process met. Some of the surfaces that present depth erosion are also affected by the stabilized or semi stabilized landslides. The affected surface is of 160.83 ha, meaning 7.17% of the mapped surface, the erosion formations being drips, gullies (138.06 ha), and ravines (22.77 ha), as shown in table 3.

Table 2
Wind and water eroded fields

Total agricultural surface	Mapped agricultural surface	Affected surface	Water eroded				
			Low	Moderate	Strong	Very strong	Excessive
3067 ha	**2242.74**	**831.11**	254.42	254.5	259.23	62.96	0
%	**73.12**	**37.06**	30.61	30.62	31.19	7.58	0
			Wind eroded				
3067 ha	**2242.74**	**0**	0	0	0	0	0
%	**73.12**	**0**	0	0	0	0	0

Table 3
Depth erosion affected fields

Total agricultural surface	Mapped agricultural surface	Affected surface	Eroded by differnt form :		
			Drips,gullies	Torrents	Ravines
3067 ha	**2242.74**	**160.83**	138.06	0	22.77
%	**73.12**	**7.17**	85.84	0	14.16

Table 4
Landslides affected fields

Total agricultural surface	Mapped agricultural surface	Landslide surface	From which :					
			furrows	waves	steps	mounds	flows	collapse
3067	**2242.74**	**589.72**	98.48	0	0	491.24	0	0
%	**73.12**	**26.29**	16.7	0	0	83.3	0	0

Table 5
Fields with gleyed and pseudo gleyed soils

Total agricultural surface	Mapped agricultural surface	Pseudogleyzed affected surface	From which (ha, %):				
			Low	Moderate	Strong	Very strong	Excessive
Pseudogleyzed soils							
3067 ha	**2242.74**	**1389.77**	200.32	813.49	309.33	66.63	0
%	**73.12**	**61.97**	14.41	58.53	22.26	4.79	0
Gleyzed soils							
3067 ha	**2242.74**	**40.58**	0	0	0	0	40.58
%	**73.12**	**1.81**	0	0	0	0	100

Landslides due to erosions The affected surface is of 589.72 ha, that represents 26.29 % of the mapped surface as it is shown in table 4. The landslides appear due to the coastal spring's action and to the small depth phreatic water. These soils are situate don the coast with slopes between 14-30%. The main types of landslides are

with the furrows (98.48 ha) and with the mounds (491.24 ha).

The nivo-pluvial excess due limitations On these surfaces the stagnogleyzation phenomena appears duet to the reduced slope of the field, to the fine or average fine texture and to some local conditions that prevent the water draining. The combination of these factors leads to a faulty drainage of the water coming from the vertical raining. The stagnogleyzation affected surface overpasses half of the mapped area being of 1389.77 ha. The affected surface on degrees of stagnogleyzation is presented in table 5. We recommend as measurements a deep loosening, surface or deep draining all according to the stagnogleyzation degree.

This category of fields includes the low drainage surfaces the pluvial water stagnation affecting the agricultural production. The stagnogleyzation is from low to extremely intense. As agro pedo amelioration measurements we recommend the scarification at distances of 1.5-2 m, perpendicular on the roads and level curves if the slope is < 2%, and diagonal on the roads if the slope is between 2 – 12 %. There are also necessary draining works and surface draining.

Another possible measure is the systematic drain gullies at low depths (15-20 cm) that can be remade annually. On small slopes (< 1.5%) they are placed on the biggest slope line an don big slopes in the way that the average gully slope to be between 0.5-0.8%. On the fields with clay texture (> 40% clay) the mole drainage system can be applied at depths of 40-80 cm, with the distance between them of 8-10 cm. This is a complementary draining method as a subsidiary for the asanation-draining systems. The essential condition is the existence of fields with slopes of 1-2%.

In the case of the fields with slopes lower than 1-2 %, we recommend the molding of earth strains that suppose the molding of curved strains separated by draining gullies [8]. They are executed on the biggest slope line of the field.

Fields with flooding limitations The flooding surface is situated in the proximity of the water courses or in the inner meadows. The total flooding surface is of 182.56 ha, being presented on flooding degrees in table 6. For these surfaces we recommend the damming and water courses regularization.

Table 6
Surfaces affected by flooding

Total agricultural surface	**Mapped agricultural surface**	**Flooding surface**	**From which (ha/%):**		
			rare	**frequent**	**Very frequent**
3067 ha	**2242.74**	182.56	40.2	77.76	64.6
%	**73.12**	8.14	22.02	42.59	35.39

4. Conclusions

- The cultivation and growth of crops is conditioned by several limited factors. Some of them such as the climate (temperature and raining) relief (slope and position) and parental material cannot be intervened upon. Other factors can be influenced or changed by measurements of soil erosion prevention, landslides, phreatic or pluvial humidity excess or other different agro pedo amelioration works.
- For preventing and controlling the landslides we recommend the collecting of the costal springs that are numerous especially in the complex soil units. We also recommend the asanation and draining

works and surface draining followed by a proper maintenance. Another factor that would lead to good results is the cultivation of perennial and water resistant ameliorative crops (or over seeding in the meadow areas). It is also recommended the growth stimulation of these crops with the aid of organic or chemical fertilizers. There can also be done leveling for the regularization of the water drain on the slopes.

- The works of deep raising that lead to the soil aeration, the increase of apparent density and the creation of better crop developing conditions. The scarification will be done in parallel with slope direction at slopes smaller than 2 – 3% and diagonal to this direction for slopes bigger than 2 – 3%.
- The organic fertilizers incorporation (cobs and straws in a dose of 40-50 t/ha) or other agricultural secondary products. In the inter mountains areas due to the water accumulation tendency the deep raising is done only in the cases in which the fields aren't drained.
- On the fields with depth erosion we recommend the same measures as for the surface erosion as well as protection crops for the ravine.

5. References

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