ISSUES RELATED TO THE USE OF LAND ON WHICH DRYING-DRAINAGE SYSTEMS ARE BUILT

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Abstract

The draining-drainage systems carried out for eliminating the excessive humidity on agricultural lands were designed with respect to the exploitation of surfaces on the draining sectors. Since upon the construction and reconstruction of property rights the orientation of the absorbent drainage lines and drying network was not considered, the plots of land are either perpendicular on, or parallel to, or even form an acute angle with these absorbent drains and/or drying canals. The different soil works performed on each individual plot has led, in time, to the formation of ridged strips of variable widths, level differences and transverse slopes, depending on the width of the plots, on the manner in which they are used and on the machinery employed for the agricultural works conducted. The land shaping in ridge straps and their different orientation of to the drain lines and the channel network leads to a non uniform elimination of the water excess on the drained land. On the arable drained land surfaces with individual parcels orientated along the level curves, the land shaping in ridge straps produced water stagnation on drains and the accentuation of excessive humidity especially in spring and raining seasons which lead to the gradual passing of the parcel to a lower category of use, that is grasslands. Non-ridged plots enjoy better excessive water removal, which enables farmers to perform adequate and timely spring works and thus have better agricultural productions. The draining-drainage systems carried out for eliminating the excessive humidity on agricultural lands were designed with respect to the exploitation of surfaces on the draining sectors.

Key words: excessive humidity, drying-drainage system, individual parcels, modelling in bands with crests, constituting and reconstituting the property right

Out of all main limiting factors of agricultural production that manifest themselves depending on local pedoclimatic conditions, appear moisture, flooding, reduced soil permeability and compaction, erosion, landslides and others.

Drainage, embankment-regularization, underground drainage, soil erosion control, and more have been done in order to grow the production capacity of agricultural land, and, especially, of arable land, which is of 178.502 ha (20.8% agricultural land) in Suceava county (Moca V. and collaborators, 2000).

After implementing hidroameliorative improvements, a special importance should be given to their use and how these are maintained over time, taking into account the new conditions created by the transition to private ownership of land.

MATERIAL AND METHOD

The excessive humidity, which occurs in the Moldova River basin and which is due to rain and/or ground water and to water system overflows, has manifested itself under various forms and at different intensities, on both horizontal and sloped land.

The natural conditions of the Baia piedmont plain support the occurrence and maintenance of excessive underground and surface humidity. The Moldova River meadow and 1.5 km-wide slip-shaped terraces, which are almost parallel with the Moldova River bed and which run north-west and south-east, with small 1-5% slopes, with flat areas and many small depressions, facilitate water stagnation.

In the wet climate of the Moldova River basin, the heavy precipitations fallen over 1-5 consecutive days and the low evapotranspiration rate make up the main excessive humidity cause in low permeability soils (Nitu T. and collaborators, 1985).

The precipitations fallen throughout the year exhibit an uneven distribution, with considerable amounts fallen in 24 hours or after long-lasting heavy rains, which cause surface overflows that carry along soil particles, thus enhancing bank erosion and hence clogging the channels (Radu O., 2009).

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Three drying-draining systems (Rotopăneşti-Rădăşeni-Fântâna Mare, Drăgoieşti-Berchişeşti, Bogdăneşti-Baia) and the Băişeşti-Dumbrava irrigation-drying system with a total drained area of 8761 ha, of which 3059 ha of underground draining works, were built between 1978 and 1980 in order to achieve the maximum production capacity of the Moldova River meadow and terraces land.

The actual drying channels network includes master collecting channels, secondary collecting channels, sector collecting channels and belt channels.

The Drăgoieşti-Berchişeşti drainage system (*fig. 1*), with an area of 1790 ha, out of which 553 ha containing underground drainage works, is part of the hydrographic basin of river Moldova and is located on its left bank, within Drăgoieşti, Berchişeşti and Cornu Luncii.

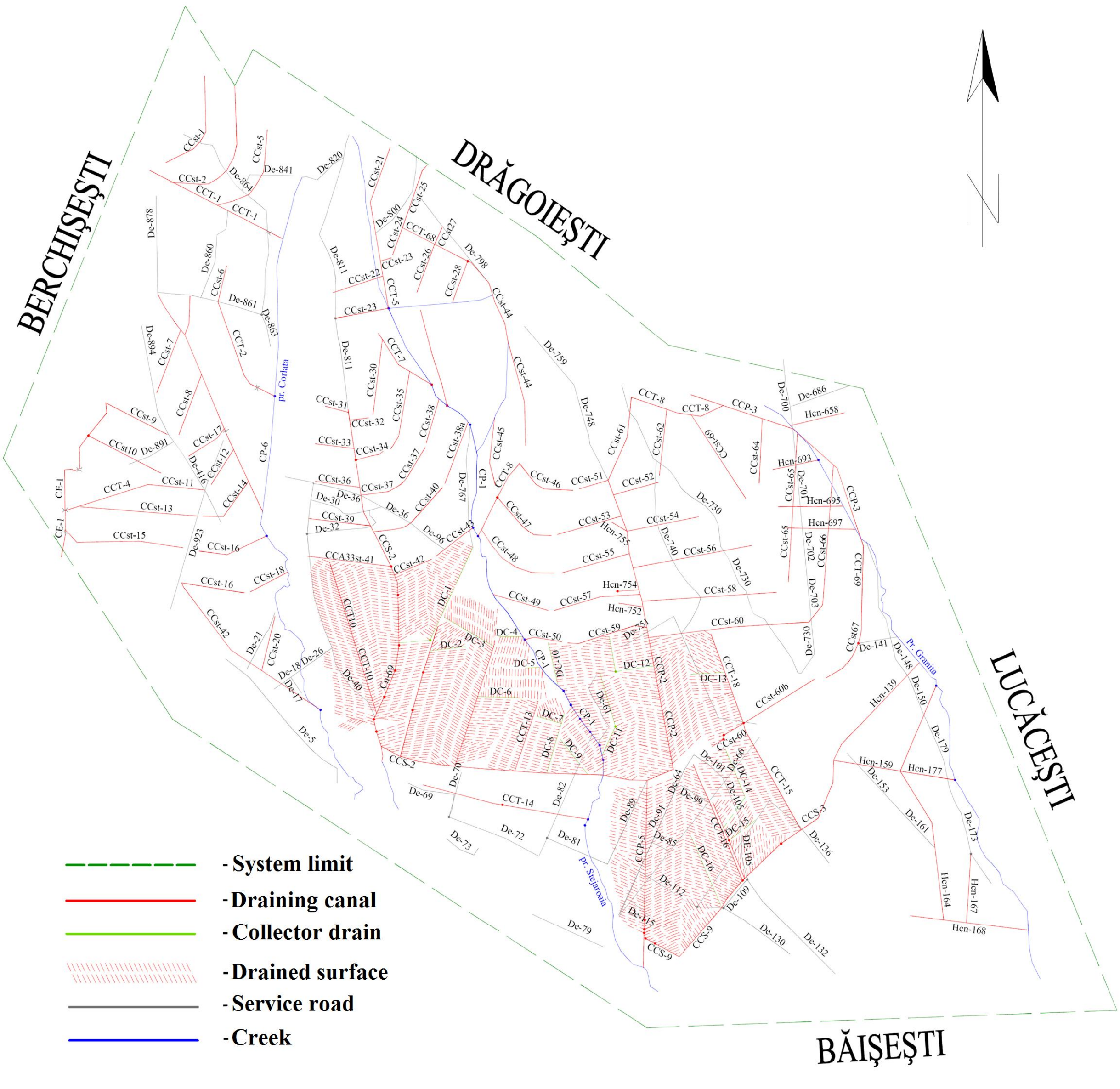

Figure 1 **Drying-drainage systems from Drăgoieşti-Berchişeşti**

Morphologically, the system is located on the river meadow of Moldova and meadows of inland streams Ratus, Corlata, Rău, Stejăroaia and Bahna, on the upper and lower terrace of river Moldova, the highest altitude is of 510.88 m is situated in the northern part of the area.

In the execution of tertiary, secondary and main canals, the watercourse ways, natural valleys and depressions were taken into account as much as possible.

Drainage channels were made with trapezoidal section, at a size which ensures the transport of maximum flows at 5%.

To show the strip tillage as a consequence of working land individually on parcels of drained soil, under private property, topographic surveying of precise geometric leveling were made, on the basis of which transversal and longitudinal were drawn of individual parcels of land.

In order to determine the water content of soil at this time, samples of soil were taken, the probe tube, in steps of 10 cm thickness to a depth of 0.80 m, both the line of the ridge and on gutter, resulting from strip tillage oriented approximately along the contour. Also, the content of water in soil and on the parcels oriented towards the line of the highest slope was determined, with undeveloped surface within the same sector of drainage.

RESULTS AND DISCUSSIONS

As a result of gaining and regaining private ownership, the parcels are located perpendicular, parallel and at an acute angle to the drainage network. Individual working of land parcels has determined in time the strip tillage, with widths, differences in levels and variable transversal slopes depending on the width of parcels, their use and machinery used for agricultural work. Figure 2 shows a transversal profile on a drained surface with individual perpendicular parcels on the collecting channel of the sector $CCst_{48}$.

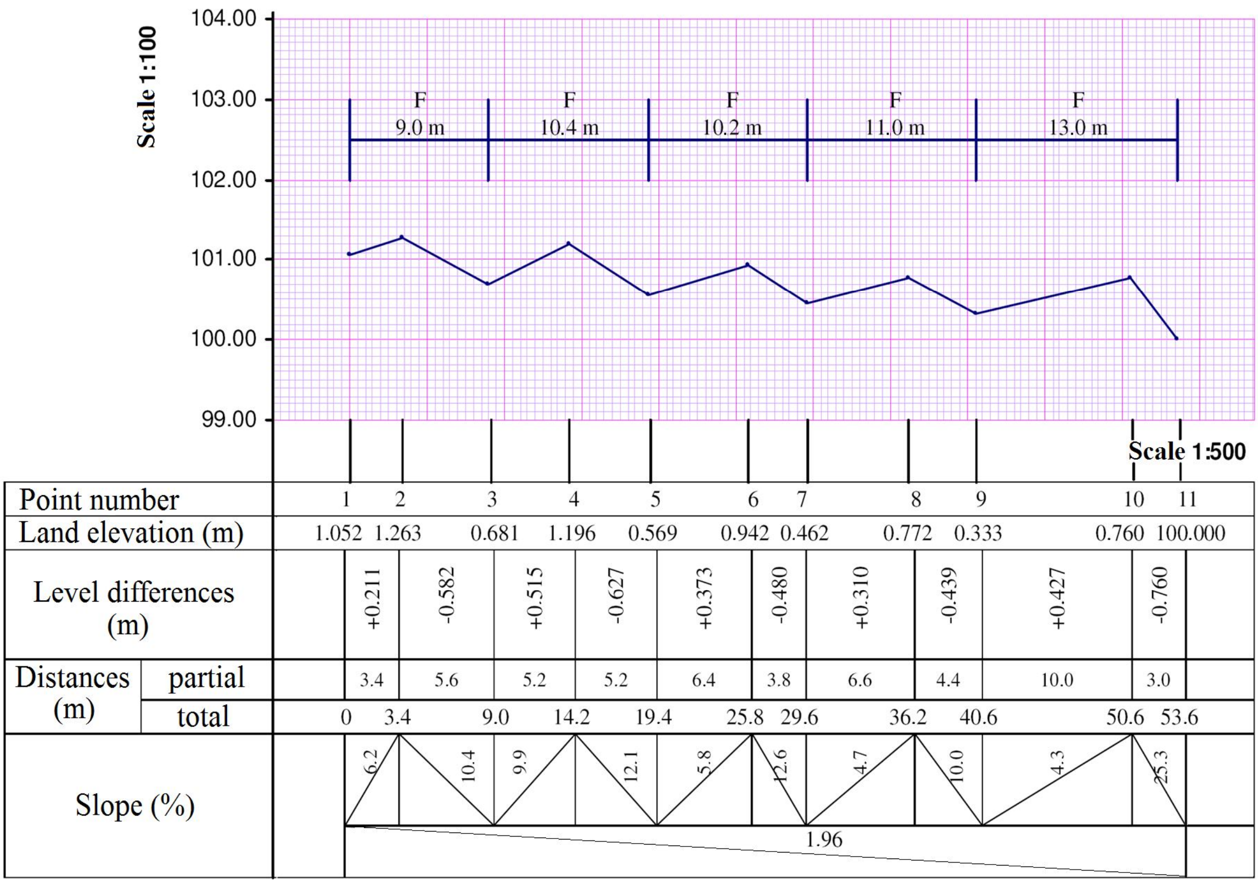

Figure 2 **Transversal profile of strip tillage, perpendicular oriented on the channel $CCst_{48}$**

Analyzing the transversal profile, we have identified the strip tillage as land id worked individually, with widths between 9.0-13.0 m, differences in levels of gutter-ridge varying between 0.211 m and 0.760 m and transversal slopes from 4.3 % to 25.3 % (Radu O., Savu P., 2008).

From the analysis of the longitudinal profile, made on these land parcels (*fig. 3*), results an orientation of the individual parcels approximately parallel to the contour, recording in the studied section of 100 m, a channel with a low slope value of 0.015% and on lengths of 25 m, counter-slopes up to 0.09%.

Although the average transversal slope on land parcels studied is of (*fig. 2*), which would ensure the elimination of excess of surface water, in spring when the snow melts and after heavy rains, due to the orientation of strip tillage parallel with contour, the accumulation of water in the area of channels, its stagnation for a long time and the appearance of hydrophilic plants takes place (*fig. 4*).

Extension of excess moisture and failure to work the land in time in spring resulted in the gradual transition of strip shaped parcels and oriented approximately along the contour, from arable land to grassland.

Point number	1		2		3		4		5
Bank elevation (m)	100.484		100.424		100.436		100.440		100.444
Elevation of chanel bottom (m)	100.015		99.975		99.967		99.977		100.000
Level differences (m)		-0.040		-0.008		+0.010		+0.023	
					-0.015				
Distances (m) partial		25.0		25.0		25.0		25.0	
Distances (m) total	0		25.0		50.0		75.0		100.0
Slope of chanel bottom (%)		0.16		0.03		0.04		0.09	
					0.015				

Figure 3 **Longitudinal profile of strip tillage parcels**

Figure 4 **Water stagnation and the installation of hydrophilic plants**

Land shaping in strip tillage determines the non-uniform elimination of excess of water from surfaces with drainage works. Figure 5 shows that the average water content of soil has the highest value on the line of channel (35.44%), and the lowest on surface unshaped parcels and oriented approximately perpendicular to contour (30.35%).

The value of the average water content of the soil ridge line of 34.59% is close to the value recorded in the gutter line, due to the stagnation of water in the gutter and the small distance between them, the width of the parcel of 13.00 m. The unshaped surface showed the lowest value of the average water content; it is less than 4 and, respectively 5 percent relative to the gutter line and ridges, due to runoff of water from rain and snowmelt, parcels being worked jointly in an association.

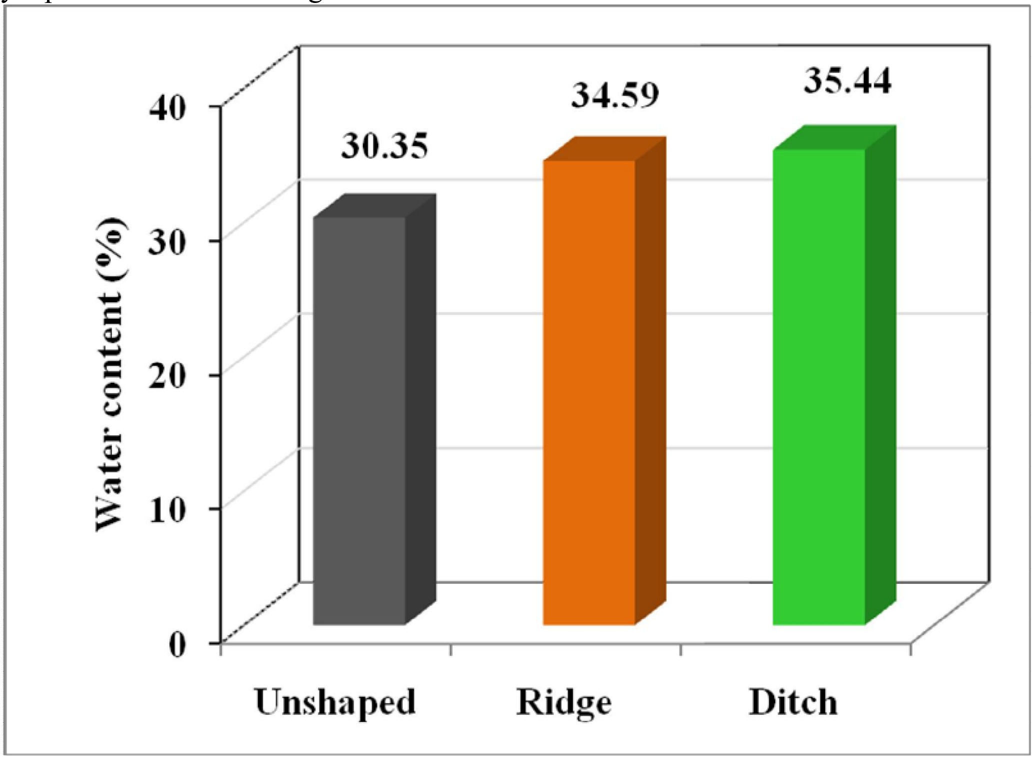

Figure 5 **Average content of water at the beginning of growing season**

During the growing season (*fig. 6*), the highest value of average water content of the soil was recorded throughout the gutter line (27.84%) but the lowest value of 22.94% was obtained on the ridge line. The average water content of the soil was of 23.75% on the unshaped surface, which is about 4% lower than the value recorded on the gutter line.

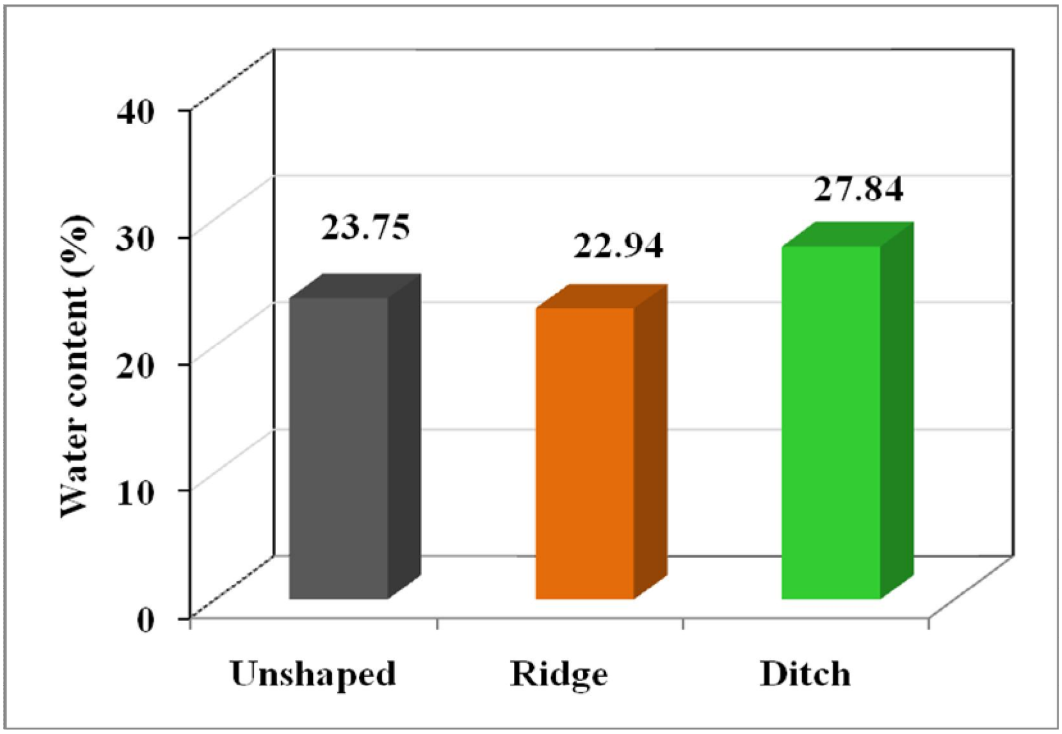

Figure 6 **Average content of water in soil during growing season**

More efficient elimination of excess water coming from rainfall and snow melt on the unshaped surface allows performing timely and efficiently spring works, normal growth and development of plants and obtaining high level of crops (*fig. 7*)

Figure 7 Corn Crop on unshaped surface

CONCLUSIONS

Individual working of parcels on land with drainage works determined shaping the land in strips with ridges, with widths, differences in levels and variable transversal slopes depending on parcel's widths, their use and machinery used for agricultural work.

By shaping land in strips with ridges as a result of individual working of parcels, we get an irregular elimination of excess of water from surfaces with drainage works.

On arable surfaces only with drainage works and with individual parcels along contour, shaping land in strip ridges determined water stagnation in channels and the extension of the excess of humidity, especially, in spring and during heavy rainfall, which led to gradual transfer of parcels to the lower category of grassland. In case of unshaped parcels, a better elimination of excess of water takes place which allows better performance in good conditions of spring works, normal growth and development of plants.

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