IMPROVEMENT OF THE ANTI-EROSION FITTING METHODS OF THE FIELDS FOR THE VINE CULTURE

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Abstract

The vine best values the slope hills. Currently over 70% of the vine cultivated areas are situated on hills. Having in view the slope of the field it is recommended that the terraces be done on the level curves, at the slope situated between 15-25 %.

On the fields that have a slope of up to 15 %the vine shall be planted without the terraces of the field, on the direction of the level curves and on the field with a slope over 25% the vine shall be planted on the direction of the slope line.

Key words: grape, vineyards, terraces, espalier, eroded soil

INTRODUCTION

As the vine plantations in famous vineyards are situated on a slope, from which over 50% on higher slopes than the admitted limit for mechanization, complex fitting are needed for the expansion or rehabilitation of the vine plantation.

The vine can be planted on hills having a slope of up to 14% without any anti-erosion fit, the rows being oriented on the direction of the level curves. The fields with slopes between 15-25 % are terraced from the basis of the slope to its upstream. After having fit the first terrace the fertile soil from a depth of 40-50 cm from the second terrace is pushed with the help of a bulldozer on the first terrace and then the terrace is flattened. Then the fertile soil from the third terrace is pushed on the second terrace and so on.

MATERIALS AND METHODS

The anti-erosion works had been done and followed at the vine farm from Botean locality, in Bihor county. The main weather elements that characterize this farm nearby Oradea city are the ecosystem factors.

a)-the biotic factor

- age of plantation – 15 years

b)- the weather factor

- number of vegetation days – 182
- global heat balance – 3183.3 Celsius degrees
- useful heat balance – 1552.3 Celsius degrees
- heatstroke – 1445.3 Celsius degrees
- rains during the vegetation period – 349.6 mm
- heat coefficient – 17.55 Celsius degree
- heatstroke coefficient – 7.98
- rain coefficient – 1.91
- heliothermic factor – 2.03

- hydrothermic coefficient – 1.24
- bioclimatic factor – 7.37

c) The edaphic factor

- type of soil – red brown

The fit, parceling and modeling of the fields had been done as follows:

a) Sloping the vine rows on the general direction of the level curves according to the exhibition requests, realizing bigger lengths of work and applying the agricultural and technical measures against erosion.

These plantations are done on fields having a slope up to 14%, the useful surface being of 85-95% , the plantation distance of 2.2/1.0 meters, this meaning a number of 4545 hubs on a hectare.

b) By flattening, cleaning and putting the roads on level curves, facing the rows on the line of the biggest slope and ensuring the mechanization conditions with the winch.

In this case the fields have a slope of over 25% , the useful surface being 85-90%, the plantation distance of 1.5-1.0 m , thus there are a number of 6666 hubs/hectare.

c) By flattening and cleaning the slope, putting the roads on the level curves, between which the plantation of the vine is done, on the curve level. In the first 2-3 years, through repeated works of the soil, on each interval a micro terrace is created.

In this situation the slope of the field is of 15-25 % , the useful surface of 85-87%, the plantation distance of 2.8/0.8 m, thus there are a number of 4464 hubs/hectare.

d) By creating terraces and by vine plantation the useful breadth of the terrace platform is according to the field slope. In this case the field slope is of 15-25% , the useful surface of 58-64%, the plantation distance of 2.0/1.2 m , thus there are a number of 4167 hubs/hectare.

The plantation distances, the density of the hubs for a hectare and the used leading forms contain solutions which are presented in Table 1.

Table 1

Plantation distance, density of the vine and leading forms used in experiments

Fit system	Plantation distance	Nutrition surface/hub	Density of the hub vine/hectare	Distance report	Leading form
Without terraces on the level curve	2.20 x1.0	2.20	4545	2.20	Bilateral string on the strain
Terraces	2.00 x 1.20	2.40	4167	1.66	Bilateral string on the strain
On the level curves through micro terraces	2.80 x 0.80	2.24	4464	2.80	Unilateral string on the strain
With rows oriented on the slope line	1.50 x 1.00	1.50	6666	1.50	Unilateral string on the strain

The sustaining system specific to these forms of fit is the espalier with 2.20 m concrete poles using 5 rows of wire.

When there is a fit on level curves through micro terraces and when there is a fit by facing the rows on the slope line then the number of the espaliers used on a hectare is bigger with 30-40%.

The observations and the determinations had been done on 15 year old vine plantations, on the Merlot type of vine, grafted on the Berlandiri X Riparia Kober 5BB.

RESULTS AND DISCUSSIONS

The way the field was used (table 2) emphasizes the 30-40% losses from the terrace fit surface. For the other fit systems the field is 80-90% valued.

Table 2

The way the field is used according to the fit system

Field slope %	Fit system	The useful width of the platform in meters	Number of rows	Non productive field from the fit surface
0-14	Without terraces on the level curves	60-100	25-45	5-15
15-25	Terraces	9.5-17.5	4-8	34-42
	On level curves through micro terraces	80-100	29-35	15-23
Over 25	With rows facing the slope line	40-60-80	-	10-15

The soil erosion (table 3) is influenced by the fit system and by the slope.

Table 3

The average yearly soil erosion according to the fit system

Fit system	Width of the platform/m	Inclination of the platform	Eroded soil m^3/hectare/year
Without terraces on the level curves	60-100	0-14	3.11
Terraces	9.5-17.5	0-6	2.47
On level curves through micro terraces	80-100	12-20	22.87
With rows facing the slope line	40-80	Less than 25	28.83

The volume of eroded soil, due to the heavy torrential rains has values between 2.47 and 28.83 m^3/hectare/year being substantially reduced on the level curve plantations with a field slope of up to 14% and on terraced plantations that have a field slope of 15-25%. For the vine plantation in which the slope degree does not modify there the erosion is 15% bigger. For these fit systems the erosion decreases with over 50% when the width of this lot is getting smaller due to improvement works like: soil mulching and non-cultivation through spraying with erbicides previously and afterwards.

The grape production for the Merlot type in the plantations with a slope of up to 14% is of 9541 kg/hectare compared to 6499-8194 kg/hectare in plantations that have a slope bigger than 15%(table 4).

Table 4.

Grape production for the Merlot type

Specification	Measurement Unit	Average on variants	Fit system			
			Without terraces on level curves	Terraces	On level curves through micro terraces	With the rows facing the slope line
Hub production	Kg %	1.891 100	2.447 131	2.164 104	1.611 96	1.273 67
Hectare production	Kg %	7817 100	9541 122	8194 105	6499 83	7036 90
Sugar	g/l %	209 100	189 90	201 96	220 105	228 109
Acidity	g/l	5.3	5.9	6.4	4.8	4.2
H_2SO_4	%	100	111	121	91	79

In what quantity is concerned the crop registers a surplus of 20-30 grams of sugar /liter on plantations with micro terraces and on those mechanized with the help of the winch, to which the general slope of the field did not modify the latter, having a great percent of light.

The production costs are influenced by the slope and by the production level. In over 255 slope plantations the values are 20-40% bigger than in 14% slope plantations.

CONCLUSIONS

On fields situated on slopes bigger than 5% agricultural systems and cultivation technologies must be applied specific for these types of fields which can ensure the production increase, the prevention and the stop of the soil erosion, the maintenance and increase of the soil fertility potential.

As the field slope increases, the volume of the necessary works for the fit and preparation of the field for future plantations and exploitation is 36-130%.

The erosion process on bigger slope fields is diminished when special terrace works are done.

In order to protect and prevent soil erosion, vine plantations with slopes up to 14% are recommended with the rows facing the level curves and plantation on terraces with slopes of up to 25%.

Micro terrace plantations on a slope of up to 25% increase the value of the field.

The realization of vine plantations on slopes bigger than 25% with the rows facing the slope line can be done in family farms.

REFERENCES

1. Cheregi Viorel, 2003 – Viticultura, Editura Universitatii din Oradea
2. Cheregi, Viorel 1998 – Viticultura speciala, Editura Universitatii din Oradea
3. Cotea V.D., N. Barbu, C.C.Grigorescu, V.V. Cotea, 2003- Podgoriile şi vinurile României, Editura Academiei Române, Bucureşti
4. Dejeu Liviu, 2004 – Viticultura practică, Editura Ceres, Bucureşti
5. Dobrei Alin, Liliana Rotaru, M. Mustea, 2005- Cultura viţei de vie, Editura Solness, Timişoara
6. Ion Măgdălina, 1994 – Exploatarea şi întreţinerea lucrărilor de îmbunătăţiri funciare, Editura Didactică şi Pedagogică, Bucureşti
7. Moţoc M. Şi coab., 1975 – Eroziunea solului şi metodele de combatere, Editura Ceres, Bucureşti
8. Oşlobeanu M., M.Macici, Magdalena Georgescu, V.Stoian, 1991- Zonarea soiurilor de viţă de vie în România, Editura Ceres, Bucureşti
9. Oprea Ştefan, 2001 – Viticultura, Editura AcademicPres, Cluj Napoca
10. Pleşa I., Gh.Florescu, D. Mureşan, I.Popescu, N.Ceauşu, P.Savu –Îmbunătăţiri funciare, 1980, Editura Didactică şi pedagogică, Bucureşti