RESEARCH ON MINIMIZING THE DISRUPTIVE EFFECT OF CLIMATE CHANGE ON VITICULTURE BY APPLYING ADAPTED TECHNOLOGIES

CERCETĂRI PRIVIND MINIMIZAREA EFECTULUI PERTURBATOR AL SCHIMBĂRILOR CLIMATICE ÎN VITICULTURĂ PRIN APLICAREA UNOR TEHNOLOGII VITICOLE ADAPTATE

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Abstract. *The research was conducted within SCDVV Bujoru, Galati county in the climatic conditions of the years 2012 to 2013. Experienced technological factors (soil system maintenance and fruit load) differentially influenced the intensity of physiological and biochemical processes with direct consequences for grape production and quality. A stronger positive influence on the production of grap, to exercise maintenance system, ground biggest productions were obtained when total mulching with straw. High temperatures combined with poor rainfall during the growing season and diurnal average consumption vine led to soil moisture differentiated soil in system maintenance. In a dry year, grape production was influenced by soil maintenance system, the maximum yield for variant partial mulching. In a normal year in terms of climate stands out partial mulching option, followed by mulching total. Systems maintenance of soil by mulching (total or partial) and minimum tillage exerted a positive influence on the quality of grape production. The reduction of the load of the fruit (20 and 40%) resulted in the maintenance of the systems of the soil to increase the content of sugar in the grapes and a decrease in acidity of the must, which yielded high values of the index gluco-acidimetric, adverse obtaining quality wines and typical.*
Key words: *vine, moisture, grape marc, mulching total, minimum tillage*

Rezumat. *Cercetările s-au efectuat în cadrul SCDVV Bujoru, jud. Galaţi în condiţiile climatice ale anilor 2012-2013. Factorii tehnologici experimentaţi (sistem de întreţinere al solului şi încărcătura de rod) au influenţat în mod diferenţiat intensitatea proceselor fiziologice si biochimice cu consecinţe directe asupra producţiei de struguri şi a calităţii acesteia. O influenţă pozitivă pregnantă asupra producţiei de struguri a exercita sistemul de întreţinere al solului, producţiile cele mai mari s-au obţinut în cazul mulcirii totale cu paie. Temperaturile ridicate, cumulat cu precipitaţiile deficitare din perioada de vegetaţie şi consumul mediu diurn al viţei de vie au condus la umidităţi ale solului diferenţiate în funcţie de sistemul de intreţinere al solului. Într-un an secetos, producţia de struguri a fost influenţată de sistemul de întreţinere al solului, maximul obţinându-se în cazul variantei mulcire parţială. Într-un an normal din punct de vedere climatic se evideţiază varianta mulcire parţială, urmată de mulcirea totală. Sistemele de întreţinere a solului prin mulcire (totală sau parţială) şi minimum tillage au exercitat o influenţă pozitivă asupra calităţii producţiei de struguri. Reducerea încărcăturii de rod (cu 20 şi 40%) a*

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determinat în cazul tuturor sistemelor de întreţinere a solului o creştere a conţinutului de zahăr în struguri şi o scădere a aciditătii mustului, fapt ce a condus la obţinerea unor valori ridicate ale indicelui glucoacidimetric, nefavorabile obţinerii unor vinuri tipice şi de calitate.
Cuvinte cheie: *viţă de vie, umiditate, tescovină compostată, mulcire totală, minimum tillage*

INTRODUCTION

Climate change occurred mainly in the last decade have affected increasingly more vineyards in Moldavia, mainly in the south. Water regime of the vine is the whole process of absorption of moisture from the environment, moving them into the plant and its elimination in the external environment, in the context of creating and maintaining an ecological balance, ameliorative permanent, not upset at all dynamics of soil, water and plants. Water regime is represented by the biology of the species and varieties of vines to the water necessary for growth, fruiting and ripening (varieties differ greatly from one to another with regard to water consumption), the climatic characteristics of the area, soil properties and applied technology (Alexandrescu et al. 1994). Alternative techniques vine culture and especially the use of biological methods of culture, contributes to ease the long monoculture. They tend to establish a new balance in the ecosystem components are considered *more natural that respects life and the environment*. The vine is developed as a result of growth unit is a water consuming. It has great possibilities for water supply and precipitation conditions of about 450 mm / year since it has a developed root system, physiological and ecological plasticity large, high root pressure and high suction force leaves (Liviu Dejeu et al. 1997). The vine has a growth device developed as result is a consumer high of water. It has great possibilities for water and precipitation conditions of about 450 mm / year since it has a developed root system, physiological and ecological plasticity large, high root pressure and high suction force leaves (Dejeu et. al., 1997).

MATERIAL AND METHOD

The experience was done in the experimental polygon Bujoru RDS VV planted with Merlot. The research was conducted over the period 2012-2013 and taking into account the intended purpose in the study were the following aspects:

Factor A – **soil maintenance system with graduations:**

a_1 – *black field* (autumn plowing, spring plowing, hoeing mechanical interval 5, 5 manual hoeing a row, fertilization with N, P, K optimal dose) (fig. 1);

a_2 – *total mulching with crop residues/straw* (straw spread over a time interval and layer thickness of 10 cm, fertilization with N, P, K optimal dose), (fig. 2);

a_3 – *partial mulching interval with grape marc composted* (composted pomace spread within the thickness of 10 cm on all post-emergent herbicide - 2 herbicides, fertilization with N, P, K at a dose reduced by 50%), (fig. 3).

a_4 –*minimum tillage(*autumn plowing, hoeing deep mechanical spring post emergence herbicide total 2-3 herbicide, fertilization with N, P, K optimal dose) (fig.4).

Factor B – *fruit load* with graduations:

b_1 – Recommended fruit load (36 eye / hub)

b_2 – 80% of the recommended fruit load (29 eye / hub)
b_3 – 60% of the recommended fruit load (22 eye / hub)

Recommended fruit load was 36 eye / hub.

The field location was by the model after experiences polifactorial plots located in the following scheme:

a_1			a_2			a_3			a_4		
b_1	b_2	b_3	b_1	b_2	b_3	b_1	b_2	b_3	b_1	b_2	b_3

Observations and measurements were conducted on climatic factors, soil moisture, quantity and quality of grape production. Harvesting grapes and determine qualitative characteristics made technological maturity at the same time for all experimental variants.

Fig. 1 - Black field

Fig. 2 - Total mulching with crop residues/straw

Fig. 3 - Partial mulching interval with grape marc composted

Fig. 4 - Minimum tillage

RESULTS AND DISCUSSIONS

Climatic data from a weather station using a AGROEXPERT system and are presented in Table 1 and Figure 5 reveal that Bujoru wine center by the

amount of rainfall and mean air temperatures of 2012 is dry and 2013 a normal year. A big problem is the intensity of extreme values of climate factors, which until now were considered accidental and which in recent years have become common. Of these air temperature and heavy rains are the most aggressive (Enache, 2010).

The year 2012 was a particularly dry year, with a decrease in rainfall regime and an uneven distribution of rainfall. The maximum precipitation was in May (115,8mm) and led to a build script, in reality not all the amount was recovered, much of it is lost through leaks to the ground. Since June rainfall decreased significantly hovering below multiannuality. Deficit rainfall and maximum temperatures above 30 ° C have influenced the relative humidity during certain periods the recorded values below 50%, resulting in stressful conditions for growing vines. Compared to the average multiannual average temperature shows a relative difference of 103%, 109% sum of active temperatures, relative humidity of 84%, 118% insolation and precipitation 99%.

The growing season of year 2013 starts with air temperatures close to normal. Although in June, July and August were recorded maximum air temperatures above 30 °C, the average temperature is lower during June-September compared to the multiannual due lower temperatures during nights. Rainfall during the growing season of 2013 amounts to 516.0 mm. The lack of useful rainfall during July 2 to August 25 created stressful conditions for vines. The rains that followed the end of August, combined with those of September were able to largely cover the deficit created in July-August. In September there was excess rainfall of 165.0 mm , but maximum rainfall recorded were not fully recovered because in four days consecutive rainfall amount produced was 187.4 mm. Relative humidity is within the normal range, there were only sporadic values below 50% in the first decade of April and in August.

Table 1

Climatic conditions 2012-2013

Climatic parameters	The annual average	2012 year	Relative difference	2013 year	Relative difference
The average temperature (ºC)	11,5	11,9	103	11,1	97
Sum of active temperatures (ºC)	3516	3838	109	3295	94
Relative humidity of air (%)	73	61,6	84	73,9	101
Insolation (hours)	1796	2096	118	1931	108
Precipitation (mm)	453,8	448,0	99	713,1	157

Compared to the average multiannual, average temperature shows a relative difference of 97%, the amount of active temperatures of 94% relative humidity of 101%, 108% insolation and precipitation 157%.

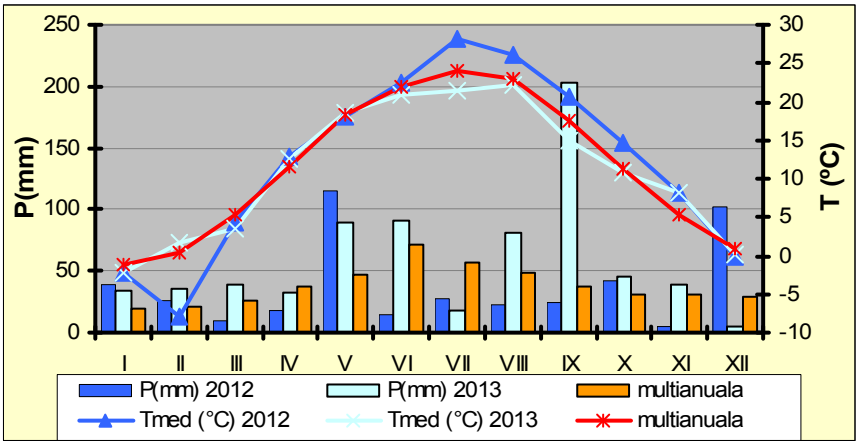

Fig. 5 - Monthly distribution of precipitation and mean air temperature

By applying technology adapted to wine better able to conserve water in the soil and water losses to a minimum. From the point of view of production results show particularly high influence they have on the amount of grape experimental variations. The drought of 2012 directly influenced the production and quality of the grapes. Looking from the point of view of the influence of soil maintenance on the quantity and quality of grape production (average of three loads of fruit), we see that in a dry year how was 2012, when production was maximum total mulching with straw followed by mulching the interval with marc. In a normal year, mulching with marc achieved maximum production (5.539 kg / vine stocks), followed by mulching with straw (4,196kg / vine stocks) (table 2). Systems maintenance of soil by mulching (total or partial) and minimum tillage exerted a positive influence on the quality of grape production. Partial mulching with marc gives balanced quality grape production. In terms of fruit load influence on the quantity and quality of grape production (average of the three soil maintenance systems), reducing fruit load led to lower production in a dry year and getting balanced production in a year normal (Table 3). Reducing fruit load when mulching with composted grape marc, and minimum tillage resulted in a slight increase in the production of grapes.

Table 2

Influence of soil maintenance system on the quantity and quality of grape production (average of three loads of fruit)

Fruit load	The production Kg/ vine stocks		The weight of 100 grains g		Volume 100 grains ml		The sugar g/l		Acidity g/l H_2SO_4	
	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013
a1	1,013	2,398	94	123	85	123	258	239	3,41	2,69
a2	1,483	4,196	104	128	93	128	239	218	3,93	2,79
a3	1,037	4,539	111	145	99	129	237	213	3,62	2,96
a4	0,940	2,724	101	137	90	123	254	232	3,40	2,94

Table 3

Influence of fruit load on the quantity and quality of grape production (average of the three soil maintenance systems)

Fruit load	The production Kg/ vine stocks		The weight of 100 grains g		Volume 100 grains ml		The sugar g/l		Acidity g/l H_2SO_4	
	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013
b1	1,253	3,507	102	132	91	125	239	227	3,77	2,79
b2	1,073	3,514	102	134	91	125	245	224	3,76	2,83
b3	1,030	2,997	103	123	93	116	267	207	3,32	2,68

CONCLUSIONS

1. The year 2012 in terms of climate was atypical, with a water deficit accentuated and with an excess thermal regime. The year 2013 presented favorable climatic conditions vine culture, except the period 2 July to 25 August when rainfall deficit was emphasized. Rainfall that followed the end of August, combined with those of September were able to largely cover the deficit created between July and 25 August.

2. In a dry year rainfall deficit and maximum temperatures above 30°C have influenced the relative humidity recorded the values specified period of less than 50%, leading to stressful conditions for growing vines. In a normal year relative humidity is within normal limits, only sporadically recorded values below 50%.

3. In a dry year, grape production was influenced by maintenance system, the maximum obtained with partial mulching variant and in a normal year stands out partial mulching variant , followed by total mulching.

4. Reducing fruit load for minimum tillage and mulching with marc led to a slight increase in the production of grapes.

5. Systems maintenance of soil by mulching (total or partial) and minimum tillage exerted a positive influence on product quality grape of these partial mulching with marc gives balanced quality grape production.

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