THE ADAPTATION TO CLIMATE CHANGE A GRAPEVINE TECHNOLOGIES

ADAPTAREA TEHNOLOGIILOR VITICOLE LA SCHIMBARILE CLIMATICE

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Abstract. *Efficiency and stable development of vineyards depends primarily on environmental factors, particularly the deviation from their normal (frost, hail, drought, torrential rains). Natural factors are closely linked to ecological parameters of the territory, landscape, agricultural technique of cultivation. An optimal interaction of all these factors and correct adjustment of agricultural technique leads to an effective Vineyard with a good productivity during the operation. The research was conducted within RDSVW Bujoru, district Galaţi in climatic conditions of 2012-2014. Experienced technological factors (soil and system maintenance fruit load) differentially influenced grape production. It stands soil maintenance system complete littered with straw mulching, followed by maintenance system of the soil by mulching partial by marc compost.*
Key words: *vines, climate change, the total mulching with straw, composted grape marc partial mulching.*

Rezumat. *Dezvoltarea eficientă şi stabilă a plantaţiilor viticole depinde în primul rând de factorii de mediu, îndeosebi de abaterea de la normală a acestora (ger, grindina, secetă, ploi torenţiale, etc). Factorii naturali sunt strâns legaţi de parametrii ecologici ai teritoriului, relief, agrotehnica de cultivare etc. O interacţiune optimă a tuturor acestor factori şi o reglare corectă a agrotehnicii conduce la o viticultură eficientă, cu o productivitate bună pe parcursul perioadei de exploatare. Cercetările s-au efectuat în cadrul SCDVV Bujoru, jud. Galaţi în condiţiile climatice ale anilor 2012-2014. S-a urmărit elaborarea unor soluţii tehnologice de diminuare a efectului perturbator al schimbărilor climatice personalizate la nivel de centru viticol, care să asigure productivitatea şi sustenabilitatea pe termen lung a plantaţiilor viticole. Factorii tehnologici experimentaţi (sistem de întreţinere al solului) au influenţat în mod diferenţiat producţia de struguri. Se remarcă sistemul de întreţinere a solului prin mulcire totală cu paie, urmat de sistemul de întreţinere a solului prin mulcire parţială cu tescovină compostată.*
Cuvinte cheie: *viţă de vie, schimbări climatice, mulcire totală cu paie, mulcire parţială cu tescovină compostată.*

INTRODUCTION

Vineyards in southern Moldova are increasingly affected by climate change than occurred in the last period. Reducing the quantity and quality of crops and grape vines in vineyards affected by the occurrence of early autumn frosts,

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excessive negative temperatures, the spring frosts and drought rendered during the growing season, trainer losses for vineyards. We are seeing lately from torrential rainfall, long dry, excessively dry years followed by normal or rainy years. All these things affect the water reserve in the soil which exhibit hydric most times since June. Alternative techniques culture of the vine and in particular the uses of biological methods of crop monoculture contribute to the constraints of time. They tend to establish a new balance in the ecosystem components are considered more natural that respects life and the environment. Vine has developed a vegetative device and therefore is water intensive. It has great possibilities in terms of water supply and rainfall of about 450 mm / year because it has a developed root system with physiological and ecological plasticity large, with a high root pressure and high suction force of the leaves (Dejeu *et al.,* 1997). Climate change is recognized today as one of the most serious environmental challenges, societal and economic issues facing mankind. Climate change affects many sectors. Agriculture is one of the areas most exposed due to its dependence on weather conditions. Negative effects on agricultural yields will be exacerbated by more frequent extreme weather events (floods, heavy rains, heat waves and drought). Most of the effects of climate change on agriculture are resulting in water. The lack of water has a major impact on agricultural production.

MATERIAL AND METHOD

The experience was made in an experimental polygon in the SCDVV Bujoru planted with Merlot. The research was conducted during 2012-2014 and taking into account the proposed order were studied as follows:

The soil maintenance, with the graduations*:*

V_1 – *black field* (plowing autumn, spring plowing, five hoeing mechanical on interval, five manual hoeing on interval, fertilization with N, P, K the optimal dose) (Figure 1);

V_2 – *total mulching with plant debris* (plant debris spread along with the range and depth of 10 cm, fertilization with N, P, K the optimal dose) (Figure 2);

V_3 – t*he partial mulching mulch marc interval* (spread grape marc compost with layer thickness range of 10 cm, postemergence herbicides on row - two herbicides, fertilizer N, P, K dose reduced by 50%) (Figure 3).

They were made observations and determine the climatic elements and quantity of grapes. Harvesting of grapes and determine the qualitative characteristics made the technological maturity at the same time for all experimental variants.

Fig. 1 - Black field

Fig. 2 - Total mulching with straw

Fig. 3 - Mulching partial with grape marc

RESULTS AND DISCUSSIONS

Climatic data recorded at the weather station using a system SCDVV Bujoru AGROEXPERT and are shown in Table 1, 2 and fig. 4, 5 and 6 reveal that the amount of viticultural Center Bujoru precipitation and mean air temperatures, the years 2012, 2014 and 2013 are dry a normal year. A big problem is the intensity of extreme values of climate factors, which until now were considered accidental and that in recent years have become common. Of these air temperature and heavy rains are the most (Enache, 2010).

The year 2012 was a very 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 fact the whole amount was not recovered, much of it is lost through leakage at ground level. Since June precipitation decreased considerably hovering below multiannuality. Deficit rainfall and maximum temperatures exceeding 30°C have influenced the relative air humidity during certain periods it recorded values below 50%, leading to stressful conditions for growing vines. Compared to the average multi-annual mean air temperature has a relative difference of 103%, 109% amount of active temperatures, humidity 84%, 118% insolation and precipitation 99%.

The growing season of 2013 begins with air temperatures close to normal. Although in June, July and August were recorded maximum air temperatures above 30°C, average air temperature is lower from June to September multiannuality process using lower temperatures during the nights. Rainfall during the growing season of 2013 totaling 516.0 mm. Lack of useful rainfall during July-25 August 2 created stressful conditions for vineyard. The rains that followed the end of August, combined with those of September have largely managed to cover the deficit created in July-August. In September surplus was recorded rainfall of 165,0 mm maximum rainfall recorded but were not fully valorised on 4 consecutive days because of rain amount produced was 187,4 mm. Relative humidity is within the normal range, occurred only sporadically values less than 50% in the first decade of April and in August. Compared to the average multi-annual mean air temperature has a relative difference of 97%, 94% total active temperature, relative humidity of 101%, 108% insolation and precipitation 157%.

Year 2014 was a normal year, with a decrease in rainfall regime and an uneven distribution of rainfall. The maximum rainfall in the months of April was (72,4) and July (84,6mm) and the minimum in May (4.1 mm) and September (3,0 mm). Deficit rainfall and maximum temperatures exceeding 30°C have influenced the relative air humidity during certain periods it recorded values below 50%, leading to stressful conditions for growing vines. Compared to the average multi-annual mean air temperature has a relative difference of 93,9%, 91,6% total active temperature, humidity 104,7%, 88,1% and precipitation sunstroke 99.2 %.

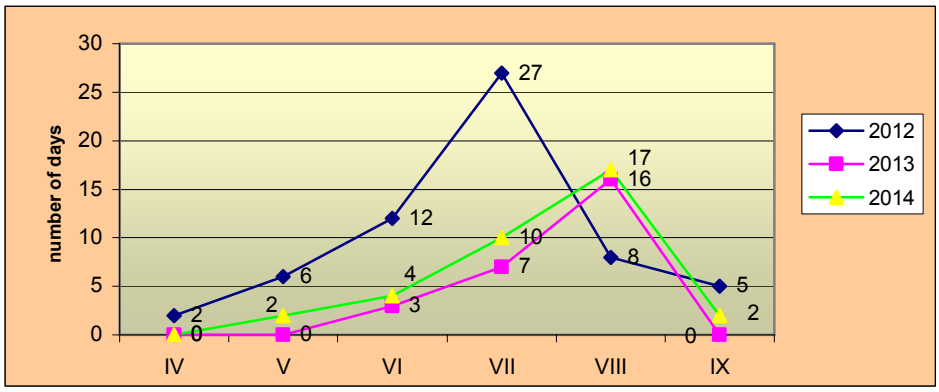

Fig. 4 - Number of days with Tmax air above 30ºC

Table 1

Climatic parameters / 2012-2014 relative difference

Climatic parameters	The average yearly	2012 year	Relative difference	2013 year	Relative difference	2014 year	Relative difference
Tmedie a aerului (ºC)	11,5	11,9	103	11,1	97	10,8	93,9
Suma T active (ºC)	3516	3838	109	3295	94	3220,3	91,6
Ur (%)	73	61,6	84	73,9	101	76,4	104,7
Insolația (ore)	1796	2096	118	1931	108	1582,8	88,1
Precipitații (mm)	453,8	448,0	99	713,1	157	450,4	99,2

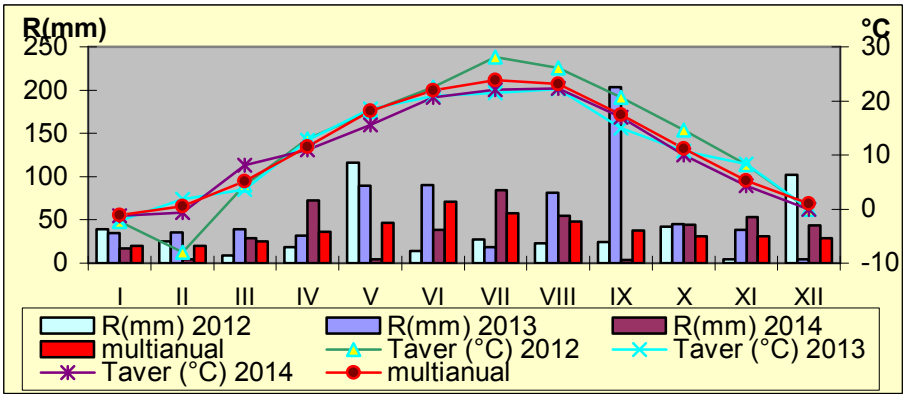

Fig. 5 - Monthly distribution of rainfall and average air temperature 2012-2014

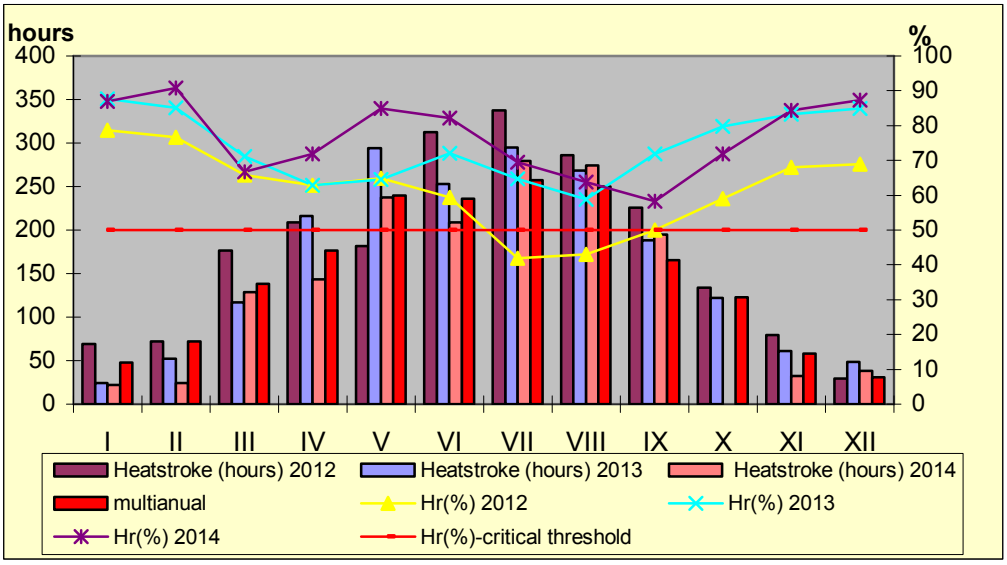

Fig. 6 - Heatstroke and relative air humidity 2012-2014

By applying technology to manage vineyards adapted to better conserve water in the soil and water loss is minimized. In terms of productive results show particularly large influence they have on the quantity of grapes experimental variants (fig. 7). The drought of 2012 directly influenced grape production. Analyzing in terms of soil maintenance system influence on the production of grapes, we note that in a dry year as 2012 maximum production was if total mulching with straw, followed by mulching the interval with marc. In a normal year, mulching with grape marc achieved maximum production (18,609 t / ha), followed by mulching with straw total (17,205 t / ha).

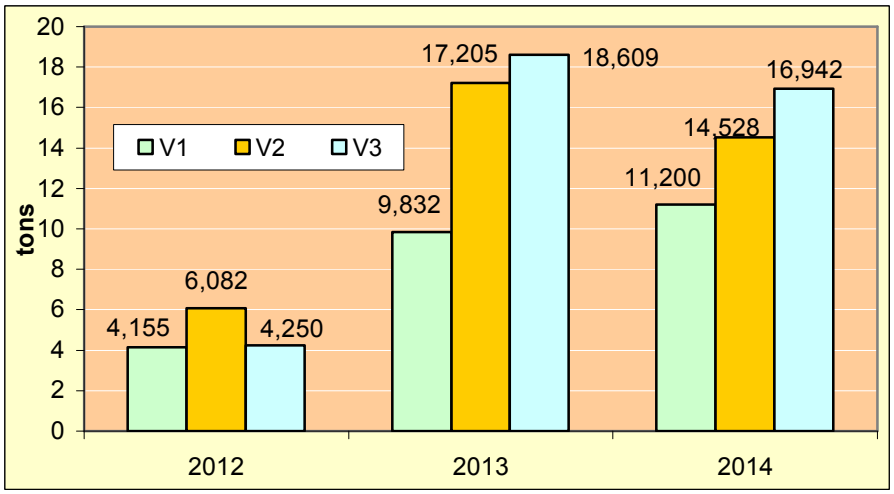

Fig.7 - Influence of soil maintenance system on production grape 2012-2014

CONCLUSIONS

1. Three years taken in observation were different. The year 2012 in terms of climate was unusual, with accentuated water deficit and a surplus thermal regime. The year 2013 presented the favorable climatic conditions for growing grapevine, except the period 2 July to 25 August when rainfall deficit was emphasized. The rains that followed the end of August, combined with those of September have largely managed to cover the deficit created during July- August 25th. Year 2014 was a normal year, with a decrease in rainfall regime and an uneven distribution of rainfall.

2. In a dry year rainfall deficit and higher maximum temperatures of 30°C have influenced the relative humidity, the values recorded during periods of less than 50%. In a normal year relative air humidity is within the normal range, only sporadically recorded values below 50 %.

3. The maintenance of soil influences grape production. In extremely dry years production maximum mulching is recorded in total and in a normal year is highlighted followed by mulching partial mulching total.

4. Mulching is recommended to apply partial and total reducing disruptive effect of climate change in the vineyards, depending on climatic year.

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