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ENVIRONMENTAL CONDITIONS OF SOILS NEAR IVAYLOVGRAD IN APPLYING THE HERBICIDES FOR WEED CONTROL IN VINEYARDS

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Abstract

During the 2010-2011 year near Ivaylovgrad herbicides Flazasulfuron and Glyphosate were tested alone and in combination for weed control in vineyards. Against this background, identified some soil characteristics such as soil reaction, content of carbonates, particle size composition, organic matter, content of basic nutrients. Made from the two-year studies found that the combination of herbicides Flazasulfuron at a dose 3 g/da + Glyphosate at a dose 83 g/da to control greatly weeds in vineyards, especially persistent weed Convolvulus arvensis. Data from soil analyzes showed no significant changes in agroecological soil conditions.

Key words: *organic farming, allelopathy, mixed vegetable crops.*

INTRODUCTION

Many factors influence the growth, development and productivity of the vine and the quality of grapes and wine as more important ones are: climate, soil + subsoil, orography and terrain exposure, varietal composition sanitary condition of seedlings the fight against weeds, diseases and pests, technology of cultivation of vineyards and winemaking technology. Weeds are a limiting factor in growing perennial crops-vineyards, orchards and berries (Tonev, T, Dimitrova M, Kalinova Sht, Zhalnov Iv, Spasov V, 2007). Vineyard requires keeping the soil surface clear of weeding. Clean soil is evenly illuminated by the sun and gives temperetura at night, which helps to better ripening of the grapes. Vine Weeds compete in terms of nutrients and water. At the same time they limit the natural ventilation in the stand, creating the premises for longer retain excess moisture and development of various diseases (Tonev T, 2000).

In many countries in Europe vineyard weed problem in terms and cleaning shoots vines in vineyards is decided by the soil treatments. Disadvantage of soil treatments is that they are destroying the soil structure must be performed frequently and are relatively expensive agrotechnical event. These disadvantages can be avoided by using appropriate herbicides.

The aim of this study is to trace the effects of herbicides used to combat weeds on the main soil characteristics such as mechanical structure, organic matter, soil reaction and others.

MATERIALS AND METHODS

The study was carried out during 2010-2011 year in vineyards in the region of Ivaylovgrad.

Municipality of Ivaylovgrad is located in the farthest southeastern part of the Rhodopes. To the east it borders on the Republic of Greece and its neighbours to the north and west are the municipalities of Lubimets, Madzharovo and Krumovgrad.

Ivaylovgrad is located at the edge of the Eastern Rhodopes along the middle current of the River Arda and its tributaries Byala and Luda reka.

The climate is transitional and Mediterranean. The terrain is characterized by low hills and valleys and altitude above the sea level varies from 70 to 700 m.

Amid options herbicide soil samples were taken at a depth of 0-40 cm.

Soil samples were prepared and analyzed in the Department of Soil Science at the Agricultural University-Plovdiv (Trendafilov K, Popova R, 2007). Certain soil parameters are as follows:

- Particle size composition of photosedimentografy on FRITISCH;

- Organic matter by Tiurin;
- pH (H_2O) value-potentiometric;
- Total carbonatesby Shaibler;
- Mobile potassium -in 2n HCL;
- Mobile forms of phosphorus – according to Egner-Reem;
- Nitrate and ammonium nitrogen with 1% KCL;
- Quantity of the water – soluble salts – conductometric.

Table 1. Variants of experiment

Preparation	Active substance	Dose
1. Untreated – undug		
2. Katana 25 WG + Nasa 360 SL	Flazasulfuron + Glyphosate	1 g/da 72 g/da
3. Nasa 360 SL	Glyphosate	216 g/da
4. Katana 25 WG	Glazasulfuron	3.75 g/da
5. Katana 25 WG + Nasa 360 SL	Flazasulfuron + Glyphosate	3 g/da 108 g/da

RESULTS AND DISCUSSIONS

The main soil varieties within the area include significantly leached *Chromic-eutric cambisols* to slightly podzolized (luvisols) maroon forest soils (*Chromic luvisols*) with another differentiated profile. The leached maroon forest soils with non-differentiated or slightly differentiated profile take the high and the relatively most eroded parts of the terrain. At some places they have the morphology of the significantly eroded or weak maroon forest soils.

They have been formed on eluvium consisting of a huge variety of massive rocks – granite, rhyolite, trachyte, basalt, andesite, gneiss, sandstone, marble and others and have a more shallow profile, relatively more skeletons, smaller deposits of nutrients (Gjurov and Artinova, 2001; Teoharov, 2011).

These soils are characterized by brown A horizon with a small quantity of humus, slightly acid (pH 6.4-6.5) in the upper horizons and slightly alkaline (pH 8) in the lower horizons, which is typical of this type of soils – the carbonates have been displaced 80 m and above due to the influence of the fulvic acids contained in the humus, which are formed by forest plants and move the carbonates deeper into the profile – this explains the variation of the soil reaction from being slightly acid in the upper horizons to being slightly alkaline in the lower horizons where carbonates are found.

Based on the contents of clay along the profile, in terms of mechanical content the soils are defined as slightly and moderately sandy clay. The higher values of clay refer to the middle section of the profile. The content of clay and physical clay (<0.01 mm) in the surface horizons of the leached maroon forest soils is less compared to the lower sections of the soil profile (Tables 2 and 3). This difference is a typical feature of the maroon forest soils regardless of the nature of the bed rock /alluvial or massive. This can be explained by the stronger claying inside the soil in the middle and the lower sections of the profile and it is possible for the different intensity of this process along the profile to be influenced by a type of underground water close to the surface that is characterized by changeability of its distribution and delivery rate.

Table 2. Physico-chemical characteristics of Chromic-eutric cambisols in depth 0-40 cm

Variants	pH (H_2O)	$CaCO_3$ (%)	Organic matter (%)	Particle size composition (= 0.01 mm) (%)
1. No treat – No digging	6.4	no	1.02	26
2. Katana 25 wg + Nasa 360 sl	6.5	no	1.01	23
3. Nasa 360 sl	6.5	no	1.01	24
4. Katana 25 wg	6.4	no	0.95	22
5. Katana 25 wg + Nasa 360 sl	6.4	no	0.88	25

The small reserves of humus, nitrogen and phosphorus and the medium reserve of potassium in these soils, the shallow profile and the good natural drainage do not provide sufficient quantities of nutrients and water for the plants (Table 4).

The movement of the herbicides inside the soil depends on the structure of the soil, the hydrology and the soil and weather conditions as well. There are many authors working in that sphere (Leibman and Davis, 2000; Carter, 2000; Valcheva et al., 2011; and others) who found that herbicides can move to deeper layers and this depends on the characteristics of the terrain of the surface.

Table 3. Physico-chemical characteristics of Chromic-eutric cambisols in depth>60 cm

Variants	pH (H_2O)	$CaCO_3$ (%)	Organic matter (%)	Particle size composition (= 0.01 mm) (%)
1. No treat – No digging	7.9	21.75	0.72	38
2.KATANA 25 WG + NASA 360 SL	8.0	31.01	0.88	36
3. NASA 360 SL	8.1	33.83	0.49	37
4.KATANA 25 WG	7.8	22.03	0.59	34
5.KATANA 25 WG + NASA 360 SL	7.9	29.03	0.47	35

Table 4. Agro-chemical properties by variants

Variants	NO_3^{2-} (mg/kg)	NH_4^+ (mg/kg)	NO_3^{2-} NH_4^+ (mg/kg)	P_2O_5 (mg/100g)	K_2O (mg/100)g
1. No treat – No digging	13.2	22.3	35.5	9.3	25
2.KATANA 25 WG + NASA 360 SL	11.3	19.2	30.5	8.6	18
3. NASA 360 SL	9.5	15.4	24.9	8.9	21
4.KATANA 25 WG	8.7	10.3	19.0	5.6	19
5.KATANA 25 WG + NASA 360 SL	9.3	18.6	27.9	6.6	23

The purpose of the drainage is to remove the excess water from the soil or the surface of the ground. The interaction and the ways for the movement of the herbicides in the soil is a complex process and the results are varied. In this case, we have not established any significant changes in the soil of the examined region.

CONCLUSIONS

The soils in the region of Ivaylovgrad has comparatively shallow soil profile and are characterized by a low content of humus, nitrogen and phosphorus.

These soils have slightly to moderately sandy clay mechanical composition, moderately acid soil reaction in the upper horizons /pH 6.4/ and alkaline in the lower horizons /pH 8/ where carbonates are found.

Based on the conducted two-year survey we can state that the combination of the herbicides flazasulfuron in a dose of 3 g/da and glyphfosate in a dose of 83 g/da controls to a large extent the weeds in the vineyards.

Used in various doses of herbicides to combat weeds do not lead to a change in the values of soil characteristics such as article size composition, organic matter, soil reaction and others.

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