

STUDY OF SOIL TYPES AROUND THE VILLAGE OF SUSAM-HASKOVSKI MINERALNI BANI FOR THE PURPOSE OF VINE CULTIVATION

ИЗСЛЕДВАНИ НА ПОЧВИТЕ ОКОЛО СУСАМ –ХАСКОВСКИ МИНЕРАЛНИ БАНИ ВЪВ ВРЪЗКА С ИЗПОЛЗВАНЕТО ИМ ЗА СЪЗДАВАНЕ НА ЛОЗЯ

RADA POPOVA

Agricultural University, Plovdiv, Bulgaria
Tel. ++359 32 654 389, E-mail – rpopova@au-plovdiv.bg

Manuscript received: January 22, 2007; Reviewed: May 25, 2007; Accepted for publication: August 27, 2007

ABSTRACT

Five soil types in the region of the village of Susam-Haskovski mineralni bani were studied. The soil indexes pH, humus content, active carbonates, physical clay, and clay fraction were studied, and the soil texture coefficient was determined. The soil reserves with respect to the basic nutritive elements – N, P, K – were also determined. The soil types were defined as eluviated chromic luvisols and in combination with the climatic characteristics of the region they proved suitable for vine growing and red table wines production, in case of application of appropriate agro-technical measures and fertilization norms.

Key words: vine, chromic luvisols, physicochemical properties

РЕЗЮМЕ

Изследвани са 5 почвени профила в областта на с. Сусам – Хасковски минерални бани. Определени са почвени показатели като рН, съдържание на хумус, активни карбонати, физична глина, глинеста фракция и е определен текстурният им коефициент. Определена е и запасеността на почвите относно основните хранителни елементи – N, P, K. Почвите се характеризират като лесивирани канелени горски и в съчетание с климатичните особености на района са подходящи за отглеждане на лозя за червени трапезни вина при прилагане на съответните мерки на агротехника и норми на торене.

Ключови думи: лозя, канелени горски почви, физико-химични свойства

INTRODUCTION

The agro-climatic resources of Bulgaria are determined by its geographical situation, relief, and the impact of the nearby seas (Mediterranean Sea and Black Sea). The region of Haskovo is situated in the southernmost part of the Thracian Plain at an altitude of 192m. The relief is plain.

The most typical characteristic of the climate in the region of Haskovo is determined by its peculiar situation. With respect to the climate, it belongs to the South Bulgarian sub-region of the Continental-Mediterranean climatic region in Bulgaria, and precisely, to the climatic area of the Eastern Rhodopes river valleys. The region, however, is situated along the border between the two large climatic regions dividing Bulgaria's territory, and which are totally different to each other with respect to the climatic conditions [1]. This fact determines the observed, in different years, peculiarities and variations with respect to the conditions for the growing of agricultural crops, which are untypical for the overall specific character of the climatic region, and which makes it different from the adjacent territories.

The winter in the region of Haskovo is mild. The minimal temperatures during the winter months most often fall down to -13°C and rarely drop below -20°C . The average monthly temperature even in the coldest month of the year (January) is positive ($0,2^{\circ}\text{C}$). The summer is hot and the average monthly temperature in the warmest months of the year is $23,4-23,6^{\circ}\text{C}$, with an absolute maximum of $41,8^{\circ}\text{C}$, recorded in August. The spring and autumn are warm, and the autumn being slightly warmer than the spring.

The annual rainfall distribution is typical for the Mediterranean climatic region. The main rainfall maximum is observed at the end of autumn and beginning of winter (November-December), and the secondary maximum is in June. The main minimum is also in summer – at the end of summer and beginning of autumn – in August and September, which are definitely dry months.

The spring comes comparatively early and is short. It begins around 7.III. and lasts until 1.V. The spring duration is about 55 days. With respect to temperature, the spring in the Haskovo region is warm, and the average monthly temperature of the air in the typical spring month April is higher than 11°C . These climatic characteristics have favourable effect on the development of the winter crops, the sowing terms of the spring crops, and the application of the agro-technical measures at the appropriate time. The amount of rainfall in spring is about 156mm, and with respect to the humidity criteria it can be determined as humid.

Generally, the summer in the region of Haskovo is quite dry. Drought is typical for the region, and it is especially intensive in August. The drying-up period is most intensive in July, August, and September. The second half of the summer is quite dry, especially August and September, when a secondary rainfall minimum is also observed.

The autumn begins in early October (7.X. being the average date) and lasts until the end of November (26.XI. being the average date). Its duration is about 50 days. With respect to temperature, it is warm, and the annual monthly temperature of the air in the typical autumn month October is higher than 13°C . With respect to humidity, autumn is slightly dry. The summer dry period frequently passes into the autumn, which fact on the one hand is favourable for the ripening of the fruits and that of the late spring crops, but on the other hand, it has negative effect on the soil preparation for the sowing of autumn crops.

The winter begins at the end of November (26.XI. being the average date) and lasts until the beginning of March (7.III.). The snow cover is characterized with comparatively small thickness and remains for a short period of time. The average 10-day thickness of the snow cover during the typical winter month January is barely 6-8 cm. The winter climatic conditions as a whole favour the successful wintering of the agricultural crops and the perennial plants, but in some of the years, considerable deviations were observed, and the thin snow cover may lead to critical situation regarding the winter cereal crops.

The region of the village of Susam belongs to the Thracian-Tundja soil province of distribution of the eluviated chromic luvisols.

The soils in the region are eluviated chromic luvisols. These soil types were formed due to the influence of well-developed, mainly, oak forest vegetation, and to a lesser extent, to that of grass vegetation. The main process, under the impact of which the formation and evolution of these soils occur, is the eluviation. Besides this, the intra-soil clay-formation in the middle section of the soil profile acts as a concomitant process. The developed illuvial horizon possesses the characteristics of a cambial horizon as well, a fact showing the genetic bond of these soils to the leached chromic luvisols [2].

MATERIALS AND METHODS

Five soil types from the region of the village of Susam-Haskovski mineralni bani with respect to the indexes humus content by Turin's method, pH – potentiometrically, active carbonates according to

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Tabl. 1 Physicochemical indexes of the studied soil types
Табл. 1 Физико- химични показатели на изследваните почви

Дълбочина см Depth cm	pH(H ₂ O)	Хумус % Humus %	Активни карб. % Active carbonates %	< 0,01%	clay%	T _к
A 0-40	4,87	2,56	no	33,6	23,0	1,72
B 40-80	5,08	1,45	no	52,7	39,7	
BC 80-130	7,88	0,99	3	41,2	30,2	
A 0-40	5,28	3,31	no	32,1	21,2	1,71
B 40-80	6,26	1,03	no	47,8	36,4	
BC 80-130	7,80	0,89	2,5	43,5	29,7	
A 0-40	5,40	2,68	no	39,8	26,2	1,89
B 40-80	5,42	1,28	no	56,8	49,6	
BC 80-130	8,0	1,01	2,7	42,4	34,7	
A 0-40	4,97	1,86	no	37,8	24,6	2,28
B 40-80	5,18	1,02	no	62,6	56,3	
BC 80-130	7,98	0,78	3,5	48,7	43,2	
A 0-40	4,97	1,86	no	41,3	29,3	1,99
B 40-80	5,14	0,92	no	68,8	58,4	
BC 80-130	6,74	0,63	1,5	51,4	49,1	

Druino-Galle, mechanical characteristics by means of FRITSCH'S photosedimentograph, texture coefficient, and N,P,K content, were studied [4].

RESULTS AND DISCUSSION

The eluviated chromic luvisols in the region of Susam are situated on Old Quaternary alluvia and are characterized by a clearly expressed differential soil profile. Below the forest cover what follows is a well-distinct humus-eluvial horizon, which upper part has a brown-grayish colour, and the lower – gray colour, with a red-brownish shade, lighter mechanical texture, and fragile lumpy structure. The eluvial horizon quite abruptly passes downwards into the following clay-illuvial horizon. This horizon has a brown-reddish colouring, solid texture, and lumpy-prismatic structure with glossy sides, under which follows a subsoil rich in carbonates [3]. It is evident from the results in table 1 that the mechanical composition of these soil types, depending on the soil-constituting materials, varied from medium sand-clay to slightly clay. The texture coefficient, depending on the degree of eluviation, varied from 1,71 to 2,28.

The humus content varied from medium to high, and it was the greatest in the upper section of the humus-eluvial horizon – 3,31%, and decreased to 1% and below 1% in the lower section of the eluvial and illuvial horizons. The humus type in the fallow land was fulvatic-humatic and further downwards it was predominantly fulvatic.

These soil types were characterized with medium to low acidity – pH in H₂O varied from 4,87 to 6,26 in the illuvial horizon, and from low alkaline to alkaline – up to 7,88 in the soil-constituting materials, which is a result of the deep phosphate transfer - below 80-100cm. The active carbonates content was not high – up to 3% in C horizon.

With respect to the basic nutritive elements – N, P, K /tabl., 2/, the studied soil types were characterized with low to medium reserves of absorbable nitrogen / from 14,2 to 57,3 mg/ 1000g /. The amount of the absorbable phosphorus varied from 6,8 to 21,3 mg/100g , a fact which characterized the soils as having low to medium reserves.

With respect to potassium, the soil types had comparatively good reserves / 16,0 – 38,0 mg /100g /, which is due to the great amount of potassium in the soil-constituting materials.

CONCLUSIONS

On the basis of the analysis of the soil-climatic characteristics of the area around the village of Susam-Haskovski mineralni bani, the following conclusions were made:

1. With respect to climate, the region around the village of Susam-Haskovski mineralni bani meets the requirements for growing of vines, suitable for the

Tabl. 2 Agrochemical indexes of the studied soil types
Табл. 2 Агрохимични показатели на изследваните почви

Дълбочина см Depth cm	Минерален азот mg / 1000g Mineral nitrogen mg/1000g			mg / 100g	
	Амониев NH ₄ Ammonium NH ₄	Нитратен NO ₃ Nitrate NO ₃	Общ N Total N	P ₂ O ₅	K ₂ O
	0-40	46,4	10,9	57,3	21,3
40-80	16,3	12,3	28,6	10,6	20
80-130	8,4	7,0	15,4	15,0	20
0-40	8,2	10,9	19,1	19,7	34
40-80	7,8	8,0	15,8	7,5	21
80-130	6,9	7,8	14,7	9,8	19
0-40	10,9	12,3	23,2	6,8	38
40-80	9,5	9,5	19,0	11,2	24
80-130	7,3	6,9	14,2	10,6	23
0-40	24,5	10,9	35,4	15,0	30
40-80	13,6	8,2	21,8	10,4	17
80-130	11,3	7,9	19,2	11,6	18
0-40	10,9	8,2	19,1	18,9	27
40-80	8,2	7,8	16,0	13,7	17
80-130	7,5	6,8	14,3	13,1	16

production of red table wines.

2. With respect to mechanical composition and the physicochemical properties, the eluviated chromic luvisols meet the requirements for growing of vines, suitable for the production of red table wines.

3. Due to the low total nitrogen and phosphorus content in the studied soil types, it is necessary to fertilize them with well-seasoned barnyard dung, nitrogen and phosphorus fertilizers, in accordance with the appropriate fertilization norms.

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