

EXPERIMENTAL RESULTS ON THE POSSIBILITIES OF VEGETABLE GROWING IN THE AREA OF WESTERN CARPATHIAN MOUNTAINS FROM ROMANIA

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Abstract. In the area of Western Carpathian Mountains, the vegetable growing is less extended and the assortment of vegetables is limited to few species with smaller necessities regarding the pedoclimatic conditions. This research presents the results obtained after testing a number of 25 species and varieties of vegetables in the specific conditions of the area of Glacier – Western Carpathian Mountains, at an altitude of 1150 m. From these, the following vegetables reacted very well: onion, winter onion, chives, garlic, pea, celery, cabbage, salad, garden chicory, lovage, tarragon and rhubarb.

Key words: vegetable growing, mountain area

INTRODUCTION

Generally, vegetable growing is less extended in mountain area, because of the less favorable conditions. Some vegetable species, with smaller necessities regarding the temperature, as cabbage, onion, carrot, and parsley are grown in family gardens.

Because of the extension of agro-tourism in Western Carpathian Mountains area, it is indispensable to diversify the assortment of vegetable and also to find solutions for spreading cultivation in less favorable areas.

The approached issues of the research are part of an ample program of study of Western Carpathian Mountains area, initiated and coordinated by a collective from Freiburg University – Germany, in collaboration with Romanian partners, financing being provided by the German Ministry of Research, with the purpose of durable development of the area.

MATERIALS AND METHODS

Experimentally, it was initiated in the 2001 year and it consisted in studying a diversified assortment of species and varieties of vegetables, observing, in the first phase, their way of reacting in the specific conditions of the mountain area.

The experimental growings were placed in the area of Scărișoara – Glacier, at an altitude of 1150 m. Twenty-five species and varieties of vegetables were tested in 2001 and thirty species in 2002, using, almost exclusively, Romanian sorts.

During the vegetation period, a special attention was paid to the setting up of the main phenological phases of growth in non-protection conditions.

To increase the diversity of vegetable ranges some unknown species in the mountains area such as: winter onion, chives, rhubarb, garden chicory and corn salad have been taken in

study. With a view to cultivating some species with higher pretentious to warmth and with the purpose to obtain earlier yields, it was studied the effect of temporally protection of cultures using special covering materials (such as Agryl, Covertain) that are permeable to water, so water form rainfalls can be used by plants since the water resources are limited.

As part of the project, there were also performed studies regarding the types of soil and the climatic conditions in the area.

RESULTS AND DISCUSSIONS

The experimental growings were placed on a soil type Terra Rosa (red soil). The main characteristics are listed in the table 1.

Table 1

The characterization of the type of soil „Terra Rosa”

Characteristics/Horizons	At	Ao	A/B	Bv ₁	Bv ₂
Depth (cm)	3-0	0.15	15.24	24-43	43-60
Rough sand (2.0-0.2 mm)	3.4	4.0	4.6	3.1	2.4
Fine sand (0.2-0.002 mm)	36.0	14.6	9.4	12.7	7.8
Dust (0.02-0.002 mm)	26.7	41.0	44.5	40.6	28.5
Clay (under 0.002 mm)	33.9	40.4	41.5	43.6	61.3
Apparent density (DA 9/cm ³)	-	1.08	1.22	1.19	1.18
Total porosity (PT%)	-	59.7	54.4	55.7	56.1
Withering coefficient (CO%)	-	14	15	15	22
Field capacity (CC%)	27	26	26	31	-
Water PH	5.21	5.34	5.54	5.69	6.70
Humus (%)	15.42	6.31	2.82	2.61	-
Total N (%)	0.754	0.312	0.144	0.134	-
Total P (%)	10	3	2	3	-
Mobile K (ppm)	109	25	23	25	-

As regards the characterization of the area from climatic point of view, we have resorted to the data registered in the meteo stations existing in the area: Vlădeasa, Băișoara, Stâna de Vale and Câmpeni. Therefore, in the area of Glacier - Poiana Călineasa, the annual average of temperature is placed around the value of 4°C. The annual average of air temperature in July could be appreciated as placed around the value of 13°C (table 2).

Table 2

Air temperature (°C) - monthly and annual average (1960-2000)

Meteo station	Monthly												Annual
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Vlădeasa 1800	-7.3	-7.2	-4.9	-0.4	4.5	7.7	9.4	9.6	6.2	2.7	-2.2	-5.8	1
Vlădeasa 1400	-4.3	-4.1	-1.7	3.4	8.2	11.3	13	13.1	9.6	5.7	0.9	-2.8	4.4
Băișoara	-4.1	-3.8	-1.2	3.7	8.7	11.9	13.6	13.6	10.1	6	1.3	-2.5	4.8
Stâna de Vale	-5.5	-4.9	-1.7	3.1	8.4	11.8	12.9	12.4	9.1	4.7	0.3	-4.2	3.9
Câmpeni	-4	-1.7	2.4	7.6	12.6	15.5	17.1	16.6	12.7	7.8	2.5	-1.9	7.3

Annually, the average number of days without frost is 220 in Câmpeni, and about 206 in Vlădeasa (1400 m) and Băișoara.

In the area of Glacier - Poiana Călineasa, with the aid of diagrams of correlation with altitude, the medium value of relative humidity of air was estimated to 80-81%.

In Western Carpathian Mountains, the smallest precipitations quantities that have fallen in the period of 1961-2000, have been between 600mm and 700 mm. Exception was made by Vlădeasa (1400) and Stâna de Vale stations, where the precipitations haven't fallen under 1200 mm.

In the studied area the average temperatures are over 10°C only in May, June, July, August and September. In organization of vegetable cultures an important aspect that must be taken in consideration is the fact that the minimum temperatures are often negatively in May and low enough in June.

The species and the varieties of vegetables tested under the pedo-climatic conditions above-mentioned and an assessment of the way these have reacted are presented in the table 3.

Table 3

Species and varieties of vegetables grown in the conditions of Glacier – Western Carpathian Mountains area

No	Species (variety)	Way of reacting	No.	Species (variety)	Way of reacting
1.	<i>Allium cepa</i> L.	Very good	14.	<i>Raphanus sativus</i> L.	Good
2.	<i>Allium schoenoprasum</i> L.	Very good	15.	<i>Allium porrum</i> L.	Good
3.	<i>Allium fistulosum</i> L.	Very good	16.	<i>Beta vulgaris</i> L.	Good
4.	<i>Allium sativum</i> L.	Very good		convar. <i>conditiva</i> L.	
5.	<i>Pisum sativum</i> L.	Very good	17.	<i>Pastinaca sativa</i> L.	Good
6.	<i>Apium graveolens</i> L. var. <i>rapaceum</i>	Very good		convar. <i>hortensis</i> . Ehrh.	
7.	<i>Brassica oleracea</i> . var. <i>capitata f.alba</i> L.	Very good	18.	<i>Petroselinum crispum</i> Mill	Good
8.	<i>Lactuca sativa</i> L.	Very good	19.	<i>Daucus carota</i> L.	Good
9.	<i>Chicorium endivia</i> L.	Very good	20.	<i>Valeriana locusta</i> L.	Good
10.	<i>Levisticum officinale</i> Koch	Very good	21.	<i>Phaseolus vulgaris</i> L.	Satisfactory
11.	<i>Artemisia dracunculus</i> L.	Very good	22.	<i>Cucurbita pepo</i> L. var. <i>oblonga</i> Wild.	Satisfactory
12.	<i>Rheum rhabarbarum</i> L.	Very good	23.	<i>Solanum lycopersicum</i> L.	Unsatisfactory
13.	<i>Brassica oleracea</i> . var. <i>gongylodes</i> L.	Good	24.	<i>Capsicum annuum</i> L.	Unsatisfactory
			25.	<i>Cucumis sativus</i>	Unsatisfactory

Table 4

Growth of vegetables in specific conditions of Scărișoara – Glacier area (18.V.2002)

Species	Type of culture	Height of plants		rosette ∅		Number of leaves	
		cm	%	cm	%	Pieces	%
Early cabbages	unprotected	8.0	100.0	18.0	100.0	13.0	100.0
	protected	18.0	225.0	28.7	159.4	19.3	148.5
Summer cabbages	unprotected	12.7	100.0	18.6	100.0	7.7	100.0
	protected	19.3	151.9	34.3	184.4	11.7	151.9
Cauliflower	unprotected	18.7	100.0	21.4	100.0	12.6	100.0
	protected	30.0	160.4	33.3	155.6	15.6	123.8
Kohlrabi	unprotected	17.7	100.0	26.3	100.0	12.4	100.0
	protected	23.0	129.9	37.6	142.9	15.3	123.4
Broccoli	unprotected	21.6	100.0	21.3	100.0	8.0	100.0
	protected	25.6	118.5	37.0	173.7	10.0	125.0
Lettuce	unprotected	7.0	100.0	12.0	100.0	9.7	100.0
	protected	13.0	185.7	23.4	195.0	13.3	137.1

It can be seen that out of the 25 species and varieties of vegetables, 12 have reacted very good, 9 – good, 2 – satisfactory and only three species have reacted unsatisfactory.

Therefore results that the assortment of vegetables in this area could be diversified by growing species, which are less, or not in the least known by the locals, and which have favorable conditions of growing.

Figure 1

Performance of the vegetation phases for the main species of vegetable. grown in the specific conditions of the Glacier area

Culture	Month / Decade																	
	IV	V			VI			VII			VIII			IX			X	
	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	
Early cabbage	ooo							xxxx										
Summer cabbage				o	oo			x		xxxx								
Onion. garlic	ooo									xxxxxxx								
Leek				o	oo													
Celery				o	oo													
Carrot	ooo									xxxx								
Parsley	ooo													xxxxx				xxx
Parsnip														xxxxx				
Pea	ooo								xx		xx			xxxxxxx				xxx
Salad	ooo				xxxx									xxxxx				
Early radishes	ooo					xxx												
Perennial onion	ooo			xx	xxxxxxx			xxxxxxx		xxxxxxx			xxxxxxx					

Legend: ooo - setting up culture (seeding, planting)
 — - period of vegetative growth
 x x x - period of harvesting

Regarding the growth of vegetables in specific conditions of Scărișoara – Glacier area it has found that protection of plants by direct covering with special materials ensures a rhythm of growth more accelerated comparative with unprotected plants (table 4).

As example, in case of early cabbage, the protected plants have had the height with 125 % higher; the diameter of rosette is with 59.4% higher and the number of leaves with 48.5% higher than in case of unprotected plants. Similar results were obtained to summer cabbage, cauliflower, kohlrabi, broccoli and lettuce.

Considering the specific conditions of the area, the setting up of growings of the first urgency could be performed from the second decade of April (15 – 20 IV), when were set up the growings of: carrot, parsley, parsnip, pea, salad, radishes, red beet, cabbage, turnips.

The last decade of May were set up more pretentious to the heat growings (tomato, pepper, cucumber) and growings for the autumn production (autumnal cabbage, autumnal turnip, leek, celery).

Specific to the performance of the vegetation phases is the extension of the vegetation period with 2 - 3 weeks approximately (Figure 1).

CONCLUSIONS

1. The specific pedo-climatic conditions of Western Carpathian Mountains give possibility to diversify the assortment of grown vegetable by introducing new species and varieties, less known in the area.

2. For the species pretentious to the temperature, measures of temporary or permanent protection with various kinds of covering materials are indispensable.

REZUMAT

CERCETĂRI ASUPRA POSIBILITĂȚII DIVERSIFICĂRII SORTIMENTULUI DE LEGUME CULTIVATE ÎN CARPAȚII OCCIDENTALI DIN ROMÂNIA

În arealul Carpaților Occidentali, cultura legumelor este restrânsă, sortimentul cultivat fiind limitat la un număr redus de specii datorită condițiilor pedoclimatice specifice zonei. Lucrarea de față prezintă rezultatele obținute în urma testării a 25 de specii și varietăți de legume în condițiile specifice arealului Carpaților Occidentali, la o altitudine de 1150 m. Dintre legumele testate, următoarele s-au comportat foarte bine în condițiile date: ceapa, ceapa de tuns, mazărea, țelina, varza, salata, cicoarea de grădină, tarhonul, rebarbărul.