

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

CERCETARI PRIVIND POSIBILITATILE DE CULTIVARE A LEGUMELOR IN ZONA MUNTILOR APUSENI

AL.S. APAHIDEAN, Maria APAHIDEAN, F. PĂCURAR
Universitatea de Științe Agricole și Medicină Veterinară Cluj-Napoca

Rezumat: În zona Munților Apuseni cultura legumelor este puțin practică iar sortimentul de legume este redus. Deoarece în zona menționată se constată dezvoltarea activităților legate de agroturism, este necesară diversificarea sortimentului de legume din zonă și găsirea unor soluții rentabile, pentru practicarea culturii legumelor în scopul asigurării acestora în stare proaspătă. În lucrare se prezintă rezultatele obținute privind comportarea în cultură a unui număr de peste 25 specii și varietăți de legume în condițiile zonei Ghețari-Scărișoara, la o altitudine de 1150 m. Sunt prezentate de asemenea rezultatele privind creșterea și dezvoltarea unor legume cultivate în sistem protejat, prin acoperire directă cu materiale specifice de tip Agryl, Covertan, cu scopul obținerii unor producții mai timpurii. Cercetările întreprinse au făcut parte dintr-un amplu program inițiat și coordonat de un colectiv de la Universitatea Freiburg-Germania în colaborare cu mai mulți parteneri români printre care și USAMV Cluj-Napoca, finanțat de către Ministerul german al cercetării științifice.

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.

MATERIAL AND METHOD

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 growing 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 growing 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”

Horizons	A _t	A _o	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 4⁰C. The annual average of air temperature in July could be appreciated as placed around the value of 13°C (table 2).

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%.

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

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.

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.

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 3). 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.

Table 3
Growth of vegetables in specific conditions of Scărișoara – Glacier area (18.V.2002)

Species	Type of culture	Height of plants		rosette Ø		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

Considering the specific conditions of the area, the setting up of growing of the first urgency could be performed from the second decade of April (15 – 20 IV), when were set up the growing of: carrot, parsley, parsnip, pea, salad, radishes, red beet, cabbage, turnips. The last decade of May were set up more pretentious to the heat growing (tomato, pepper, cucumber) and growing for the autumn production (autumnal cabbage, autumnal turnip, leek, celery).

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				x					
Leek				o	oo									xxxxx				xxx
Celery				o	oo									xxxxx				
Carrot	ooo									xxxx			xxxxxxxxx					xxx
Parsley	ooo													xxxxx				
Parsnip	ooo													xxxxx				
Pea	ooo							xx		xx								
Salad	ooo																	
Early radishes	ooo				xxxx													
Perennial onion	ooo				xxx													
	ooo		xx		xxxxxxx		xxxxxxx		xxxxxxx									

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

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

REFERENCES

1. **Apahidean Al. S., Maria Apahidean, 2004**, - *Cultura legumelor și ciupercilor*, Ed. AcademicPress, Cluj-Napoca
2. **Choux Cl., Cl. Foury, 1994**, - *Productions legumieres, voll-III*, TEC-DOC, Paris
3. **Indrea D., Al. S. Apahidean, 1997**, - *Cultura legumelor timpurii*, Ed. Ceres, București
4. **Indrea D., Al. S. Apahidean, 2004**, - *Ghidul cultivatorului de legume*, Ed. Ceres, București