

## THE INFLUENCE OF PLANT PROTECTION ON CABBAGE CULTIVATED ON POLYETHYLENE FILM GREENHOUSE

**Apahidean Al. S., Maria Apahidean, D. Măniuțiu,  
Rodica Ganea, I. Paven, Diana Ficior**

<sup>1)</sup>University of Agricultural Sciences and Veterinary Medicine, Faculty of Horticulture,  
Nr. 3-5 Mănăștur St., 3400 Cluj-Napoca, Romania, e-mail: sapahidean@usamvcj.ro

**Abstract.** Pedoclimatic conditions in Transylvania are less favourable to obtain early productions for vegetables than in the South and West of Romania. In this paper we present the results obtained on cabbage culture that has been done in polyethylene film greenhouse. There were used two varieties and two different densities. It has been also observed the effect of simple and double plant protection on the early production. It has been noticed that the double protection of cabbage in polythene tunnels assures a better growth of plants and so an earlier production.

**Key words:** cabbage, polyethylene film greenhouse

### INTRODUCTION

Pedoclimatic conditions in Transylvania are less favourable to obtain early productions for vegetables than in the South and West of Romania, where vegetable growers obtain earlier productions with 2-3 weeks. Due to this reason, vegetable growers from Transylvania try to find some technological arrangements that allow them to obtain earlier crops.

In Europe the major ways to obtain earlier yields are: plastic tunnels, low plastic tunnels or directly temporally protection using different crop covers. In this way plants have better conditions to grow, so the productions are earlier.

### MATERIALS AND METHODS

Experiences were organized in a polythene tunnel from the University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca during 2003-2004.

As a biological material were used two Dutch varieties: Golden Acre and Santorino. These varieties have been cultivated on two different densities: 60000 plants/ha and 80000 plants/ha. There were used two systems of protection: a simple one due to the plastic tunnel protection and a double one realized by the tunnel as well as by a non-woven crop covers (Covertan, Agryl) that was placed immediately after the planting.

The experience was set up at the beginning of March and the specific technology for cabbages cultivated in polyethylene film greenhouse has been applied.

During the growth period there were done observations about growth of plants and the yield obtained.

## RESULTS AND DISCUSSION

Plant growth has been influenced by the system of protection at the beginning of vegetation. Rosette diameter was bigger with 28.6-40.6% for Golden Acre and with 27.4-38.4% bigger for Santorino. The same effect has been noted for plant height and for number of leaves (table 1).

Table 1

Observations regarding plant growth to plastic tunnel cabbage

Variant			Diameter		Height of plants		Leaves	
Variety	Density (thousands of plants/ha)	System of protection	cm	%	cm	%	no	%
Golden Acre	60	simple	36.5	100.0	19.8	100.0	11.8	100.0
Golden Acre	80	double	51.2	140.6	23.2	117.2	14.6	117.2
Golden Acre	60	simple	33.6	92.3	19.6	99.0	11.8	100.0
Golden Acre	80	double	46.8	128.6	26.2	132.3	15.8	133.9
Santorino	60	simple	32.8	100.0	17.8	100.0	12.6	100.0
Santorino	80	double	45.4	138.4	22.0	123.6	15.0	119.0
Santorino	60	simple	34.6	105.5	17.2	96.6	12.4	98.4
Santorino	80	double	41.8	127.4	26.4	148.3	15.0	119.0

The cabbage yield has been 43.9 t/ha for Golden Acre and 50.5 t/ha for Santorino. The yield increase was 15%. The increase of density from 60000 plants/ha to 80000 plants/ha has provided a yield increase with 3.3 t/ha.

The double system of protection has provided yields increase about 33.5 t/ha, with 13.5 t/ha higher than for the variant with simple protection (table 2).

Table 2

The influence of plant protection system on cabbage yield

System of protection	Yield		Difference (t/ha)	Signification
	t/ha	%		
Simple	40.4	100.0	-	-
Double	53.9	133.5	13.54	***

DL 5%      3.31  
 1%         4.81  
 0.1%      7.22

Table 3

The combined influence of variety, plant density and plant protection system on cabbage yield

Variant			Yield		Difference	Signification
Variety	Density (thousands plants/ha)	System of protection	t/ha	%	t/ha	
Golden Acre	60	simple	42.2	100.0	-	-
Golden Acre	60	double	44.3	104.9	2.1	-
Golden Acre	80	simple	46.6	110.4	4.4	-
Golden Acre	80	double	56.4	133.6	14.2	**
Santorino	60	simple	43.9	100.0	-	-
Santorino	60	double	51.7	117.8	7.8	*
Santorino	80	simple	47.0	107.1	3.1	-
Santorino	80	double	63.3	144.2	19.4	***

Analysing the combined influence of the three factors it has been found that the double protection of Golden Acre variety at 80000 plants/ha has provided 56.4 t/ha, with 33.6 % higher than in case of same variety cultivated at 60000 plants/ha and with simple protection.

The Santorino variety has provided, in the same conditions, a yield of 63.3 t/ha.

## CONCLUSIONS

1. In Transylvanian conditions cabbage culture in polyethylene greenhouse provides earlier yields if the plants are protected supplementary with non-woven crop covers (Covertan, Agryl).
2. The highest yield (63.3 t/ha) has been obtained for Santorino variety cultivated at 80000 plants/ha and with double protection in the first weeks after plantation.

## REFERENCES

1. Benoit F., Ceustermans H., 1990, Morphogenesis of Chinese cabbage (*Brassica campestris* ssp. *Pekinensis* Rubr) under single and double direct crop covering. In Proceedings XI-th International Congress on the use of plastics in agriculture, New Delhi, India, p. 39-46.
2. Garnaud J. C., 1992, Les plastiques et la protection des plantes, CPA, PHM, Paris.
3. Printz P., 1992, Les brise-vent et les oubrieres, CPA, PHM, p. 461-466.

## REZUMAT

### INFLUENȚA PROTEJĂRII CULTURII DE VARZĂ ÎN SOLARII ASUPRA PRODUCȚIEI

Condițiile pedoclimatice specifice Transilvaniei sunt mai puțin favorabile pentru obținerea unor producții timpurii de legume decât cele întâlnite în Sudul și Vestul României. Lucrarea de față prezintă rezultatele obținute în cazul culturii de varză în solarii acoperite cu folie de polietilenă. Au fost studiate două soiuri de varză, plantate la desimi diferite. S-au făcut observații și asupra efectului acoperirii simple și duble a plantelor asupra producției timpurii de varză. S-a observat că acoperirea dublă asigură o mai bună creștere a plantelor, și ca urmare se poate obține o producție mai timpurie.