The Additional Mycorrhization Effect on the Development of Potato Plants

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Abstract

The height and the leaf area of three potato varieties, in two sequences of vegetation (30 and 50 days after planting) were analysed in order to mark the effect of the additional mycorrhization on the potato plants. The development of the potato plants was positively influenced by the additional inoculation with mycorrhizal fungi. In this conditions the plants height varied between 19.67 cm and 25 cm on the first sequence of vegetation and 58 cm and 63 cm on the second sequence of vegetation. Related to the leaf area development of the potato plants under additional mycorrhization, at 30 days after planting this parameter ranged between 211.68 cm² and 256.63 cm² and 341.13 cm² and 624.93 cm² at 50 days after planting.

Keywords: *arbuscular mycorrhiza, plants, potato*

Introduction. Arbuscular mycorrhizal (AM) fungi have been widely recognized as biological control agents (Barea et al., 2005). They play a key role in the plant nutrition and growth, in the resistance to drought and in the soil structure. These soil microorganisms have been used to control plant diseases thus improving plant resistance (Smith and Read, 2008).

Aims and objectives. We studied the influence of the additional mycorrhization in the development of potato plants by measured the height (cm) and leaf area (cm²).

Materials and methods. The experimental plot was located in Rascruci, Cluj County, Romania. For the research experiment it was used the method of subdivided plots. To establish the effect of the additional colonization on the plants growth parameters were made observations on two sequences of vegetation at 30 and 50 days after planting. The followed parameters were: the plant height (cm) and the leaf area (cm²) of three potato varieties: early variety (Roclas), semi-early variety (Christian) and late variety (Gared). For the inoculum it was used a mixture of arbuscular mycorrhizal fungi (200.000 propagules per liter,

material of AM fungi, concentrated on an inorganic carrier).

Results and Discussions. On the first sequence of vegetation (Tab. 1) the additional mycorrhization has a positive effect regarding the height of plants for all the three studied varieties. All of them presented significant positive differences to the control, under additional inoculation. The least influenced variety was the semi-early one.

At 50 days after planting (Tab. 2) only the early variety was positively influenced by the mycorrhizal inoculation.

Regarding the leaf area of the potato plants, the additional mycorrhization had a positive influence on all three studied varieties. At 30 days after planting (Tab. 3) for the early variety of potato has been reported a very significant positive difference to the control and it also presented the highest favourability. On the second sequence of vegetation (Tab. 4), at 50 days after planting, was noted that the mycorrhizal inoculation influenced positively only the early and semi-early variety while the late variety showed no significant differences to the control.

Tab. 1. Additional mycorrhization effect on the height of potato plants in first sequence of vegetation

Variety	Mycorrhization type	Plant height	% to control	Difference to control	Difference significance	Duncan test
Varieties average	natural	15.67	100	0	Mt.	-
Early	natural	19	121.3	3.33	-	BC
	additional	24.33	155.3	8.67	***	D
Semi-early	natural	13.67	87.2	-2	-	A
	additional	19.67	125.5	4	*	C
Late	natural	14.33	91.5	-1.33	-	A
	additional	25	159.6	9.33	***	D
LSD (p 5%) 3.62		LSD (p1%) 5.21	LSD (p 0.1%) 7.72			

Tab. 2. Additional mycorrhization effect on the height of potato plants in second sequence of vegetation

Variety	Mycorrhization type	Plant height	% to control	Difference to control	Difference significance	Duncan test
Varieties average	natural	56.55	100	0	Mt.	-
Early	natural	47.33	83.7	-9.22	0	A
	additional	62.33	110.2	5.78	*	BC
Semi-early	natural	63.33	112	6.78	*	C
	additional	63	111.4	6.45	*	C
Late	natural	59	104.3	2.45	-	BC
	additional	58	102.6	1.45	-	BC
LSD (p 5%) 5.61		LSD (p1%) 8	LSD (p 0.1%) 11.71			

Tab. 3. Additional mycorrhization effect on the leaf area of potato plants in first sequence of vegetation

Variety	Mycorrhization type	Leaf area	% to control	Difference to control	Difference significance	Duncan test
Varieties average	natural	163.14	100	0	Mt.	-
Early	natural	198.45	121.6	35.31	-	BC
	additional	256.63	157.3	93.49	***	D
Semi-early	natural	161.73	99.1	-1.41	-	AB
	additional	211.68	129.7	48.53	*	C
Late	natural	129.21	79.2	-33.93	-	A
	additional	221.62	135.8	58.48	*	CD
LSD (p 5%) 41.94		LSD (p1%) 60.79	LSD (p 0.1%) 91.31			

Tab. 4. Additional mycorrhization effect on the leaf area of potato plants in second sequence of vegetation

Variety	Mycorrhization type	Leaf area	% to control	Difference to control	Difference significance	Duncan test
Varieties average	natural	374.31	100	0	Mt.	-
Early	natural	400.63	107	26.32	-	A
	additional	624.93	167	250.62	***	C
Semi-early	natural	387.72	103.6	13.52	-	A
	additional	513.19	137.1	138.88	**	B
Late	natural	334.58	89.4	-39.73	-	A
	additional	341.13	91.1	-33.18	-	A
LSD (p 5%) 89.47		LSD (p 1%) 130.70	LSD (p 0.1%) 198.68			

Conclusion. In the present research work, we demonstrated that the additional mycorrhization had a positive influence on the development of the potato plants in both considered sequences of vegetation. The potato variety most strongly influenced by additional inoculation, was the early variety followed by the semi-early variety.

REFERENCES

1. Barea J.M., M.J. Pozo, R. Azcon, C. Azcon-Aguilar (2005). Microbial cooperation in the rhizosphere. *J. Exp. Bot.*, 56:1761-1778.
2. Smith S.E., D.J. Read (2008). *Mycorrhizal symbiosis*. 3rd edit., London: Academic Press. p. 787.