THE INFLUENCE OF DENSITY AND DEPTH OF SOWING IN THE PRODUCTION OF RICE SEEDLING ON THE INITIAL PLANTS GROWTH

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INTRODUCTION

In the Republic of Macedonia rice production has a long tradition. The overall rice production is concentrated in the Eastern part of the country along the river Bregalnica. Over 90 % of total production in the country is implemented in Kocani region and the rest in the production areas in Shtip, Veles and Vinica. In the world there are different ways of growing rice. In general, area preparation and management during the vegetation, harvest and processing are similar worldwide. The differences are apparent between rice cultivation with irrigation and without irrigation. There are two ways of cultivation of irrigated rice: direct sowing and transplanting method. Generally, in Macedonia, the rice is grown by direct sowing in the water.

MATERIAL AND METHODS

As a experimental material was used Italian variety *San Andrea*. The experiment was set up on the area located near Shtip, Karbinci village. The greenhouse for producing seedlings was 35 m long and 4 m wide. The whole area was divided into two parts, with space in the middle. After leveling the ground it was placed a black plastic foil and on it a layer of sand (2-3 mm) and a layer of mixture (5 cm). It was investigated the influence of three densities of sowing (150 g seeds/m^2, 250 g seeds/m^2 and 300 g seeds/m^2) and two depths of sowing (0.5 cm and 2-3 cm) in a randomized block system, with three repetitions (Fig. 1). Seeds before sowing were soaked in water for 24 hours. Measurements were performed on representative samples of 10 plants of each repetition.

RESULTS AND DISCUSSION

In Table 1 are given the average values obtained for length of the primary root and stem depending on the density and depth of sowing measured one week after sowing, two and three weeks after sowing. In the first measurement the highest average value for the length of the root (3.8 cm) is measured in variant with 250 g/m^2 and smallest (3.2 cm) in the variant with seeds 150 g/m^2. The length of the stem on the first measurement was the longest in the variant with 150 g/m^2 and the smallest in variant with 300 g/m^2. In the second measurement, the highest average values for root (7.3 cm) and stem (10.5 cm) were obtained in variant with 250 g/m^2 and the smallest with 300 g seeds per m^2. The plants obtained from greater depth of sowing had better growth in the first measurement. In variant with 0.5 cm depth of sowing were obtained plants with longer root in the second and third measurement, as well as higher growth of the stem at the second measurement.

Table 1. The influence of the density and depth of sowing to the length of the primary root and stem of plants (cm)

Density of sowing (g/m^2)		Depth of sowing (0.5 cm)				Depth of sowing (2-3 cm)			
		1*	2*	3*	average	1*	2*	3*	average
150 g/m^2	root	3.2	6.4	8.1	5.9	-	-	-	
	stem	2.3	10.1	12.2	8.2	-	-	-	
250 g/m^2	root	3.8	7.3	8.1	6.4	-	-	-	
	stem	2.2	10.5	13.3	8.7	-	-	-	
300 g/m^2	root	3.6	5.3	7.8	5.7	3.8	4.1	4.2	4.0
	stem	2.0	10.0	12.5	8.2	3.0	8.4	13.4	8.3

1* - one week after sowing; 2* - two weeks after sowing; 3* - three weeks after sowing

CONCLUSION

The plants obtained from sowing with density of 250 g/m^2 have the best developed root and above-ground part. This variant of sowing provides a better space and light for proper plant growth. In higher density sowing (300 g seeds/m^2) the plant have less production of dry weight. From the variants with different depth of sowing, better plants are produced in smaller depth of sowing. From all examined variants of density and depth of sowing in seedling production of *San Andrea* variety most competitive plants for transplanting were obtained by sowing with seeds of 250 g/m^2 at a depth of 0.5 cm.

The yield of rice cultivated with transplanting system was higher by 37 % compared to the yield from the traditional way of rice cultivation (Nikolov et al., 1994). According to Ehsanullah et al. (2000), transplanting gave significantly higher paddy yield as compared to different direct sowing methods. Farooq et al. (2011) also pointed out that yield in direct seeding of rice is often lower than transplanting system principally owing to poor crop stand and high weed infestation. In the manufacture of rice seedling a significant impact on yield has the production of seedlings. The quality of seedlings depends on the variety, temperature, density and depth of sowing etc. (Roshan, 2013).

The aim of this study was to determine the influence of the density and depth of sowing in the production of seedlings of the variety *San Andrea* on the initial plants growth.

It was measured the length of the primary root and stem one week after sowing (first measurement), two weeks after sowing (second measurement) and three weeks after sowing (third measurement). Plant growth in the third measurement is expressed in percentage relative to the first measurement.

After three weeks of sowing it was measured and the dry weight of the root and aerial parts of the plants.

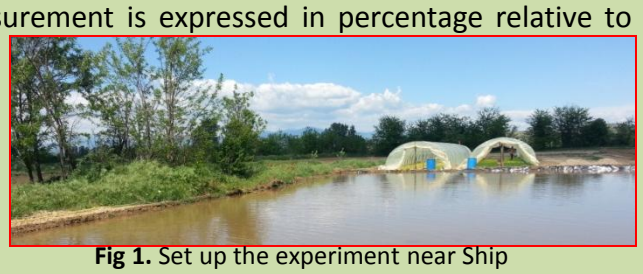

Fig 1. Set up the experiment near Ship

In Table 2 are given the values of the influence of different density and depth of sowing on the production of dry mass of plants. Most dry weight (0.88 g) was obtained from plants produced with the lowest density sowing. The plants produced in variant with the highest density of sowing has received the least amount of dry weight (0.73 g).

Table 2. The influence of the density and depth of sowing to the dry weight of root and stem (g) three weeks after sowing

Density of sowing (g/m^2)	Depth of sowing (0.5 cm)				Depth of sowing (2-3 cm)			
	root	stem	average	root + stem	root	stem	average	root + stem
150 g/m^2	0.56	0.32	0.44	0.88	-	-	-	-
250 g/m^2	0.50	0.37	0.43	0.87	-	-	-	-
300 g/m^2	0.43	0.30	0.36	0.73	0.31	0.20	0.25	0.51

In the second and third measurement the largest root growth compared to the first measurement have the plants from the variant with the lowest density (Tab. 3). Plants of this variant in the second and third measurement had the lowest growth of the stem in the same from the first measurement.

Table 3. Percent of increasing the length of the root and stem 2 and 3 weeks after sowing

Density of sowing (g/m^2)		Depth of sowing (0.5 cm)			Depth of sowing (2-3 cm)		
		2*	3*	average	2*	3*	average
150 g/m^2	root	200.0	253.1	226.5	-	-	-
	stem	249.1	530.4	389.7	-	-	-
250 g/m^2	root	192.1	213.2	202.6	-	-	-
	stem	447.3	604.5	525.9	-	-	-
300 g/m^2	root	147.2	216.7	181.9	107.9	110.5	109.2
	stem	500.0	625.0	562.5	280.0	446.7	363.3

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