УДК 635.15 631.526:32(477.41)

AGROBIOLOGICAL EVALUATION OF RADISH VARIETIES IN KYIV REGION

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Rezumat. Lucrarea prezintă rezultatele studiului cu privire la soiurile de ridiche cultivate în regiunea Kiev (Basys, Kseniya, Krakowianka, White Breakfast, Crimson şi Rodos). S-a constatat că recolta timpurie de ridiche, precum şi calităţile comerciale ale ridichilor, depind în mare măsură de caracteristicile soiului. Soiurile Crimson şi Rodos au cea mai scurtă durată a fenofazei, perioada de creştere fiind de 21-24 zile. Producţia soiurilor studiate a variat între 18,2 – 29,1 t/ha. Soiurile Crimson şi Rodos s-au evidenţiat prin producţia înaltă de ridichi (97%) - aproximativ 29,1 şi 25,22 t/ha şi prin greutatea medie a rădăcinii de 30 şi, respectiv, 28 g. Referindu-ne la perioada de formare a rădăcinilor trebuie de menţionat că aproximativ 75-80% din rădăcinile soiurilor White Breakfast, Crimson şi Rodos au fost obţinute în timpul primei recolte.

Cuvinte cheie : *Raphanus sativus*; Soiuri; Productivitate; Ridiche; Procent de producţie-marfă

Abstract. The paper presents the study results on the radish varieties cultivated in the Kyiv region (Basys, Kseniya, Krakowianka, White Breakfast, Crimson and Rodos). It was found out that the early harvest of radishes as well as root marketability largely depends on varietal characteristics. The varieties Crimson and Rodos have the shortest phenophase, their growing period is of 21-24 days. The yield of the studied varieties ranged from 18.2 - 29.1 t/ha. The Crimson and Rodos varieties were characterized by a high yield of radishes (97%) - about 29.10 and 25.22 t/ha and by the average root weight of 30 and 28 g respectively. As for the friendliness of root formation, we should mention that about 75-80% of the roots of the White Breakfast, Crimson and Rodos varieties have been gathered during the first harvest.

Key words: *Raphanus sativus*; Varieties; Yield; Radishes; Marketable yield

INTRODUCTION

Radish represents one of the earliest maturity vegetables. It opens the season of early spring vegetables. High cold resistance and short vegetation period makes it possible to obtain profit for growers cultivating it in April. Radish helps to reduce the shortage of vitamins in spring when the body is unbalanced after the winter period, and there are no other outdoor growing vegetables on the domestic markets. Therefore, properly selected radish varieties allow us to obtain early and high quality yield of root crops (Lihac'kij, V.I. et al. 1996; Ânuškevič, S.M. 1999).

Radish has great food and medicinal value. Its pulp consists of a lot of fibers, minerals, pectin, essential oils, vitamins C, B1, B2, and PP. It normalizes the cholesterol level and removes toxins and waste products from the body, contains phytoncides - natural antibiotics that increase immunity. The radish is recommended for use in atherosclerosis prevention and also for blood vessels and heart diseases. The essential oils of root crops give them a pleasant sharp taste, therefore they are appetitive and digestive (Barabaš, O.Û. 1994; Lihac'kij, V.I. et al. 1996).

The assortment of radish includes more than 50 varieties and hybrids listed in the State Register of Plant Varieties Suitable for Dissemination in Ukraine. Beside this, it is always changing and renewing. The implementation of radish varieties in production will give producers the opportunity to receive early high yields and desired taste properties of root crops (Ânuškevič, S.M. 1998; Bobos' I.M. 2013; Koltunov, V.A. et al. 2008).

The aim of our research is to choose the earliest and high-yielding varieties with good taste and high quality indexes suitable for the Kyiv region conditions.

MATERIAL AND METHODS

Experimental researches of the earliness and productivity of radish varieties were performed in 2012-2013 on the plots of the scientific and industrial laboratory "Testing new plant varieties and environmental technology evaluation of the fruit trees, vegetables, herbs, flowers and ornamental crops" of National University of Life and Environmental Sciences of Ukraine(NULES),which is located in the northern part of the Forest-Steppe of Ukraine on sod-medium podzolic soils. The study was

conducted in four replications according to the procedure of case study in vegetable and melon growing (Bondarenko, G.L., Âkovenko, K.I. 2001) and according to the Guidelines of state variety testing of the agricultural crops (potatoes, vegetables and melons), ed. V. Volkodav (2001).

The research was focused on six local and foreign radish varieties - Basys, Kseniya, Krakowianka, White Breakfast, Crimson and Rodos. The local variety Basys was taken as a control group. The size of the plot was 5 m^2.

Forty plants were sampled – 10 for each repetition. Seeds' sowing was performed as early as possible in the open field. In order to protect the plants from crucifer flea beetle the plot was covered by agro-fiber immediately after sowing the seeds. During all trials there were carried out phenological observations, plant biometric measuring and records of harvest, biochemical analysis and tasting rate of roots. Biometric measurements were performed before the harvest: the number of leaves on the plants was counted, plant height and area of leaf surface was measured.The agricultural technique of radish growing was acceptable in the production environment.

Harvesting was done two-three times. Recording of yield was performed on all the options. The harvested roots were sorted by marketable and unmarketable fractions and were weighed separately. The unmarketable root crops were sorted by categories: affected by diseases, damaged by pests, cracked and ugly. Each fraction was weighed and calculated separately.

RESULTS AND DISCUSSIONS

As a result of the trials it was found that in the early plant vegetation periods, there were no differences in phenological phases among the investigated variants. Significant changes took place during the formation of the fifth leaf (Tab. 1). The earliest appearance of the fifth leaf was observed at the varieties Crimson and Rodos - 2-3 days before the control variant. The phase of technical maturity occurred earlier at the varieties Crimson and Rodos - 21-23 days from sprouts occurrence, which is 3-5 days earlier than in the case of Basys variety.

According to testing results, it was found that the studied assortment was characterized by early ripening terms. The results of the conducted research established that the duration of the interphase periods of radish varieties was different. The formation of the marketable Crimson and Rodos root crops was marked by the shortest duration of phenophase and vegetation period - 21-23 days.

Table 1. *Duration of radish interphase periods (2012-2013)*

Variant	Interphase periods, days			
	sowing – seedlings	seedlings – the first leaf appearance	seedlings –the fifth leaf appearance	seedlings - technical maturity
Basys (control)	5	5	15	26
Kseniya	4	5	14	25
Krakowianka	5	5	15	26
White Breakfast	5	5	14	24
Crimson	4	5	12	21
Rodos	4	5	13	23

According to the obtained results it was noticed that radish varieties formed different vegetative mass. In accordance with the biometric measurements, leaves height of radish varieties varied ranging from 12.4 cm (White Breakfast variety) to 19.4 cm (Krakowianka variety). The number of leaves ranged from 5.7 to 7.6 pieces/plant. Leaf surface area was the smallest at White Breakfast variety 13.3 cm^2 and the largest at Krakowianka variety - 168.6 cm^2.

The marketable yield of varieties that were investigated ranged between 18,2-29,1 t/ha (Tab. 2). Significant differences in the obtained yield were found between the control variety Basys and Crimson, Rodos and Krakowianka varieties. Crimson variety was characterized by the highest yield - 29.1 t/ha, that is 9.78 t/ha more than in the case of the control variant. Moreover, the average weight of roots of this variety was the largest amounting to 30 g Also, it should be noted that Rodos variety, the average root weight of which was of 28 g of and the yield - 25.22 t/ha, exceeded the control variant by 5.9 t/ha. As for the varieties Kseniya and White Breakfast there was not found significant difference compared to the control variant Basys.

Table 2. *Agronomic indices of radish assortment (2012–2013)*

Variety	Yield (t/ha)			Marketability of roots, %	Average weight of roots, g	Marketable yield, t/ha
	First time	Second time	Third time			
Basys (control)	10,5	6,3	4,2	92	21	19,32
Kseniya	10,0	7,0	0,3	91	20	18,20
Krakowianka	11,5	5,75	5,75	94	23	21,62
White Breakfast	16,5	5,5	-	91	22	20,02
Crimson	22,5	7,5	-	97	30	29,10
Rodos	22,4	5,6	-	97	28	25,22
HIP_{05}	1,5					

According to trial results it was found that the studied radish assortment was characterized by early ripening terms. As for the formation of root friendliness it should be noted the varieties White Breakfast, Crimson and Rodos, the first yield of which was of 75-80% of roots, which is an indicator of variety earliness and adaptability to the growing conditions. The varieties Basys, Kseniya and Krakowianka had longer harvesting periods (three times).

During the harvesting there were found ugly, cracked, rotten root crops as well as roots damaged by the dew worm. It was established that the most sensitive roots to cracking were those of Krakowianka variety. The varieties Basys and Kseniya had about 7-8% of ugly roots. The most rotten roots were recorded by the White Breakfast variety; as a result their marketability was of 91%. High resistance to cracking and deformity showed Crimson and Rodos varieties with the marketability of roots of 97%.

CONCLUSIONS

As a result of the conducted research it was found that the formation of early yield of radish roots and their marketable figures significantly depends on the varietal peculiarities. The earliest varieties are White Breakfast, Crimson and Rodos varieties with the shortest phenophase duration and the vegetation period of 21-23 days. Crimson and Rodos were characterized by high marketable yield of roots providing about 29.10 and 25.22 t/ha respectively.

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Data prezentării articolului: *18.03.2014*
Data acceptării articolului: *12.04.2014*