

UDC 635.153:631.53(479.25)

Peculiarities of Radish Seed Breeding in Conditions of Ararat Valley

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ARTICLE INFO

Keywords:

radish,
seedling,
replanting,
floriferous shoot,
seedpod,
seed

ABSTRACT

The aim of the current article is to study the impact of the measures taken via replanting of the radish seedlings and via leaving them in the sown areas (without replanting) on the morphological changes and seed productivity of the radish seed plants.

The research results have evidenced that the replanting of the plant seedlings is the best option for the radish seed production. In case of replanting 5.5 % more seedpods with large and uniform seeds have been developed on the floriferous shoots of the seedlings and the seed productivity per plant has exceeded the rivaling variant by 66 %; besides, the average weight of 1000 seeds exceeded the competing variant by 2.5 g.

Introduction

Enrichment of the vegetable crop varieties used by population has become an urgent issue in the current market environment. Radish is namely among such vegetables, which is an annual root crop cultivated everywhere. This crop is used only fresh, and differs in its nutritional and palatability traits (Sazonova, 1982). Radish contains valuable enzymes, mineral salts, vitamins, essential oils that are important for the digestion of hardly digestible food and for metabolism regulation (Smirnov, 1981, Gusev, 1991). Apart from high nutritional value, radish is also endowed with vital medicinal qualities. It is worth mentioning that the annual per capita consumption of the vegetables amounts to about 125 kg, 1 kg of

which is the share of radish crop (Dyachenko, 1979).

Short vegetation period and high cold resistance rate are among other advantages of the discussed crop, due to which it is possible to get early yield. It is necessary to state that natural and climatic conditions of our republic are quite favorable for producing seeds of the above mentioned crop.

There is hardly any theoretically justified event accurately organized in the current agricultural seed production sector in Armenia. It is well known that the seed qualitative indices are related to the growing conditions, applied agro-technical measures, as well as to varietal peculiarities. The aim of the current work is to study the effect of the measures taken via replanting the seed plants' seedlings

and those without their replanting on the biomorphological changes and seed productivity of the radish seed plants in the corresponding farms.

Materials and methods

The studies were conducted within 2017-2019, on the experimental farm of the Scientific Centre of Vegetable and Industrial Crops of the Ministry of Economy, RA.

The research works were implemented in line with the guidelines for primary seed breeding of vegetable and cucurbits crops (Ludilov, 1991).

Seeding was carried out on April 10. The seedlings were replanted in the field on May 12, with 70x35 cm planting plan. Approbation was conducted within the period of the root crops technical maturation during which root crops peculiar to the species were selected. After approbation, the plants were watered, whereafter the mature and healthy root crops were harvested. The tuber diameter in the root crops made 2.5-3.0 cm. On the seed plants of the root crops selected for planting, 3-5 cm-long central leaves (1-2 items) were left. The seedlings of the radish crops were planted in the soil with the depth of 1.5-2.0 cm and well tightened with soil, otherwise the rooting can slow down leading to their drooping. After planting the seedlings were watered. Since the weather conditions were dry and the air humidity was rather low throughout the cultivation period, the seedlings were watered twice. For the first time they were watered during the vegetation period, and then watering was conducted during the flowering stage. In addition to water supply the plants were also fertilized with mineral fertilizers. Weeding and loosening activities were also carried out.

To ensure purity of varieties, the seed field was cleaned from other varieties keeping 1000 m distance from each other. Pollination was performed by means of insects.

The radish seeding without replanting was conducted at the start of May. The disadvantage of the mentioned method for producing seed plants consists in the fact that it is difficult to make true choice among the plants, which leads to the deterioration in the varietal purity. The first discrimination care /weeding/ was implemented parallel to the plants sparsification in the mass tuber formation stage of the root crops. Only plants with varietal characteristic size and color in the upper parts of the root crops were selected. The second rogueing was implemented before the flowering stage. This time the plants with inflorescences of atypical colouring were removed. Harvesting was organized when the pods were light-yellow and seeds were

light-brown. The seed stalks were harvested at once, since their pods are strong and do not open.

Phenological observations, biometric measurements and resulted seed estimation was implemented during the vegetation period. Field trials and numerical figures were processed by the method of variation dispersion analysis used for statistical processing of the data obtained (Dospekhov, 1985).

The experiments were performed with three replications on the radish variety "Diego", which is widely cultivated in Armenia.

Results and discussions

The studies show that some changes have been observed in biomorphological characteristics of seed plants that were replanted and in those that were not (left in the sown areas).

According to the data presented in table 1, different conditions of seed plants cultivation have had certain impact both on the floriferous shoot emergence time and on the flowering and maturation times. Thus, floriferous shoots of replanted seedlings appeared on the 67th day after sowing, while in the seed plants which were not replanted floriferous shoots appeared on the 51st day after sowing. The same pattern was observed in the flowering and maturation phases.

Table 1. Duration of seed plants phenophases (average for 2017-2019)*

Phases	Replanted seedlings	Seedlings left in the sown areas (without replanting)
Sowing time	10.04	05.05
Planting time	12.05	-
Floriferous shoot emergence time	15.06	26.06/51
Flowering time	08.07	18.07/73
Maturation time	29.08	12.09/129
Duration of vegetation, days	142	129

*Composed by the authors.

Table 2. Changes in the main indicators of seed productivity depending on cultivation conditions (average for 2017-2019)*

Quantity	Replanted seedlings	Seedlings left in the sown areas (without replanting)
Number of seedpods per plant, n	285	270
Number of seeds per seedpod, n	5	4
Number of seeds per gram, n	100	120
Seed productivity per plant, g	15.0	9.0
Seed productivity c/ha	6.0	3.6

*Composed by the authors.

Table 3. Radish seed quality depending on conditions of seed plants cultivation (average for 2017-2019)*

Seedlings	Size and uniformity, %			Weight of 1000 seeds, g	Germination rate, %	Germination energy, %
	large	medium	small			
Replanted seedlings	50.5	42.0	7.5	10	93	86
Seedlings left in the sown areas (without replanting)	28.4	45.2	26.4	7.5	87	75

Different conditions of seed plants cultivation affected biomorphological properties and seed productivity of the seedlings as well.

The data presented in table 2 show that different ways of cultivation affected the number of floriferous shoots, seedpods and seeds per seedpod, as well as indices of seed quality. Thus, 285 seedpods were developed on the floriferous shoots of replanted seed plants, the number of seeds formed in seedpods was 5, as to the seed productivity, 15.0 g seed per plant and 6 c seed per hectare was produced. Meanwhile, for plants, that were left in the sown areas (without replanting) the mentioned indicators made 270 n, 4 n and 9.0 g, 3.6 c respectively.

Based on the seed quality indices, it should be noted that the average weight of 1000 seeds, the percentage rate of large and medium seeds, germination capacity and energy in the seedlings of replanted plants were rather high (Table 3).

Conclusion

The research work performed has testified that replanting of seedlings is the best option for radish seed production. The floriferous shoots of replanted seedlings produced 5.5 % more seedpods with large and uniform seeds, besides, the mentioned variant has been distinguished by its seed productivity which is 66 % higher than that of observed in the second variant (without replanting). Finally, the

weight of 1000 seeds exceeds the similar indicator recorded in the seed plants left in the sown areas (without replanting) by 2.5 g.

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Accepted on 30.04.2020

Reviewed on 26.05.2020