UDK 631.53.01:635.34:635.9

FEATURES OF SEEDS GROWING OF ORNAMENTAL CABBAGE

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The results of the study on features of seeds growing of ornamental cabbage are given. Advantages of the sparse and dense placing of uterine plants are determined.
Key words: *ornamental cabbage, seeds growing, sorts, seeds, crop capacity.*

The ornamental cabbage is a valuable and attractive plant. It can be used in cookery and for decorating. It contains up to 17-18% of dry substance, 4,9 – 5,2% of sugar, 160 – 176 mg% of vitamin C, which exceeds the indices of the white cabbage. [2,3]

This sort of cabbage can form tall plants and short forms with various leaf coloring.

The analysis of literature on the subject of ornamental cabbage seed growing shows the insufficiency of the information in this sphere. In Ukraine only Kyiv experimental station studied the selection of this sort of cabbage. New sorts are created in Japan, Netherlands, Russia. All publications describe the meaning of leaf decorative forms, sorts, separate elements of the technology of growing and usage. Seed growing of ornamental cabbage is not fully described in the literature.

One should know general information about the plant as an object of seed growing for the successful solving of the given problem.

Leaf forms of cabbage don’t form its head or it is very soft when we speak about dwarfish plants. Tall plants unite late ripening sorts with various leaf forms. Leaf blade can be inversely ovoid, lire-shaped, lire- shaped pinnated, flat or curly with sharply cut sides. The color of leaves can be green and violet of different tints. [13]

The decorative effect of plants is made by their form as well as various coloring of leaves, their fuzziness. With the beginning of cold weather the color of leaves becomes brighter and plants become more colorful. In autumn plants look the most ornamental. Adult plants well survive during replanting. It allows to decorate areas which are free from summer plants with cabbage decorative. The leaves are eatable. The process of its growing does not differ from the technology of white cabbage growing using seedlings.

The value of ornamental cabbage is in its leaves. It contains twice more cellulose, proteins than white cabbage. It predominates other kinds of cabbage by vitamins, especially vitamin C and carotene. In European countries it is widely used in cooking salads, garnishes, soups. But oftener it is used for decorating. The plant is biennial. The duration of vegetative period during the first year is 160-170 days, the second year is 100-120 days. The plant is cold-resistant, it endures short autumn frosts up to minus 15°C. It is also resistant to high temperature, it demands good soil moisture, positively reacts to fertilizers. [11,5,10]

Ornamental cabbage is biennial, cold-resistant. The sprouts are resistant to temperature minus 3-4°C, ovaries – to temperature up to minus 15°C. It also demands high moistening, as its plants have large overground part which evaporates huge amount of water.

Diseases and pests which are spread among the plants of white cabbage are dangerous for ornamental cabbage during its growing period and storage. Though leaf forms, especially curly-leafy sorts are less harmed by fungal disease and pests which gnaw leaves. But seeding plants as well as other cabbage plants are harmed by plant-lice. [14,2]

The vegetative period of ornamental cabbage is practically unlimited. The terms of sowing depends on its purpose. For decorative using it is grown as early white cabbage. Seedling could be grown in open nursery gardens as well as white cabbage seedling. Plants are placed in the row at the distance of 60-70 sm. [3,4]

This biennial plant is decorative only during the first year of growing, during the second year it is grown only to get seeds. It is well resistant to the lack of moistening, it is little harmed by pests. It is characterized by high resistance to frosts and it remains effective till late autumn. [15,17]

Ornamental cabbage is a cross-pollinating plant which demands the compliance of distance between different sorts on the open plot no less than 2,000 meters, on sheltered plot no less than 600 meters [10,3]

Using the information from different sources and taking practical experience into consideration we should say that ornamental cabbage under the conditions of Ukraine is not fully studied and popular, the selective work and research on seed growing are hardly done.

Research Methodology. Based on the objectives, at former Kyiv Research Station the selective work on creation of decorative forms of the cabbage have been carried out for many years and the peculiarities of seed growing are studying. In the process of the scientific-research work, the task was to study main methodological problems and separate elements of seed growing technology taking into account the use of open soil conditions both for seedlings growing and for queen cells and seeds.

During this scientific-research work were used “Methodological instructions for cabbage selection” (2001), “Modern methods of vegetable and melons selection” (2001) worked out with authors participation [7, 16]. Main problems of seed growing were studied according to “Methodology of experimental work in olericulture and melon-growing” (2001), in accordance with the “Statute about production of original and elite seeds of vegetable and melon crops, fodder roots, fodder cabbage” (2001) [12]. Statistic working of the received indices was done according to “Methodology of experimental work” (1985) [1].

The results of the investigation. Taking into account the plant biennial life cycle, queen cells and seeds of ornamental cabbag were grown similarly to late-ripening sorts of white cabbage without using buildings of protected soil. Only high-stalwart sorts of domestic selection created at former Kyiv Experimental Station were studied. These sorts are included into State register of plants varieties, which are suitable for growing on the territory of Ukraine: Charivnytsya (red tall) and Krasunya borivska (green tall). General technological requirements for growing cabbage plants

were complied. Soil loosening, wild grass eradication, pests destroying were done in time.

The peculiarities of ornamental cabbage growing are the same as other cabbage varieties peculiarities, but high doses of nitric fertilizers must be avoided because they decrease frost-resistance. One should protect it from plant-lice. Plants should be protected from winds with hilling.

Seeds were sown in nursery garden in the third decade of April. It coincided with the sowing terms of late-ripening sorts of white cabbage. Seedlings were planted into open soil in the first decade of June according to the schemes: 70x50, 70x60 and 70x70sm that influenced the size of the vegetative part of plants in diameter (table 1).

1. The diameter of overground part of ornamental cabbage plants depending on the scheme of their placement, sm (average for 2010-2012)

Scheme of placement	Sort of cabbage	
	Charivnytsya	Krasunya borivska
70x50 (control)	64,3±3,2	58,5±2,7
70×60	70,1±3,4	65,2±2,9
70×70	72,8±3,9	69,7±3,0

The results of the conducted research show the advantages of tenuous planting in the row. With the increase of the distance the plants of the ornamental cabbage were grown in width and became more attractive, especially at the end of the vegetative period. Plants of Charivnytsya variety were a bit wider in diameter comparing with Krasunya borivska. Though being planted according to the scheme 70x60 and 70x70 both sorts were more developed against 70x50.

Before harvesting of uterine plants the estimation of the grown material was done. Was made an attempt to keep an intense red-violet coloring and typical fringe on the leaves which occupied the largest part of Charivnytsya plants. In case with Krasunia borivska typical plants were selected with intense green tint and dense moss-like fringes which covered the largest part of the leaf.

For receiving the original seeds, 5% of were selected, for receiving elite seeds – 25% of queen cells were selected as “Statute about production of original and elite seeds of vegetable and melon crops, fodder roots, fodder cabbage” (2001) requires.

During the harvesting the plants were dug out, leaves were cut, only petioles of size 1-1,5 and upper leaves were left. In the storehouse they were kept vertically or with slight slope on the pillar. Root system was covered with moist soil-mixture of humus and sod soil. The temperature in the storehouse was 1°C, relative air humidity was 90-95%.

A month before planting in the second half of term of storing uterine plants were examined, died leaves and affected queen cells were removed, the temperature increased, the soil-mixture was moisturized.

In early spring of the next year the prepared queen cells were planted in open soil, providing its vertical placing and soil compressing near the plant system. The schemes of planting 70x40, 70x50, 70x60 cm were used. Seed yield depended on the planting density (table 2).

2. Seed yield of ornamental cabbage depending on the scheme of planting placement, kg (average for 2010-2012)

Scheme of planting, sm	Variety of cabbage	
	Charivnytsya	Krasunya borovska
70x40	510	512
70×50 (control)	503	497
70×60	470	465
HIP_{05}	*27,2*	*24,3*

The conducted accounting of seed yield gives the opportunity to confirm that this index is significantly higher with more condensed plants placement (70x40 and 70x50). Were obtained 503-510 kg/hr of seeds of Charivnytsya variety and 497-512 kg/hr of seeds of Krasunya borivska against the scheme 70×60 cm — 470 and 465 kg/ha respectively. Under such conditions the productivity of one plant was a bit lower but the productivity of seed per area unit was higher on account of the density of plants placing by schemes of placement 70×40 and 70×50 cm. An important advantage of condensed planting is the increasing the number of the similar seeds in the general mass, mainly of medium fraction. The similarity of seeds according to the research variants doesn't differ much.

Conclusion. On the basis of the received results were investigated methodological problems and some elements of technology of growing uterine plants and ornamental cabbage seeds without using greenhouses. The advantages of tenuous planting (70x60 and 70x70) during the first year, and condensed planting (70x40 and 70x50) during the second year were determined.

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Одержано 25.04.13

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Особенности семеноводства капусты листовой декоративной.

Вопросы семеноводства капусты листовой декоративной в источниках литературы освещены недостаточно. В процессе научно-исследовательской работы ставилась задача исследовать основные методические вопросы и отдельные элементы технологии выращивания семян капусты листовой декоративной с учетом использования только условий открытой почвы как для выращивания рассады, так и маточников и семян.

Результатами исследований установлено преимущества разреженного размещения растений в строке.

Проведенный учет урожайности семян дает возможность утверждать, что этот показатель существенно выше сравнительно с более загущенным размещенем семенных растений 70 × 40 и 70 × 50 см. У сорта Волшебница получено 503 – 510 кг / га семян, Красавица Боровская — 497 – 512 кг / га против схемы 70 × 60 см — 470 и 465 кг / га соответственно. При таких условиях производительность одного растения была несколько меньше, но выход семян с единицы площади значительно повышался за счет большего количества растений по схем размещения 70 × 40 и 70 × 50 см. Важным преимуществом загущенной высадки является увеличение количества однородных семян в общей массе, преимущественно средней фракции. Всхожесть семян в зависимости от вариантов исследований существенно не отличалась.

***Ключевые слова**: капуста листовая декоративная, семеноводство, сорт, семена, урожайность.*

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Features of seeds produce of decorative kale.

Questions of seeds produce of decorative kale highlighted insufficiently in the literature. In the process of the research the task was to investigate the basic methodological questions and some elements of technology of decorative kale seeds cultivation using only exposed soil conditions both for growing seedlings and queen cells and seeds.

The results of studies helped us to establish the benefits of a sparse placement of plants in the row.

Acounting of seed yield makes it possible to affirm that this index is significantly higher comparing with more thickened placement of seed plants 70 × 40 and 70 × 50 cm. A variety Enchantress received 503 – 510 kg / ha of seeds, Belle Borovskaya — 497 – 512 kg / ha against the scheme 70 × 60 cm — 470 and 465 kg / ha accordingly. Under such conditions, the productivity of a single plant was rather lower, but the seed yield per unit of area increased significantly due to a larger number of plants on the layouts of 70 × 40 and 70 × 50 cm An important advantage of the thickened planting is the increase of number of seeds in overall weight, of predominantly midle fraction. Seed germination, depending on the variants of studies did not differ significantly.

***Key words**: decorative kale, seeds produce, variety, seed, yield.*