Researches regarding the physiological, agrochemical and morphological state of cabbage seedling while planting

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ABSTRACT

This experiment was conducted in the field of Faculty of Horticulture from Bucharest. There were produced seedlings of early cabbage, using various variants. Those varieties were resulted from the mixture of perlite, manure and top soil. Each of those materials has different characteristics and formed a very productive combination. The seedlings were produced in warm greenhouses by direct seeding, followed by their transplant in plastic glasses (with a diameter of 6 cm). The periods of optimal growing and the system of culture were respected properly. From the results obtained was concluded that the mixture used helped plants to grow in a proper way, supplied the appropriate quantity of nutritive elements and gave a well physiological state. The seedlings had a height of 5.8 cm at V2 and 3.7 cm at V3 and V8, 7-8 leaves, a well developed root system, 11.8 cm long roots for V1 and 19.9 cm long roots for V4 and a root volume of 1 cm³ at V7 and V8 and 2.5 cm³ at V8.

Key words

Early cabbage, nursery transplant, quality

In general, cabbage is a vegetable with multiple uses (1, 3), extremely appreciated by consumers due to its biochemical content and positive influence on human body. Early cabbage is especially appreciated because is consumed after winter, when the human body needs to strengthen (2). This is the main reason why this particular vegetable has been chosen to study, in order to find new ways of production. The results expected are easier ways of working, less pollution and more benefits for the health of this consumer (4).

Material and Method

These researches have been done in the experimental field of Faculty of Horticulture from Bucharest. The material used has been the cabbage variety named “Early of Vidra”. During the experiment period, the seedling were made between the 20th and 25th of January, in warm greenhouses, in small a boxes, with substrata mixture. The transplant has been done in plastic glasses of 150 ml, after 10-15 days from seeding. Then, the plants have been in the optimal phase of development. The seedlings have been produced with the help of various variants of substrata mixture, as it follows:

V1=control (40% soil of leaves, 30% manure, 20% top soil, 10% sand)
V2=1/2 perlite + 1/2 manure
V3=1/2 perlite + 1/2 top soil
V4=1/3 perlite + 1/3 top soil + 1/3 manure
V5= 1/3 perlite + 2/3 manure
V6=1/3 perlite + 2/3 top soil
V7=2/3 perlite + 1/3 manure
V8= 2/3 perlite + 1/3 top soil

The plants have been subjected to biometrical (height, number of leaves, diameter of the stem, level of development of the root system, weight of fresh plants), physiological (content of free ions, index of water permeation, colour,) and agrochemical analyses (grade of supply with NPK).

Results and Discussions

The mixtures used to produce the cabbage seedlings influenced the process of development in different ways. As consequence, the height of seedlings was higher at V2 (1/2 perlite + 1/3 manure), which had 5.83 cm and V4 (1/3 perlite + 1/3 top soil + 1/3 manure), which had 4.9 cm. Smaller values were registered at V8 (2/3 perlite + 1/3 top soil) and V3 (1/2 perlite + ½ top soil), with numbers such as 3.7 cm. V1 also scored a high value of 5.43 cm.

The number of leaves was directly proportional with the height of the plants. The number registered was of
8 leaves at V2 (1/2 perlit + ½ manure), V3 (1/2 perlit + ½ top soil), V4 (1/3 perlit + 1/3 top soil + 1/3 manure) and V6 (1/3 perlit + 2/3 top soil) and of 7 leaves for the other variants. The control registered a number of 8 leaves.

The stem diameter reached values between 2 and 3.5 mm (fig. 2). The most developed seedlings from this point of view were the ones from V2, with a thickness of 3.5 mm, followed by V5, with 3.3 mm and V4, with 3 mm. The smallest values were registered at the variants produced with more perlit or more top soil.

The root system has developed very well, due to the materials used while preparing the mixtures. Those materials were light and that provided optimal conditions to air.

The volume of the root system varied between 1 cm$^3$ at V7 and V8 and 2.5 cm$^3$ at V5. The variants with control had 1.7 cm$^3$.

The development of the roots was proved also by roots, with reached a length of 11.8 cm at control and 19.9 cm at V4.

The weight of fresh plants was considered appropriate, varying between 9.8 g at V8 and 13.8 g at V6.

The physiological indexes determined in the moment of planting proved the importance of mixture soil in which the seedlings were produced.

The content in free ions varied between 1027.9 µs/g at control and 1861.17µs/g at V7. The index of water permeation, which gives the circulation of free ions through the plasmatic limbs, varied between 0.25 at control and 0.12 at V3.

The content in “a” chlorophyll, which is the most important item for photosynthesis processes was higher at V7 and V8, due to the quantity of perlit, and at V1 (control), with values of 17.91 µg/ml extract, 17.47 µg/ml extract and 17.59 µg/ml extract (fig. 4).

The content in “b” chlorophyll registered lower values then chlorophyll “a”. It was not appropriate for the intense growing of the plants (fig. 4). The values reached were 3 times or four times lower then the ones specific for chlorophyll “a”. This fact can be observed form the proportion between chlorophyll “a” and “b”.

The content in xantofil and carotene also registered low values, inappropriate for this period of growing.
The level of supply with different elements is a very important aspect which characterizes the cabbage seedlings. In what regards the content of N, it was between 1996.3 ppm N-NO₃ at V7 and 1217.7 ppm N-NO₃ at control (fig. 5).

The content of P was higher at the variants with a large quantity of manure, respectively 435 ppm at V2, 399 ppm at V5. Lower values were registered at V7, with 217 ppm and V8, with 210 ppm (fig. 6).

The content of K varied between 8600 ppm at V2 and 5880 at V7 (fig. 5).

Conclusions

The researches regarding the physiological, agrochemical and morphological state of early cabbage nurseries during planting, conducted to a series of conclusions, as it follows:

- In order to make the mixture, there have been used easy and low cost materials;
- The plants have registered a more vigorous growing at the variants where the organic materials have had a higher percentage;
- The content of nutritive elements was higher for the nurseries where the manure has had a higher percentage;
- In comparison with control, all variants studied have had intensive physiological processes.

References