CONTRIBUTIONS REGARDING THE POSSIBILITY TO IMPROVE THE ONION (*ALLIUM CEPA* L.) CULTURE TECHNOLOGY, BY DIRECT SOWING, IN THE PEDOCLIMATIC CONDITIONS FROM TRANSYLVANIAN PLATEAU

*(SUMMARY OF PhD THESIS)*

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Also called “queen of vegetables”, the onion has been grown since ancient times due to its nutritional, seasoning and phytoncide qualities, serving in the same time both as an important raw material within the industry of vegetables, fish or meat canned food and the pharmaceutical industry. If all technological links are applied, onion is one of the most profitable vegetable species, from the creation of the crop to harvest, within a modern technology. The lower the costs and the higher the quantity and quality of the production the bigger the profit (POPANDRON, 2002).

The aim within vegetable growing is to maintain the “quantity – quality” balance both for obtaining socially efficient productions and providing the population with nutritionally safe products.

The purpose of this research is establishing the cultivar, the sowing time and the optimum density of the plants within the crop, under the specific pedoclimatic conditions of Gherla town area, in order to get a strong production of high quality bulbs.

The proposed research objectives and activities have pursued to set the influence of experimental factors upon:
- plant growing and development;
- morphological nature of the bulbs;
- morpho-physiological nature of the bulbs;
- bulb production;
- commercial attributes of the bulbs;
- chemical composition of the bulbs;
- economical efficiency of the crop.

Two varieties of biological materials were used, namely Density 4 and Ramata Rossa di Milano. The first one has yellow bulbs and it is used both for consumption and industrialization, and the second has red bulbs, mainly consumed raw.

In order to reach the proposed target and the objectives of research several comparative experiences with polyfactorial nature were organised on the plain in the locality of Gherla. Three factors were approached: the variety, the sowing time and the plant density in the crop, each one with two gradations.
• **Factor A – variety**
  • a1 – Density 4;
  • a2 – Ramata rossa di Milano.

• **Factor B – sowing time**
  • b1 – spring (February – March);
  • b2 – autumn (August – September).

• **Factor C – density of plants in the crop**
  • c1 – one million plants/hectare, harvestable;
  • c2 – two million plants/hectare, harvestable.

After combining the three experimental factors (ȘAULESCU și ȘAULESCU, 1967; ARDELEAN, 2005), there have resulted eight experimental variants placed in subdivided blocks, in three repetitions.

It has been concluded that all three factors have directly influenced the production of sowed onion under the pedoclimatic conditions of Gherla. The sowing time had the biggest influence on the production, followed by the increase of plant density and the cultivar.

With a density of one million plants/hectare sowed during springtime, Ramata rossa di Milano has realised on a three years average a production with 1.44 tonnes/hectare lower than Density 4. With a density of two million plants/hectare Ramata rossa di Milano has realised a production of 3.49 tonnes/hectare, significantly different from Density 4 (figure 1. and 2.).
During autumn, Ramata rossa di Milano recorded a production of 5.04 tonnes/hectare with a density of one million plants/hectare and 10.64 tonnes/hectare with a density of two million plants/hectare. The explanation is given by the smaller percent of flowering stems compared to Density 4 (figure 3. and 4.).
The best commercial quality of the bulbs has been obtained from the crops of Density 4 established during springtime and it has recorded a 1st quality volume of 49.85 tonnes/hectare at a density of one million plants/hectare. In the case of Ramata rossa di Milano, at the same density there has been recorded a production of 43.81 tonnes/hectare, under the conditions of a very high percent compared to a total of 96.12% in the first case and 86.87% in the second (figure 5. and 6.).
The biggest values of pulp consistency were recorded both on Density 4 and Ramata rossa di Milano at a density of two million plants/hectare sowed during springtime. Density 4 has recorded bigger values of pulp density than Ramata rossa di Milano, regardless of the sowing time or density used. The sowing time, variety and density of the plants in the crop have directly influenced the consistency of the bulbs.

The density of bulbs has been expressed in mass units in relation to the volume unit and has been correlated with their consistency.
Another assessment factor of bulb’s nutritional value, namely the taste, has been evaluated through marks based on a 1 to 5 scale. The best marks were obtained by Ramata rossa di Milano, having a sweet and slightly spicy taste.

The content in soluble dry matter has recorded the highest value in the case of Density 4 at a density of two million plants/hectare (9.61%), passing Ramata rossa di Milano with 9.3%.

The soluble dry matter of Ramata rossa di Milano bulbs has lower values (8.67 – 8.98%) than Density 4 (9.19 – 9.61%).

The content of bulbs in soluble dry matter was significantly influenced by the density of the plants in the crop and the sowing time.

In both cases, the best values were recorded during springtime, at a density of two million plants/hectare. The minimum value was recorded in both cases during autumn, at a density of one million plants/hectare.

By studying the content of onion bulbs in ascorbic acid, we can assert that the analysed types store different quantities, depending on the plants density. So, at a density of two million plants/hectare, Density 4 has recorded a content of vitamin C of 12.43 mg/100 g, passing Ramata rossa di Milano with 9.4%.

In both cases, the influence of sowing time and density was significant.

The highest quantity of sugar was recorded during springtime, at a density of two million plants/hectare (8.14 g/100 g s.p. in the case of Ramata rossa di Milano and 7.22 g/100 g s.p. in the case of Density 4).

The acidity of bulbs, mostly correlated with their content in vitamin C, expressed in percentage and significantly influenced by the sowing time and density, was higher at Density 4 (0.83), compared to Ramata rossa di Milano (0.62). Both values were recorded during springtime, at a density of two million plants/hectare.

Both the global production depending on variety, sowing time and plants density and the level and quality of production were comprised between 12487 lei/hectare and 45994 lei/hectare. The highest global production value has been recorded in the case of Ramata rossa di Milano during springtime at a density of two million plants/hectare, and
the lowest in the case of Density 4 during autumn at a density of two million plants/hectare.

The total expenses range between 34714 lei/hectare and 35554 lei/hectare in the case of Density 4 and between 34834 lei/hectare and 35794 lei/hectare in the case of Ramata rossa di Milano.

The profit was comprised between 3144 lei/hectare and 10200 lei/hectare.

These values were influenced by the price of the seeds and the level of realised production and the incomes gained per hectare were influenced by the average price of production capitalizing.

The lowest cost limit (0.61 lei/kg) was recorded at Ramata rossa di Milano, spring with a density of two million plants/hectare and the highest cost limit (2.45 lei/kg) at Density 4, autumn with a density of two millions plants/hectare.

The conditions for growing direct seeded onion in the vegetable area of Gherla are propitious so we recommend the enhancement of this growing method while the onion growth in the area is made using exclusively onion sets. We recommend using extensively two onion cultivars – Density 4 and Ramata Rossa di Milano – which are very productive and have very good quality bulbs; these cultivars behave well against the pedoclimatic conditions specific to the drainage basin of the Someşu Mic river.

Setting-up onion crops by direct sowing by using those two cultivars is to be made during the first decade of March as the plants from the crops started in the first decade of September sprout floriferous stems (they vernalize).

For this we recommend using the Ramata rossa di Milano cultivar, seeded in the spring with a sowing density of two million plants/hectare due to the higher yields of over 58 t/ha in the vegetable area of Gherla.

As for the growing of onion to be eaten raw, we recommend the red onion cultivar of Ramata rossa di Milano, while for the growing of onion to be industrially processed or as condiment for various dishes and canned food we recommend the Density 4 cultivar.

The onion crops will be set-up using the sowing pattern with five-row beds (40+25+25+25+25 cm), on a field moulded with beds that have ridge-to-ridge width of
140 cm and a 3-cm depth, while the seed amount is 4 kg/ha (sowing density of one million plants/hectare) and 8 kg/ha (sowing density of two million plants/hectare).

We recommend the research be continued using other valuable Romanian or foreign cultivars such as: Katty, Vitez, Electric or Sibir, Copper Ball F1, Pegase F1 and Mississippi F1, Calatis F1 and Histria F1, which could lead to a bigger yield than the yield of 58 t/ha obtained through our research within the environment specific to the vegetable area of Gherla, Cluj County, Romania.