

SUMARRY

at doctoral thesis

STUDIES AND RESEARCHES FOR IMPROVING EGGPLANT (*SOLANUM MELONGENA* L.) SEED PRODUCTION IN SOUTHERN ROMANIAN CONDITIONS

Keywords: biostimulant, cultivar, density, fruit thinning;

Eggplant (*Solanum melongena* L.) belongs to the *Solanaceae* family and is an annual, herbaceous plant that does not form tubers. The edible part is the fruit, which is consumed only after being cooked (Munteanu, 2003).

With an average annual per capita consumption of approximately 7 kg, the currently cultivated areas in Romania do not meet this demand. Furthermore, consumer preferences are oriented toward specific fruit shapes and colors, and the registered cultivars in Romania correspond to these requirements. These cultivars are also well adapted to the country's climatic and pedological conditions (Scurtu et al., 2020).

Seed production is pursued with two primary objectives. On one hand, it is essential to maintain the necessary stocks for preserving cultivars' defining traits, particularly within higher seed categories (breeder's seed, pre-basic seed, basic seed). On the other hand, it is necessary to provide certified seed to farmers and producers for the commercial production intended for consumption.

The research presented in this doctoral thesis, entitled "Studies and Research for Improving Eggplant (*Solanum melongena* L.) Seed Production under Southern Romanian Conditions", aimed to optimize seed production conditions for eggplant, regardless of the category targeted for production. The studies were conducted in the years 2019, 2020, and 2022 at the Research and Development Institute for Vegetable and Flower Growing Vidra (RDIVFG Vidra), Ilfov County.

The doctoral thesis is structured into two parts, each comprising several chapters.

Part I. Current state of knowledge regarding the eggplant (*Solanum melongena* L.) seed production

Chapter 1. The importance of eggplant crop

Chapter 2. Special features of eggplant crop

Chapter 3. The importance of the experimental factors studied

Part II. Results of own research

Chapter 4. Aim and objectives of the research, material and methodology

Chapter 5. Results regarding the influence of plant density on eggplant seed
crop

Chapter 6. Results regarding the influence of treatments with biostimulants and fertilizers on eggplant seed crop

Chapter 7. Results regarding the influence of the number of fruits per plant on eggplant seed crop

Chapter 8. General conclusions and recommendations

The bibliography required for the preparation of the present doctoral thesis comprises a total of 141 titles, drawn from both Romanian and international specialized literature.

The first part constitutes a bibliographic study aimed at covering the current knowledge regarding the importance of eggplant crop and seed production for this species, as well as certain technological stages where intervention is possible to achieve the thesis objectives. This section is structured into three chapters. Various sources were utilized for documentation, including specialized books, scientific articles, field-specific journals, technical treatises, and websites.

The first chapter includes information on the nutritional, therapeutic, agronomic, economic, and social importance of eggplant crop, as well as the risk factors affecting commercial and seed production crops. It also addresses the significance of eggplant crop for seed production and the legislative framework governing this activity, in order to identify potential areas for technological improvement. The chapter is divided into six subchapters.

The second chapter is structured into three subchapters and presents the biological, ecological, and technological particularities of the species. These define the parameters that must be met for the successful cultivation of eggplant and have shaped the objectives of the thesis.

The third chapter provides general information regarding various factors that influence the quantity and quality of eggplant seeds and addresses potential improvements in certain technological stages within seed production for this species. The four subchapters review the specialized literature concerning the influence of cultivar, planting density, biostimulant treatments, and fruit thinning on seed quantity and quality.

The second part represents the author's contribution to the research topic and presents the aim, objectives, methodology employed to achieve the objectives, and the results of the original investigations. This section is structured into five chapters.

Chapter 4 outlines the aim of the thesis, the objectives, the materials used, the methodology applied in conducting the research, and the working environment, which includes the meteorological and pedological conditions of the natural setting.

The aim of the present thesis was to evaluate the possibility of improving seed production technology for eggplant (*Solanum melongena* L.) cultivation by optimizing certain technological stages under the conditions of southern Romania.

To fulfill this aim, several objectives were established. Thus, the following were studied:

1. study of the influence of planting density on the seed production crop of eggplant;
2. study of the influence of treatments with simple or mixed biostimulants on the seed production crop of eggplant;
3. the influence of fruit thinning on the seed production crop of eggplant.

The biological material consisted of eggplant plants belonging to two open-pollinated cultivars, Belona and Luiza, while *the biotechnical material* comprised biostimulants based on commercially available products. These were grouped into experimental treatments according to their predominant content.

Based on the aim of the thesis, the following experimental factors were studied:

1. Cultivar – with two levels:
C1 = Belona,
C2 = Luiza.
2. Planting density – with three levels:
D1 = 40000 plants/ha;
D2 = 35000 plants/ha;
D3 = 30000 plants/ha.

The biostimulant treatments were grouped according to their main composition and defined as factors:

3. Treatments with seaweed-based biostimulants, with four levels:
Am1 = untreated;
Am2 = Agrocean B, at a concentration of 2 mL per 1 L of water;
Am3 = E – Dalgin, at a concentration of 3 mL per 1 L of water;
Am4 = Kelpak, at a concentration of 2 mL per 1 L of water.
4. Treatments with amino acid and fertilizer-based biostimulants, with five levels:
Aa1 = untreated;
Aa2 = Florone, at a concentration of 0.5 mL per 1 L of water;
Aa3 = Flower 50, at a concentration of 3 mL per 1 L of water;
Aa4 = Florabax, at a concentration of 1.5 g per 1 L of water;
Aa5 = Rerum, at a concentration of 5 mL per 1 L of water.
5. Treatments with mixed biostimulants based on inoculum of beneficial microorganisms and seaweed extract, with three levels:
M1 = untreated;
M2 = Clonotri (2 mL/1 L water) + NutryAction (8 mL/1 L water);
M3 = Sublic (2 mL/1 L water) + NutryAction (8 mL/1 L water).
6. Fruit thinning on the plant, with four levels:
F1 = three fruits per plant;
F2 = four fruits per plant;

F3 = five fruits per plant;

F4 = retention of all fruits formed on the plant.

The first experimental factor, the cultivar, was sequentially combined with each of the other experimental factors, resulting in five two-factor experiments arranged in subdivided plots with three replications. In the experiments studying the influence of treatments with various biostimulant preparations, four foliar applications were performed at 14-day intervals, starting from the formation of the first fruits.

Regarding environmental conditions, they satisfactorily met the plants' requirements. However, in our country, the water needs of the plants are not always met, which necessitated and justified the implementation of irrigation practices.

The interpretation of the experimental data obtained from the measurements was carried out using statistical and mathematical methods, such as ANOVA, while the analysis of the significance of differences among variants was performed using Duncan's multiple range test ($p \leq 0.05$).

Chapter 5 presents the author's original results concerning the combined influence of cultivar and planting density, as well as the influence of planting density on each eggplant cultivar. As a result of the study, it was found that plant density did not influence the maturation period of each cultivar, but it had a significant impact on the number of mature fruits, seed yield, thousand seed weight, and seed germination qualities. The most effective density proved to be 35000 plants/ha, with good results in seed germination also observed at 30000 plants/ha.

Chapter 6 is structured into three subchapters. In each subchapter, the influence of the cultivar and a specific category of biostimulant preparations was studied. Thus, the first subchapter analyzed seaweed-based biostimulant preparations; the second subchapter examined mixed biostimulant preparations based on amino acids and fertilizers; and the final subchapter focused on mixed preparations containing inoculum of microorganisms and seaweed extract. The influence of each product category was studied on each cultivar, as well as the combined effect of cultivar $\times$ biostimulant treatment.

Seaweed-based biostimulant treatments had a positive influence on seed production in eggplants, contributing to faster fruit maturation and the improvement of several seed quality parameters, especially in the Luiza cultivar. Kelpak stood out with the most pronounced effects, significantly increasing the number of mature fruits, seed yield, and germination rate in both cultivars. Additionally, the treatments led to an increase in thousand seed weight and seed vigor index in Luiza, while the effects on the Belona cultivar were more limited, indicating a lower sensitivity of this variety to biostimulant application.

Amino acid-based biostimulant and fertilizer treatments had a positive impact on seed production in eggplant, contributing to faster fruit maturation, increased seed yield, and improved physiological seed quality. The product Rerum proved to be the

most effective, positively influencing all analyzed indicators in both cultivars, while Florabax showed significant effects particularly in the Luiza cultivar.

Biostimulant treatments based on microbial inoculants and seaweed extract had a moderately positive impact on seed production in eggplant, without significantly influencing fruit maturation. These treatments increased the number of mature fruits per plant in both cultivars and led to improvements in seed yield, particularly in the Belona cultivar. In the Luiza cultivar, the best results were obtained with the Clonotri + NutryAction combination, which also led to significant increases in thousand seed weight.

Chapter 7 presents the results regarding the influence of fruit thinning on the seed production of eggplant, both for each cultivar individually and the combined effect of cultivar and fruit number limitation. Limiting the number of fruits per plant in eggplant has a significant impact on seed production, contributing to faster fruit maturation and improved seed quality. The best results were obtained when the number of fruits was limited to three per plant, leading to increases in thousand seed weight, germination capacity, germination speed, and seed vigor. Although a higher number of fruits favors a greater total seed yield, it negatively affects seed quality parameters. Additionally, fruit thinning helps reduce the differences between cultivars, having a particularly beneficial effect on the Belona cultivar.

Chapter 8 presents the final conclusions of this doctoral thesis. It is worth noting that the purpose and objectives of the thesis were fully achieved, demonstrating that the thesis is important in the spectrum of specialized works, being interesting, timely and useful.