ABSTRACT

Keywords: cultivar, density, fertilization;

The garden broad bean (*Vicia faba* L.) is a species originating from the Mediterranean area and the Middle East area and it is a well-known plant in our country, but found in cultivation on small areas.

Although there was a long tradition for the cultivation of this species in our country, it began to be lost once with the introduction of other species such as peas and beans into cultivation on large areas, but other several factors contributed to the decline of the cultivation of this species, such as the use in cultivation of the landraces whose seeds have a higher tannin content, and therefore a taste less acceptable to consumers, the cultivation of this plant in the wrong sowing time epoch, the sensitivity to the attack of some diseases and pests, the lack of local commercial garden broad bean cultivars and the import of foreign cultivars that are commercially available with seeds not tested in our country for seed transmitted pest or disease.

The research carried out for the elaboration of the doctoral thesis entitled "**Studies and researches on the influence of some technological factors on garden broad beans crop**" took place in the didactic field of the discipline of Vegetables growing at the Faculty of Horticulture, during the period 2020-2023.

The doctoral thesis is structured in two parts and comprises a number of seven chapters.

Part I - The current state of knowledge regarding the influence of some technological factors on the garden bean crop. It comprises a number of three chapters.

Chapter 1. Importance of garden broad bean crop, origin and area of distribution

Chapter 2. The biological and ecological peculiarities of the species *Vicia faba* L.

Chapter 3. The importance of the technological factor cultivar, density and fertilization in broad bean crop

Part II - Results of own research. It comprises a number of four chapters.

Chapter 4. The goal and the objectives of research. The material and general working method

Chapter 5. Morphological, agro-productive and phenological characterization of the cultivars under study

Chapter 6. Results regarding the influence of technological factors on the yield and yield components

Chapter 7. General conclusions and recommendations

The bibliography includes a number of 109 titles belonging to the specialized literature from abroad as well as from the country.

The first part of the thesis is made up of three chapters and includes general information about the importance of garden bean crop, the biological and ecological particularities of the species, as well as the importance of the studied technological factors. A number of sources have been used to create these chapters, including: specialized treatises, scientific articles, books and information from websites.

The first chapter provides information on the garden broad bean importance in food, agro-phytotechnical importance, economic and social importance, risk

factors for the crop, as well as information on the origin and distribution area of the broad bean crop culture.

The garden broad bean is a leguminous plant, cultivated in more than 58 countries being the third most cultivated grain leguminous plant worldwide. The high nutritional value of the garden broad bean is due to the percentage of crude protein of the dry seeds, over 26%.

The second chapter presents the biological and ecological peculiarities of the species. This information is essential in order to optimize the technological factors in the broad bean crop.

The garden broad bean belongs to the *Papilionaceous* family and is an annual, herbaceous, partially autogamous plant, up to 2 m tall, with one or more basal shoots and a well-developed root system. The broad bean plant finds optimal conditions for growth and development in humid and cool areas with average annual precipitation of more than 650 mm.

The third chapter provides general information on the cultivation technology of garden broad beans, but at the same time, deals with the influence of technological factors cultivar, density and fertilization on the growth, development, yield and yield components, as well as the health status of broad bean plants. This chapter aims to present the general technology of growing garden broad beans and the importance of knowing the influence of the studied factors on the crop.

The garden broad bean has a relatively simple cultivation technology, the crop is established by sowing the seeds directly in the field, in the first part of April, in equidistant rows at 50-80 cm, and 6-10 cm between plants in a row, the sowing norm being included between 160-240 kg/ha, depending on the variety. The main technological factors that determine the quantity and quality of the harvest are cultivar, density and fertilization.

The second part includes a number of four chapters and presents the goal and objectives of the doctoral thesis, the natural framework conditions in which the research was carried out, the material and the working method, as well as the interpretation of the results obtained.

The fourth chapter includes the purpose and objectives of the study, the materials and working method, the experimental variants, the study of the conditions of the natural environment, the meteorological characterization of the years of study, conclusions and recommendations regarding the possibility of cultivation of garden broad beans in the climatic conditions of the NE of the country.

The purpose of this thesis is to evaluate the possibilities of promoting garden broad bean culture in the climatic conditions of the NE of the country.

To achieve the proposed goal, the following objectives were established:

1. the study of natural environment conditions;
2. establishment of the behaviour of an assortment of garden broad beans compose of seven foreign cultivars in the NE of the country;
3. establishment of the influence of the cultivar on the yield and yield components;
4. establishment of the influence of density on the yield and yield components;
5. establishment of the influence of the fertilization regime on the yield and yield components;
6. establishment of the combined influence of cultivar x density interaction on the yield and yield components;

7. establishment of the combined influence of cultivar x fertilization interaction on the yield and yield components;

8. establishment of the combined influence of density x fertilization interaction on the yield and yield components;

9. establishment of the combined influence of cultivar x density x fertilization interaction on the yield and yield components;

In order to establish the behaviour in comparative culture of a variety of garden beans compose of seven foreign cultivars, a monofactorial experiment was carried out in which the studied factor was the cultivar.

Factor A – The *Cultivar*, with seven graduations:

a_1 – De Monica;

a_2 – Karmazin;

a_3 – Aguadulce;

a_4 – Bartek;

a_5 – Scorpio;

a_6 – Witkiem Manita;

a_7 – Superfine.

A three-factorial experiment was established in order to determine the influence of cultivar, density, fertilization or interactions: cultivar x density, cultivar x fertilization, density x fertilization or cultivar x density x fertilization on yield and its components.

Experimental factors and their grading:

Factor A – *Cultivar*, with two graduations:

a_1 – De Monica;

a_2 – Karmazin.

Factor B – *Fertilization*, with three graduations:

b_1 - fertilization regime 1: Orgevit (1t/ha);

b_2 - fertilization regime 2: Orgevit (1t/ha) + NPK (16:16:16) (300 kg/ha);

b_3 - fertilization regime 3: Orgevit (1t/ha) + NPK (16:16:16) (300 kg/ha) + NH_4NO_3 (100 kg/ha).

Factor C – *Plant density*, with three gradations:

c_1 – 150,000 plants/ha;

c_2 – 200,000 plants/ha;

c_3 – 250,000 plants/ha.

The processing of the experimental data was carried out by appropriate statistical-mathematical methods, including the ANOVA method; to evaluate the significance of the yield differences between the studied variants, the Tukey test was used, for $p \leq 0.5$.

The precipitation regime necessary for the cultivation of garden broad beans during the vegetation period, from a quantitative point of view, is not ensured in the area of Iasi County. The garden broad bean crop can be an economically efficient crop in the NE area of the country, as long as the plant's requirements for environmental factors (temperature, relative air humidity, light) are correlated with the monthly average values and the crop is irrigated during critical phases (emergence, flowering and seed filling).

The fifth chapter includes own results obtained on the main morphological, phenological and agroproductive characteristics of the cultivars studied, the brief description of the cultivars, as well as the main diseases and pests encountered during the years of study in the garden broad bean crop.

The obtained results highlight a relatively low variability regarding cultivar phenology and a high variability regarding most morphological and agroproductive characteristics. From the point of view of productivity, the cultivars studied achieved remarkable results and can be successfully cultivated in the climatic conditions of the NE of the country.

The sixth chapter includes results obtained regarding the influence of cultivar, density and fertilization factors, as well as cultivar x density, cultivar x fertilization, density x fertilization and cultivar x density x fertilization interactions on the main morphological and agro-productive characters.

The cultivar factor significantly influenced the green seeds yield, the best variant was the Karmazin cultivar that obtained the highest yield of 7409,07 kg/ha.

The density factor significantly influenced the green seeds yield; the best variant was the density of 250,000 plants/ha, which resulted in the obtainment of the highest green seeds yield of 6354,96 kg/ha; the yield increase was due to a greater number of pods per unit area.

The fertilization factor significantly influenced the green seeds yield, the best variant was the fertilization with Orgevit+NPK+NH_4NO_3, which determined the obtainment of the highest green seeds yield of 6534,69 kg/ha; the increase in yield being due to the increase the number of pods per plant as well as the mass of seeds per plant.

The cultivar x density interaction significantly influenced the green seeds yield; the best variant was Karmazin x 250,000 plants/ha, which resulted in the obtainment of the highest yield of green seeds of 8517,74 kg/ha.

The cultivar x fertilization interaction significantly influenced the green seeds yield; the best variant was Karmazin x Orgevit+NPK+NH_4NO_3, which determined obtainment of the highest green seeds yield of 7845,41 kg/ha.

The density x fertilization interaction significantly influenced the green seeds yield; the best variant was 250,000 plants/ha x Orgevit+NPK+NH_4NO_3, which determined the obtainment of the highest green seeds yield of 7450,76 kg/ha.

The cultivar x density x fertilization interaction significantly influenced the green seeds yield; the best variant was Karmazin x 250,000 plants/ha x Orgevit+NPK+NH_4NO_3, which determined obtainment of the highest green seeds yield of 8812,64 kg/ ha.