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THE INFLUENCE OF SOIL PROPERTIES ON GRAIN PRODUCTION IN SPRING FORAGE PEA CROP

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Abstract: Forage pea (*Pisum arvense* f. *aestivale*), also known as field pea, is one of the important species cultivated in our country for the feed of several animal species, due to the remarkable content of the grains in proteins, calcium, vitamins, but also in other essential elements for animal nutrition. Also, together with oats, it forms the spring mash, which is well-known for its high fodder quality. The research carried out during three experimental years, in the climate and soil conditions of the Arad Plain, regarding the cultivation of spring forage pea, highlighted the importance of soil fertility, as well as the importance of the water from precipitation during winter and growth period. Among the three experimental years (2020, 2021 and 2022), the best results regarding grain production were recorded by the spring forage pea variety Salamanca with determined growth, in the year of 2021, on a cambic chernozem, low carbonate, medium loam/medium loam clay type of soil, when the grain production exceeded 4.800 kg/ha, STAS grains. The same genetic material (Salamanca variety), cultivated under identical technological conditions, on a weakly stagnoglazed vertosol, medium loam clay/dusty-clay type of soil, achieved a significantly lower grain production, of less than 4.000 kg/ha. It is remarkable that, in the all three years of spring forage pea cultivation, the grain production obtained on the cambic chernozem type of soil exceeded, each time, the value of 4.000 kg/ha, while, in the case of the vertosol, every year recorded a production below the value of 4.000 kg/ha, making soil fertility as one of the most determinant factors for production of this significant legume crop.

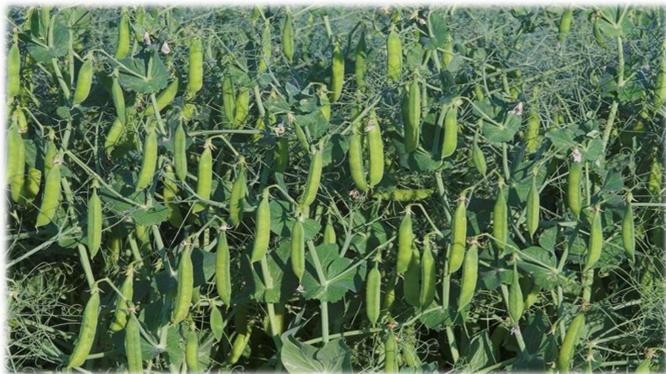
Key words: pea, variety, soil, production

• Introduction

The spring forage pea (*Pisum arvense* f. *aestivale*) originates in the Mediterranean region and was brought to Romania as crop after the year 1700, in Transylvania. It then reached other agricultural areas across the country and has been used for the feed of several animal species, due to its remarkable content of the grains in proteins, vitamins, calcium, as well as other essential elements for animal nutrition.

Part of the Fabaceae botanical family, in time, this species has gained even more interest in cultivation, both as pure crop, as well as in spring mash when combined with a straw cereal (oat, rye, barley, or triticale).

Also, spring forage pea is considered as one of the most important species for nitrogen fixation, being proved that the remaining nitrogen in the soil after the spring forage pea crop, is significant.



• Material and method

For the research carried out during the agricultural years of 2020, 2021 and 2022, we used the genetic material of spring forage pea named Salamanca, developed by the Saaten Union Romania company, which is well-known for its exceptional properties, such as:

- ☐ **Medium vegetation period**
- ☐ **Height of the plant - medium to tall**
- ☐ **First pea-pod is inserted not very low and thus, using the harvester is possible without any loss**
- ☐ **Particular resilience to falling and bending**
- ☐ **Can be successfully grown in all areas favorable to pea culture in Romania**
- ☐ **Large constant productions with a guaranteed profit for farmers**

The research took place on two different soils from the point of view of their physical and chemical properties, in the Arad Plain, cambic chernozem, which can be found on higher terrain, and in the lower terrain, a weakly stagnoglazed vertosol, located on the territory of Zimandu Nou Commune, Arad County.

The purpose of the reaserch was to identify the elements that would lead to obtaining significant pea grain productions. Thus, a single-factor experience was organized in each agricultural year, on the two types of soil, the Salamanca dynamic-growth variety being cultivated in identical conditions as regards the used agricultural technology.

• Results and discussions

The table bellow presents the results of the grain productions in the 2020, 2021, and 2022 agricultural years, which were obtained from the Salamanca spring forage pea variety, given the conditions of the Arad Plain.

| Crop years | Cultivated variety | Soil type | Grain production (kg/ha) | Difference to the annual production mean (kg/ha) | Difference to the general mean of versions (kg/ha) | Difference to the general mean of versions (%) |
|--|------------------------|------------------------------|--------------------------|--|--|--|
| 2020 | Salamanca | Cambic chernozem | 4723 | 637 | 729 | 118 |
| | | weakly stagnoglazed vertosol | 3448 | 637 | 546 | 86 |
| | Annual production mean | | | 4086 | 92 | 102 |
| 2021 | Salamanca | Cambic chernozem | 4834 | 606 | 842 | 121 |
| | | weakly stagnoglazed vertosol | 3622 | 606 | 372 | 91 |
| | Annual production mean | | | 4228 | 234 | 106 |
| 2022 | Salamanca | Cambic chernozem | 4216 | 547 | 225 | 106 |
| | | weakly stagnoglazed vertosol | 3121 | 547 | 873 | 78 |
| | Annual production mean | | | 3669 | 325 | 92 |
| General average of versions in the period of the 2020-2022 cultivation years (kg/ha) | | | 3994 | | 100% | |

The general average production of all the analyzed versions was close to 4000 kg/ha and 3994 kg/ha state-set standard grain, respectively, which would lead to a very big profit for the farmers if adequately sold.

Among the three experimental years, the best climatic conditions for the spring forage pea crop was registered in 2021; year 2022 had the most unfavorable climatic conditions. Also, in the all three years of spring forage pea cultivation, the grain production obtained on the cambic chernozem type of soil exceeded, each time, the value of 4.000 kg/ha, while, in the case of the vertosol, every year recorded a production below the value of 4.000 kg/ha, making soil fertility as one of the most determinant factors for production of this significant legume crop.

• Conclusions

The climatic and soil conditions in the Arad Plain, the area where the research was carried out, are favorable to the spring forage pea crop, even without irrigation. The seeding has to take place during the optimal period, which is early March, thus that the plants can take advantage of the water accumulated during the winter months.

Cultivating the Salamanca variety proved to be a good choice because the crop results on the two types of soil were high. A significant increase was registered on the more fertile soil, the cambic chernozem, with a mean production of 1194 kg/ha.