

THE INFLUENCE OF SOME FOLIAR FERTILIZERS APPLICATION ON THE SEED PRODUCTION OF FRENCH BEAN

Ana-Emilia CENUȘĂ

University of Agricultural Sciences and Veterinary Medicine, Bucharest, 59 Marasti, District 1, 011464, Bucharest, Romania, Phone: +40 21 318 25 64/232, Fax: + 40 21318 28 88, E-mail: ema_april@yahoo.com

Corresponding author email: ema_april@yahoo.com

Abstract

The paper presents the results concerning a study on the influence of some foliar fertilizers grown in a comparative crop in some dwarf French bean varieties used for seed production. The research works were carried out during the year 2011. Foliar fertilization, which is an environmental friendly method of applying nutrients, proved to be an important factor to achieve high yields. Biological material under trial was represented by two dwarf Romanian varieties having green pods (Fantastica, Delicioasă de Pasărea) and one dwarf Romanian varieties having yellow pods (Margareta). For the foliar fertilization, three products were used, Agroleaf Power Total 0,3%, Phyto's K 0,3%, MeForte 0,3% + CaForte 0,3% that were applied in all the physiological phases, at every ten days. The variants were grown in an experimental field according to the method of subdivided plots with three replications. The observations performed concerning the phenology and morphological traits of the plants (plant pod number, pod length and weight of one thousand seeds) allowed an accurate characterization of the varieties under investigation as well an optimum recommendation for the foliar fertilising scheme. The processing of the production data of the seed crop was made according to the variance analysis. The appliance of foliar fertilizers assures very significant seed production differences. By using Agroleaf Power Total 0,3% for foliar fertilization to dwarf french bean at ten days, has a very significant influence to seed production obtained on area unit. The paper presents data from the Ph. degree thesis in the frame POSDRU/107/1.5/S/76888, project financed from the European Social Fund through the Sectoral Operational Programme for Human Resources Development 2007-2013.

Keywords: dwarf french bean, foliar fertilizers, seed production, variety.

INTRODUCTION

Fertilizers are main means to get higher production in the most grown plants if they are correctly applied taking into account plant requirements, soil characteristics and weather conditions [4].

Research works emphasized that in the conditions of a normally supplied soil with nutritive elements, dwarf French bean crop has small requirements regarding the level of fertilization and does not require on organic fertilization in the year of culture [7].

Several authors presented in their works results concerning chemical fertilization in dwarf French bean crop [8,9].

Others authors recommended in dwarf French bean crop according to the results of soil analysis both chemical fertilization and 1-2 foliar fertilizations with Mg and microelements of Folimax 0.3% type [10].

Due to a good economical efficiency regarding mechanical works at application of foliar fertilizers as well their rapid effect on the plant production they are more and more used in the growing technology of different species [2].

Fertilization is a modern and efficient means both for higher crops and improvement of the production and on the other hand it offers possibilities for reduction of consumption of fertilizers and energy [5].

„Use of some alternately and nonconventional sources as unpollutant source of nutrients applied foliaceous and periodically in vegetation represents a necessary and important variance to get ecological products residually unpolluted. Foliar fertilization assure both macro and microelements share as well organic substances which stimulate the process of metabolism of chlorophyl assimilation and energetal output. Foliar fertilization does not

replace soil fertilization but it can make it complete and even substitute it" [12].

We consider necessary the improvement of growing technology for seed production in dwarf French bean according to the provision of the Law no. 266/2002 by introduction of the scientific results obtained by our own research works on foliar fertilizers which can contribute at the growing of seed production and their quality.

Nowadays there are very many foliar fertilizers of chemical and biological nature but we must establish the type and doses of fertilizers as well the conditions of their use at a maximum efficiency.

MATERIAL AND METHOD

The research work were carried out during the year 2011 in a comparative crop with some dwarf French bean for the seed production.

At dimensioning of the plots, at carrying out of the observations performed during the vegetative period and in the technique of the data recording, we observed the provisions imposed by the experimental technique.

Experiments were placed in the experimental field according to the method of subdivided plots having three factors with three replications. The surface of the experience covered 1,000 msq. and it had 36 variants. The Factor A consists in foliar fertilizers with four graduations (a1-untreated, a2- Agroleaf Power Total 0,3%, a3- Phyto's K 0,3%, a4- MeForte 0,3% + CaForte 0,3%). The Factor B consists in varieties of dwarf French bean with three graduations (b1, b2-varieties with green pod-Fantastica, Delicioasă de Pasărea, b3-variety with yellow pod-Margareta). The Factor C represents time of application with three graduations (c1-recommended by the producer, c2- six treatments at every 10 days, c3- three treatments when plants were of 15 cm height, at the beginning of the flower buds and pod setting). The check control was the variant without any treatments.

In order to establish of the level of soil provisioning with nutritive elements, soil samples were picked up before the crop setting using a probe. Taking into account the bulletin of soil analysis of the soil all the variants were

chemical fertilized with 300 kg/ha complex fertilizer N.P.K. 15.15.15. The plots were shaped in wide furrows having 1.5m width.

On each furrow three rows were sown at 35 cm apart with 5 cm distance between plants. Herbicides were applied premergently with Dual Gold 1l/ha and postmergently with Basagran 2l/ha. Some chemical treatments were applied with Vondozeb 0.2% + Topsin 0.1%, Funguran 0.4%, Ridomil Gold 0.3%, Milbeknoch 0.075%, Confidor Energy 0.1%, Mospilan 0.022% to control diseases and pests. For the location, field works, experience setting, agrotechnical works and biological purifications general standards for the seed green bean crop were observed. Biological purifications represent a specific work for the technology of seed production and were carried out by mass negative selection, removing unsuitable plants id est sick or untypical for the variety [6].

For the specific treatments of the experiment, pesticide pump graduated cylinder and electronic balance were used. Foliar fertilizers were applied in the shape of aqueous solutions using 200-500 l water/ha.

During the vegetative period observations were made as follows:

- phenological observations regarding the most important phenophase: sowing-sprouting, sprouting-start of blooming, sprouting-appearance of the first pod, number of days to technical maturation of the pods and physiological maturity of the seeds.

- biometrical determinations concerning the height of the plants, pod width, pod length, number of pods per plant. After harvesting of the plants at the physiological maturity of the seeds, seeds were picked up, weighted using an electronic balance and registered. Biometrical determinations were made to establish weight of the grains per plant and weight of one thousand dried seeds.

Computing of the seed yield obtained per ha in varieties of dwarf French bean treated with foliar fertilizers was made after the recommendation of the researchers from the field of vegetable seed production [1].

- denseness of the crop (plants/ha) 400,000 recommended in the production technology (35 cm/35 cm/80*5 cm)

- decrease of denseness (46%), where: biological purification (6%), phytosanitary purification (35%), mechanical damages (5%)
- denseness of the harvested plants (220,000 pl/ha)
- amount of seeds per plant (gr. seeds/plant)
- gross weight of seeds (kg/ha)
- evaluation of the loses due to mechanical conditioning of the seeds-represent a minus of about 25%.

The production data were statistically processed in order to establish economical optimum amount of foliar fertilizers. The processing of the results was made by the method of variance analysis while testing of the results significance was assured by the aid of F test on the error for a global evaluation and by the method of limited difference (DL) to test the significance of every variant in proportion to the control [3,11].

RESULTS AND DISCUSSIONS

Influence of the variants of fertilization on plant phenology was evident in the phenophase of the varieties.

Yields of seeds obtained in comparative culture for orientation (CCO) are different depending on the variant of fertilization (Table 1).

It is remarkable positive influence of the foliar fertilizers irrespective of the variant, production gains by comparison with control being significant. The best production results (to seeds/ha) were recorded in the case of fertilization with Agroleaf Power Total where gain yield by comparison with control is also very significant (0.92 to/ha). The smallest seed yield was recorded at the control plot unfertilized with foliar fertilizer (1.65 to/ha). By the use of foliar fertilizers significant gain yield ranging between 33.73% and 55.42% were obtained.

By the analysis of the significance of the differences at total seed production by comparison with the untreated variant we found the following actions of the factors under investigation:

-foliar fertilizer Agroleaf Power Total assured the highest differences of production in all varieties under investigation (1.02 to/ha at Delicioasă de Pasărea, 0.48 to/ha at Margareta)

-variety Delicioasă de Pasărea recorded the highest yields of seeds in all the variants foliar fertilized by comparison with the control untreated (0.71 to/ha)

-irrespective of the foliar fertilizer used and variety the highest seed yields were obtained at variants treated by six times during the vegetative period at every ten days (2.40 to/ha)
-action of the foliar fertilizer Agroleaf Power Total and interactions Agroleaf Power Total and the variety Delicioasă de Pasărea are very significant

-the lowest production difference by comparison with control untreated was obtained in the case of interaction among factors foliar fertilizer Phyto's K x variety Fantastica x time of application being according the three phenophase of the plants (0.23 to/ha).

Table 1. Synthesis of the results from the comparative culture for orientation of some French bean seed varieties under investigation

Variant	Seed yield (to/ha)	Variant	Seed yield (to/ha)
14-a2b2c2	3.40	6-a1b2c3	2.09
32-a4b2c2	3.21	18-a2b3c3	2.04
13-a2b2c1	3.18	26-a3b3c2	1.96
31-a4b2c1	3.14	36-a4b3c3	1.91
15-a2b2c3	3.11	12-a2b1c3	1.85
23-a3b2c2	2.65	25-a3b3c1	1.77
22-a3b2c1	2.59	7-a1b3c1	1.75
11-a2b1c2	2.55	27-a3b3c3	1.67
17-a2b3c2	2.52	29-a4b1c2	1.55
35-a4b3c2	2.52	9-a1b3c3	1.49
33-a4b2c3	2.49	28-a4b1c1	1.46
34-a4b3c1	2.48	20-a3b1c2	1.26
24-a3b2c3	2.47	30-a4b1c3	1.21
16-a2b3c1	2.43	19-a3b1c1	1.15
4-a1b2c1	2.42	21-a3b1c3	1.14
5-a1b2c2	2.13	1-a1b1c1	1.11
8-a1b3c2	2.10	2-a1b1c2	0.83
10-a2b1c1	2.10	3-a1b1c3	0.80

DL 5% = 0.36 to/ha; DL1% = 0.50to/ha;

DL0.1% = 0.68to/ha.

CONCLUSIONS

These contributions to the improvement of the technology give the individual producers of green bean seeds solutions of a durable utilization of the resources in agriculture, diminish soil and subsoil water pollution using friendly products for vegetable plants (foliar fertilizers efficient at a low dose).

Application of this technology will cause a main decrease of the production costs and of

energetic consumptions because it is not necessary their incorporation in the soil and on the other hand, they can be mixed up with pesticides at their application.

The weight of the grains per plant and weight of one thousand dried grains are primarily characteristics of variety with a strong influence on the yield but they can be influenced also by technological measures. Foliar fertilizers applied in dwarf green bean crop for seed production influenced the production significantly.

The highest gain yield were obtained by application of the foliar fertilizers Agroleaf Power Total applied in the vegetative period in six treatments at every ten days in the variety with green pod Delicioasă de Pasărea. Use of foliar fertilizers applied periodically in the vegetative period in dwarf green bean crop for seed lead to important gains yield very significant by comparison with the control unfertilized foliar ranging between 33.73%-55.42%.

Quantity and quality of the seeds are evidently influenced by the three factors: foliar fertilizers, variety, time of application.

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