

## **TECHNOLOGICAL SEGMENTS WITH LOW POLLUTION DEGREE TO CONTROL THE PATHOGEN AGENTS, PESTS AND WEEDS IN THE GARDEN BEANS CROP**

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**Keywords:** *pathogen, pest, garden beans, control*

### **Abstract**

*In this study are presented the results of the research concerning the low degree pollution technology for the garden beans, referring to the following technological flow: choosing a beans variety with tolerance to the characteristic pests; the beans variety with yellow pod Sonests has this quality; the optional possibility of using herbicides on the location that will be planted with this vegetable species as follows: preemergent with Dual 960 Gold and postemergent with Fusilade forte; prevention and control of the pathogen agents and pests using foliar treatments with pesticides (fungicides, insecticides and miticides) "friendly" for the plants and with low risk for the environment, user and consumer; ensuring production increases through root fertilization with biostimulation, mostly vegetable, applied at intervals of 7-10 days. By applying this low degree pollution technology a beans production of 2.880-2.950 kg/m<sup>2</sup> was obtained.*

### **INTRODUCTION**

In realizing increased garden beans productions (field culture or successive culture), efficient measures for plants protection are necessary meant to maintain below the "damage and tolerance limit" the specific pathogenic agents, pests and weeds.

It is known the fact that in preventing and controlling the pathogenic agents, the pests and the weeds conventional products are used, which often need a longer break after the treatments are made. We also need to mention the fact that species - known as test plant - is very sensitive to pesticides, many times appearing fitotoxicity effects that can sometimes lead to compromise the culture.

In this paper are presented the experimental results regarding a technology with low pollution degree that protects the beans culture from the specific pathogenic agents, pests and weeds, by using several pesticides "friendly" to this species and with a low risk for the environment, user and consumer.

## MATERIAL AND METHODS

The work was done using Sonesta garden beans variety.

The monitored experimental variants were the following:

**V1** = technological variant with low pollution degree, comprising the following technological links:

- a. for preventing and controlling the pathogenic agents, 6 treatments with Bouille bordelaise 0.75% were made, at intervals of 7-10 days, the first treatment at the appearance of the first trifoliary leaf;
- b. for preventing and controlling the pests, 5 treatments were applied: 1 treatment with Chess 0.04%, 2 treatments with Mospilan 0.04% and 2 treatments with Milbeknock 0.075%;
- c. weekly root fertilization with:
  - Kendal 0.3% + Megafol 0.3%, at the phenological stage, plants at the first trifoliary leaf, then at intervals of 7 days as follows:
    - Cropmax 0.1% + Agroleaf high P 0.3%;
    - Kendal 0.3% + Brexil combi 0.3%;
    - Cropmax 0.1% + Agroleaf total 20-20-20 0.3%;
    - Megafol 0.3% + Plantafol 20-20-20 0.3%;
    - Cropmax 0.1% + Agroleaf total 20-20-20 0.3%;
- d. erbicides formula: before Dual 960 Gold 1.0 litres/ha. And after Fusilade forte 0.8 litre/ha.

**V2** = idem **V1**, without erbicides.

**V3** = variant with conventional treatments as follows:

- in order to prevent and control the pathogenic agents, 6 treatments were made with Dithane M 45 0.2% + Topsin 0.1%;
- in order to prevent and control the pests, 5 treatments were made with: Confidor 70 WG 0.02% (1 treatment), Confidor energy 0.1% (2 treatments) and Sanmite 0.075% (2 treatments).

**V4** = variant without treatments.

Observations were made regarding:

- structure of the weeds, the pathogenic agents and the pests;
- frequency and intensity of the attack using scales specific to pathogenic agents and pests;
- dynamics of the harvesting.

The plant population in the technology of the culture was respected.

Also we mention that the irrigation was made by dripping and for fertilization 100 kg/ha Complex fertilizer was administered weekly 20-20-20.

## RESULTS AND DISCUSSION

The climatic conditions in our country influence the appearance and evolution of diseases and pests at the garden beans variety.

After surveys made in different areas of the country it was established that the bacterium *Axonopodis campestris* pv. *phaseoli*, synonymous with *Xanthomonas phaseoli*, that causes the common burn of the beans creates the biggest problems of this crop in the field. The following pathogenic agents manifested a lower frequency of the attack in the beans cultures: *Pseudomonas syringae* pv. *phaseolicola*, *Colletotrichum lindemuthianum* and *Sclerotinia sclerotiorum*.

Concerning the pests, it was observed that the red spider *Tetranychus urticae* was the main species; the black lice *Aphis fabae* was also monitored but with a lower frequency.

Concerning the structure of the weeds the following species were monitored: *Echinochloa crus-galli* and *Sorghum halepense* among the monocotyledons (24.1%) and *Amaranthus retroflexus*, *Capsella bursa-pastoris*, *Hibiscus trionum*, *Convolvulus arvensis*, *Galinsoga perviflora* and *Polygonum oleracea* among the dicotyledons (75.9%).

The experimental results of the year 2008 for this vegetable species are presented in tables 1 and 2.

From table 1 results the fact that for the variants using treatments during the vegetation period and also for the variant without treatments (untreated witness), there were no pathogenic agents observed in the culture, except some sporadic attacks on the pods with *Sclerotinia sclerotiorum* (below 1%).

From table 2 results that in the culture of garden beans the pests *Tetranychus urticae* and *Aphis fabae* were present.

On the 15<sup>th</sup> of July, for the variant without treatments there were present 122.50 individual/leaf with *Tetranychus urticae* and an intensity of 88.71%, for the technology with low pollution degree were observed 61.18 individuals/leaf, with an intensity of 19.30%, and for the variant with conventional treatments 86.72 individual/leaf, with an intensity of 21.71%.

In what concerns the pest *Aphis fabae*, the average number of colonies/plant monitored on the 15<sup>th</sup> of July 2008 was of 4.28 colonies/plant for the technology with low pollution degree, 5.14 colonies/plant for the variant with conventional treatments and 5.71 colonies/plant for the variant without treatments.

It needs to be mentioned the fact that the recorded results concerning the pests were influenced by the presence in the culture of the useful and auxiliary fauna that includes: *Coccinellidae* (*Coccinella 7-punctata*, *Adonia variegata*), eggs of *Chrysopidae*, adults of *Nobis* spp., *Pyrrhocoris apterus*, *Forficula auricularia* and *Syrphus* spp.

**Table 1**

**Results concerning the technology with low pollution degree for preventing and controlling the pathogenic agents, pests and weeds in the garden beans culture, Sonesta variety**

Specification	Pathogenic agents observed	Pests observed on the 15 <sup>th</sup> of July 2008	Weeds present in the culture	Pods production (kg/m <sup>2</sup> )
Technology with low pollution degree Without erbicides	Insignificant attack caused by <i>Sclerotinia sclerotiorum</i> on the pods	- <i>Tetranychus urticae</i> cu 61.18 individuals/leaf F(%) = 100.00 I(%) = 19.30  - <i>Aphis fabae</i> cu 4.28 colonies/plant	<b>Monocotiledons (14/m<sup>2</sup>):</b> <i>Echinochloa crus-galli</i> (10), <i>Sorghum halepense</i> (4) <b>Dicotiledons (44/m<sup>2</sup>):</b> <i>Amaranthus retroflexus</i> (14), <i>Capsella bursa – pastoris</i> (4), <i>Hibiscus trionum</i> (6), <i>Galinsoga perviflora</i> (8), <i>Polygonum oleracea</i> (12) Eficacity 86%	2,950
With erbicides				2,880
Technology using conventional products	Insignificant attack caused by <i>Sclerotinia sclerotiorum</i> on the pods	- <i>Tetranychus urticae</i> 86.22 individuals/leaf F(%) = 100.00 I(%) = 21.71 - <i>Aphis fabae</i> cu 5.14 colonies/plant	<b>Monocotiledons (14/m<sup>2</sup>):</b> <i>Echinochloa crus-galli</i> (10), <i>Sorghum halepense</i> (4) <b>Dicotiledons (44/m<sup>2</sup>):</b> <i>Amaranthus retroflexus</i> (14), <i>Capsella bursa – pastoris</i> (4), <i>Hibiscus trionum</i> (6), <i>Galinsoga perviflora</i> (8), <i>Polygonum oleracea</i> (12)	2,250
	Insignificant attack caused by <i>Sclerotinia sclerotiorum</i> on the pods	- <i>Tetranychus urticae</i> cu 122.50 individuals/leaf F(%) = 100.00 I(%) = 88.71 - <i>Aphis fabae</i> cu 5.71 colonies/plant	<b>Monocotiledons (14/m<sup>2</sup>):</b> <i>Echinochloa crus-galli</i> (10), <i>Sorghum halepense</i> (4) <b>Dicotiledons (44/m<sup>2</sup>):</b> <i>Amaranthus retroflexus</i> (14), <i>Capsella bursa – pastoris</i> (4), <i>Hibiscus trionum</i> (6), <i>Galinsoga perviflora</i> (8), <i>Polygonum oleracea</i> (12)	2,070

Table 2

## Pests observed in the beans crop

Technology with low pollution degree					
Date	<i>Aphis fabae</i> (average number of colonies/plant)	<i>Tetranychus urticae</i>			Useful and auxiliary fauna
		average number of individuals/leaf	F (%)	I (%)	
10.06.2008	0.71	0.00	0.00	0.00	<i>Coccinellidae</i> ( <i>Coccinella 7-punctata</i> , <i>Adonia variegata</i> ), eggs of <i>Chrysopidae</i> , adults of <i>Nabis</i> spp., <i>Pyrrhocoris apterus</i> and <i>Forficula auricularia</i> were observed
17.06.2008	0.85	3.57	7.12	3.25	
24.06.2008	0.89	6.71	26.23	6.23	
01.07.2008	1.14	14.22	59.21	7.86	
08.07.2008	4.00	34.22	100.00	12.25	
15.07.2008	4.28	61.18	100.00	19.30	
Technology with conventional treatments					
Date	<i>Aphis fabae</i> (average number of colonies/plant)	<i>Tetranychus urticae</i>			Useful and auxiliary fauna
		average number of individuals/leaf	F (%)	I (%)	
10.06.2008	0.89	1.14	3.12	2.34	One species was present – <i>Coccinella 7-punctata</i>
17.06.2008	1.12	14.22	11.24	5.56	
24.06.2008	1.37	21.71	32.14	6.45	
01.07.2008	4.28	34.22	64.12	9.12	
08.07.2008	4.57	59.18	100.00	16.23	
15.07.2008	5.14	86.22	100.00	21.71	
Variant without treatments					
Date	<i>Aphis fabae</i> (average number of colonies/plant)	<i>Tetranychus urticae</i>			Useful and auxiliary fauna
		average number of individuals/leaf	F (%)	I (%)	
10.06.2008	2.03	6.21	28.57	7.00	<i>Coccinellidae</i> ( <i>Coccinella 7-punctata</i> , <i>Adonia variegata</i> ), eggs and adults of <i>Chrysopidae</i> , adults of <i>Nabis</i> spp., <i>Pyrrhocoris apterus</i> , <i>Forficula auricularia</i> and <i>Syrphus</i> spp. were observed
17.06.2008	3.00	12.24	57.14	7.42	
24.06.2008	4.14	36.21	71.42	13.71	
01.07.2008	4.28	87.72	85.71	36.85	
08.07.2008	5.42	102.11	100.00	51.71	
15.07.2008	5.71	122.50	100.00	88.71	

Concerning the achieved production, from table 1 it results that for the technology with low pollution degree (with and without herbicides), 2.880 – 2.950 kg/m<sup>2</sup> were obtained, while for the technology with conventional treatments 2.250 kg/m<sup>2</sup> were obtained, compared to 2.070 kg/ha for the variant without treatments.

## CONCLUSIONS

1. The technology with low pollution degree that we suggest protects the garden beans cultures against the specific pathogenic agents, pests and weeds and refers to the following technological flow:
  - a. choosing a beans variety with tolerance against the specific pathogenic agents, with economical value for this culture; we mean mainly the tolerance against the two bacterias with high frequency at the beans cultures in our country: *Xanthomonas axonopodis* pv. *phaseoli* that causes the common burn of the beans and *Pseudomonas phaseolicola* that causes the halo burn of the beans. Against these bacterias the Sonesta variety has always been tolerant;
  - b. the facultative possibility to use herbicides on the places that will be grown with this species, as follows:
    - before, with Dual 960 Gold 1.0 litre/ha;
    - after, with Fusilade forte 0.8 litre/ha;
  - c. for preventing and controlling the pathogenic agents, 6 treatments were made with Bouille bordelaise 0.075% at intervals of 7-10 days, the first one at the appearance of the first trifoliary leaf;
  - d. for preventing and controlling the pests, 5 treatments were applied with the following insecticides: Chess 0.04% (1 treatment), Mospilan 0.04% (2 treatments) and Milbeknock 0.075% (2 treatments); root fertilizations with biostimulators like: Kendal 0.3% + Megafol 0.3%, beginning with the phenological stage of the plants at the first trifoliary leaf and then at 7 days intervals: Cropmax 0.1% + Agroleaf high P 0.3%, Kendal 0.3% + Brexil combi 0.3%, Cropmax 0.1% + Agroleaf total 0.3%, Megafol 0.3% + Plantafol 20:20:20 – 0.3%, Cropmax 0.1% + Agroleaf total 0.3%.
2. The technological flow with low pollution degree for the beans culture, Sonesta variety, has led to a production of 2.950 kg/m<sup>2</sup> pods.

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