RESEARCH CONCERNING THE INTEGRATED CONTROL OF DISEASES PESTS AND WEEDS IN CABBAGE CROP

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Abstract. Cabbage as vegetable has a great importance both alimentary and medicinal. Its cultivation require a well balanced technique especially regarding the treatments to control diseases, pests and weeds. The aim of this paper is to establish a strategy of integrated control of the pests, diseases and weeds in cabbage crops, in the context of a sustainable agriculture.

INTRODUCTION

Cabbage, respectively the vegetables which belong to Cruciferae family have a rich complex of pests and diseases, fact what determines to achieve a cultivation technology and integrated control, capable of maintaining the attack, respectively the infestation under the economical harming level. Once with the development of the sustainable agriculture concept, researchers job become harder and harder because they have to find alternative methods for pests, diseases and weeds control. It is wanted a combinations of these alternative methods with the conventional ones (chemical agriculture) so that agricol products to be healthy and the soil less polluted. Another very important aspect in integrated control is a well knowledge regarding the pesticides, and the pause period and toxic residues which remain after they are used. Once Romania adhered to EU we also responded its need regarding the pesticides which can be used agriculture. In this moment from the EU market there will be put off very important active substances for vegetables especially and for agriculture in general as: diazinon, tiodicarb, diclorvos, malation and fenitrotion. Among the important products in vegetables with active substances mentioned above are: Diazol 50 EW, Diazol 60 EC, Gyrillosin 5 G, Sintogrill 5G, Carbetox 37 CE, Carbetox 50 CE, products which can be used until next year in December. Because of this, as mentioned above, the researcher’s job in achieving several sustainable strategies for integrated control is harder and harder because it isn’t allowed anymore to use these key active substances to control pests.
MATERIAL AND METHOD

The experiences took place on the field in Cluj-Napoca, Dămbul Rotund. The seedlings were produced in a cold seedling house on soil (a tube type of solar). The cultivars used in experience were: Amager, De Buzău and Gloria. The plots for Amager and De Buzău cultivars have a surface of about 9 m² with 4 repetitions and for Gloria for about 18 m² with 4 repetitions (Fig.1).

Fig.1. Experimental field (original)

The field was sowed in autumn and in spring it was prepared with the motocultivator. The layers, respectively the plots were made manual, 16 of them. On one side there were applied on the plots (8) black foil (for mulching) to control the weeds (Fig.2).

Fig.2. Mulching system (black foil) – original -
There were watered with the help of an irrigation falling dripping system (Fig. 3). Water source was represented by a fountain which was filled up with an water pomp in a 1000 L basin suspended at a high of 3 min order to achieve a pressure necessary to accomplish falling irrigation (Fig.3). It was watered more abundant (watered at two days interval) in the first weeks from planting, and afterwards it was watered twice a week applying about 1 liter of water /plant.

Fig.3. Falling irrigation system (original)

In 2007 the pests which overdue the economical harming level were: *Phylotreta* spp. (*atra* și *nemorum*), *Brevicoryne brassicae* and after abundant precipitations at the end of summer appeared the snails too: *Limax maximum* și *Deroceras agrestis* (Fig.4). Regarding the diseases there weren’t any problems because there were made several preventive phytosanitary treatments. The weeds were controlled by weeding out on the plots where there was applied black foil (for mulching), and on the others the weeding out was made manually.

Fig. 4. The main pests which made problems: *Brevicoryne brassicae, Phylotreta* spp. și *Limax maximus* (original)

Phytosanitary treatments were applied with a back pomp with a capacity of 20 liters.
REZULTS AND DISCUSSIONS

The field experiences helped to establish a strategy for integrated control which for this year (an atypical year for agriculture) gave the expected results (Table Nr. 1).

Soil disinfection was made both at the level of seedlings and also at the level of the experimental field where the experiences were placed. For soil disinfection we used Gryllosin 5 G product 30 kg/ha, with the help of which there were obtained good results. Once with this insecticide appliance in the experimental field there also been made a fertilization with Complex NPK (15:15:15) 350 kg/ha in the insecticide at 5-10 cm in soil.

To prevent diseases appearance named plants falling produced by the phytopatogen agent *Phythium debaryanum* we used Previcur 607 SL product in concentration of 0.2 %.

The treatments on vegetation were achieved both for prevention and also at the attack appearance, respectively when the economical level of harming was overdone.

The first treatment was made on 27th June 2007, treatment achieved with a combination of Ridomil Plus 48 0.3 % and Calypso 480 SC in concentration of 0.02 %. This treatment was made preventively to control some important pests as: cabbage fly (*Delia brassicae*) and cabbage owl (*Mamestra brassicae*) and an pathogen agent *Peronospora brassicae* which produces cabbage blight.

The next treatment was made on 7th July 2007, 10 days later, when pest appeared inm the experimental field: *Brevicoryne brassicae* şi *Phylotreta* spp., which overdone the economical harming level 3-4 individuals/plant. The phytosanitary treatment was composed in a combination between Faster 10 CE insecticide 0.03 % and Ridomil Plus 48 fungicide 0.3 %, in order to prevent blight appearance at cabbage crop.

Very hot climatic conditions favored rapid development of the main pests grey cabbage lice (*Brevicoryne brassicae*) and *Phylotreta* spp. So that after 2 weeks, on 21st July 2007, it was necessary one more treatment to control the pests. It was used an acaricid insecticide product Talstar 10 EC 0.03 % combined with a foliar fertilizer Cropmax 0.2 %

For the second generation cabbage owl *Mamestra brassicae* and *Pieris brassicae* it was made a prevention treatment for the attack with Actara 25 WG 0.02 % combined with Aliette 80 WG fungicide 0.2 % in order to prevent the appearance of blight and foliar fertilizer Cropmax 0.2 %.

A great problem in crop protection was the appearance once the rain appeared of snails, which were controlled with Mesurol (3-5 kg/ha)

Before harvest another phytosanitary treatment was made to control fleas *Phylotreta* spp., which in 2007 developed very well, treatment with the insecticide Fastac 10 CE 0.02 %, insecticide with a very short pause period.
At all treatments per vegetation it was added Aracet 2% so that the resulted solution to adhere better at the cabbage leaves, which are waxy.
## Strategies to control diseases and pests in cabbage crop

Table nr. 1

<table>
<thead>
<tr>
<th>Nr. crt</th>
<th>Fenological phase and the period of appliance</th>
<th>Disease or pest to control</th>
<th>Commercial name of the product</th>
<th>Doze kg, l, t/ha</th>
<th>Observații</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Soil disinfection</td>
<td>Pests of the subterranean organs</td>
<td>GRYLLOSIN 5 G</td>
<td>30 kg/ha</td>
<td>- incorporated in soil on the depth of 0-10 cm</td>
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<td>2</td>
<td>Seedlings treatments</td>
<td>Plant falling - <em>Phytophthora debaryanum</em></td>
<td>PREVICUR 607 SL</td>
<td>0.2 %</td>
<td></td>
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<tr>
<td>3</td>
<td>Foliar treatments after planting</td>
<td>Mană – <em>Peronospora brassicae</em></td>
<td>RIDOMILPLUS 48 ALIETTE 80 WG</td>
<td>0.3 % 0.2 %</td>
<td>- it was introduced also aracet 2 % so that the solution to adhere better on the surface of the leaves</td>
</tr>
<tr>
<td></td>
<td>Cabbage flea – <em>Phyllophaga spp.</em></td>
<td></td>
<td>CALYPSO 48 SC FASTAC 10 CE FASTER 10 CE ACTARA 25 WG TALSTAR 10 EC MESUROL</td>
<td>0.02 % 0.02 % 0.03 % 0.02 % 0.03 % 3-5 kg/ha</td>
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<td>Cabbage moth – <em>Plutella xylostella</em></td>
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<td>Cabbage fly – <em>Delia brassicae</em></td>
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<td>Grey flea - <em>Brevicoryne brassicae</em></td>
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<td>Cabbage owl – <em>Mamestra spp.</em> – <em>Pieris spp.</em></td>
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<td>Garden snail - <em>Deroceras agrestis</em></td>
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<td>4</td>
<td>Soil and vegetation fertilization</td>
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<td>Complex NPK 15:15:15 Cropmax</td>
<td>350 kg/ha 0.2 %</td>
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</table>
CONCLUSION

1. To control weeds there was used black foil applied on the surface of the soil.
2. To compensate the lack of water in the soil produced by a longer period of draught in this year there was used an irrigation sprinkling system, which combined with mulch foil proved to be very efficient in achieving high cabbage production.
3. Disease which frequently appear in cabbage crops (*Phythyium debaryanum* and *Peronospora brassicae*) were prevented with success applying treatments with: Previcur 607 SL, Ridomil Plus 48 and Aliette 80 WG products.
4. To control the pest *Mamestra brassicae* at first generation and *Delia brassicae* Calypso 480 SC had good results, and at second generation Actara 25 WG had good results.
5. The most important pests, which determine the greatest damage this year (*Phylotreta* spp. and *Brevicoryne brassicae*) were kept under the economical level of harming using Faster 10 CE, Fastac 10 CE and Talstar 10 EC.
6. Once the abundant precipitations appeared at the end of summer, at the level of soil the humidity increased a lot, fact which favored the appearance of other pests as snails, which were controlled with Mesurol 3-5 kg/ha.

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