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BEHAVIOR OF VEGETABLE PLANT SEEDS AT APHIDS ATACK AND CONTROL OF THESE PESTS

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INTRODUCTION

The aphids feed with many cultivated and wild plants (Boucher, 2012;.Cannon et all., 2017; Capinera, 2015; Fereres, 2000, Gildow, 2008; Mutiga, 2010; Natwick et all., 2016; Natwick, et all., 2016).

In addition aphids are vectors for many vegetable plant viruses (Calin, 2005). Also, through honeydew (sugary waste), they allow the development of sooty molds, which further depreciate the quality of vegetable plants for seeds.

The main specie of aphids at vegetable plants for seeds at SCDL Bacău were the following:

- *Aphis fabae* Scop. - black bean aphid, that attacked seed plant of: bean, parsley, beetroot, celery, lovage.
- *Myzuss persicae* Both. – green peach aphid that attacked seed plants of tomato, eggplant, bean and pepper.
- *Aulacorthum solani* Kalt. – green potato aphid that attacked seed plants of tomato eggplant and pepper.
- *Macrosiphum euphorbiae* Thomas – potato aphid that attacked seed plants of tomato eggplant and pepper.
- *Brevicorzne brassicae* L.– cabbage aphid that attacked cabbage plant of seeds.

Black bean aphid is a polyphagous species, which attacks over 200 woody species: (ornamental shrubs represent primary hosts) and herbaceous plants (celery seeds, beans, poppy, beetroot, etc., which are secondary hosts). It feeds by sucking the sap from the tissues and forming colonies on the shoots, flowers, pods and on the underside of the leaves. Due to the attack, the leaves wrinkle, discolor and dry, and the pods remain small and give low yields (Calin, 2005; Chandi and Kaur, 2015; Mwanauta et all., 2015). So *A. fabae, M euphorbiae* and *M. persicae* are vectors for *Bean Comon Mosaic Virus* (BCMV), (Morales and Bos, 1988).

Aphids transmit this virus "non - persistently", meaning that the viruses attach easily to insect stilets. BCMV is the most common bean virus (Marinescu et all., 1986 and Sovarel and all., 2000). It observed that the viruses can manipulate aphid-host interactions to facility it transmission (Ziegler-Graff, 2000). *A. fabae, M. persicae*, *B. brassicae* are vectors for *Common Mosaic Necrosis Virus* (BCMNV) that attack vegetable species from *Phaseolus, Vicia, Vigna, Lupinus, Pisum, Arachis, Glycine, etc*. It is transmitted by aphids in a non-persistent mod.

Green peach aphid is a polyphagous species, which attacks woody plants: (peach apricot, etc.), these being primary hosts and herbaceous plants (tomatoes, eggplant, peppers, potatoes, etc.), respectively secondary hosts. The green peach lice feed by sucking the sap from the tissues and forming colonies on the underside of the leaves (Calin, 2005). *M. persicae, M. euphorbiae* and *A. fabae* can transmit *Cucumber Mosaic Virus* (CMV) (Gildow et all. 2008). This virus infects more 1200 species in over 100 plant families and can cause significant economic losses in plants of pepper, spinach, lettuce, celery, tomato and bean.

Green potato aphid attacks many specie of vegetable: garlic, bell pepper, chicory, cucumber, lettuce, common bean, dock, tomato, aubergine, potato, faba bean. It is vector for many viruses: *Potato virus Y*, *Potato virus A*, *Potato virus X* and *Potato leafroll virus* (Culjak et al., 2013), *Cucumber mosaic virus* (Contangelo et al., 1994), *Bean yellow mosaic virus* (Yahia et al., 1997), *Turnip yellows virus* (Schliephake et al., 2000), *Zucchini yellow mosaic virus* (Katis et al., 2006).

Potato aphid is a polyphagous species, which attacks over 200 plants as: potatoes, tomatoes, sugar beets, cabbage, lettuce, peppers, eggplants, cucumbers, weeds (Senecio), various flowering plants, etc. The *M. euphorbiae* feeds by sucking sap from the tissues and forming colonies on the underside of the leaves.

For seed crops, the pest is also dangerous due to the vector character of some viruses (Calin, 2005). The potato aphid is vector for more 40 non-persistent viruses and 5 persistent viruses, as: P (PRSV-P) and W (Watermelon Mosaic Virus 1 (WMV-1) strains of Papaya Ringspot Virus which infect cucurbits and watermelon, Watermelon Mosaic Virus 2 (WMV-2),

lettuce mosaic virus, bearded iris mosaic virus, narcisus yellow stripe virus, tulip breaking virus, potato leaf roll virus, potato virus Y, beet mild yellowing virus and beet yellow virus, etc.

Cabbage aphid forms colonies on the cruciferous plants of cabbage, cauliflower, horseradish, kale, radish, mustard, etc., covering and stinging the leaves and shoots and feeding intensely on the sap of the attacked plants. In prickly areas, the leaves discolor to change color to pale yellow or pink.

The plants stop growing, the leaves are corrugated, remain small, or dry out. If the aphid attack occurs in the seedling or rosette phase and no control treatments are applied, the plants no longer form heads.

Attacked cabbage seeds or other crucifers (cauliflower, radishes, etc.) have blue-pink flower shoots and the flowers abort or dry out. The harvest of attacked plant decreases by up to 30-40%. *B. brassicae* is a vector for 23 virus diseases of *Cruciferae*. So it can behave as a vector of viruses, transmitting to crucifers and cauliflower as cruciferous mosaic virus (*Brassica virus 1*.

The control of aphids is very important in vegetable for seed production. Aphid control may be from preventive and curative methods: IPM, barrier crops integrating companion cropping and nitrogen application, agronomic, biological and botanical practices in field. host and vector manipulation in molecular biology, etc. (Sæthre1 et all., 2011, et all. 2014, Shelton and Badenes-Perez 2006 Sovarel Gabriela, et all. 2020, V. Ziegler-Graff, 2000)

MATERIAL AND METHODS

The experiments were carried out at the Vegetable Research - Development Station Bacau in vegetable plant for seed: tomato, pepper, bean, celery, lovage, parsley, and beetroot. The aphid attacks of: black bean aphid, green peach aphid, green potato aphid, potato aphid and cabbage aphid that attacked plant of seeds was monitored and evaluated from May to August. The observations were taken every 10 days.

The attack estimation was determined using the following indicators: Frequency of attack (F%), Intensity of attack (I%), Degree of attack (DA%). The results obtained will be used in pests control in order to decrease the number of treatments utilized in control of aphid pests and to increase the parasite and predator populations of vegetable pests. The following insecticides applied on leaves were evaluated for pest control (table 1).

Efficacy was calculated 3 and 5 days after the treatment, according to the Sun-Shepard method (Püntener, 1981). Assessments were also made on phytotoxicity at plant, crop development and visible residues.

Table 1. Inseecticide variants for aphids control

No.	The product	Active substance	Concentration (%)/kg/ha
V1	Konflic	50% salt of K, 50% ex-tract of *Qua-ssia amara*	0.3
V2	Neemes	98% extract of neem seeds	0.25
V3	Teppeki	50% flonicamid	0.14 kg/ha
V4	Mospilan	200 g/kg acetamiprid	0.15 kg/ha
V5	Untrated	x	x

RESULTS AND DISCUSSIONS

The degree attack (DA%) of aphid species at vegetable plants for seeds at SCDL Bacau were the following (Table 2) .

Table 2. DA% of aphid species at vegetable plants for seeds

No.	Aphid specie	Host plants for seeds	Degree attack % (DA%)
1.	*Aphis fabae* Scop. - black bean aphid	Bean Parsley Beetroot Celery Lovage	24.6 7.0 11.0 3.5 4.2
2.	*Myzuss persicae* Both. – green peach aphid.	Tomato Pepper Eggplant Bean	5.6 14.2 7.4 0.1
3.	*Aulacorthum solani* Kalt. – green potato aphid	Tomato Pepper Eggplant	2.5 1.4 0.2
4.	*Macrosiphum euphorbiae* Th. – potato aphid	Tomato Pepper Eggplant	1.8 0.9 0.1
5.	*Brevicorzne brassicae* L. – cabbage aphid	Cabbage plant of seeds.	5.9

It can see that DA% of black bean aphid was high on the bean – 24.6 %, followed by seed plants of beetroot 11% , parsley - 7%, lovage - 4.2%, celery – 3.5%.

Green peach aphid had the biggest attack on the pepper 14.2%, followed at the eggplant – 7.4%, tomato - 5.6% and bean 0.1%.

Green potato aphid had a smaller DA% on: tomato – 2.5%, pepper - 1.4%, eggplant – 0.2%.

Potato aphid had a smaller DA%: tomato – 1.8 %, pepper – 0.9%, eggplant – 0.1%.

Cabbage aphid attack only cabbage plant for seeds, DA% being 5.9 %.

The efficiency of products studied for the control of black bean aphid attack is presented in fig 1. It can see that the all insecticide had very good efficiency. So Teppeki - 0.14 kg/ha had the best efficiency - 99.5%, followed by Mospilan - 0.15

kg/ha - 99.1%, Konflic - 0.3% - 98.4% and Neemes – 025 % - 94.3%.

The efficiency of products studied for the control of green peach aphid attack is presented in fig. 2.

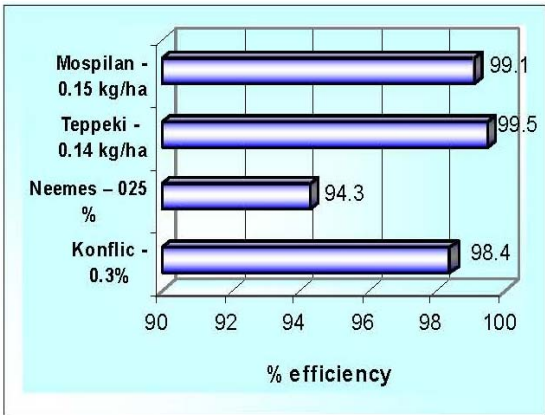

Fig. 1. The efficiency of products in control of black bean aphid

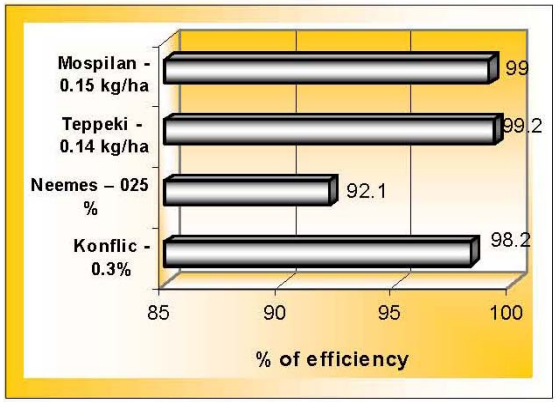

Fig.2.The efficiency of products in control of green peach aphid

The efficiency of studied insecticides were very good in all variant being over 90%.

The efficiency of products studied for the control of green potato aphid attack is presented in fig 3.

All products has very good efficiency in control of green potato aphid, over 93%.

The efficiency of products studied for the control of potato aphid attack is presented in fig. 4.

In condition of low attack of potato aphid which did not exceeded 1.8% DA, all variants had over 93%.

The efficiency of products studied for the control of cabbage aphid attack as following, fig 5.

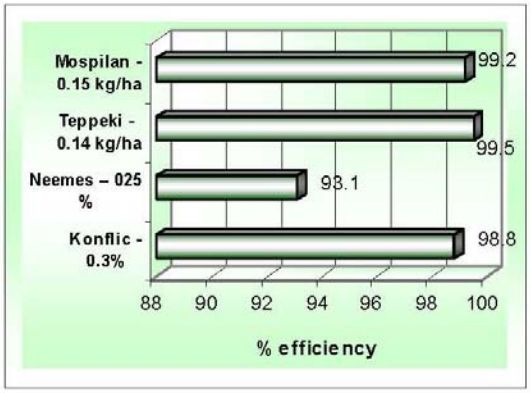

Fig.3.The efficiency of products in control of green potato aphid

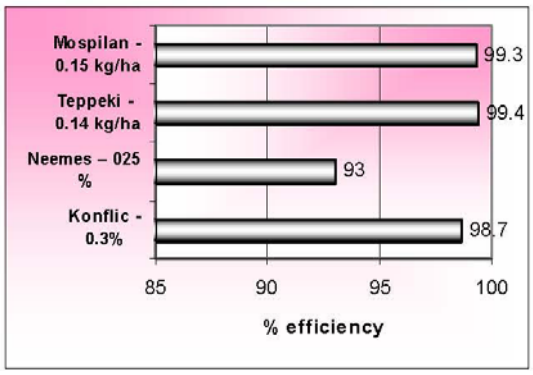

Fig. 4. The efficiency of products in control of potato aphid

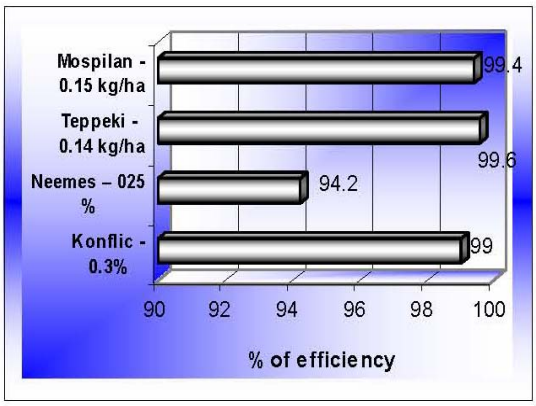

Fig. 5. The efficiency of products in control of cabbage aphid

The efficiency of products in control of aphids at plant cabbage for seeds was very good: Konflic - 0.3% - 99.0 %, Neemes – 025 % - 94.2 %, Teppeki - 0.14 kg/ha - 99.6%, Mospilan - 0.15 kg/ha - 99.4%.

CONCLUSIONS

The degree attack (DA%) of black bean aphid was high on the bean – 24.6 %, followed by seed plants of beetroot 11% , parsley - 7%, lovage - 4.2%, celery – 3.5%.

Green peach aphid had the biggest attack on the pepper 14.2%, followed at the eggplant – 7.4%, tomato - 5.6% and bean 0.1%.

Green potato aphid had a smaller DA% on: tomato – 2.5%, pepper - 1.4%, eggplant – 0.2%.

Potato aphid had a smaller DA% in: tomato – 1.8 %, pepper – 0.9%, eggplant – 0.1%.

Cabbage aphid attack only cabbage plant of seeds, DA% being 5.9 %.

The efficiency of products studied for the control of black bean aphid attack had very good efficiency. So Teppeki - 0.14 kg/ha, had the best efficiency - 99.5%, followed by Mospilan - 0.15 kg/ha - 99.1%, Konflic - 0.3% - 98.4 and Neemes – 025 % - 94.3%.

The efficiency of products studied for the control of green peach aphid attack was very good in all variant being over 90%

All products had very good efficiency in control of green potato aphid, over 93%.

In condition of low attack of potato aphid which did not exceeded 1.8% DA, all variants had over 93% efficiency.

The efficiency of products in control of aphids at plant cabbage for seeds was very good: Konflic - 0.3% - 99.0 %, Neemes – 0.25 % - 94.2 %, Teppeki - 0.14 kg/ha - 99.6%, Mospilan - 0.15 kg/ha - 99.4%

ABSTRACT

The experiments were carried out at the Vegetable Research - Development Station Bacau in open field crops for seeds: bean, parsley, beetroot, celery, lovage, tomato, pepper, eggplant for control of aphids attack.

The degree attack (DA%) of black bean aphid was high on the bean – 24.6 %, followed by seed plants of beetroot 11% , parsley - 7%, lovage - 4.2%, celery – 3.5%.

Green peach aphid had the biggest attack on the pepper 14.2%, followed at the eggplant – 7.4%, tomato - 5.6% and bean 0.1%.

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All products had very good efficiency in control of green potato aphid, over 93%.

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The efficiency of products in control of aphids at plant cabbage for seeds was very good: Konflic - 0.3% - 99.0 %, Neemes – 0.25 % - 94.2 %, Teppeki - 0.14 kg/ha - 99.6%, Mospilan - 0.15 kg/ha - 99.4%

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