Research on the potential of the biopreparation VVH 86086 as a biological tool for the topping of inflorescences of tobacco grown for seed production

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Abstract

An important characteristic of tobacco seeds is their different quality caused by biological or physiological reasons. This different quality is due to the different conditions of the formation and maturation of seeds in seed capsules of each inflorescence. One method reducing the different quality of seeds is topping of inflorescences. Topping of inflorescences is the practice of topping a part of the inflorescence (late flowers and immature seed capsules). Topping is mainly performed manually but it is also possible by treatment with chemical substances. The substances used so far are old and suspended from production or prohibited from use and the need for biological/organic production of tobacco seeds makes it necessary to find and use biological tools for topping of tobacco inflorescences.

The purpose of the research is to study the potential of using the biopreparation VVH 86086 as a biological tool for topping of tobacco inflorescences.

Key words: tobacco inflorescences; topping of inflorescences; tobacco seeds; biological tools for topping

INTRODUCTION

One of the important activities having an impact on increasing the yield and quality of tobacco as a raw material is the use of seeds for planting that have high varietal and sowing qualities (Kolesnik, 1976). The preservation of the original qualities of the tobacco varieties grown largely depends on the development of seed production. Without high-quality seed/tobacco production even the best variety is not capable of demonstrating its full biological potential. (Slavova, 2003, 2010; Bonchev & Encheva, 2007)

In tobacco, depending on the biological characteristics of plants, the reproductive phase occurs 40-70 days after planting in the field. This phase includes the period from the appearance of the flower clusters to seed maturation. The flower cluster consists of 5-6 flower twigs with total of 50-80 flowers for oriental and 50-60 for large-leaf tobacco but there are also clusters with up to 120-150 flowers. The variation of the number of flowers in one cluster of a variety is most frequently about 20-30 %. Blooming starts with the central bud of the inflorescence. It blooms 1-3 days earlier than the other ones; then, the next buds positioned closest in the flower twigs start to bloom, starting from the top down. 2-3 days after opening of the buds from the first row, the ones from the second row start to bloom, then the ones from the third, etc. The closer a bud is to the inflorescence centre, the earlier it starts to bloom. Low-positioned buds on twigs start to bloom later than the ones positioned at the top. The buds at the end of twigs bloom last. The total duration of blooming until the ripening of seeds in seed capsules is 38-40 days. The most biologically potent, with high sowing qualities, providing high germination energy and germination capacity of the seeds

are the ones from the capsules of the third to the fifth vertical row and the least biologically potent are the ones from the fifth to the seventh one (Tomov et al., 1989). According to Staikov (1963), the seeds most valuable biologically are those formed in the capsules positioned in the middle of the inflorescence along the twig from the 2-nd to the 6-th capsule and from the 2-nd to the 6-th twig. The little seeds that are not completely ripe from the top capsules and from the capsules formed additionally onto the twigs are with low germination and weak, prematurely blooming plants grow from them.

The different quality of tobacco seeds is an important characteristic caused by biological and physiological reasons. This different quality is due to the different conditions of the formation and maturation of seeds in seed capsules of each inflorescence. According to Yakovuk (1984) these differences are significant even in the same plant. The peripheral seed capsules are formed 10-20 days later than the central ones when the power and vitality of the plant are reduced which in its turn reduces the process of formation of organic substances necessary for seed growth.

One of the methods for reduction of the different quality of seeds is the topping of inflorescences. Topping of inflorescences is the practice of topping a part of the inflorescence (late flowers and immature seed capsules). Long-year tests show (Chirikovskiy, 1978; Cherkasov, 1978, Tomov, et al., 1983, Yakovuk, 1984) that the smaller number of seed capsules in one inflorescence leads to the increase of the absolute weight of the seeds, hence of their germination capacity.

Topping is mainly performed manually but it is also possible with treatment of inflorescences with chemical substances. Unfortunately, the substances used before are old and suspended from production or prohibited from use (maleic hydrazide, reglon, nurival, etc.), and the need for biological/organic production of tobacco seeds makes it necessary to find and use biological tools for topping of tobacco inflorescences. Bozukov (2017) found when testing the biological preparation VVH 86086 for suckering and suppression of shoot formation of tobacco that the treatment of tobacco inflorescences for the purpose of suckering of plants with preparations leads to drying out of blossoms and dropping young fruit without affecting already formed seed capsules.

The purpose of the research is to study the capacity to use the biopreparation VVH 86086 as a biological tool for topping tobacco inflorescences.

MATERIAL AND METHODS

The research is performed with the biopreparation VVH 86086 manufactured by Jade, France.

Preparation ingredients: 680 g/l pellargonic (nonanoic) acid /extract from pelargonium roots.

Formulation: Emulsifiable concentrate.

Flower clusters from 10 oriental and large-leaf tobacco (Virginia and Burley) were treated in phase of 90% formed mature seed capsules of tobacco plants. The treatment was performed with atomizer sprayer with working solution of the bio preparation in concentration of 1.5 %, with consumption for solution of 40 l/da.

10 untreated plants were left as reference samples from the three variety groups. The effect was assessed 3 days after treatment.

Inflorescences with mature seed capsules were collected from the treated and untreated plants of the three tobacco types. The seeds were deposited in a laboratory of seed testing of the Institute of Tobacco and Tobacco Products for assessment of germination energy and germination capacity.

RESULTS AND DISCUSSION

The presented figures (1-3) show that as early as the 3rd day after treatment of the inflorescences all present flowers and undeveloped seed capsules are dried out/dropped while in the reference samples (fig.4) they are fresh and vital.

The results in the Table 1 shown that when topping inflorescences of the three variety groups with the biopreparation, the total percentage of germination capacity (I-st + II-nd assessment) of the seeds is similar - 80 % (for Virginia tobacco) or higher (for Oriental and Burley) than the one of reference (untreated) plants.

However, the germination energy (first assessment) of the seeds of untreated inflorescences of Oriental and Virginia tobacco is higher than the one of the treated ones while it is the opposite for Burley tobacco – the germination energy of the seeds from

Figure 1. Treated inflorescence of Oriental tobacco

Figure 2. Treated inflorescence of Burley tobacco

Figure 3. Treated inflorescence of Virginia tobacco

Figure 4. Untreated inflorescence of Virginia tobacco – reference sample

Table 1. Assessment of germination energy and germination capacity of the seeds on the 10-th and 14-th day.

No.	Modifications	Percentage of germinated seeds		
		I-st assessment	II-nd assessment	Total germination capacity
1.	Oriental – bio topping	68	25	93
2.	Oriental – untreated/reference	81	6	87
3.	Burley – bio topping	85	1	86
4.	Burley – untreated/reference	62	3	65
5.	Virginia – bio topping	65	15	80
6.	Virginia – untreated/reference	79	1	80

treated inflorescences is higher than the one of untreated seeds.

Test results shown that the bio preparation VVH 86086 may be successfully applied for topping of inflorescences in seed-producing tobacco crops.

CONCLUSIONS

1. The bio preparation VVH 86086 may be used for bio ***topping*** of inflorscences in tobacco, seed-producing crops.

2. The total percentage of germination capacity of the seeds is similar (for Virginia tobacco) or higher (for Oriental and Burley) than those of reference (untreated) plants.

3. Germination energy of the seeds of untreated inflorescences of Oriental tobacco and Virginia tobacco is higher than those of treated ones while it is the opposite for Burley tobacco – the germination energy of the seeds of treated inflorescences is higher than the one of the seeds of untreated ones.

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