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COMPARATIVE ANALYSIS OF FLUMETRALIN APPLICATION FOR CHEMICAL TOPPING OF TOBACCO IN UZBEKISTAN

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Abstract

This article presents data on the efficacy of flumetralin as a chemical pinching for Virginia type of tobacco. The plant growth regulator flumetralin (emulsifiable concentrate) proved to be an effective tool for tobacco pinching at an application rate of 1 kg/ha with a spray volume of 120 L/ha. The findings support the widespread implementation of this chemical pinching method in Virginia-type tobacco cultivation in the Urgut district of Uzbekistan.

Keywords: *Virginia, topping, stepping, dose, efficacy, leaf tiers, pinching*

Introduction

In large production fields, the generative organs of a tobacco plant (buds, flowers and seed pods) are “ballast” from an economic point of view. During their formation, they consume ready-made nutrients that are formed in the leaves, which is why the latter lose their density and do not develop well. As a result, there is a yield decrease, the chemical-technological indicators and the grade of raw materials worsen. This contributes to the accumulation of dry matter in the leaves and largely determines the level of yield of tobacco and its quality (Umurzakov 1991; Andersen et al., 1970; Akehurst 1991; Atkinson etc al., 1980; and World Tobacco situation, 1993). The tiered maturation of tobacco leaves is preserved when plants are grown under residual conditions, so the effect on leaf maturation essentially means a change in the very evolutionary nature of the tobacco plant.

The general and integral expression of age-related changes in the metabolism of all tobacco leaves is a constant increase in the content of plastic substances during youth

(synthesis predominates), their preservation at an approximately constant level during physiological maturity (synthesis and decay are balanced), a steady decrease in plastic substances during aging (decay prevails) of the organ (Andersen et al., 1970).

The main distribution of plastic substances between individual leaves in the tobacco metameric series occurs according to phyllotaxis. During the period of vegetative growth, the centers of abstraction of plastic substances from the formed leaves are the young growing leaves of plants and roots. With the transition of plants to the reproductive phase of development, these centers of attraction remain, however, other parts of plants begin to play the main role in the attraction of nutrients at this time: first, the central inflorescence, and then pinching develop (Akehurst 1991).

A characteristic feature of the age-related change in the hormonal status of the tobacco leaf is expressed in the fact that each stage of life corresponds to the highest level of a certain type of regulatory substances: in the initial period of growth, cytokinins have their maximum level, during the period of intensive growth – gibberellin-like substances, during physiological maturity – auxins, at aging stage – growth inhibitors and ethylene. The rest of the hormones in this period are of subordinate importance.

Along with its own hormonal system, the vital activity of the tobacco leaf is also determined by the general gradient of phytoharmones at the level of the whole organism.

Thus, to change the rate of maturation of tobacco leaves, it is necessary to modify the natural gradient of phytohormones. In particular, in order to bring the periods of maturation of metameric organs closer, it is necessary to delay the breakdown of auxins, cytokinins, and gibberellin-like substances in the lower leaves, and to shift the ratio of regulators in the upper leaves towards a faster accumulation of ethylene (Umurzakov 1991).

By suppressing or activating the functioning of certain centers of auxin production, as well as by changing the level of auxins and ethylene in the formed leaves, one can change the intensity of synthesis and the nature of the distribution of plastic substances in the plant.

The elucidated features of the influence of various centers of mobilization of substances on individual groups of leaves allowed us to conclude that the maturation of the leaves of the upper breaks can be significantly changed by eliminating the attractive effect of the inflorescence and pinching. It is possible to delay the aging of the lowest leaves (1 and 2 breaks), the outflow of substances from which is mainly due to the attracting effect of the leaves growing higher on the stem, possibly by removing the lower seedling leaves, i.e. plant cleaning.

In tobacco growing, it is known that topping (decapitation of a plant) actually somewhat delays the aging of the lower leaves and accelerates the ripening of the upper leaves of plants. In this case, the greatest effect is obtained if, together with the inflorescence, 4–5 upper leaves are removed, which, like the top of the shoot, have a strong attracting effect in relation to the leaves of the lower tiers (Atkinson etc al., 1980).

However, the removal of the apical part of the plants causes the rapid growth of pinching, which take on the function of rejecting nutrients. After manual pinching, they grow very quickly and, even in their infancy, are able to greatly influence the nature of the outflow of substances from the leaves. Therefore, it is necessary to prevent the development of pinching simultaneously with the removal of the top of the plants, that is, to restore apical dominance.

The studies of the above authors showed that most of the tested substances do not have a sufficiently effective inhibitory effect on the growth of inflorescences and stepsons, other substances, on the contrary, inhibiting the growth of stepsons, simultaneously have an inhibitory effect on the growth of tobacco plants, which ultimately leads to a decrease in the yield of raw materials. Substances, although they suppress the growth of pinching without an inhibitory effect on plants, they have to be applied manually, separately for each plant. Many of the substances tested are very expensive and therefore cannot be used on a large scale. In recent years, in tobacco-producing countries, a plant growth regulator, flumetralin, has been used for chemical pinching.

Recommendations for their use should be developed for a zoned tobacco variety, specific natural, soil-climatic and agrotechnical conditions for growing it, and contain methods proven in production for each process.

One of the obligatory agricultural practices for growing tobacco is the chemical pinching of plants. This contributes to the accumulation of dry matter in the leaves and largely determines the level of yield and quality of large-leaf Virginia type tobacco.

Recommendations for their use should be developed for a zoned tobacco variety, specific natural, soil-climatic and agrotechnical conditions for growing it, and contain methods proven in production for each process.

The intensity of growth and the mass of pinching per plant depend on the variety of tobacco and the specific conditions for its cultivation.

Material and methods of research

Flumetralin is a member of the 2,6-dinitroaniline class of chemicals. Flumetralin is a plant growth regulator that is used to control the growth of axillary buds (side shoots) on tobacco plants. Used to control side shoots on large-leaf Virginia tobacco varieties. Flumetralin is absorbed by the tobacco plant within a few hours after application and provides control of the growth of lateral shoots throughout the entire growth period (Guide to Pesticides, 1994).

Dinitroanilines selectively suppress plant and protozoan microtubes and do not act on fungal and vertebrate tubulins.

Type of preparation – emulsion concentrate. Methods of application – Flumetralin is applied as a hand spray (Handbook of Agrochemicals, 1987).

Frequency of application: Flumetralin is applied only once during the growing season. It is usually applied 3–7 days after cutting off the top of the flower part of the tobacco plant.

Application technology – manual application on special containers.

Flumetralin is applied as a manual spray with a working fluid flow rate of 1 kg of Flumetralin, 80, 120, 140 liters of water per hectare.

Processing was carried out in the morning at an air temperature not higher than 22–24 °C and a wind speed of not more than 1.2 m/s. As a control, a 0.5 ha plot was chosen where no treatments were carried out. Accounting for the number of pinching and the biological effectiveness of the drug was carried out according to the guidelines of ARITTP (Krasnodar) and the State Chemical Commission of the Republic of Uzbekistan.

Statistical analysis was done using Dospekhov 1986 method.

Results and their discussion

Of great practical interest is the use of pinching in combination with the treatment of plants with physiologically active substances. At the same time, immediately after mechanical topping, the plants are treated with inhibitory substances – flumetralin. The use of flumetralin significantly reduces the formation and growth of pinching.

As can be seen from Table 1, after the removal of inflorescences, intensive growth of lateral shoots is observed on plants, which must be removed.

Spraying with the physiologically active substance flumetralin after mechanical topping causes depression of growth processes. At the same time, lateral shoots grow slowly, acquire an ugly shape with lanceolate leaves, the weight of stepsons is 3–5 times, and the number and length of stepsons are 3 times less than on plants without stepsons.

Weakening, but not complete cessation of the formation and development of lateral shoots on the plant during their chemical pinching with Flumetralin, in our opinion, makes it possible to exclude their mechanical removal (Table 1). At the same time, the process of manual pinching is reduced, which contributes to a noticeable reduction in labor costs.

In solving this problem, in our opinion, it is important to have varieties of tobacco that are not capable of forming lateral shoots before the topping of plants and apply agricultural techniques for cultivating them, which ensures uniform growth and development of plants on plantations. The latter will make it possible to carry out the treatment of flumetralin clotted plants at an earlier stage of plant development without a noticeable decrease in the weight of the tobacco yield.

In addition to the variety and depth of topping of plants (the number of upper leaves harvested along with the inflorescence), the formation and growth of pinching is also influenced by the weather conditions of the year of tobacco growth.

Table 1. *Effect of flumetralin on the growth and development*

Treatments	Indicators of the development of pinching			
	number of pinching from 1 plant, unit.	average length of pinching, cm	Weight of 25 pinching, g.	
			raw	dry
Trimming by hand:				
Control	6	14.3	403.1	62.2
Treatment with 1 kg of flumetralin in 80 l/ha	2	4.2	83.4	10.5
Treatment with 1 kg of flumetralin in 120 l/ha	2	3.0	76.2	9.0
Treatment with 1 kg of flumetralin in 140 l/ha	2	2.2	67.2	8.1

Observations have shown that stepping plants with flumetralin increase the wet weight of the roots and stem of one plant by the end of the growing season, but to a different extent. In comparison with the control, as expected, the largest increase in their weight is observed during chemical pinching after manual topping. The combined use of manual topping with chemical pinching of plants with flumetralin somewhat increases the numerical values of these indicators. The thickness of the stem at the base, in the middle and at the top of the plants also changes approximately.

Chemical pinching of tobacco with flumetralin significantly accelerates the growth of the leaf blade and increases its area by the time the tobacco is harvested (Table 2). This is observed to the greatest extent in young leaves of the upper tiers and to the least extent in older, almost formed leaves of the middle tiers. This somewhat brings together the size of the leaves remaining on the plant after pinching.

Table 2. *Influence of plant pinching with flumetralin on the growth and development*

Options	Growth and Development Indicators		
	plant height, cm	number of harvested leaves from 1 plant, pcs	average leaf area, cm^2
Control	127.4	22	285.2
Treatment with 1 kg of flumetralin in 80 l/ha	122.3	19	325.0
Treatment with 1 kg of flumetralin in 120 l/ha	120.2	20	331.2
Treatment with 1 kg of flumetralin in 140 l/ha	118.4	20	327.6

After chemical pinching with flumetralin, growth processes are noticeably accelerated, and during the harvesting period, the leaves of the upper breaks have a significantly larger area of the leaf blade. All the patterns of changes in the area of the leaf blade, noted above, depending on the technology of pinching tobacco, were widely confirmed in the results of changes in the length and width of tobacco leaves at the time of their harvesting.

After treatment of plants with an aqueous solution of flumetralin, observations showed that after about 24 hours, bends of petioles, leaves and stems appear. After 2–3 weeks they disappear, but not completely. The leaves remain slightly lowered downwards.

Topping and pinching tobacco plants is an important agricultural practice in shaping the yield and quality of raw materials.

Based on this, we can conclude that in order to obtain high yields of large-leaf Virginia tobacco in the conditions of Uzbekistan, it is necessary to include in the technology of growing tobacco the chemical pinching of plants using flumetralin at a dose of 1 kg, the flow rate of the working fluid is 120 l/ha, as an important agricultural technique that suppresses growth stepsons of tobacco (Figure 1).

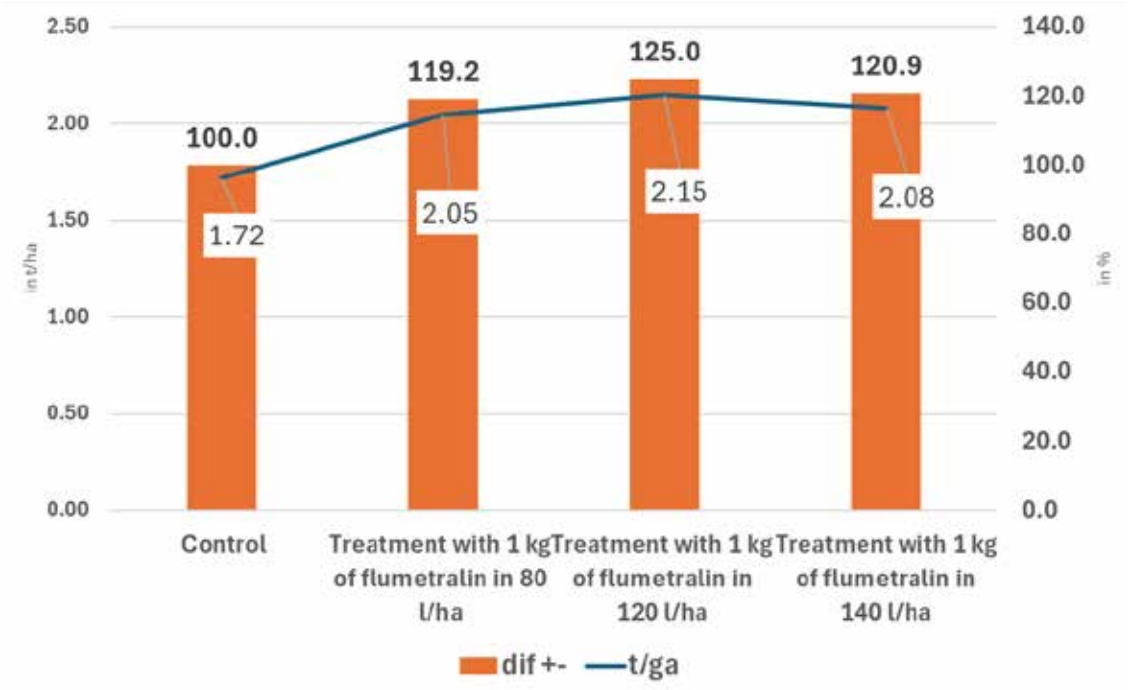
Conclusion

The proven technology of chemical pinching of tobacco plants using flumetralin (1 kg of substance per 120 liters of water), as it was seen from the data presented by us, allowed the production specialist to actively intervene in the growth and development of its harvested period and purposefully form yield at a certain level. Significantly greater economic efficiency is provided by the chemical pinching of tobacco plants.

The widespread introduction of these processes in tobacco growing in the Urgut region when growing tobacco of the Virginia type undoubtedly gives a significant economic effect.

Plant growth regulator Flumetralin e.c. turned out to be an effective tool in the fight against pinching of tobacco, at a rate of 1 kg/ha, while the rate of consumption of the working fluid is 120 l / ha. The preparative form is satisfactory, phytotoxicity was not detected.

Figure 1. *Influence of stabbing methods using flumetralin on the yield*



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