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Agro-environmental evaluation of fertilizer when growing tomatoes

Purpose. To study the agroecological assessment of fertilizer systems for growing tomatoes. Methods. Field, analytical, mathematical and statistical. Results The complex analysis of tomato fruit by the quantity of their commodity, non-commodity and damaged products during growing in the conditions of a micro-dipole experiment was carried out. The accounting area of the plot is 5.2 m2, the total area is 234 m2 with 9 fertilizer variants. Conclusions It has been established that the yield of tomatoes with the use of mineral fertilizers increases the yield of marketable products and reduces the yield of non-commodity, while organic fertilizers affect the resistance of plants to the negative effects of pathogens. The highest yield of commodity products of tomatoes was under the conditions of mineral nutrition + mulch and under the conditions of systematic fertilization with organic fertilizers (humates), namely 9.8 and 9.3 kg / m2, respectively.

Key words: fertilizer systems, tomato, commodity and non-product products, open soil.

Formulation of the problem. In modern conditions, the issue of a balanced agroecological approach in the cultivation of agricultural crops is acutely raised, while the problem of growing vegetables in closed and open soils remains the most problematic and least studied [1, 6]. In a number of scientific publications there is a contradictory information on the influence of different fertilizer systems on quantitative and qualitative indices of vegetable crops, in particular tomatoes [5, 7]. Most studies are based on the study of cultural biology. However, in view of the use in traditional technologies of growing a large number of mineral fertilizers and chemical means of protection, predominantly environmental aspects of cultivation are not considered at all [4, 11]. Analysis of recent research and publications. The question of studying the peculiarities of the growth and development of tomatoes, their requirements in the elements of nutrition is covered by such outstanding writings as R.I. Schroeder, E.A. Grachev, MS Ritov, N.I. Kichunov, they were the founders of the biology of vegetable crops and methods of soil cultivation [5]. O.Yu. made an important contribution to the ecologization of the production of vegetable products, in particular tomatoes. Barabash, V.V. Pidlynyuk, T.R. Stefanovskaya, RM Schmidt et al. [2, 3, 9]. The urgency of the issue of ensuring the introduction of quality vegetable products without harmful substances and in sufficient quantities is beyond doubt. In view of this, we conducted a study on the technological aspects of tomato cultivation, in particular the influence of fertilizer on quantitative and qualitative indices. The purpose of research. To study agroecological evaluation of fertilizer systems for tomato cultivation. Materials and methods. In the course of the work the general scientific and special research methods were used: field - for the selection of soil and plant samples, conducting field micro-district experiments, studying the productivity of tomatoes; Analytical - for the analysis of the obtained results, their scientific substantiation; Mathematical-static-for mathematical and statistical processing of the obtained results. In the section of a micro-dipole experiment in the field, which was occupied by tomatoes, an experimental plot of 234 m2 with a reference area for tomatoes - 5.2 m2 was allocated. The scheme of the experiment envisaged the following fertilization options: 1. Without fertilizers - control. 2. Without fertilizers + mulching of soil. 3. Mineral fertilizer under the weight-bearing soil cultivation. 4. Mineral fertilizers under spring soil tillage + mineral nutrition of plants. 5. Mineral fertilizer under spring soil cultivation + mineral fertilization of plants + mulching of soil. 6. Gumat + root nutrition of plants by rubber. 7. Humat + root nutrition of humates + mulching of soil. 8. Organic fertilizer (cattle manure, local

introduction). 9. Organic fertilizer (cattle manure, local application). Research results. In general, over the years of research (2010-2012), the maximum air temperature in July was - 22.7oC, 20.7 and 22oC, respectively. In 2011 and 2012, the road was characterized by a lack of moisture levels. In 2010, in May, it fell 159% compared to the norm. During the years of observation, an excessive amount of molybdenum in June was noted. In July 2010 - 2012 the amount of precipitation was 90%, 142 and 169% compared to the average multi-year indicators. August 2010 - 2011 was insufficiently secured by moisture. An important indicator of meteorological conditions is the hydrothermal coefficient (GTK), which is determined by the ratio of the amount of precipitation to the sum of temperatures above 10 ° C, reduced by 10 times. In the years of research, the State Customs Committee made up: in 2010 - 1,2, 2011 - 1, in 2012 - 1,1. Consequently, according to G.T. Peasant, vegetation period of research can be characterized as 2010 - sufficiently moisturized, 2011 - weakly dried fruit, 2012 - moisturized. In general, the weather conditions for the years of research were somewhat different. Therefore, it gave an opportunity to more fully assess the impact of different types of fertilizer on the productivity of tomatoes.

By analyzing the yield of tomatoes in terms of commodity and non-commodity products and affected or discarded fruits, we have established certain laws and peculiarities. The most positive in this regard was option 4, with mineral fertilizers with fertilization. Here is the highest yield of fruit products from m2, which, in our opinion, depends on the availability of nutrients throughout the growing season of cultural development. Describing variants with local manure removal, we can state that at low rates of its introduction the output of non-commodity products increases, with a fairly low amount of commodity output. Regarding the defeat, this indicator is of medium importance, which is a sign of certain influence of the introduction of organic fertilizers on the state of disease development. Consequently, provided organic fertilizers are introduced, the nutrition of plants is better shown and the resistance of the fruits to diseases is increased. The analysis of yield of tomatoes in 2011 showed the dynamics of the increase in the quantity of commodity and non-fruit fruits for some fertilizer variants. So, the highest number of non-fruit fruits was obtained in the version with the use of organic beans in the amount of 6 t / ha, namely - by 40% more compared to the control. Also, in this variant, the total number of non-fruit fruits has increased. Regarding the option where organic fertilizers were introduced in a moderate amount (option 8), the non-yield of the fruits was 10% lower compared to control tomatoes. Regarding the defeat of the fruits of tomato diseases, we noted an increase in the affected fruits by 3.7% compared with the control. Against the background of an increase in overall yield in variants using humates, we also observed a decrease in the total number of affected and non-fruit fruits not only compared with control, but also compared with other fertilizer variants. Thus, the severity of the fruits in variants 6 and 7 was 60 and 46% lower than the control, while the number of non-commodities was 23 and 25% lower respectively. We relate this to the positive effect of organic fertilizers and the balanced growth of macro- and microelements throughout the entire period of plant growth, which made it possible to substantially protect plants from diseases. It should be noted that against the background of soil mulching, the number of affected fruits was slightly higher than the similar variant without mulch, but this is primarily due to the balanced concentration of micro and macro elements in this fertilizer, which provides improved growth and development of plants, and in its Turns, contributes to increasing the resistance to disease. The yield of commodity fruits in these variants also increased by 60% and 0% respectively. In turn, the yield index has reached the number of fruits obtained for the use of mineral fertilizers, which makes it possible to argue about the alternative of this fertilizer system mineral. In 2012 there was an increase in yield in variants, where organic fertilizers were used in different amounts (3 and 6 t / ha). Thus, the total yield in these variants was 40% higher compared to the control and the equivalent option, where mineral fertilizers were used (options 4 and 5). However, against the background of an increase in total yield, the commodity yield increased by 64 and 70%. That is, the number of affected and unpredictable fruits has decreased. Thus, the introduction of the increased amount of organic fertilizers allowed to reduce the number of non-fruit fruits by 60%, whereas for introducing 3 t / ha - only by 15%. There is a leveling of the number of irritated fruits compared to control, while the improvement is only 2%. In variants where no fertilizer was used, but as an alternative, soil priming was used, the amount of non-commodity products decreased by 7%, and

the damaged disease by 30%. Also, the number of fruit fruits increased by 6% compared with control, the total yield was less by 3%. The obtained results on the number of fruit trees in variants with the removal of mineral fertilizers allowed to note the negative influence of these fertilizers on the resistance of plants to diseases. So, the fruits affected by the disease in option 5 were 8% less than the control, in the quantitative index, there was almost no difference. This tendency was also characteristic for Option 6, where the indicator decreased by only 5%. The positive dynamics of fertilization during the growing season is a decrease in the number of non-food products by 64 and 52%, respectively. Mulching of the soil against the background of mineral fertilizers did not make a difference with the same variant with regard to the number of affected fruits, and the number of commodity fruits was within NIR, while for the total amount of commodity products against the background of mulch we received an increase of 71% versus 63% against the background of mineral Systems. This allows us to conclude that an increase in the total yield of 1 kg / m2 in option 6 is summarized. Summarizing the results obtained regarding the yield of tomatoes and their division into commodity and non-food products, it can be argued that the smallest number of non-fruit fruits was obtained in the variant , Where it systematically introduced mineral fertilizers during the growing season.

Average yield of tomatoes depending on fertilizer systems over the years of research (2010-2012): □- commodity; Sh - unmatched; - are amazed; □- total

In turn, the highest indicators of non-commodity products were characterized by variants of control and variants with mulch. The damage to the fruits of tomato disease was less than the fertilizer system using organic fertilizers (gums) - variants 6 and 7. The largest number of affected fruits, even at the level with the control, were characterized by variants where organic fertilizer systems were used in different Quantities (3 and 6 t / ha). The highest forage yield of tomatoes was characteristic of the option of removing mineral impurities during the vegetation + mulch period (option 5), and the smallest indicator was on the control.

Conclusions

During 3 years of growing tomatoes in open ground, it was found that the yield of tomatoes under the condition of use of mineral fertilizers increases the yield of marketable products and reduces the yield of unpolluted, while organic fertilizers affect the resistance of plants to the negative effects of pathogens. The highest yield of commodity products of tomatoes was provided on the condition of mineral nutrition + mulch and provided that the organic fertilizers (humates) were systematically fed, namely 9.8 and 9.3 kg / m2, respectively.

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