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ИСПОЛЬЗОВАНИЕ МУЛЬЧИРУЮЩИХ МАТЕРИАЛОВ ПРИ ВЫРАЩИВАНИИ ЗЕМЛЯНИКИ В УСЛОВИЯХ КРАСНОДАРСКОГО КРАЯ

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Рассмотрены данные двухлетних исследований по использованию мульчирующих материалов различных цветов при выращивании интродуцированных сортов земляники. По результатам исследований лучшим материалом с точки зрения температурного и влажностного режимов почвы, а также прохождения фенологических фаз является нетканный материал Дорнит 500

Ключевые слова: ЗЕМЛЯНИКА, ПОЧВА, ТЕМПЕРАТУРА, ФЕНОЛОГИЯ

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USE OF MULCHING MATERIALS IN GROWING STRAWBERRY IN THE CONDITIONS OF THE KRASNODAR REGION

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The article considers data of two-year studies on the use of mulching materials of various colors in the cultivation of introduced strawberry varieties. According to the research results, the best material in terms of temperature and humidity conditions of the soil, as well as the passage of phenological phases, is Dornit 500 non-woven material

Keywords: STRAWBERRY, SOIL, TEMPERATURE, PHENOLOGY

Strawberries are perennials and, like most perennials, they begin to prepare for winter as the day length shortens and temperatures drop. Outwardly, these changes are manifested in the appearance of berry plants, leaf development stops, leaf petioles become horizontal, the plant seems flattened, and old leaves turn red [1].

The problem with cold acclimatization is that plants do not become "hardy" until cold acclimatization is complete. Ideally, this cold will last all

winter. Winter hardiness allows plants to withstand damage at low temperatures [2].

Photosynthesis is also necessary for cold acclimatization, so plants that mulch before these environmental conditions are met will not be fully winter hardy. Strawberry plants are not as resistant to low temperatures as other perennial fruit crops, even when fully acclimatized. Various production techniques, such as raised, mounded beds with mulching, further complicate a seemingly simple task [3].

Relevance of research. Mulching is an agricultural technique that affects the proper growth and development of plants, changes the soil temperature, providing better nutrition availability and better moisture retention [4]. Mulching has a strong impact on yield, quality and duration of harvesting, which is primarily associated with better soil and moisture retention, changing soil temperature, improving nutrient availability and suppressing the number and growth of weeds, protection from frost and reducing the number of contaminated and diseased berries. .

Research goal:

The purpose of our research was to study the characteristics of growth and fruiting of promising varieties of garden strawberries, depending on the properties of mulching materials, in the conditions of the Kuban zone.

The following tasks follow from this goal:

-to study the growth characteristics of plants of the studied varieties of strawberries;

- to study the features of the formation of peduncles and the setting of berries, depending on the mulch used;

The novelty of the research - for the first time the new mulching materials Dornit 300 and Dornit 500 were tested in comparison with the classic plantation management system.

Results and discussion. Mulch affects the water, air and thermal condition of the soil. In addition, it accelerates the biological processes in the soil, providing plants with better nutrition. All this has a positive effect on the growth and development of plants, accelerating maturation and increasing yields. Obviously, with such a complex effect of mulching, its effect on the generative function is not manifested equally everywhere.

With different colors of materials used for mulching, they affect the soil and the microclimate of surface air in different ways, which must be taken into account when using them for mulching in different climatic zones of the country.

It was interesting to study the effect of mulching materials used in the experiment on the temperature and moisture content of the soil, depending on their thickness and color.

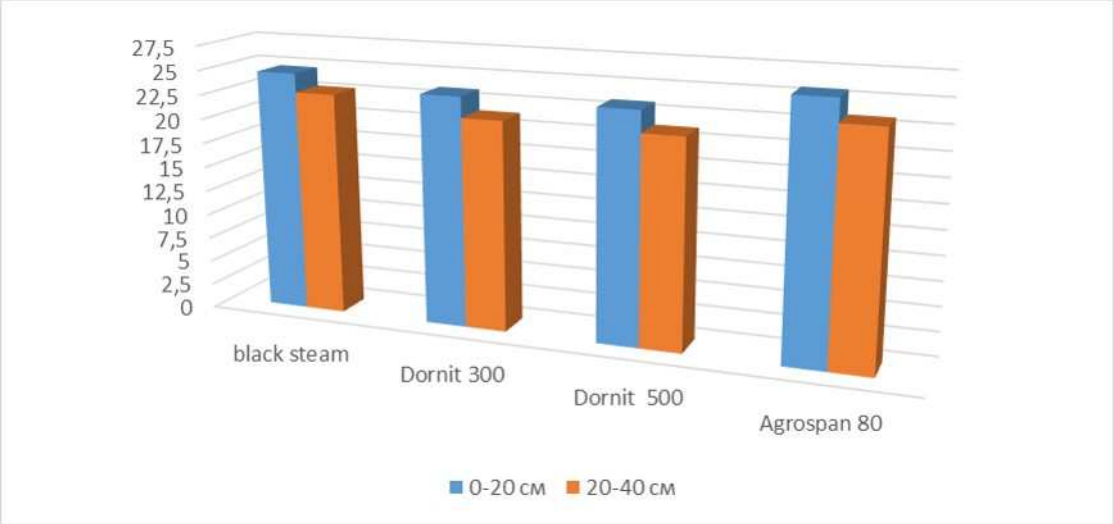

Figure 1 The influence of mulching materials on the temperature regime of the soil (average for the period from 1.06 to 20.06.2021)

As the data in the figure show, the highest temperatures are observed in the variant with the use of Agrospan. At the same time, the difference with the control variant in the soil layer of 0-20 cm is 1.0 0C, in the soil layer of 20-40 cm - 0.8 0C. In the variants with the use of Dornit material, the soil temperature at all depths was lower than in the control. This is most likely due to the fact that

the material has a white and white-greenish color that reflects part of the infrared spectrum of the sun's color. And in the control and with the use of black Agrospan, the opposite effect is observed.

To calculate irrigation rates and determine their timing, it is important to know the content of moisture available for plants in the soil. This is especially true during the period of filling and ripening of berries, since water deficiency always negatively affects the yield of this crop. In addition, in 2022, soil drought was combined with air drought, and at the same time, dry wind phenomena were observed, which led to increased transpiration in plants, which was expressed in the general drooping of the leaf apparatus. Therefore, we periodically carried out soil sampling with drying it to an absolutely dry mass. After that, the conversion to the lowest moisture capacity (HB) was carried out.

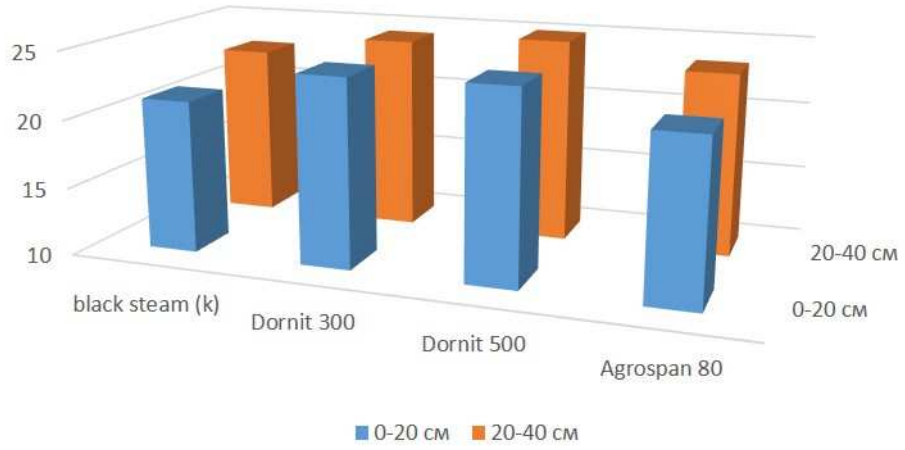

Figure 2 Influence of mulching materials on soil moisture (sampling 06/18/2022)

As our studies have shown, a decrease in the moisture content of an absolutely dry mass of soil to 21% corresponds to 70% of the lowest soil moisture capacity, which goes beyond the optimum for strawberry culture. Accordingly, when the plantation was maintained according to the black fallow

system, at the time of sampling in the 0-20 cm layer, critical values for the life of this crop were formed. The 20-40 cm layer contains 75% HB, respectively.

As for experimental options 2 and 3, in the 0-20 cm layer, almost similar moisture content was observed at the level of 79-80% HB in the 20-40 cm layer 82-84% HB. Thus, optimal conditions for strawberry plants were observed at the depth of the main occurrence of the root system. This can be explained by the denser structure of the mulching material.

As for Agrospan, this material has a rarer structure, it is well water and breathable, therefore the content of moisture available to plants ranges from 73 to 77% HB. Therefore, as on a black fallow, with such a moisture content in the soil, it is necessary to prescribe watering.

Currently, modern means for soil mulching are used, light-tight polyethylene, polyvinyl chloride films and non-woven materials. Transparent and photoselective films increase soil temperature, but do little to control weed growth; black, on the contrary, is effective in controlling weeds (Nikitochkina, 2007).

Numerous experiments conducted in different years in Russia and abroad have shown the high efficiency of mulching. The use of non-woven mulching materials allows the passage of water and free ventilation through the material. It can be used for several years. With prolonged use of mulch, the stock of weed seeds in the soil decreases, the incidence of plants and berries with diseases decreases. Significantly reduced the cost of caring for plantings and increased productivity in picking berries (table 1).

Table 1 The passage of the main phenological phases of the Asia variety, depending on the mulching materials used.

Option	Flowering		Ripening		Start of mustache formation		Harvesting time, days	
	2020 г	2021 г	2020 г	2021 г	2020 г	2021 г	2020 г	2021 г
Black steam (k)	26.04	5.05	28.05	1.06	22.06	18.06	24	24
Dornit 300	23.04	3.05	24.05	30.05	21.06	16.06	26	23
Dornit 500	23.04	2.05	24.05	29.05	20.06	15.06	26	24
Agrospan 80	20.04	29.04	22.05	26.05	15.06	13.06	24	20

As our observations showed in 2021, the variety Asia showed a shift in the passage of the main phenological phases. Moreover, this displacement was not the same. First of all, strawberry plants planted on Agrospan non-woven material began to bloom and, consequently, vegetate. This dependence was observed throughout the experiment. In fairness, it should be noted that in this variant, an accelerated (earlier) passage of more significant phenophases was observed. This is due to a stronger heating of the soil along them, and, accordingly, a faster transition of plants to vegetation.

This was followed by options 2 and 3 using white mulching materials. The difference with Agrospan was 3-5 days in flowering phenophase, maturation - 2-4 days. At the same time, the duration of harvesting also varied upwards within 2-4 days, which negatively affects the distribution of labor resources in the agricultural sector. enterprises.

In the control variant, a later entry into the vegetation period and a greater delay in the passage of phenophases were observed in comparison with other

variants of the experiment. In part, this can be explained by longer warming of the soil.

Table 2 The passage of the main phenological phases of the Syria variety, depending on the mulching materials used.

Option	Flowering		Ripening		Start of mustache formation		Harvesting time, days	
	2020 г	2021 г	2020 г	2021 г	2020 г	2021 г	2020 г	2021 г
Black steam (k)	28.04	6.05	31.05	4.06	28.06	-	28	25
Dornit 300	25.04	5.05	26.05	2.05	26.06	19.06	27	24
Dornit 500	24.04	5.05	27.05	1.06	25.06	19.06	25	22
Agrospan 80	23.04	30.04	23.05	28.05	19.06	16.06	22	20

As the data in Table 2 show, the Syria variety begins to vegetate a little later compared to the Asia variety. The difference is from 2 to 5 days depending on the phenological phase. As for the flow of phases, depending on the materials used, the same trend is observed on this variety.

It has been scientifically proven that eating fresh berries is essential for good health and provides excellent protection against many diseases. Garden strawberries are productive, and early varieties are the fastest growing crops of this crop. It has a high yield, good taste, good therapeutic and preventive properties, takes first place in horticulture. Therefore, the main task is to obtain high-quality seedlings of garden strawberries of modern high-yielding varieties.

Unfortunately, in our experiment, the laying of the plantation was carried out in late autumn and early winter, and this could not but affect the appearance of the mustache in the first year of vegetation. In 2020, there were very few of them, so we did not take them into account, we laid out the few that appeared in plastic cassettes filled with a nutrient substrate for their better rooting, since

especially black mulching materials cause burns of the root part of young rosettes. Therefore, in the following table, we present data on the formation of a two-year plantation.

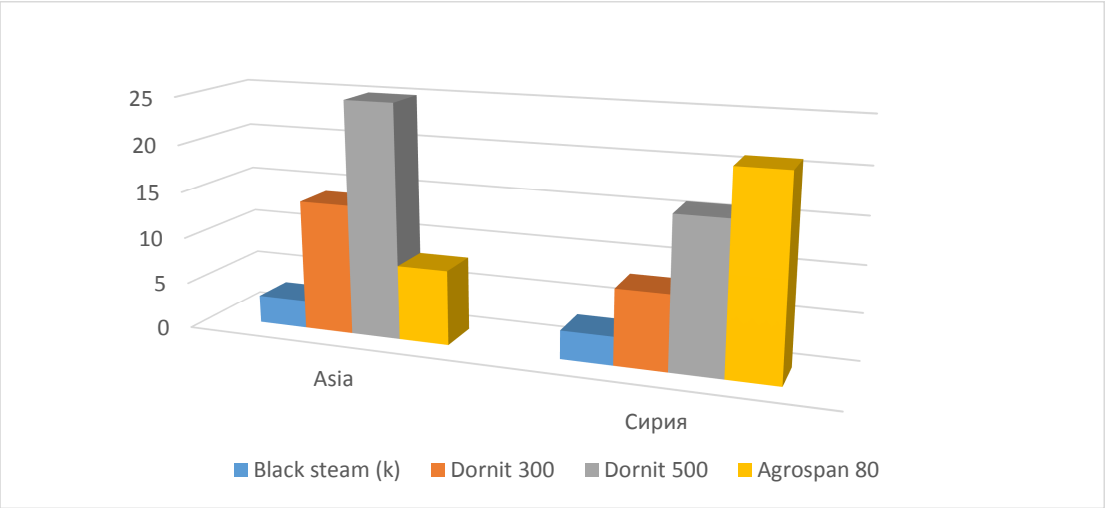

Figure 3 The number of whiskers in strawberries of the studied varieties, depending on the mulching materials used, for the 2nd year after planting, 2021

As our observations showed, the number of whiskers varied both in varieties and in experimental options. In variety Asia, the largest number of whiskers was formed in the variant with non-covering material Dornit 500, the second place in terms of the analyzed indicator was occupied by Dornit 300, the third by Agrospan. In the Syria variety, on the contrary, the most specialized shoots for propagation were formed in the 4th variant of the experiment (Agrospan), then Dornit 500, Dornit 300 follow in descending order. In both varieties, the smallest number of daughter rosettes was formed in the control variant.

Preliminary conclusions.

1. The highest temperatures are observed in the variant with the use of Agrospan. In the variants with the use of Dornit material, the soil temperature at all depths was lower.

2. As our observations showed in 2022, the Syria and Asia varieties showed a shift in the passage of the main phenological phases. First of all, strawberry plants planted on Agrospan non-woven material began to bloom and vegetate. This was followed by options 2 and 3 using white mulching materials. In the control variant, a later entry into the vegetation period and a greater delay in the passage of phenophases were observed in comparison with other variants of the experiment. The Syria variety begins to vegetate a little later compared to the Asia variety.

3. In variety Asia, the largest number of whiskers was formed in the variant with non-covering material Dornit 500, Dornit 300 ranked second in terms of the analyzed indicator, and Agrospan ranked third. In the Syria variety, on the contrary, the most specialized shoots for propagation were formed in the 4th variant of the experiment (Agrospan), then Dornit 500, Dornit 300 follow in descending order. In both varieties, the smallest number of daughter rosettes was formed in the control variant.

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