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SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)
Year: 2024 **Issue:** 12 **Volume:** 140
Published: 12.12.2024 **http://T-Science.org**

Issue Article

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THE DRY MASS OF ROOTS AND THEIR DISTRIBUTION IN FINE-FIBER COTTON VARIETIES IN SOIL LAYERS

Abstract: *The article describes the study of the effect of planting schemes on the accumulation of dry mass of the root system of fine-fiber cotton and their distribution in soil layers. The Marvarid and Guzor varieties received a high index in the dry mass of the roots and the distribution of roots in the soil layers. This condition indicates that these varieties make maximum use of nutrients and water.*

Key words: *fine-fiber cotton, variety, seed, planting scheme, root system, soil layers.*
Language: *English*
Citation: Qo‘ziboyev, A.O. (2024). The dry mass of roots and their distribution in fine-fiber cotton varieties in soil layers. *ISJ Theoretical & Applied Science, 12 (140),* 83-86.
Soi: http://s-o-i.org/1.1/TAS-12-140-15 ***Doi***: crossref https://dx.doi.org/10.15863/TAS.2024.12.140.15
Scopus ASCC: *1200.*

Introduction

Cotton is a warm climate crop grown in approximately 60 countries worldwide. It is cultivated from 45^0 North latitude to 32^0 South latitude by over 20 million Farmers. Over 90 percent of cotton grown in the world is upland cotton *G.hirsutum* L., while about ten percent of cotton area in the world belong to the sea island species *G.barbadense* L. Cotton plays an important role in providing fiber and cottonseed oil for human consumptions. One of the main cotton productions is fiber. In the world market of cotton, fine-fiber cotton varieties are estimated to be 1.5-2 or more times more expensive than fiber of *G.hirsutum* L. (Chorshanbiev et al., 2021). *G.barbadense* L is the youngest, plastic species and originated from South America (Amanov et al, 2020). Globally, 9% of the total cultivated area under cotton is allocated to varieties of the species *Gossypium barbadense* L. However, Pima’s fine fiber made up only 3% of world cotton production, they are considered commercial varieties that produce high quality fiber. Pima are mainly grown in the western and northwestern regions of the United States and also in large areas of China (Chorshanbiev et al, 2023).

The Decree of the Cabinet of Ministers of the Republic of Uzbekistan No. 47 “On the effective organization of the production of fine-fiber cotton, the reproduction of new varieties and the introduction of an incentive mechanism” dated January 30, 2020. outlines the tasks for the accelerated reproduction of original seeds of early-ripening, high-yield and high-quality fiber varieties of fine-fiber cotton, propagated in elite-seed-growing farms of preliminary reproduction, selection of the best new and promising varieties and special attention to the purity of varieties recommended for sowing fine-fiber cotton varieties.

The dry mass of the roots and their distribution in the soil layers is one of the main indicators that represent the nutrition of the cotton, the need for water and the adaptation of crops to agrotechnical conditions. The dry mass of the roots and their distribution in the soil layers affect the growth of cottons, the processes of photosynthesis and, as a result, the formation of yields.

The development of the cotton root system determines its growth processes, the ability to absorb water and nutrients. The dry mass of the roots and their distribution in the soil layers depend on the agroecological conditions, the genetic characteristics of the varieties and planting schemes. These factors play an important role in the overall biomass formation of the roots and the effective distribution in the soil layers.

Many scientific studies are devoted to studying how the root system spreads in different layers of the soil and how it affects the overall development of the plant.

In the upper layers of the soil, the roots are mainly involved in the effective absorption of nutrients and water, which is important in the early stages of growth. And the roots in the lower layers act as a reserve for long-term resources (Y.Wu, H.Zhang, X.Li, 2020), (X.Fang, Z.Zhang, W.Li, 2020).

The root system of the cotton depends on soil conditions, which it optimizes in specific environmental conditions. To achieve high efficiency, it is necessary to spread the roots in deep layers (Y.Li, H.Zhang, J.Wang, 2019).

The root system of the plant depends on its biological characteristics and adaptability to various planting schemes. Studies show that the roots of intensively growing varieties develop well in the upper layers, but also spread ineffectively to deeper layers (D.Zhao, X.Wu, M.Wei, 2022).

Planting schemes significantly change the structure of the root system and its spread to different layers of the soil. To achieve the best efficiency, it is necessary to use intensive varieties based on suitable schemes (M.Tariq, S.Abbas, M.Khan, 2021; M.Ali, M.Zhang, S.Chen, 2021).

MATERIAL AND METHODS OF RESEARCH

The trial was carried out on a field site in the Khazratqulov Gaybullo zvenos of Muglon, Kasbi District, in order to carry out the planned work in the carried out experiment, according to the experimental system below, in 2022-2024 years. The soil of the experimental field is type of taqir, the level of sizot waters is located at a depth of 2.5-3.0 meters. The experimental system consisted of 12 variants and was deployed in one yarus of 3 returns. Experimental options used to plant four different of fine fiber cotton varieties in three different planting systems. The effect of planting thickening on the yield, growth and development of these crops has been studied. In this case, up to the 1-2-3-4 option of the experiment, the width of the cottons is 90 cm the width of the seeds is planted slots range 10 sm the number of plants in each house is 1 plant (90x10x1 control) planted in 3 recesses in the scheme, the theoretical seedling thickness is 111 thousand plants/ha. Next, in the 5-6-7-8 options, the width of the beds is 76 cm, the spacing of the seeds is 10 cm, the number of plants in each house is planted in 1 plant 76x10x1 scheme in 3 returns. The theoretical planting thickness was 132 thousand plants/ha. Up to option 9-12, the width of the egats is 60 cm of seeds planted slots range 10 sm the number of plants in each house is planted in 1 plant 60x10x1 scheme in 3 returns. The theoretical planting thickness was 165 thousand plants/ha. Each return was 15 meters long and 14.4 meters wide. Considering that in the experimental field, each planting scheme was placed from 3 returns, one planting scheme occupied an area of 648 m^2. The total volume of the experimental field was equal to 1944 m^2. Accounting work, the accounting area for which phenological observations are carried out was 1458 m^2, the total experimental area was 0.2 ha.

ANALYSIS AND RESULTS

In field experiments carried out in the conditions of taqirsimon soils of the Kashkadarya region, the dry mass of the roots of fine-fiber cotton varieties ranged from 19.9-21.2 g or 2,520-2,670 t/ha on average in a soil layer of 0-90 sm, and no significant difference in varieties and planting schemes was observed.

The roots of the Surkhan-14 (control) variety were found to be slightly underdeveloped, with a dry mass of 19.9 g or 2,520 t/ha. This indicates that the root mass is relatively low in the studied layer compared to other varieties.

The variety Marvarid has a well-developed root system, and when cared for in a 76x9.9x1 scheme, the roots reached a dry mass of 21.2 g or 2,670 t/ha, ensuring effective use of nutrients and water.

In all varieties, it was noted that the main part of the roots (57.8-60.3%) is located in the upper layer of the soil. The indicator is 60.3% in the variety Marvarid (76x9.9x1), indicating that the roots have grown intensively in the upper layer.

There are 34.1-35.0% of the roots located in the 30-60 sm layer of the soil, the highest indicator was recorded in the Surkhan-14 (control) variety (35.0%) in a 60x12,5x1 scheme. This indicates that the roots penetrate a deeper layer, but this may be at the expense of losing some of the activity in the upper layer. It was found that the roots of the varieties Marvarid and Guzar are well distributed in the range of 34.1-34.9% in all schemes (Table 1).

The root distribution in the 60-90 cm layer of soil was low, accounting for only 5.7-7.5%. The highest was recorded when the Surkhan-14 (control) variety (7.5%) was growed in a 90x8,3x1 (control) scheme. This condition indicates that the roots have penetrated deep layers, but when the indicator in the upper layer is taken into account, this is not always assessed as an advantage.

Although the roots of the Surkhan-14 (control) variety penetrate well into deep layers, but slightly lower results were recorded in general efficiency.

CONCLUSIONS

In conclusion, it can be said that under the conditions of the taqir soils of the Kashkadarya region, it was found that the roots of fine fiber cotton varieties are around 19.9-21.2 g and are strongly branched than the Surkhan-14 (control) variety, their mass is higher, while the main part of the root system is distributed in a layer the roots of the Surkhan-14 (control) variety, on the other hand, were noted to be slightly more

abundant in the 60-90 sm layer of soil than in other varieties. Marvarid and Guzor varieties received a high indicator of the distribution of their roots in the soil layers and dry mass. This condition indicates the maximum use of nutrients and water by these varieties.

Table 1. The effect of planting schemes on the distribution in soil layers of 0-90 sm and dry mass of roots of fine fiber cotton varieties, (2022-2024 yy.)

№	Planting schemes	Samples	dry weight of root		distribution of roots, %		
			g/plant	t/ha	0-30 sm	30-60 sm	60-90 sm
1	90x8,3x1 (control)	Surxon-14 (control)	19,9	2,520	57,8	34,6	7,5
2		Marvarid	20,8	2,602	59,3	34,8	5,8
3		Guzor	20,7	2,601	59,5	34,7	5,7
4		Buston	20,4	2,547	59,6	34,6	5,7
5	76x9,9x1	Surxon-14 (control)	20,1	2,556	59,1	34,7	6,2
6		Marvarid	21,2	2,670	60,3	34,3	5,4
7		Guzor	20,9	2,629	58,8	34,7	6,4
8		Buston	20,6	2,565	59,4	34,7	5,9
9	60x12,5x1	Surxon-14 (control)	19,8	2,486	59,3	35,0	5,7
10		Marvarid	20,9	2,598	58,8	34,9	6,2
11		Guzor	20,5	2,568	60,2	34,1	5,7
12		Buston	20,2	2,516	59,6	34,9	5,5

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