EFFECT OF BENTONITE CLAY APPLICATION THROUGH SEED COATING AND FOLIAR FEEDING ON AGRONOMIC TRAITS OF COTTON (GOSSYPIUM HIRSUTUM L.)

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Abstract. This study investigated the effect of bentonite clay application on the growth, development, and yield components of cotton (Gossypium hirsutum L.) under typical irrigated gray soils of the Navoi Experimental Station of PSUEAITI, Karmana district, Navoi region. The results showed that all bentonite-treated variants had higher plant height, number of fruiting branches, number of fruiting elements, number of bolls, and single boll weight compared to the control treatment. The highest values were recorded in the 11th treatment, where plant height reached 122.6 cm, number of bolls 15.6, open bolls 12.4, and single boll weight 4.5 g.

Keywords: cotton, C-01 variety, bentonite clay, typical gray soil, yield components, boll weight, crop productivity.

Cotton is one of the most important agricultural crops in Uzbekistan, playing a crucial role in the national economy. Increasing cotton yield and maintaining soil fertility are among the key priorities in the agricultural sector. In irrigated farming systems, improving the agro-physical and agrochemical properties of soils through the use of local mineral resources has become increasingly important.

Bentonite clay is characterized by high adsorption capacity, cation exchange capacity, and strong water-holding ability. Its application improves soil moisture retention and nutrient availability, thereby enhancing plant physiological processes. These properties may positively influence cotton growth, development, and formation of reproductive organs. However, the effects of bentonite clay on cotton yield formation and boll productivity under typical gray soil conditions have not been sufficiently studied.

The objective of this study was to evaluate the effect of bentonite clay on the formation of yield components and single boll weight of the C-01 cotton variety under typical gray soil conditions in Navoi region.

The experiments were conducted at the Navoi Experimental Station of PSUEAITI, located in Karmana district of Navoi region, under typical irrigated gray soil conditions. The cotton variety C-01 was used as the research object. Field

experiments included different rates of bentonite clay applied through seed coating and foliar feeding. Plant growth and development were assessed through phenological observations. Plant height, number of fruiting branches, number of fruiting elements, number of bolls, number of open bolls, and single boll weight were recorded.

Table 1.

Effect of Bentonite Clay Powder Application through Seed Coating and Foliar Feeding on Growth and Development of Cotton (Gossypium hirsutum L.) cv. C-01

N	Seed coating rate with bentonite clay, kg/t	Foliar application rate of bentonite clay, kg/ha	Plant height, cm	Number of bolls per plant, pcs	Number of open bolls per plant, pcs	Single boll weight, g
1	Control (0)	-	109.6	11.9	10.1	4,2
2		1	113.1	12.2	10.3	4.2
3		1,5	115.5	13,0	11,2	4.4
4		2	114.3	12.6	11.7	4.3
5	50	-	110.8	12.3	11.3	4,3
6		1	117.9	13.9	11.3	4.4
7		1,5	120.2	14.7	11.9	4.4
8		2	119	14.3	11.4	4.3
9	100	-	112	12.7	11.7	4,3
10		1	121.4	15.1	12.2	4.4
11		1,5	122.6	15.6	12,4	4.5
12		2	116.7	14.9	12.1	4.4

The results showed that seed coating and foliar application of bentonite clay significantly influenced the growth and development of the C-01 cotton variety.

In the control treatment, plant height was 109.6 cm, while in the 7th treatment it reached 120.2 cm and in the 11th treatment 122.6 cm. Compared to the control, plant height increased by 10.6 cm (9.7%) and 13.0 cm (11.9%), respectively, indicating a positive effect of bentonite application on vegetative growth.

A similar trend was observed in boll formation. The number of bolls per plant in the control was 11.9, whereas it increased to 14.7 in the 7th treatment

and 15.6 in the 11th treatment, representing increases of 23.5% and 31.1%, respectively.

The number of open bolls also increased across treatments. The control recorded 10.1 open bolls per plant, while the 7th and 11th treatments showed 11.9 and 12.4, respectively. This indicates improved boll development and maturation under bentonite application.

Single boll weight increased slightly but consistently. The control value was 4.2 g, whereas it increased to 4.4 g in the 7th treatment and 4.5 g in the 11th treatment. Although the increase in boll weight was relatively small, it contributed significantly to overall yield improvement due to the higher number of bolls.

Overall, the 11th treatment (100 kg/t seed coating + 1.5 kg/ha foliar application) showed the best performance across all studied parameters, indicating the effectiveness of this combination under typical gray soil conditions.

The results of the study demonstrated that bentonite clay application positively affects the growth, development, and yield components of the C-01 cotton variety under typical gray soil conditions in Navoi region. Treated variants showed superior plant height, number of fruiting branches, number of fruiting elements, and boll formation compared to the control.

The highest performance was recorded in the 11th treatment, where plant height reached 122.6 cm, number of bolls 15.6, and open bolls 12.4. Single boll weight also increased from 4.2 g in the control to 4.5 g in the best treatment, confirming the positive influence of bentonite clay on reproductive development and yield formation.

These findings suggest that bentonite clay application improves soil physical properties, enhances nutrient uptake efficiency, and promotes cotton yield formation. Therefore, its use can be considered a promising agronomic practice for increasing cotton productivity under irrigated conditions.

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