

EFFECT OF IRRIGATION REGIMES ON EARLY MATURITY OF COTTON BREEDING MATERIALS.

Nasiba Umarovna Mavlonova

Tashkent State Agrarian University, PhD Candidate in Agricultural
Sciences, Associate Professor

ORCID ID: 0009-0007-7634-5645

E-mail: nasibamavlonova77@gmail.com

Abstract. *Early maturity is one of the most important agronomic traits in cotton breeding, particularly in regions facing water scarcity and shortened growing seasons. The present study evaluated the effect of two irrigation regimes on the formation of early maturity in sixteen cotton breeding lines and one standard cultivar. Field experiments were conducted at the experimental field of Tashkent State Agrarian University during the 2024 growing season. Two irrigation regimes were compared: normal irrigation (1:2:1) and artificial water-deficit conditions (0:1:0). The results showed that drought stress accelerated plant development in all genotypes, reducing the vegetation period by 1.6–10.0 days compared with normal irrigation. The earliest maturity under drought conditions was observed in breeding lines T-21-23/16 (105.0 days), O-17-19 (105.0 days), O-35-36 (105.7 days), and T-14-16/14 (106.0 days). These genotypes demonstrated stable early maturity and may serve as valuable parental material for breeding drought-tolerant cotton cultivars.*

Keywords: cotton, early maturity, drought stress, irrigation regime, breeding, *Gossypium hirsutum* L.

Introduction. Early maturity is one of the major breeding objectives in cotton because it enables plants to complete their life cycle before the onset of unfavorable environmental conditions. In arid and

semi-arid regions, early-maturing cultivars allow efficient water use, reduce irrigation requirements, and improve production stability.

Water deficit affects numerous physiological processes, including flowering, boll formation, and fiber development. However, drought stress may also accelerate crop development by shortening the vegetative period. Therefore, evaluating breeding materials under contrasting irrigation regimes is essential for identifying genotypes combining drought tolerance with desirable agronomic characteristics.

The objective of this study was to evaluate the influence of irrigation regime on early maturity of promising cotton breeding materials.

Materials and Methods. Field experiments were conducted at the experimental field of Tashkent State Agrarian University during the 2024 growing season. **Plant Materials.** Sixteen breeding families and one standard cultivar (S-6524) were evaluated.

Irrigation Treatments. Two irrigation regimes were applied:

0:1:0 – artificial water-deficit condition

1:2:1 – optimum irrigation regime

Statistical Analysis. Mean values ($M \pm SE$), standard deviation (SD), and coefficient of variation (CV%) were calculated. The experimental data were analyzed using analysis of variance (ANOVA), and differences among genotypes were evaluated at the 5% significance level.

Results. Effect of irrigation regime on early maturity the results indicated significant differences in early maturity among the breeding materials under both irrigation regimes.

Under normal irrigation (1:2:1), the vegetation period ranged from **108.3 to 116.7 days**, whereas under water-deficit conditions it ranged

from **105.0 to 109.2 days**. Thus, drought stress accelerated crop maturity in all investigated genotypes.

The earliest genotypes under drought conditions were: **T-21-23/16 – 105.0 days**, **O-17-19 – 105.0 days**, **O-35-36 – 105.7 days**, **T-14-16/14 – 106.0 days**, **O-10-11 – 106.4 days**. These breeding materials completed their development earlier than the standard cultivar S-6524 (108.7 days) (Figure 1).

Under normal irrigation, the earliest maturity was observed in: **T-21-23/16 – 108.3 days**, **T-85-87/16 – 109.1 days**, **O-19-20 – 109.3 days**, **O-10-11 – 109.3 days**, **O-95-96 – 109.7 days**.

The latest maturity under optimum irrigation was recorded in **O-12-14 (116.7 days)**, followed by **O-37-38 (116.3 days)** and **S-6524 (115.8 days)** (Figure 1).

Comparison of irrigation treatments demonstrated that drought reduced the vegetation period by approximately **2–10 days**, depending on genotype.

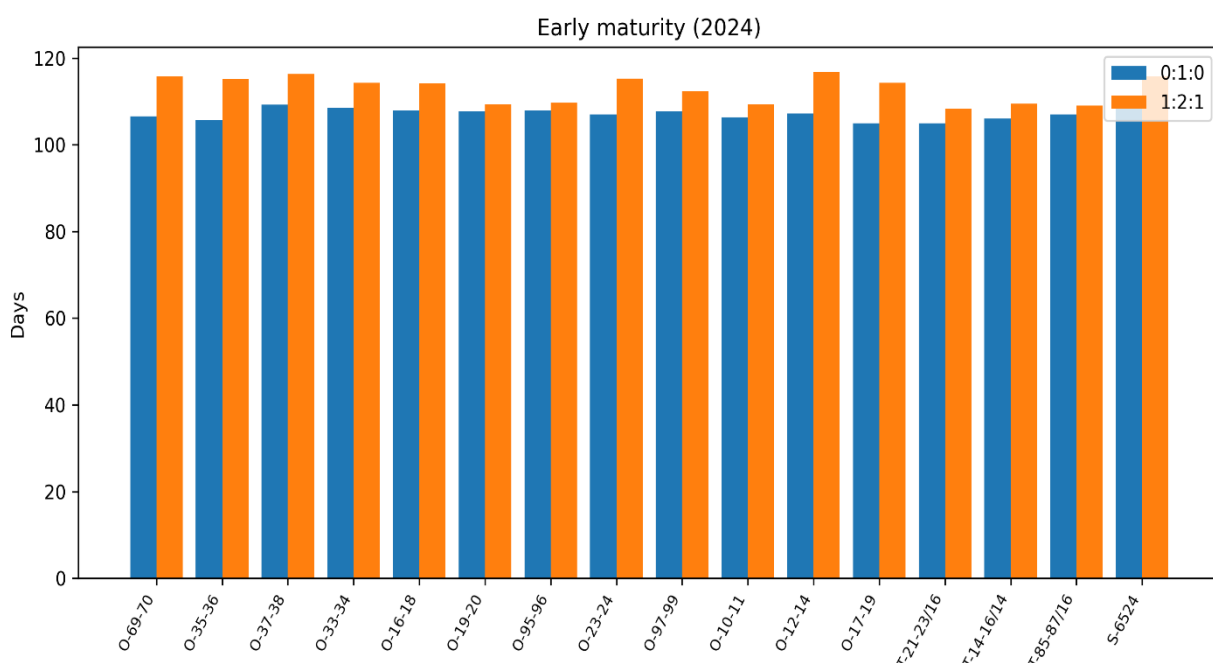


Figure 1. Early maturity (days) of cotton breeding materials under two irrigation regimes during the 2024 growing season.

Discussion. The acceleration of maturity under drought conditions agrees with the adaptive response of cotton to moisture deficiency. Water stress limits vegetative growth, resulting in earlier flowering and boll opening. However, the degree of acceleration varied considerably among breeding materials, indicating substantial genetic variability.

The breeding lines **T-21-23/16**, **T-14-16/14**, **T-85-87/16**, and **O-35-36** combined relatively early maturity with stable performance under contrasting irrigation regimes. Such stability is highly desirable for breeding cotton cultivars adapted to climate change and limited irrigation.

The observed variation among genotypes suggests that early maturity is strongly influenced by genotype–environment interaction and can be effectively improved through selection.

Conclusion. The irrigation regime significantly affected early maturity in cotton breeding materials.

The principal findings were:

Water deficit accelerated maturity in all investigated genotypes.

The earliest maturity under drought conditions was observed in **T-21-23/16**, **O-17-19**, **O-35-36**, **T-14-16/14**.

Under normal irrigation, **T-21-23/16** maintained the shortest vegetation period.

These breeding lines can be recommended as promising parental materials for breeding early-maturing and drought-tolerant cotton cultivars.