"JOURNAL OF SCIENCE-INNOVATIVE RESEARCH IN UZBEKISTAN" JURNALI
VOLUME 2, ISSUE 6, 2024. JUNE
ResearchBib Impact Factor: 8.654/2023 ISSN 2992-8869

Leaf Area Dynamics Throughout the Growth Stages of Sorghum

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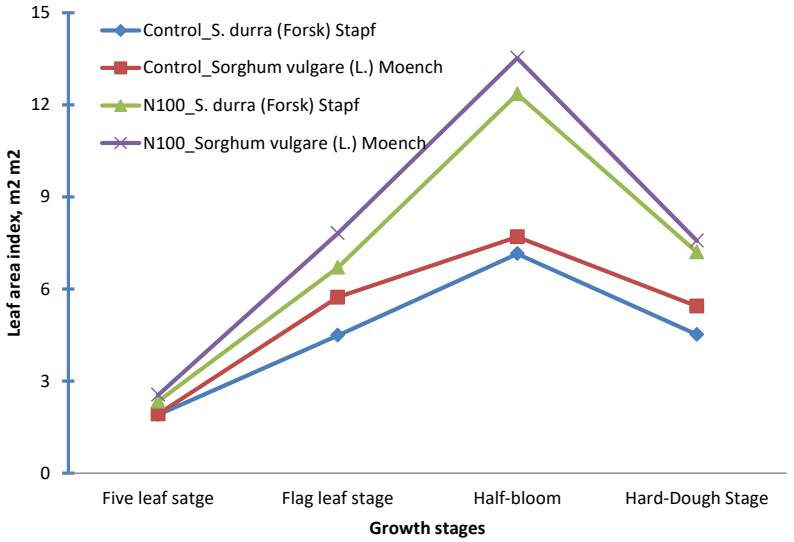
Introduction. Sorghum (Sorghum bicolor L. Moench) is a vital cereal crop cultivated in various parts of the world due to its adaptability to different climatic conditions and its importance as a food and fodder crop. The growth and development of sorghum, like other crops, is significantly influenced by its leaf area, which is a critical factor in determining the photosynthetic capacity and overall productivity of the plant. This article explores the changes in leaf area during different vegetative stages of sorghum, focusing on two varieties: Sorghum durra (Forsk) Stapf and Sorghum vulgare (L.) Moench, under varying nitrogen levels [1].

Methodology. The study was conducted by monitoring the leaf area index (LAI) of the two sorghum varieties at different growth stages: Five-leaf stage, Flag leaf stage, Half-bloom, and Hard-Dough stage. The experiment included control groups and groups treated with 100 kg of nitrogen per hectare (N100) [2].

Results and Discussion. The results of the study are illustrated in the graph below, showing the LAI at different growth stages for both varieties under control and N100 treatments.

Figure 1. Leaf area changes during the vegetation of the crop



Graph Description*:*

- **X-axis**: Growth stages of sorghum (Five-leaf stage, Flag leaf stage, Half-bloom, Hard-Dough stage)
- **Y-axis:** Leaf area index (m^2/m^2)
- **Legend***:*
  - Control_S. durra (Forsk) Stapf
  - Control_Sorghum vulgare (L.) Moench
  - N100_S. durra (Forsk) Stapf
  - N100_Sorghum vulgare (L.) Moench

Observations*:*

1. **Five-leaf Stage:** At this early growth stage, the LAI for both varieties was relatively low. However, the N100 treated groups showed a slightly higher LAI compared to the control groups, indicating the positive impact of nitrogen on leaf area development [3].
2. **Flag Leaf Stage:** This stage marked a significant increase in LAI for both varieties. The N100 treatment further enhanced the LAI, with Sorghum vulgare (L.) Moench exhibiting a more substantial increase compared to Sorghum durra (Forsk) Stapf [4].
3. **Half-bloom:** The LAI reached its peak during this stage. Sorghum vulgare (L.) Moench showed a higher LAI in both control and N100 treatments compared to Sorghum durra (Forsk) Stapf. The application of nitrogen continued to demonstrate a beneficial effect on leaf area expansion [5].
4. **Hard-Dough Stage:** The LAI started to decline as the plants approached maturity. Nonetheless, the LAI for the N100 treated groups remained higher than the control groups, signifying sustained benefits of nitrogen application throughout the vegetative period [6].

Conclusion. The study highlights the dynamic changes in leaf area index during the different growth stages of sorghum. The application of nitrogen significantly enhances the leaf area, contributing to better growth and potentially higher yields. Understanding these changes is crucial for optimizing fertilization practices and improving sorghum productivity. The findings underscore the importance of managing nutrient applications to support the vegetative development of sorghum, thereby ensuring efficient use of resources and maximizing crop performance.

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