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The Growth Hormone: Gibberellin and Its Effects On Dwarf Millet Mutants

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01. Introduction

Gibberellin or Gibberellic acid (GA), derived from the Bakanae fungus *Gibberella fujikuroi*, acts as a plant hormone with various functions. This study compares the growth of *Setaria viridis* (millet) wild type with two dwarf mutant varieties (mutant 11970 and mutant 03054) to understand genetic dwarfism and GA's role. Thirty seeds of each variety were planted, with weekly GA treatments given to four pots and two serving as controls.

02. Objective

Determine the type of dwarfism mutation:
Lack of synthesis or sensitivity to gibberellin

Lack of Synthesis: If dwarfism is due to lack of GA synthesis, then added GA will increase plant growth.
Sensitivities to GA: If dwarfism is due to lack of GA sensitivities, then added GA will not increase plant growth.

03. Methodology

Wild type & mutant seeds were planted and watered until germination. →
Once germinated, a GA & water solution containing 500 ppm was applied to the plants weekly. →
Each plants received 10 mL of the GA solution once a week, with two controls for each plant species left untreated. →
Measurements were taken on a weekly basis for every treated and untreated plant

04. Data Results

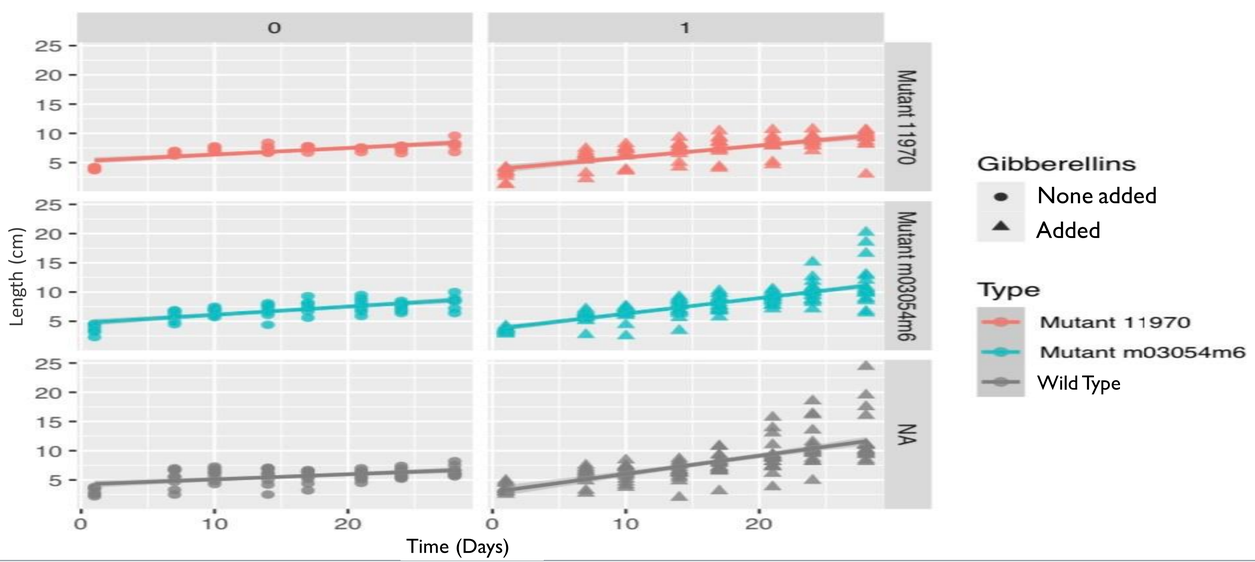

Figure 1: This graph shows the growth (in cm) among the different millets over time (days). The column on the left represents the control groups that did not get any GA versus the column on the right that shows our experimental group that got the GA weekly.

05. Results/Discussion

The results provide insight into the underlying mechanisms of genetic dwarfism and how GA treatment can store normal growth in mutant plants. It's been determined that our treated mutants appear to display growth in the appearance of gibberellin. Therefore, the mutant strains are incapable of producing GA of their own. Understanding the underlying genetic and molecular mechanisms of dwarfism is essential for developing strategies to overcome these limitations and optimize plant growth and productivity.

References
Brian, P.W. (1959). Effects of Gibberellins on Plant Growth and Development. Biological Reviews, 34(1), 37–77. https://doi.org/10.1111/j.1469-185x.1959.tb01301.x
Gupta, R., & Chakrabarty, S. K. (2013). Gibberellic acid in plant. Plant Signaling & Behavior, 8(9). https://doi.org/10.4161/psb.25504
Hedden, P., & Sponsel, V. (2015). A Century of Gibberellin Research. Journal of Plant Growth Regulation, 34(4), 740–760. https://doi.org/10.1007/s00344-015-9546-1
Lale, G., Jogdand, V.V., & Gadre, R.V. (2006). Morphological mutants of Gibberella fujikuroi for enhanced production of gibberellic acid. Journal of Applied Microbiology, 100(1), 65–72. https://doi.org/10.1111/j.1365-2672.2005.02754.x
Matsukura, C., Itoh, S., Nemoto, K., Tanimoto, E., & Yamaguchi, J. (1998). Promotion of leaf sheath growth by gibberellic acid in a dwarf mutant of rice. Planta, 205(2), 145–152. https://doi.org/10.1007/s004250050306
Takahashi, N. (1998). Discovery of Gibberellin. Discoveries in Plant Biology, 17–32. https://doi.org/10.1142/9789812817563_0002