

Gibberellin Application on Dwarf strains of Foxtail Millets

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Introduction

- Gibberellin is a plant hormone that stimulates plant growth.
- Dwarf plants have mutations that cause them to be shorter in stature than compared to others in their species. Three types of dwarf plant millets, *Setaria Viridis*, were used.
- Previous studies have shown the application and effect of gibberellin on plants. These experimenters tested the amounts and duration of gibberellic acid on dwarf mutants. They found a direct positive correlation in dwarf plants' rate of growth and addition of gibberellic acid. They also found some plants did not react with the gibberellic acid and continued the dwarf growth phenotype.

Purpose

- Purpose- Observe the effect of gibberellic acid on the different types of mutated dwarf plants.
- Null hypothesis- No change in vertical growth after gibberellic acid was applied.
- Alternative hypothesis- Vertical growth of gibberellic acid would cause a substantial increase in growth in both normal and dwarf millets.

Methods and Materials

- Millets seeds were soaked for 24 hours for optimal germination, then planted into pots.
- Each strain had 10 seeds per pot and there were three pots per strain, 30 total seeds.
- Gibberellic acid 1000 parts per million (ppm) stock solution was prepared by adding 10 mL of distilled water for every 0.01 g of gibberellin and three drops of isopropyl alcohol to allow gibberellin to dissolve.
- Upon germination the stock solution was applied to 2 out of the 3 pots.
- Results were recorded 2 and 7 days after application.

Results

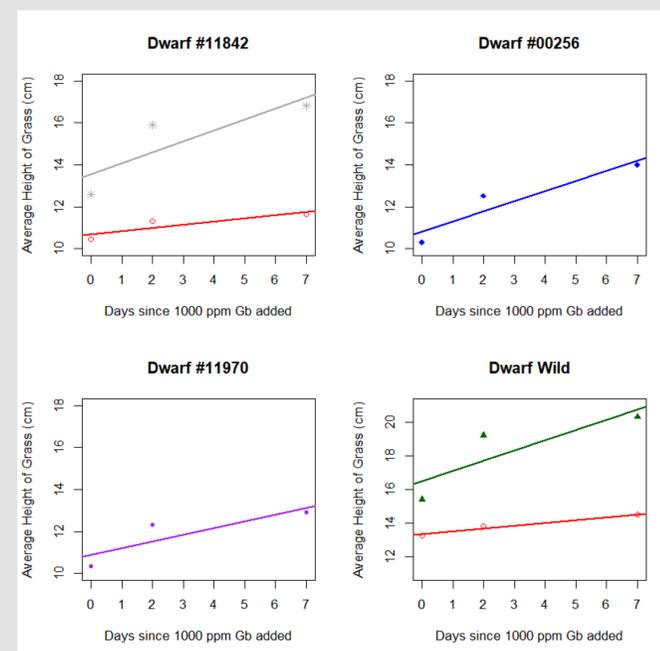


Figure 1.

Group	Best Fit	R ²
Wild No GB	$y = 13.35 + .16x$	0.941
Wild	$y = 16.49 + 0.60x$	0.449
Dwarf 1197 No GB	-	
Dwarf 11970	$y = 10.89 + 0.32x$	0.476
Dwarf 00256 No GB	-	
Dwarf 00256	$y = 10.83 + 0.48x$	0.757
Dwarf 11842 No GB	$y = 10.70 + 0.14x$	0.559
Dwarf 11842	$y = 13.53 + 0.52x$	0.3567

Figure 2.

- The data that was obtained was the average of height of each plant on each day was taken.
- Using the days as the x-axis and the average height as the y-axis a linear model was ran on the data and the following plots are the results of that.
- The lines that are red and the data that goes with it are representative of plants that did not have the growth hormone gibberellin added.
- The following equations and R² values correspond to the regression lines for the associated data sets.

Discussion

- Dwarf #11842 along with dwarf #00256 both exhibit reactions to the gibberellin application by showing a greater increase in growth, these dwarfs had receptors for the gibberellin.
- Dwarf #11970 had no sharp increase in growth, most likely due to insensitivity to the gibberellin treatments.
- The control group, wild type, had a sharp increase in growth after application of gibberellin.
- The application of gibberellin increases cell growth and promotes vertical growth. It is used in agriculture and gardening to exponentially increase growth of plants.
- Our study concluded that there is a direct correlation between plant hormone, gibberellin and positive growth, unless the dwarf was found to be gibberellin insensitive.

References

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