

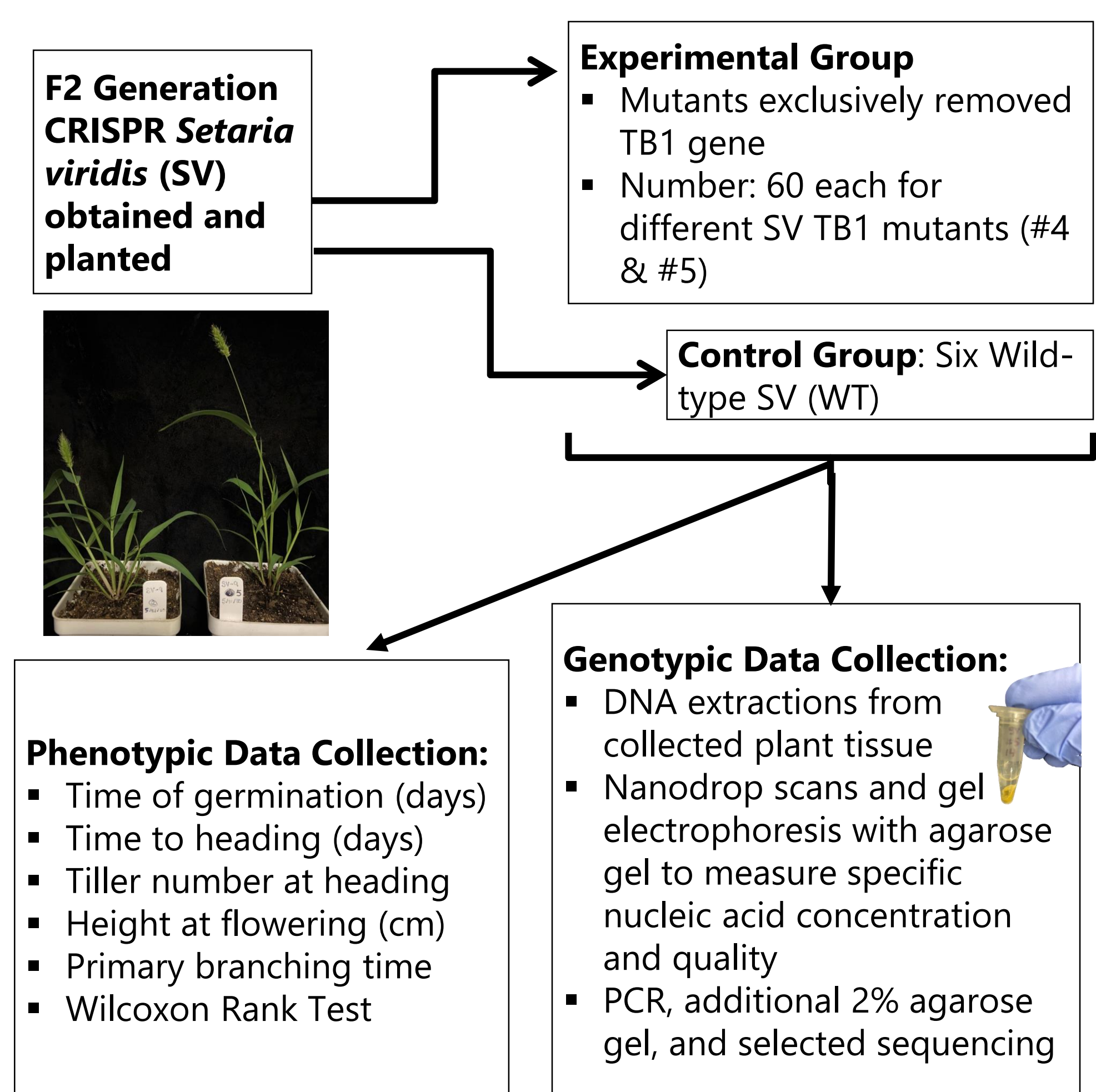
Characterization of Teosinte Branched1 Mutants in *Setaria viridis*

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Introduction

- Global crop demand has risen due to increased usage in food and biofuel (Edgerton, 2009).
- Alterations in plant architecture due to plant breeding may lead to advancements to improve production yield (Duvick, 2005).
- Increased shoot branching may be the solution to improved harvest yield (Singh, 1977).
- Teosinte branched1 (TB1)* is a branching gene identified in grasses such as maize (Lukens and Doebley, 2001). At high levels of expression, TB1 is known for repression in lateral branching (Doebley et al., 1997).
- Common ancestry between maize and *Setaria viridis* suggest genetic evolution and the opportunity for TB1 genetic comparison (Lukens and Doebley, 2001).
- Hypothesis: We hypothesize that *Setaria viridis* TB1 mutants will show increased branching, similar to TB1 mutants in maize.

Methods



Discussion

- Between the two TB1 mutant populations, days of heading was the only differing trait.
- Mutant populations differed from wild-type by having fewer tillers at heading.
- We reject our original hypothesis because the opposite pattern was discovered in that wild-type exceeded mutants in branching (tillers).

Characterization studies on plant mutants provide insight on the unpredictability of plant breeding.

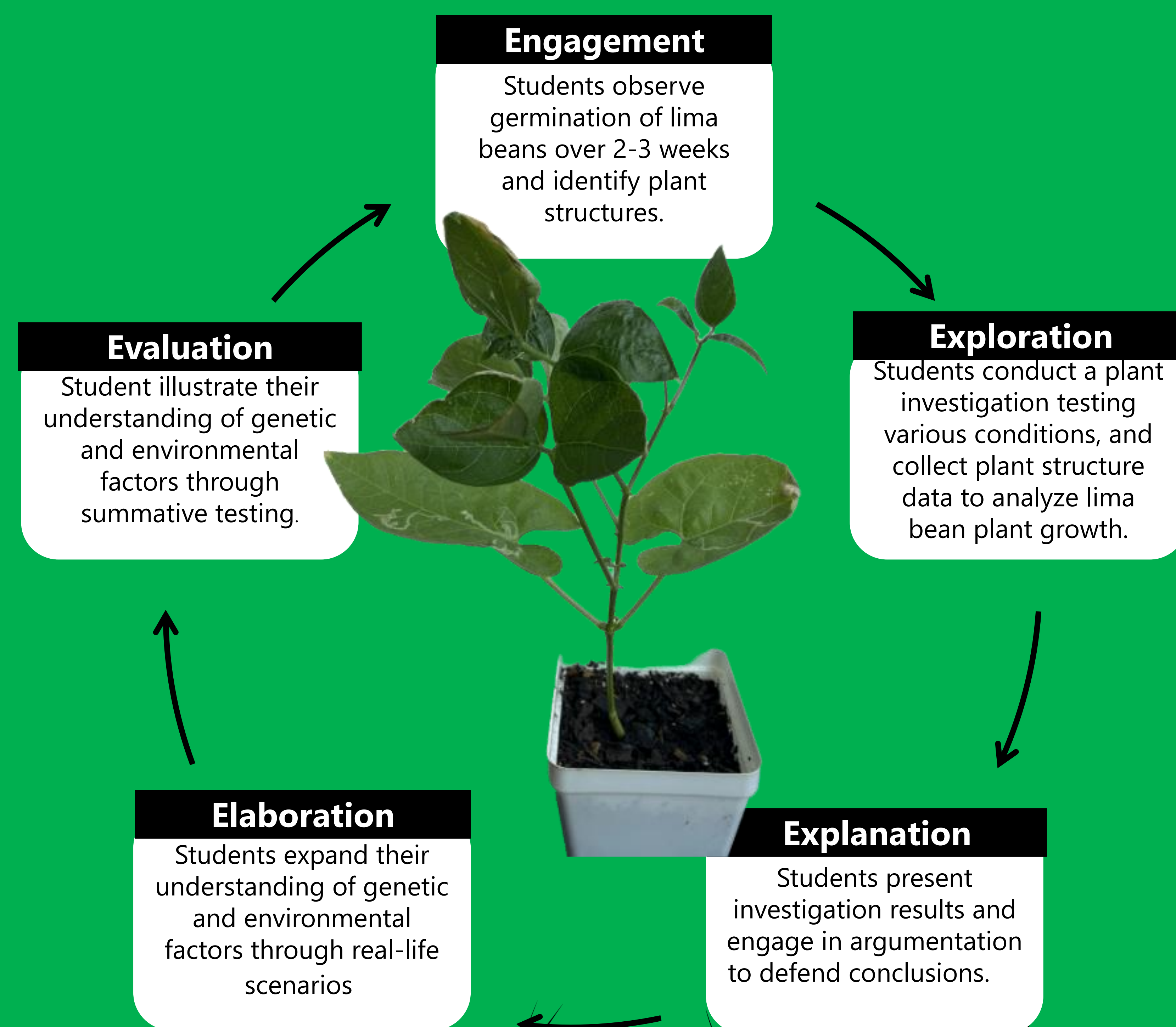
Middle School 5E Lesson Plan

“Life’s Challenges: Growth of Organisms Under Various Conditions”

NGSS: MS-LS1. From Molecules to Organisms Structure and Processes

Performance Expectation: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms

Purpose: Students investigate how organism growth is influenced by genetic and environmental factors.



Results

Hypothesis Test Summary			
Trait	Test	Significance	Decision
Medians of Day of Heading	Independent – Samples Median Test	0.026	Reject the null hypothesis
Medians of Culm Height	Independent – Samples Median Test	0.37	Retain the null hypothesis
Median of Number of Tillers at Flowering	Independent – Samples Median Test	0.261	Retain the null hypothesis
Medians of Days to Primary Branch	Independent – Samples Median Test	0.676	Retain the null hypothesis

Table 1: Wilcoxon Rank Test (significance level of $p \leq 0.05$) of difference in medians of selected traits between mutant #4 and mutant #5 population.

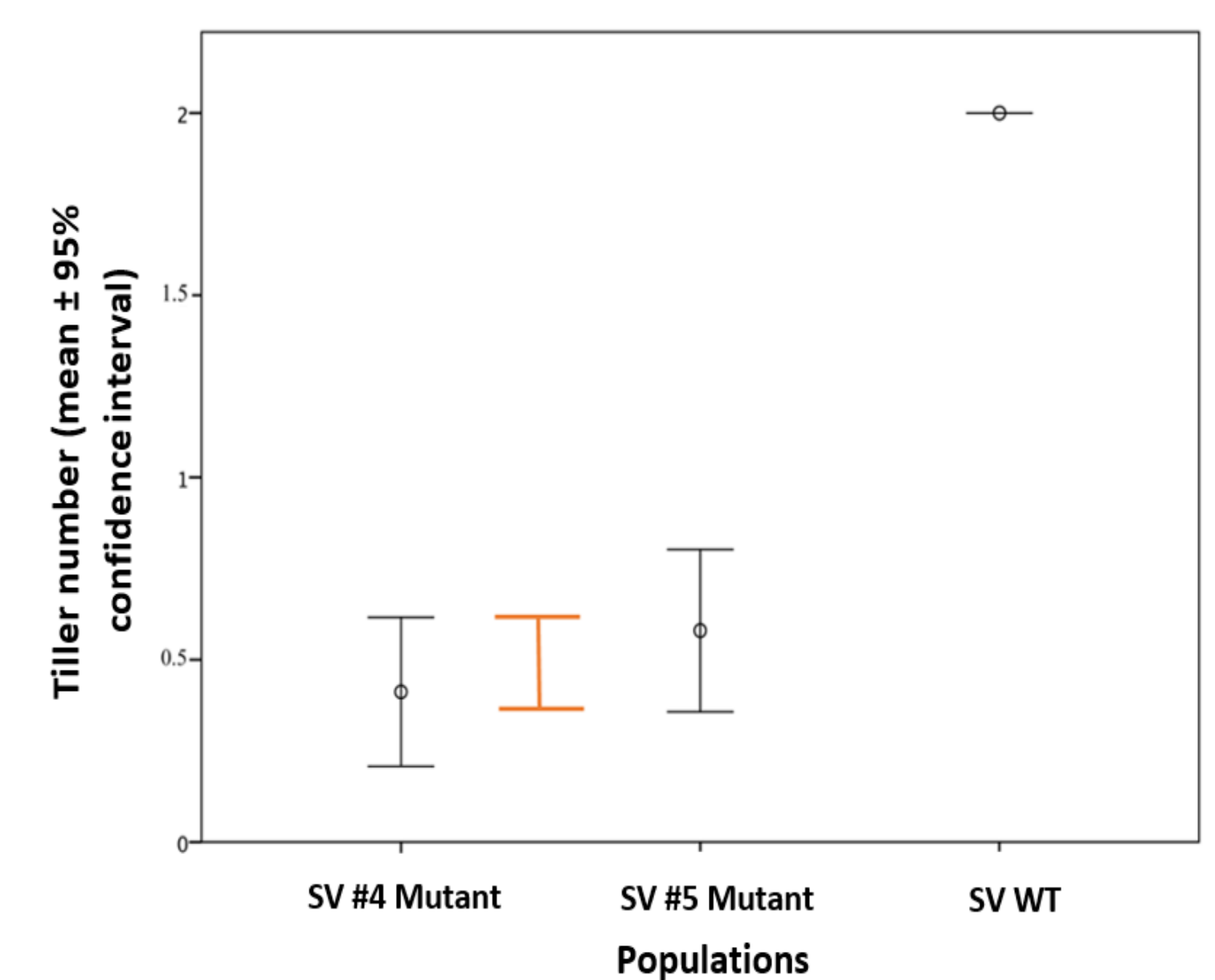


Figure 1: Tillers number at flowering for mutant #4, mutant #5, and wild-type populations. Orange bar indicates overlap in mutant values

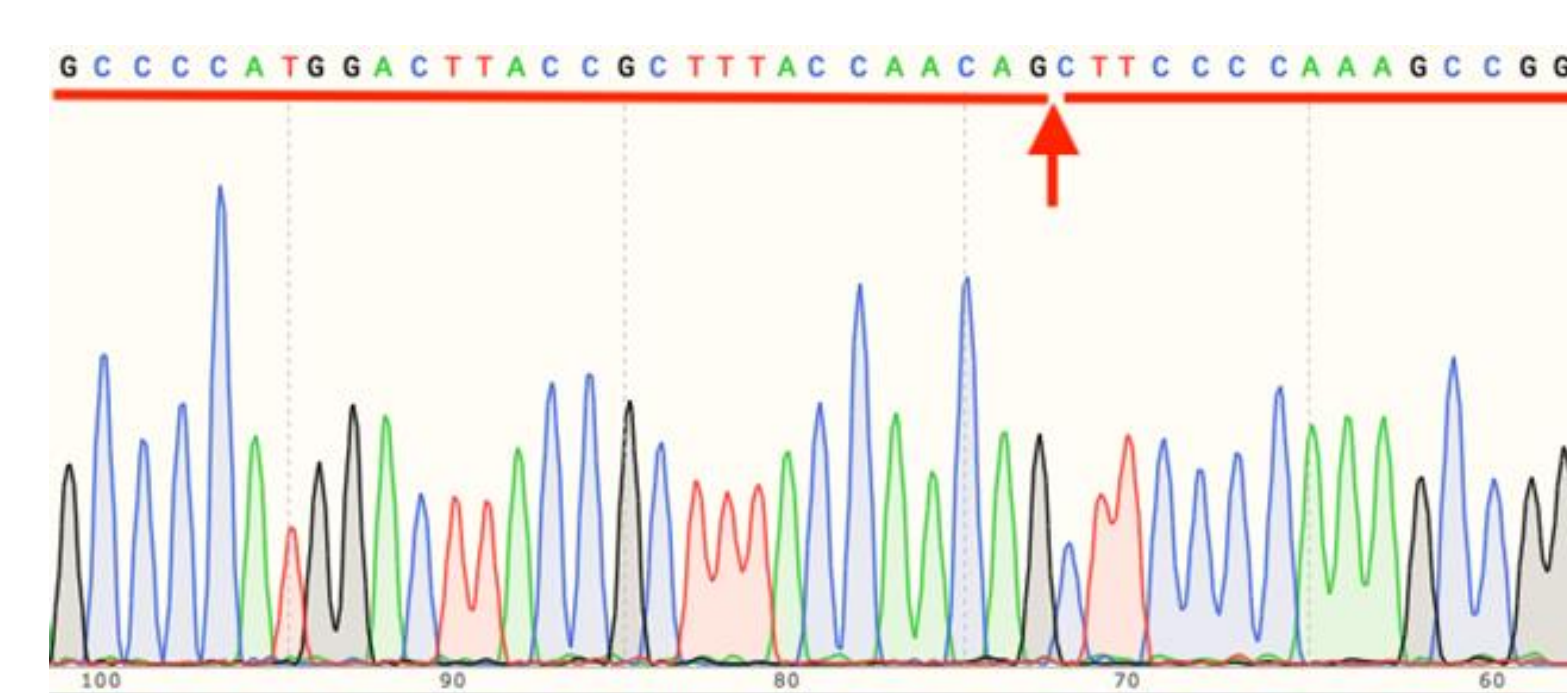


Figure 2: Chromatogram of TB1 mutant. Gap (arrow) indicates start of 16bp deletion mutation.



Figure 3: Nucleotide sequence of homozygous TB1 mutants. Arrow in TB1 sequence indicates start of 16bp deletion. Orange line shows altered amino acid sequence due to deletion. Circled TGA codon represents premature stop codon.