

Fine Mapping and Characterization of the *tassel-less4 (tls4)* Mutant in Maize



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Project Objective

To understand how *tls4* is involved in maize development and to study the function of auxin relative to how it interacts with *tls4* in mutant plants

Characterization of *tls4* Phenotype



Figure 1: The primary phenotype of *tls4* is the defects in the tassel or male inflorescence which is smaller and has fewer branches than a normal tassel.
Figure 2: *tls4* is also a dwarf mutant with fewer internodes that are shorter than normal and narrower leaves than normal maize.

Candidate Genes

Gene Number	Arabidopsis	Function
Zm00001d053853	AT1G74320	Choline and ethanolamine synthesis
Zm00001d053855	ATWHY2	DNA metabolism and repair
Zm00001d053856	SETH3	Carbohydrate metabolism
Zm00001d053857	CPN60	Chaperone protein
Zm00001d053858	EHD1	GTP binding, endocytosis
Zm00001d053859	ERF4	Ethylene responsive binding factor

There are six remaining genes in the mapping region with the hypothesized candidate gene being *ZmEHD1*.

tls4:bif2 SEM Analysis



Figure 6: Scanning electron microscopy (SEM) was performed on the immature tassels which was found to coincide with the phenotype of the mature tassel phenotype.

tls4;bif2 Double Mutant Analysis

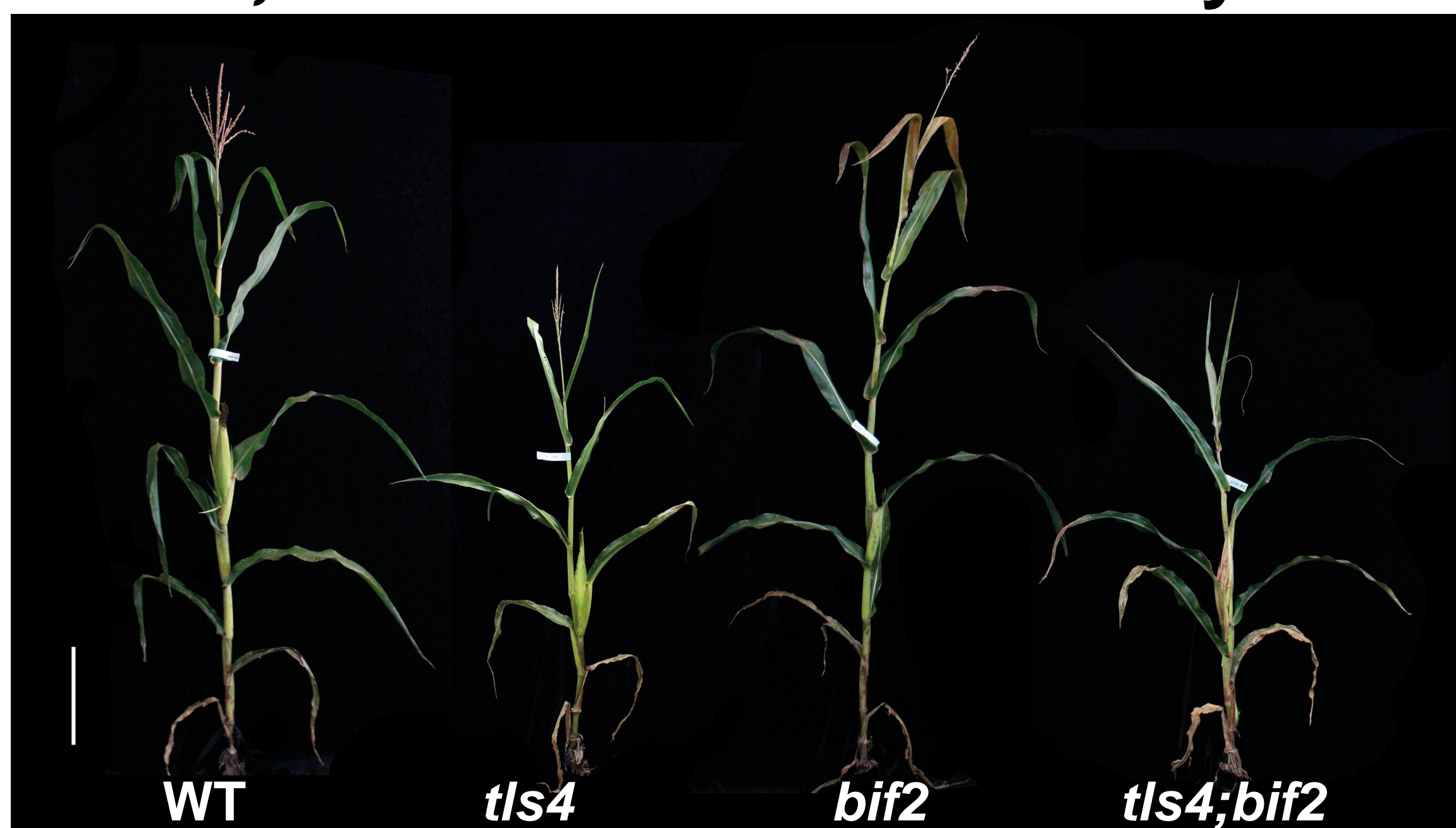


Figure 4: The vegetative phenotype of the double mutants is the same as the phenotype of the *tls4* single mutant.
Figure 5: The tassel phenotype of the double mutant has a synergistic interaction which results in a phenotype much more severe than either of the single mutants.

Conclusions

- From these results we can conclude that:
- The causative gene for *tls4* is located on a 200 kb pair region on chromosome 4
 - The causative gene for *tls4* is hypothesized to be *ZmEHD1*
 - *tls4* and *bif2* have a synergistic interaction in regards to tassel phenotype
 - *tls4* functions in auxin transport

Future Work

- Future work for this research includes
- Identification of a second allele
 - *ZmEHD1* Mutator insertion genotyping
 - Double mutant analyses
 - Auxin biosynthesis mutants
 - Confocal microscopy of reporter lines
 - *ZmPIN1*-YFP (Auxin Transport)
 - DR5-RFP (Auxin Signaling)

Acknowledgements



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Fine Mapping Results

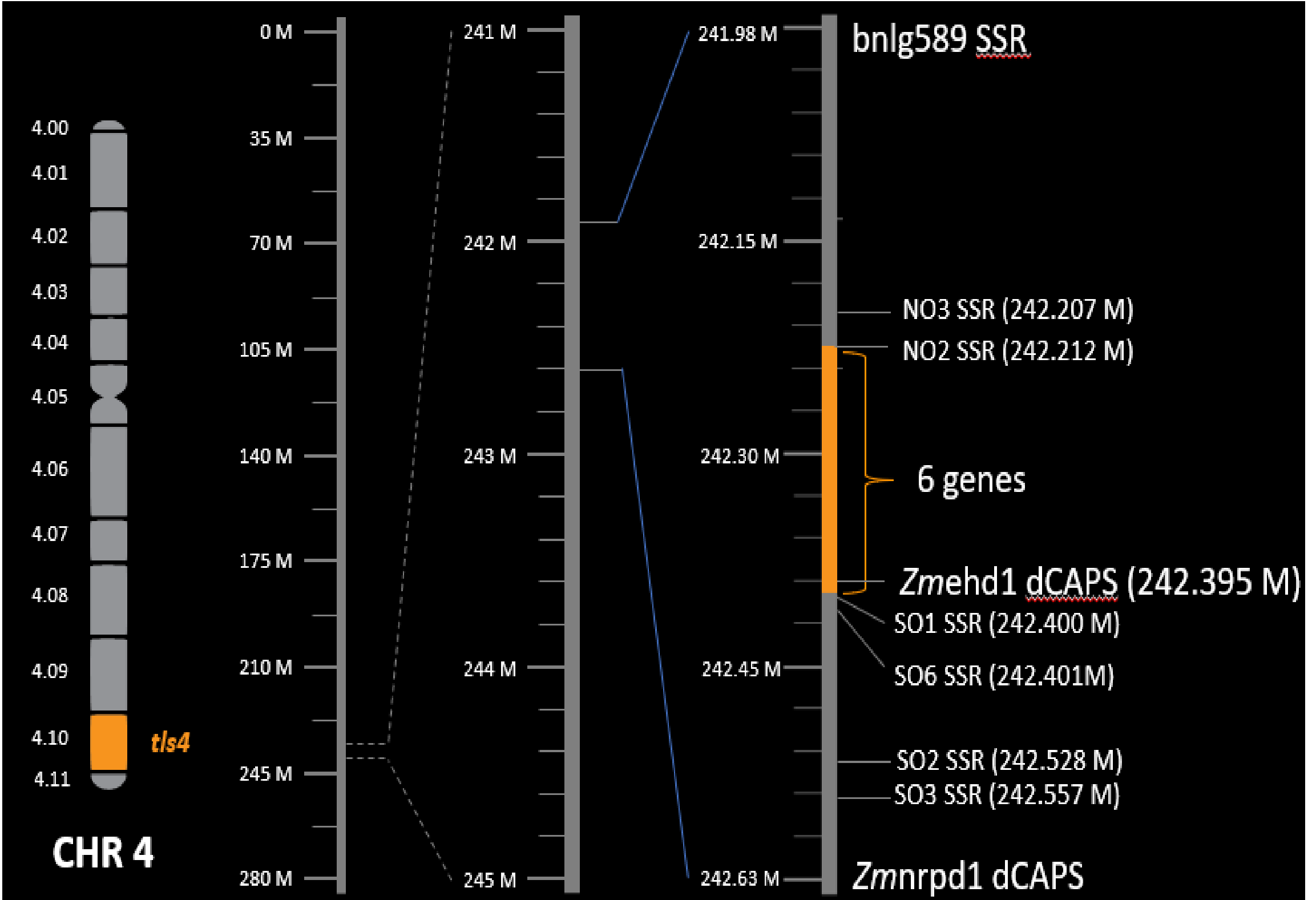


Figure 3: The location of the causative gene for *tls4* has been narrowed to a 200 kb region on the long arm of chromosome 4 through the use of Simple Sequence Repeat (SSR) markers.