

Genetics of the compact growth habit trait

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Compact growth habit in tomatoes?

Tomatoes with a determinate plant type, shortened internodes and spreading characteristics of side branching

Fruits above the ground without the requirement of typical manual practices



Primary goals of plant breeding have aimed at improved traits of commercial value.

***Introgression** of one or a few genes (traits) into a current elite cultivar (breeding line) is a common plant breeding practice.*

*Let's focus on methods for "**introgression**".*

Method 1. Crossing



Method 2. Tissue culture



Method 3. Genome engineering technologies



	Crossing	Editing genes
Changes in genetic background	High (Whole genome)	Low (very precisely)
The length of time necessary to complete	Years (on breeders)	Yet, requires cycle(s)
Technical limitation	Not favorable for wild relatives	Currently, inactivation of gene(s)



*How **new technologies** positively impact the breeding paradigm for breeders to **introgress the compact growth habit trait**?*

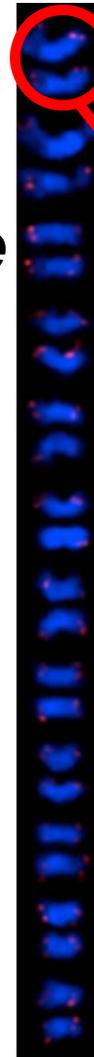
*A better understanding of **genetic information** about the trait is crucial.*

Genetic information \approx gene(s)

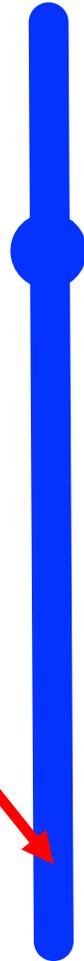
A gene or cluster of genes make phenotype(s).

Tomato has approximately 35,000 genes.

~35,000 genes are here



*Mapping,
Sequencing,
Alignment &
Asssembly*



Chromosome 1

Tomato chromosome view

Genetic information (Gene)

Gene

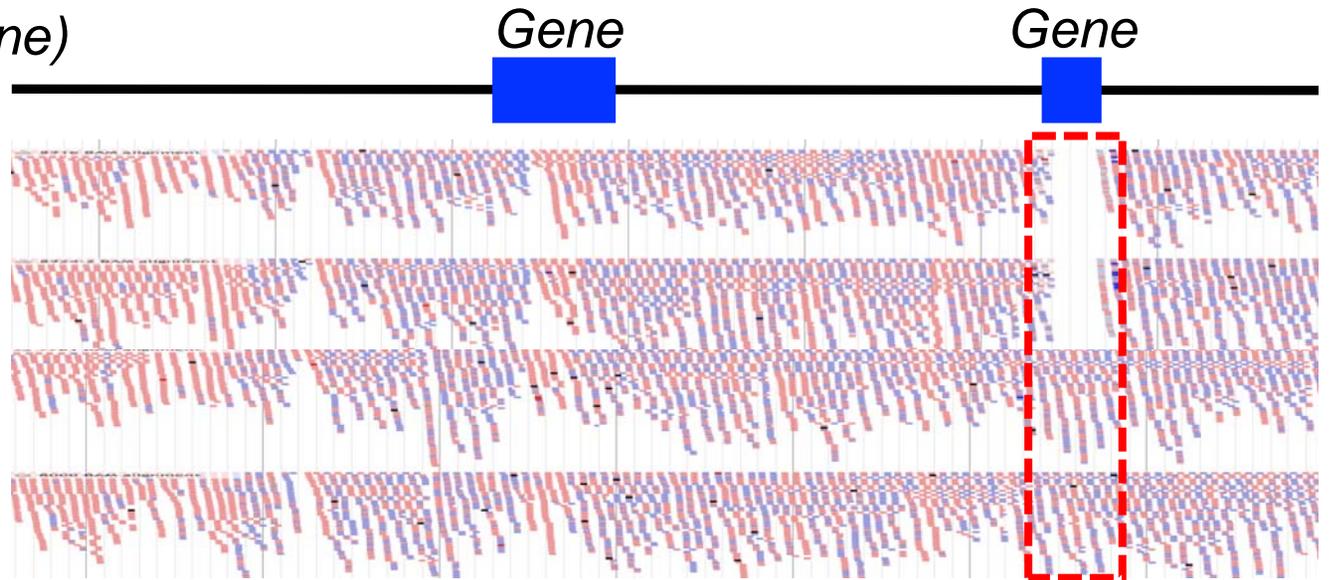
Gene

Compact Growth Habit 1

Compact Growth Habit 2

Normal plant 1

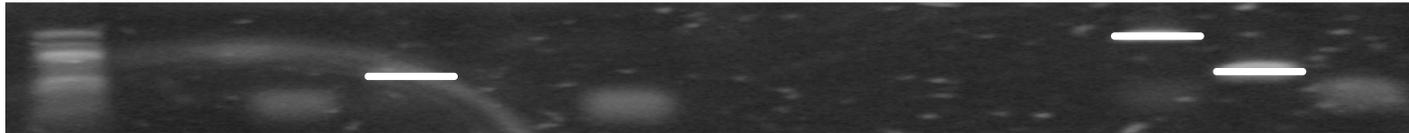
Normal plant 2



New sources of the compact growth habit trait?

S. lycopersicum accessions with morphology data

#1 #2 #3 #4 #5 #6 #7 #8 #9



Heinz 1706
Our compact growth habit plant
Negative control

Future works

1. Identification of gene(s) mediate the trait
2. Integration of recent advances in genome engineering technologies
3. Provide basic information about genetic diversity

ARTICLE

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Correction of a pathogenic gene mutation in human embryos

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Health and science reporter, BBC News website

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The common white button mushroom to resist browning by Penn State:
Cultivated and sold without oversight by the US Department of Agriculture



The waxy corn by DuPont Pioneer

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