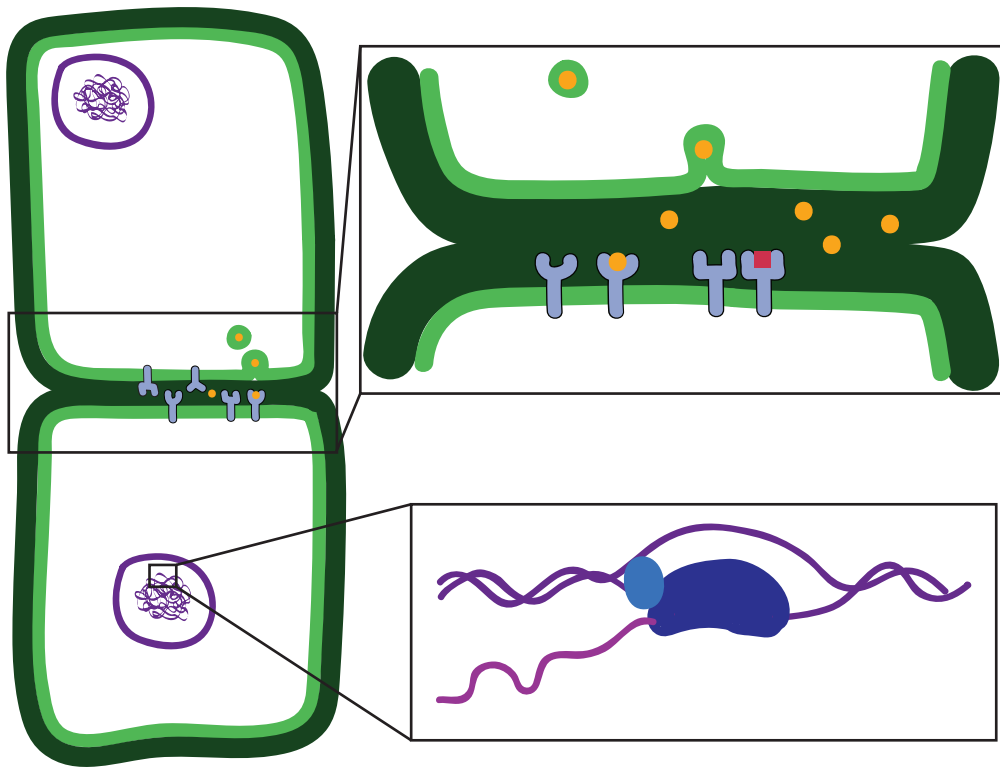




## How cells communicate - and what it means for agriculture



- ① Cell A produces a **signal molecule** (●) and sends it out to the neighboring cells.
- ② Cell B has **receptors** (Y) on its borders that can recognize the right signal.
- ③ When the signal is recognized, the **receptor** starts a process that affects **gene expression** in the receiving cell.

### ① Signal - CLE7/FCP1 ●

CLE7 and FCP1 are **signal molecules** that tell cells in developing ears to stop dividing. When plants have mutations in these genes, their cells don't stop dividing, and their ears end up bigger.



### ② Receptor - TD1 Y

Cells in developing ears have a **receptor** called TD1. When plants have a mutation in the *TD1* gene, they can't hear the "slow down" signals, and grow bigger ears.



### ③ Gene Expression - FEA4

Mutations in another gene, *FEA4*, also make plants with larger ears. *FEA4* is one of the proteins that turns on **gene expression** in developing ears. This ultimately results in altered cell division and growth patterns.



## What this means for agriculture

While big changes in these signaling genes can be bad for yield, moderate or mild changes may increase yield. Changing the strength of what a plant is "saying", changing how well they can "hear" it, or how much the plant cells act on those signals can all make a bigger ear with more kernels. Research on how best to variation in these signals can increase yield is ongoing.

# Glossary

<b>Signal Molecule</b>	A molecule that carries information between cells, by binding to receptors on the outside of the signal-receiving cells.
<b>Receptor</b>	A specialized structure on the outside of cells that receives signal molecules. Typically, particular receptors only recognize certain signal molecules.
<b>Gene Expression</b>	The process by which genes are turned on, often this involves making a protein from the DNA sequence of the gene.
<b>Meristem</b>	The region of actively dividing and growing cells within a plant.
<b>Wildtype</b>	The allele found in the “normal” plant, and the phenotype expected when you have two copies of this allele.
<b>Mutant</b>	A change in the DNA sequence of an allele, and the phenotype expected when you have two copies of this allele.
<b>Selection</b>	The process of removing poor alleles from the gene pool while promoting strong alleles coding for advantageous traits. This can be natural or human-mediated.
<b>Domestication</b>	The process of selecting for a suite of traits beneficial to humans that turned plants from wild species into crops.
<b>Improvement</b>	The process of breeding crops with specific traits to improve performance in the field.
<b>Teosinte</b>	The wild ancestor of maize from the highlands of Mexico. It was much bushier, and had harder seed coats with fewer seeds per cob.