



Plants of Tomorrow



a Bacteria



DNA Fingerprinting



Cloning: Ethical Issues and Future Consequences



The HC70AL Team

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.....And by Using Breeding and Genetic Engineering to Introduce These "Yield" Genes Into Existing Crops



Major Challenges For 21st Century Agriculture Increase Crop Yield To Provide More Food And Save/Create More Open Space (#1 Priority) Reduce Inputs Required For Growing Crops (e.g., water, fertilizer) -- A Sustainable Agriculture Reduce Environmental Impacts of Intensive Agriculture(e.g., pesticides) Optimize Crops For Human Health and Nutrition Use Crops as Factories For Specialized Industrial and Pharmaceutical Applications (e.g., vaccines) Facilitate the Conversion From a Petroleum-Based Energy System to a Dedicated Plant-Based Renewable Energy System (e.g., cellulose to ethanol) Help Reduce CO₂ Emissions and Mitigate Effects of Climate Change (e.g., switch from coal to biomass)

Plant Genome Projects and Identifying Novel New Traits Can Help Meet These Challenges!















Most Importantly..... Our Food is Derived From Fourteen Crops & <u>Over Half</u> Produce Seeds For Human and Animal Consumption



• Wheat

• Rice

• Corn

· Barley

• Sorghum

• Soybean

• Common Bean

• Coconut

Non-Seed Crops

- Potato
- Sweet Potato
- Cassava
- Sugar Beet
- Sugar Cane
- Banana

In Some World Populations 75% of Calories Are Derived From Seeds!









Ultimate Goal..... To Uncover Regulatory Genes and Circuits Driving Seed Differentiation and Development Using Genomics























Plant Embryo Development





































SignAL "T-DNA Express" Arabidopsis Gene Mapping Tool (Dec.20, 2004) Arabidopsis thaliana chromosome 1, nucleotide pairs 1 through 10,001.											
						Genes:		At1g01010	→	At1g0	¹⁰²⁰ — — —
						T-DNA and transpo respicession active contract stude contract Key: SALK T-DNA	OSON INSERTIONS: SALK_007276 SALK_005597 SAIL_672. DO: PLAG_299C12 GABI.001A08 GABI.534H0- PLAG_299D01 GABI.269H03		SAIL_1267_F05 SAIL_1267_F05 Ratm SALK SALK SALK RATM11-4514-1_H SALK	4	SALK_116014 GABL.86 SALL_32_C09 SALK_090151 SALK_090152 SALK_090152











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HC70AL Spring 2011 Gene Discovery Laboratory

What Are the Genes Required to Make a Seed?

Approach?

Gene To Mutant To Phenotype!!









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What Will You Do This Quarter?

 Study Two Arabidopsis TF Genes
 Look For Mutants in KOs of These Genes
 Sequence and Clone the "Switch" of One TF Gene

4. Study the Expression of the TF Genes

