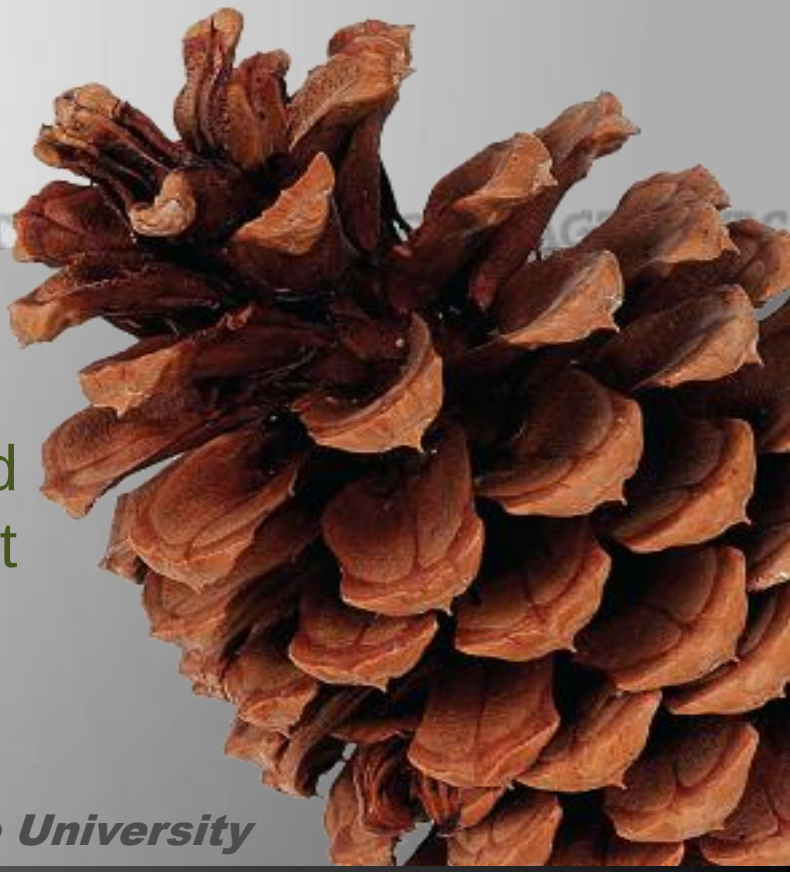
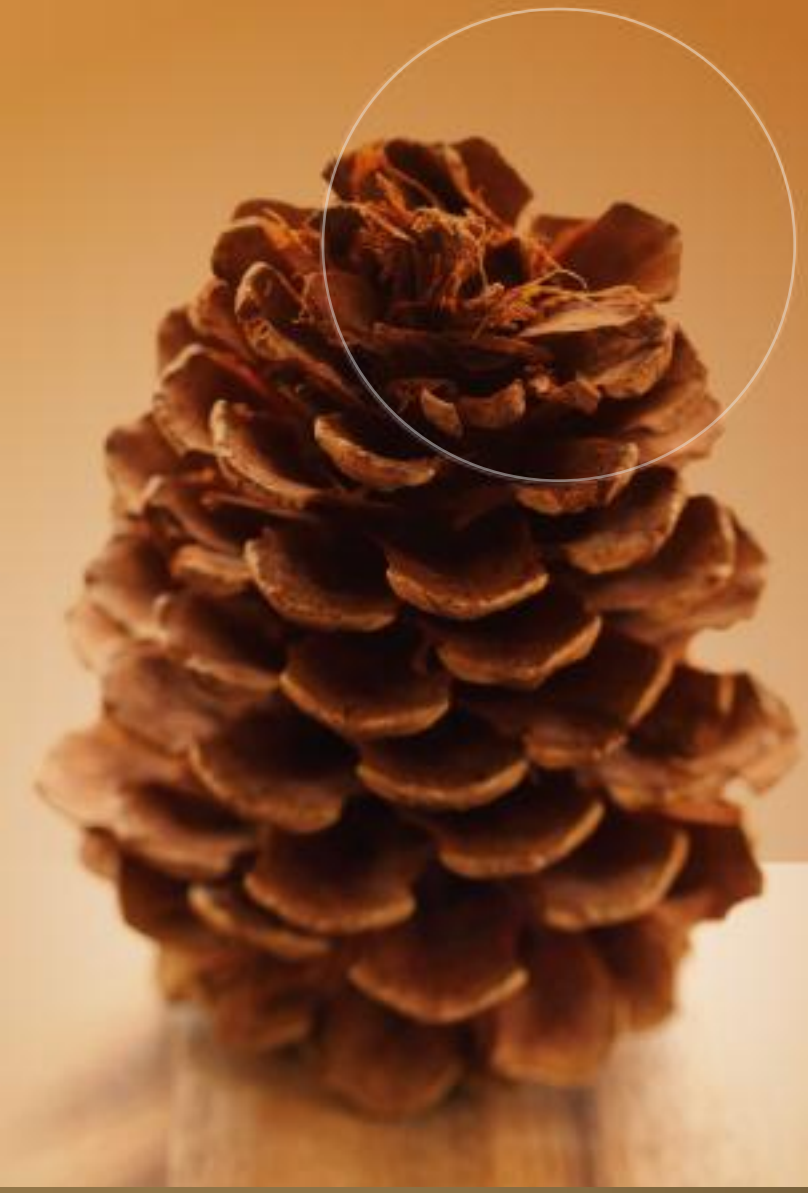
Conifer Translational Genomics Network
Coordinated Agricultural Project



Genomics in Tree Breeding and Forest Ecosystem Management

Module 1 - Introduction

Nicholas Wheeler & David Harry – Oregon State University



The Conifer Translational Genomics Network (CTGN) Coordinated Agricultural Project is a multi-state, multi-institution project, funded by USDA/NIFA and the USDA Forest Service. CTGN will deliver genomic assisted breeding by linking laboratory and field research with education and extension. A comprehensive education and extension program will provide widespread training for post-doctoral researchers, graduate and undergraduate students, tree breeders, gene resource managers, stakeholders, and the general public.

What is CTGN CAP?

CTGN CAP

	UC Davis	Texas A&M	UF	NCSU	OSU	USFS
	David Neale, PD Jill Wegrzyn Patrick McGuire	Tom Byram	Dudley Huber	Steve McKeand Ross Whetten Fikret Isik	Glenn Howe Nicholas Wheeler	Dana Nelson (SIFG) Brad St. Clair (PNW)
Objective 1a Validate Associations: Population Selections, Tissue Sampling, DNA Extraction	DNA Extraction SNP Genotyping Data Cleaning and Distribution	Loblolly Pine - Western Range	Slash Pine and Interspecific Hybrids Between Slash and Loblolly Pines	Loblolly Pine - Eastern Range	Douglas-Fir	
Objective 1b Validate Associations: Phenotyping and Association Analyses		Growth, Wood Properties, Disease Incidence	Wood Properties, Growth, Fusiform Rust Incidence, Markers Also Used For Informed Backcross Breeding	Wood Properties, Growth, Disease Incidence, Stem Quality, Crown Traits	Growth, Wood Properties	
Objective 2 Identify and Evaluate MIB Methods		Economic Modeling (Simetar)		Genetic Gain Modeling MAS Applications	Optimizing Genotyping Strategies, Developing Analytical Approaches for Combining Association and Linkage Analyses to Improve QTL Detection	
Objective 3 Develop Data Bases and Web-based Bioinformatic Tools	Integrated Genomic and Phenotypic Data Pipelines, Storage and Retrieval	Phenotypic Data Collection	Phenotypic Data Collection	Phenotypic Data Collection	Phenotypic Data Collection	
Objective 4 Establish Genetic Stock Center	DNA Stock Center					Clonal Plant Archives
Objective 5 Develop Education and Curriculum Materials	Teaching	Teaching	Teaching	Teaching	Primary Content Development & Delivery: Shortcourses, Teaching Modules, Teaching	Teaching
Objective 6 Develop and Deliver Extension Materials	Content Development and Delivery	Content Development and Delivery	Content Development and Delivery	Content Development and Delivery	Primary Content Development & Delivery: Education and Extension Evaluation	Content Development and Delivery

CTGN project goals

- Develop marker-based breeding applications for US tree breeding cooperatives
- Develop fundamental knowledge of genes and alleles that will inform gene resource management decisions regarding adaptive traits (assisted migration, genetic response to climate change)
- Deliver findings through educational and extension venues

Course objectives

- Provide a comprehensive introduction to the use of genomic tools in forest tree breeding and forest ecosystem management
- Provide the tools, resources, and contact information required to pursue more in-depth understanding of topics delivered in a set of theme based modules

Course approach

- Modules will be delivered in multiple formats:
  - *PowerPoint® slides presented in topical modules (~30 pages) with note-page content*
  - *As online content with voice-over dictation of note-page content*
- These materials are intended to serve as the basis for self-directed university courses or as supplemental materials for lecture based classes

Course content

Foundation modules

- Module 1: Introduction
- Module 2: Genes, genomes, and Mendel
- Module 3: Population genetics
- Module 4: Quantitative genetics
- Module 5: Conventional tree breeding and provenance testing
- Module 6: Genetic markers

Course content - continued

Genetic dissection of complex traits

- Module 7: Measuring, organizing, and interpreting marker variation
- Module 8: Genetic mapping
- Module 9: Mapping Quantitative Trait Loci (QTL)
- Module 10: Linkage disequilibrium
- Module 11: Association genetics

Course content - continued

Marker Informed Breeding and other marker applications

- Module 12: Marker Informed Breeding (MIB): Program management
- Module 13: MIB: Association discovery and evaluation
- Module 14: Using markers to predict breeding values
- Module 15: Genomic selection
- Module 16: Landscape genomics

External Link

- The Conifer Translation Genomics Network [Online]. Dendrome: A forest tree genome database. Available at: http://dendrome.ucdavis.edu/ctgn/ (verified 22 Feb 2011).

Thank You.

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CTGN CAP

UCDAVIS

USDA

United States
Department of
Agriculture

National Institute
of Food and
Agriculture