TreeGenes & Tripal



treegenesdb.org

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TreeGenes Database: History

- Began as the Dendrome project (USDA funded initiative) in 1993 to hold forest tree genetic maps and associated markers
- One of the 1st UDSA funded databases on the internet
- Schema has been changing and evolving ever since



TreeGenes Database: History

- Began to hold forest tree genetic maps and associated markers
- Expanded to other data types
 - Sequence
 - Resequencing, Large-Scale Genotyping, Transcriptomics/Expression
 - Full Genome Sequences
 - Analysis and Visualization Tools
 - Ability for users to mine the data
 - Resources for the user community
 - Literature, Colleagues



TreeGenes Database: Users

treegenesdb.org

2,086 users from 862 organizations in 94

countries

10,000 -

Unique Web Visitors to TreeGenes Database per month, January-December

TreeGenes Database: Species

- 1,774 species from 101 genera
 - At least one genetic artifact from each species
 - Conifers but is also inclusive of all forest trees
- Full genome sequence: 13 species
- Transcriptome/Expression resources: 3,920,817 sequences from 263 species
- 106 genetic maps from 35 species

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Automated scripts

- Primary databases such as NCBI
- Appropriate data should be submitted to primary databases first

User submissions

• For data and metadata not captured well by primary databases

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Automated scripts

- NCBI
 - Transcripts, Protein, Unigene
 Databases
 - Linked to literature records, etc.
 - Incorporated into visualization tools
- Literature
 - Web of Science, PubMed

NCBI - <PubmedArticleSet> - <PubmedArticle> - <MedlineCitation Owner="NLM" Status="PubMed-not-MEDLINE"> <PMID Version="1">25202539</PMID> - <DateCreated> <Year>2014</Year> <Month>09</Month> <Dav>09</Dav> </DateCreated> - <DateCompleted> <Year>2014</Year> <Month>09</Month> <Dav>09</Dav> </DateCompleted> - <DateRevised> <Year>2014</Year> <Month>09</Month> <Day>12</Day> </DateRevised> - <Article PubModel="Electronic-eCollection"> - < Iournal> <ISSN IssnType="Electronic">2168-0450</ISSN> - <JournalIssue CitedMedium="Print"> <Volume>1</Volume> <Issue>4</Issue> - <PubDate> <Year>2013</Year> <Month>Apr</Month> </PubDate> </JournalIssue> <Title>Applications in plant sciences</Title> <ISOAbbreviation>Appl Plant Sci</ISOAbbreviation> </Journal> - <ArticleTitle> Application of proteomics to the study of pollination drops </ArticleTitle> - <Pagination> <MedlinePgn/> </Pagination> <ELocationID EIdType="doi" ValidYN="Y">10.3732/app <ELocationID EIdType="pii" ValidYN="Y">apps.1300003 – <Abstract> <AbstractText Label="UNLABELLED">•</AbstractTe - <AbstractText Label="PREMISE OF THE STUDY" NIR Pollination drops are a formative component in gymnos sexual reproduction. • </AbstractText>

 - <AbstractText Label="METHODS" NlmCategory="ME Pollination drops were sampled from eight gymnosperm invited benchmarked.

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User submissions

- Internal projects or collaborations (day one)
- Submissions of data post-analysis at publication time

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User submissions

TGAD Accession Request Form			
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Submit genetic maps, association or population study data

Most submissions from journal requirement: Tree Genetics and Genomes

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User submissions

Genetic maps, association or population studies

TGAD Accession Request Form		
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8/5/2011	TGDR001	Association genetics of traits controlling lignin and cellulose biosynthesis in black cottonwood (Populus trichocarpa, Salicaceae) secondary xylem.	Populus trichocarpa	Total Sites: 1 Total Samples: 480 Total Gendypes: 419520 Total AFLP Markers: 0 Total SNP Markers: 0 Total SNP Markers: 0 Total SSR Markers: 0 Total SSR Markers: 0 Total Phenotypes: 1344 Total Environmentals (per sample): 0 Total Environmentals (per site): 0	Covariate Data (Population Struc Genotype Data (SNP) GPS Data Haplotype Data Phenotype Data Phenotype Definitions
9/25/2012	TGDR002	Astonishingly low genetic variation in Quercus acutissima, an important tree species in Satoyama, a traditional Japanese rural forest and agricultural landscape, revealed by chloroplast microsatellite markers	Quercus acutissima	Total Sites: 59 Total Samples: 2152 Total Genotypes: 12912 Total AFLP Markers: 0 Total SIN Markers: 0 Total cpSSR Markers: 6 Total SSR Markers: 0 Total Provident Site (per sample): 0 Total Environmentals (per sample): 0 Total Environmentals (per site): 0	Genotype Data (cpSSR) GPS Data Haplotype Data Supplemental Data
11/5/2012	TGDR003	Extensive selfing in an endangered population of Pinus parviflora var. parviflora var. (Pinaceae) in the Boso Hills, Japan	Pinus parviflora	Total Sites: 2 Total Samples: 116 Total Gendypes: 464 Total AFLP Markers: 0 Total RAPD Markers: 0 Total SRM Markers: 0 Total SRM Markers: 4 Total SRM Markers: 4 Total Phenotypes: 0 Total Environmentals (per sample): 0 Total Environmentals (per site): 0	Genotype Data (SSR) GPS Data Supplemental Data Supplemental Data Supplemental Data Supplemental Data
11/14/2012	TGDR004	Pollen dispersal and fine-scale spatial genetic structure of Dryobalanops lanceolata in a Bornean rain forest	Dryobalanops lanceolata	Total Sites: 1 Total Samples: 858 Total Genotypes: 13728 Total AFLP Markers: 0 Total SNP Markers: 0 Total SNP Markers: 0 Total CSNP Markers: 0	Environmental Metric Data Environmental Metric Definitions Genotype Data (SSR)

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Obtain TGDR accession number!

TreeGenes Data Repository

A listing of data submissions is displayed below. To submit data to TreeGenes, click here.

Date	Accession	Paper Title	Species	Data Statistics	Data Files
8/5/2011	TGDR001	Association genetics of traits controlling lignin and cellulose biosynthesis in black cottonwood (Populus trichocarpa, Salicaceae) secondary xylem.	Populus trichocarpa	Total Sites: 1 Total Samples: 480 Total Genotypes: 419520 Total AFLP Markers: 0 Total RAPD Markers: 0 Total SNP Markers: 874 Total cpSSR Markers: 0 Total SSR Markers: 0 Total SPhenotypes: 1344 Total Environmentals (per sample): 0 Total Environmentals (per sample): 0	Covariate Data (Population Structure) Genotype Data (SNP) GPS Data Haplotype Data Phenotype Data Phenotype Definitions
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Will be converted to Tripal module and made available to the community

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Data Files

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Phenotype Data Phenotype Definitions

Genotype Data (cpSSR) GPS Data Haplotype Data Supplemental Data

Covariate Data (Population Structure) Genotype Data (SNP) GPS Data Haplotype Data

TreeGenes Database: Data Access

treegenesdb.org

Tools

- Existing viewers
- Custom development

TreeGenes Database: Interfaces



TreeGenes Database: Interfaces

treegenesdb.org

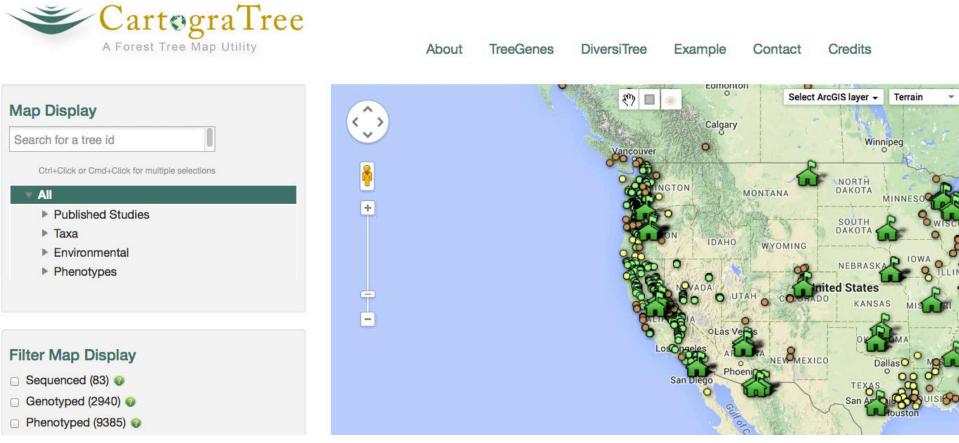
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DiversiTree – Bulk retrieval of resequencing data, genotypes, and phenotypes

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InterP	ro Term:		cg50336	CL4575Contig1	Pinus taeda (Loblolly Pine)	copper ion binding Yes Yes
	(Ex: Lipid)		cg50472	CL4726Contig1	Pinus taeda (Loblolly Pine)	copper ion binding Yes Yes
			cg50688	CL569Contig1	Pinus taeda (Loblolly Pine)	copper ion binding Yes Yes
	Enzyme:					Sswap.info
	(Ex: ATP)					
Mark al	species of interest:					
	Select: ALL NONE					
	Abies alba					
	Abies concolor					
☑	Calocedrus decurrens					
	Cedrus deodara					

TreeGenes Database: Interfaces

treegenesdb.org



Providing context to geo-referenced data
 Data from TreeGenes, WorldClim, Ameriflux, TRY-db

TreeGenes Database: Transition to Tripal

treegenesdb.org

Transition to Tripal and Chado

Challenges

- Ontologies
- Standardizing for the first time
 - 25 years of custom schemas!

Transition to Tripal

treegenesdb.org

Transition to Tripal and Chado

Advantages

- Ontologies
- Save time!
- Connect data with other databases (Tripal Gateway)
- Improve analytical capabilities (Tripal Gateway)
 - Our contribution: analytical workflows
- Review & clean up database

TreeGenes Database: Transition to Tripal

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Outcomes

–Expanded datasets: access Hardwood Genomics, GDR, TreeGenes from one location

-Expanded analytical, HPC resources

•Improve CartograTree capabilities

-New Tripal module: user submission

TreeGenes Database: Team

treegenesdb.org

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Project Leads Jill Wegrzyn *University of Connecticut* David Neale

Lead Database Administrator Emily Grau P0322 Development TeamSteven A Demurjian JrP0383Hans Vasquez-Gross

Advising Damian Gessler Semantic Options

TreeGenes
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