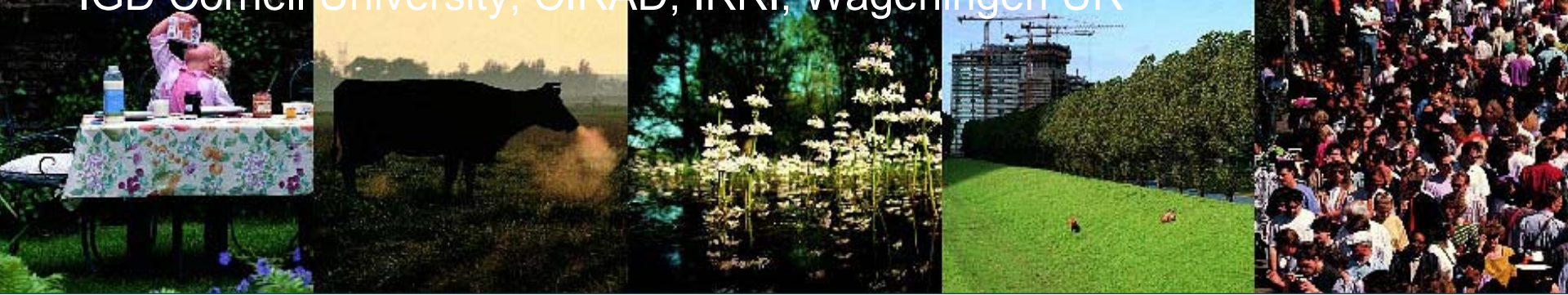


# Gathering and development of training materials & design of course curricula

Rome, 30 September, 2005

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IGD Cornell University, CIRAD, IRRI, Wageningen UR



# Introduction

- Choice of topics
- Update on different projects - different projects, different approaches
- From training materials to course curricula
- Suggestions?

# Topics

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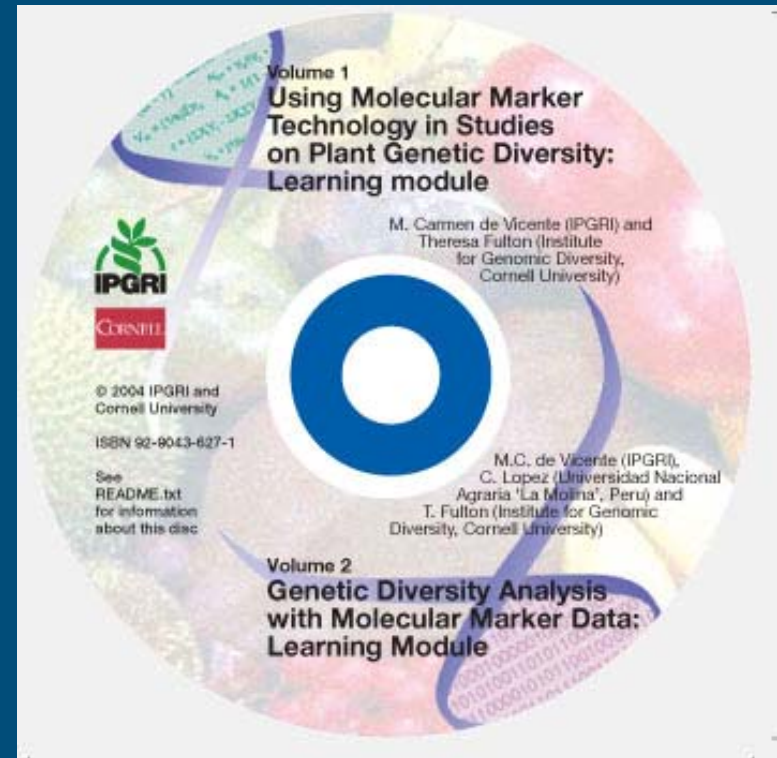
- Genomics and comparative genomics
- Genetic diversity analysis of germplasm
- Bioinformatics
- Marker-assisted selection and breeding

# Genomics and comparative genomics

- **By:** Theresa Fulton – Institute for Genomic Diversity at Cornell University
- **For:** global scientists in developing countries
- **Objective:** update on genomics and comparative genomics; how to benefit from the application in the field of plant breeding and crop improvement
  - Comparative Genomics helps us:
    - gain better understanding of how species have evolved and how they are related
    - determine the functions of genes
    - take advantage of information from other organisms

# Genomics and comparative genomics

- **Approach:** project follows up on, and will use the same format as two previously developed learning modules by Cornell University and IPGRI



# Genomics and comparative genomics

- **Training materials:** power points presentation format with definition of terms, illustrations of concepts, photographs, real-life examples, appropriate applications, lists of key references, and other items
- **Curriculum:** self-tutorial or two-week course

# Genomics and comparative genomics

## TOPICS INCLUDE:

- Key definitions
  - Approaches and methods of comparing genomes
  - Potential and limitations
  - Levels of looking at conservation (ie. gene order, gene content)
  - DNA sequence comparisons
  - Uses and applications of comparative genomics
  - Examples
- with emphasis on practical applications

# Genetic diversity analysis of germplasm

- **By:** Christian Poisson – CIRAD
- **For:** plant breeding researchers/ research program managers
- **Objective:** how can genome analysis tools be used to characterize and structure genetic resources more efficiently
- **Training materials:** power point modules
- **Curriculum:** 2 weeks course with presentations, demonstrations and practicals

# Genetic diversity analysis of germplasm

## TOPICS:

- DNA biology
- Genetic basis
- Phenotypic diversity
- Molecular marker concept
- DNA libraries
- Genetic diversity
- Implications for management of GR
- Supports for laboratory practice
- Data analysis and software use

# Bioinformatics

**By:** Richard Bruskiwich, IRRI

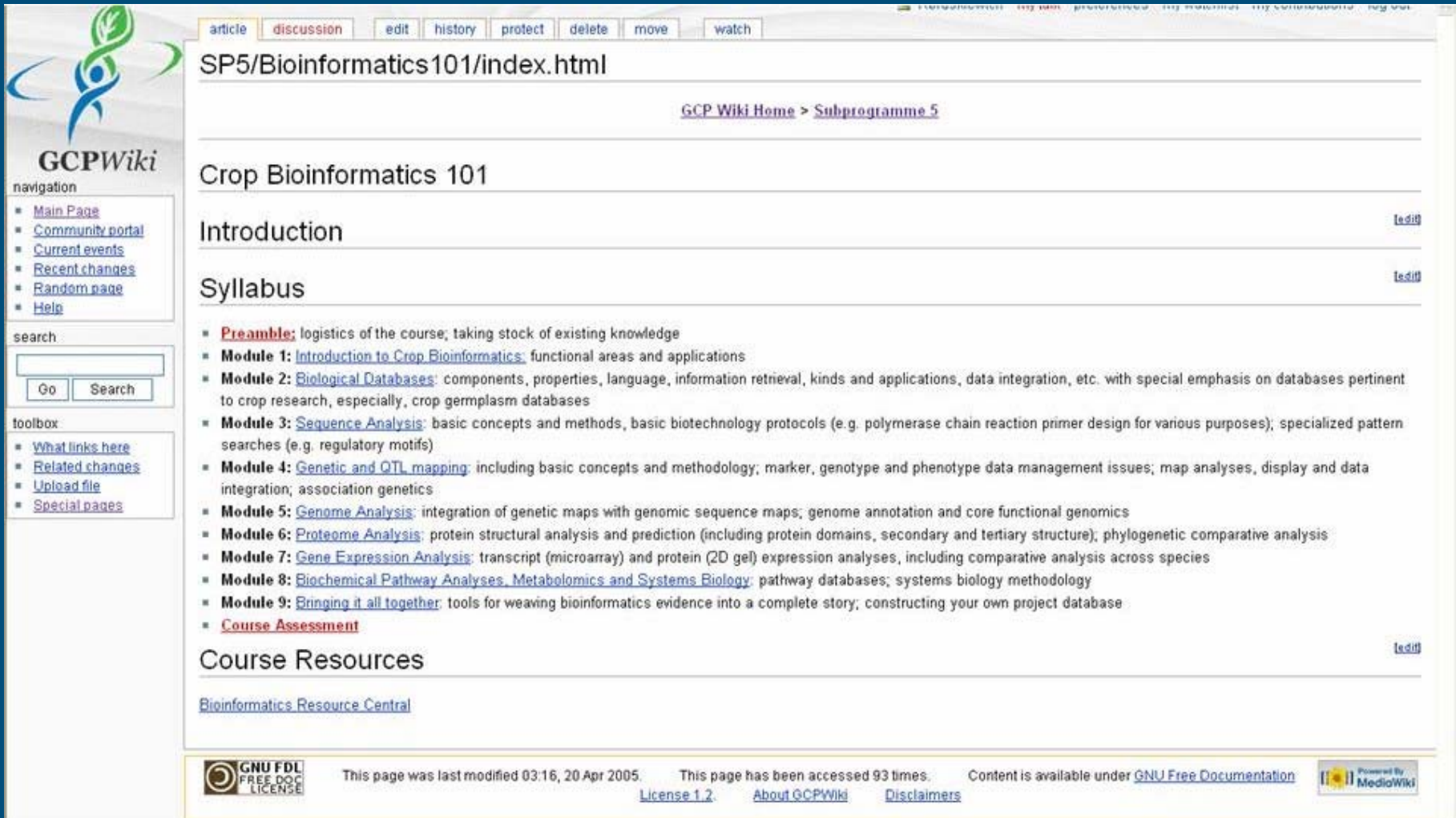
**For:** scientists with background in germplasm, biology and genetics, with working knowledge of bioinformatics application to plant and agricultural sciences

**Objective:** to gather/ design course materials as a guide to plant genome informatics and bioinformatics useful for modern plant breeding, genomics and comparative genomics, data analysis and interpretation

# Bioinformatics

**Approach:** Develop and package training materials in a web based distance education course, structured in a modular fashion, with cross references to other publicly available training materials; The CGPWiki course website providing access to the online learning environment, a discussion forum, chat facilities, and email integrated for communications between students and course facilitator, and between students

# Bioinformatics



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## SP5/Bioinformatics101/index.html

[GCP Wiki Home](#) > [Subprogramme 5](#)

### Crop Bioinformatics 101



#### Introduction [\[edit\]](#)

#### Syllabus [\[edit\]](#)

- **Preamble:** logistics of the course; taking stock of existing knowledge
- **Module 1:** [Introduction to Crop Bioinformatics](#): functional areas and applications
- **Module 2:** [Biological Databases](#): components, properties, language, information retrieval, kinds and applications, data integration, etc. with special emphasis on databases pertinent to crop research, especially, crop germplasm databases
- **Module 3:** [Sequence Analysis](#): basic concepts and methods, basic biotechnology protocols (e.g. polymerase chain reaction primer design for various purposes); specialized pattern searches (e.g. regulatory motifs)
- **Module 4:** [Genetic and QTL mapping](#): including basic concepts and methodology; marker, genotype and phenotype data management issues; map analyses, display and data integration; association genetics
- **Module 5:** [Genome Analysis](#): integration of genetic maps with genomic sequence maps; genome annotation and core functional genomics
- **Module 6:** [Proteome Analysis](#): protein structural analysis and prediction (including protein domains, secondary and tertiary structure); phylogenetic comparative analysis
- **Module 7:** [Gene Expression Analysis](#): transcript (microarray) and protein (2D gel) expression analyses, including comparative analysis across species
- **Module 8:** [Biochemical Pathway Analyses, Metabolomics and Systems Biology](#): pathway databases; systems biology methodology
- **Module 9:** [Bringing it all together](#): tools for weaving bioinformatics evidence into a complete story; constructing your own project database
- **Course Assessment**

#### Course Resources [\[edit\]](#)

[Bioinformatics Resource Central](#)

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# Bioinformatics

**Training materials:** Include key references, photographs, illustration of concepts, examples, suggested applications, practical assignments and exercises

**Curriculum:** self-tutorial or two-week course

# Marker-assisted selection and breeding

- **By:** Daniel Danial, Sjaak van Heusden, and co-workers – Wageningen University; Marja Thijssen – IAC
- **For:** researchers working with molecular markers in plant breeding and PGR conservation, or those planning to do so in the near future
- **Objective:** how to use marker technology in solving questions dictated by plant breeding objectives; how to work with marker data for the investigation of genetic diversity, the construction of linkage maps and the identification of QTLs

# Marker-assisted selection and breeding

- **Approach:** Start from training materials developed already at WU, IAC, Cornell University and IPGRI, FAO, etc.
- **Training materials:** handouts/ files/ power points for introductions, case studies, theoretical exercises, laboratory practicals, computer practicals
- **Curriculum:** 2 weeks course with presentations, discussions on applications, exercises and practicals

# Marker-assisted selection and breeding

## TOPICS INCLUDE:

- General Genetics
- Different types of DNA markers with strengths and weaknesses
- Practical applications of marker assisted breeding
- Construction of genetic linkage maps
- QTL analysis
- Bioinformatics
- Laboratory practicals

# From training materials to course curricula

- Current status of the projects: training materials are assembled
- Next: Design appropriate curricula from these materials
- Most critical for the success of a course: the participants

# Gathering and development of training materials & design of course curricula

Suggestions?

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