Objective 3. Overview of Marker Assisted Selection Workshop

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Scope

• Participants in RiceCap
• Breeders
• CAP New Hires
• Technical Staff – Directly or indirectly involved in CAPs
• Grad students
• Total – 20 people in year 1
Purpose

• Deliver a baseline of information and techniques needed for accomplishing the research plans in Obj. 1
• Train new research staff and breeders in molecular marker technology to initiate the building of molecular breeding programs in the US rice producing states.

Logistics

• Lecture component
  – Bring CAP participants up to comparable level of expertise
  – Empower participants to be important contributors to CAP project
  – Include a diversity of experts from the field to give lectures
  – Modify agenda according to needs of participants
  – Completed in early June 2005 prior to high workload required of the field phenotyping trial
  – Length 1 – 1.5 days
• Hands on – lab component
  – On an as needed basis
  – One on one training (1-2 weeks)
  – Host lab – Beaumont or Stuttgart?
Proposed Topics

• *What are genetic markers?* – What are markers, what is GMO, the types of molecular markers that are available, why some are used and not others, what is marker assisted breeding

• *How are markers currently being used in public and private crop breeding efforts?* Overview of success stories of markers that are being utilized in various crop development programs. What are the possibilities with existing technology?
Proposed Topics

• *How markers are developed.* An introduction to mapping of traits, discussion of quantitative versus qualitative traits, and available resources for molecular maps.

Proposed Topics

• *Access and utilization of public databases.* Overview of various databases that are resources for molecular breeding programs (i.e. Gramene, CAP, etc.).
Proposed Topics

• Finding markers in your germplasm pool: Identifying useful genetic sequences in the public domain, converting these to markers that can be used as breeding tools, use of wide and narrow crosses, parental screenings.

Proposed Topics

• Association studies and QTL mapping. An overview of how molecular marker and phenotypic data are analyzed. Examples of different software programs available for analysis.
Proposed Topics

- "The care and handling of DNA": tissue sampling, preservation, extractions, tissue types, PCR, marker detection, analysis, and interpretation.

Proposed Topics

- "Using markers for quality control in breeding": fingerprinting cultivars, verification of F1’s, facilitating pureseed increases, and characterization of offtypes.
Proposed Topics

• *Using markers in cultivar development*: selection of major genes, selection of QTL, which projects to use/not use markers, choice of parents, which generation(s) to apply markers, breeding strategies using markers, use of controls, role of the breeder, role of the molecular geneticist

Proposed Topics

• *Data management* – how to manage and integrate phenotypic and genotypic data sets: coordinating data collection, flat and relational databases, troubleshooting,
Proposed Topics

• *Equipment, supplies, and labor required for establishing a molecular breeding lab.*

Proposed Topics

• *Laboratory session.* Handling of tissue from field to the lab, DNA extraction methods depending on type of tissue used and type of equipment available, amplification, marker analysis methods (gels, sequencer, etc.), troubleshooting.