Benefits of Rice Genome Sequencing

Rice Genomics Program
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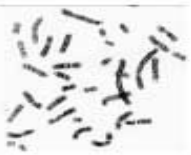
The Rice Genome

- Genes carry instructions on how organisms grow, develop, and function
- 40,000+ genes in rice

Genes are made of DNA
800 million bits of DNA information in rice genome

Genes are aligned on chromosomes
24 chromosomes in rice



BUT ....

Which of these 800 million bits of DNA are important to look at ?
- too costly to look at them all

Must identify high priority genes
- control economically valuable traits
- can map chromosomal location

OUR GOAL

Develop DNA markers for valuable traits
- Markers are DNA sequence tags readily monitored by lab analysis
- Located near gene controlling trait

Marker Assisted Selection

- Markers indicate presence of valuable genes
- Increases efficiency of selection
- Does not replace traditional breeding methods
- Helps breeders combine valuable traits into new rice cultivars

DNA Marker technology

Collect tissue

Isolate DNA

Amplify DNA markers

Analyze markers

Presence of DNA marker is associated with presence of important trait

DNA marker for disease resistance

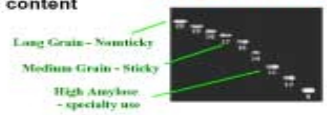
1 2 3 4 5 6 7
Rice breeding lines
... 26

Traits tagged with DNA markers

Disease resistance
- Blast disease: 5 genes
- Sheath blight: 2 genes

Cooking Quality
- Amylose content

Waxy gene DNA marker



- Pasting strength
- Cooking energy
- Grain aroma
- Grain elongation

Agronomic traits
- Cultivar identity/purity: genetic fingerprinting
- Heading date
- Seedling vigor