A NOVEL BIOMARKER TEST FOR SUGARCANE YELLOW CANOPY SYNDROME

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BACKGROUND

• Yellow canopy syndrome (YCS) affects sugarcane crops of all varieties throughout Queensland
• Misidentification of YCS-affected plants is common across the industry
• We used an RNAseq and bioinformatic approach to discover YCS biomarker candidates
• We developed a YCS biomarker test to correctly identify YCS-affected plants

METHOD

• RNAseq reads were mapped to our sugarcane YCS transcriptome and differential expression (DE) analysis was performed
• Significant DE transcripts were compared between YCS and conditions with similar symptoms
• Results were filtered to find YCS biomarker candidates

RESULTS

1. Using bioinformatics, we have successfully developed a novel molecular test to correctly identify YCS-affected plants.

CONCLUSIONS

• Further testing and validation of the YCS biomarker test is underway
• Available to sugarcane industry once validation of the test is complete

Figure 1: Typical leaf yellowing symptoms shown in sugarcane plants affected by YCS

Figure 2: Venn overlap of significant DE transcripts between conditions with symptoms similar to YCS. Venn diagram created using the http://bioinformatics.psb.ugent.be/btools/Venn/ tool.

Figure 3: Filtering process used to identify biomarker candidates.

Figure 4: (A) Gel photograph of the YCS biomarker test results from YCS-affected plants. (B) YCS biomarker test on various YCS-affected plant tissue types, as well as on non-YCS plant samples with similar symptoms.

KEY QUESTIONS

1) Is there a transcript that is uniquely expressed in YCS-affected plants?
2) Can we use that transcript to develop a biomarker test for YCS?

Figure 5: Typical leaf yellowing symptoms shown in sugarcane plants affected by YCS

Figure 6: Venn overlap of significant DE transcripts between conditions with symptoms similar to YCS. Venn diagram created using the http://bioinformatics.psb.ugent.be/btools/Venn/ tool.

Figure 7: Filtering process used to identify biomarker candidates.

Figure 8: Gel photograph of the YCS biomarker test results from YCS-affected plants. YCS biomarker test on various YCS-affected plant tissue types, as well as on non-YCS plant samples with similar symptoms.