The Australian Society for Microbiology

bringing Microbiologists together

ASM 2009 Perth

Program and Abstracts Book

2009 Annual Scientific Meeting & Exhibition of the Australian Society for Microbiology

6-10 July 2009

Perth Convention Exhibition Centre WA

www.theasm.com.au

5

Perth 2009

Golden Jubilee Year

P20.04

Examining the effects of elevated CO_2 and temperature on *Barley yellow dwarf virus* in wheat

A. Freeman[1], F. Constable[2], R. Norton[3], M. Aftab[1], K. Powell[4], B. Rodoni[2] and J. Luck[2]

[1]Department of Primary Industries, Biosciences Division Private Bag 260 Horsham Victoria 3401, Australia. [2]Department of Primary Industries, Biosciences Division Private Mail Bag 15 Ferntree Gully Delivery Centre, Victoria 3156, Australia. [3]University of Melbourne, Grains Innovation ParkPrivate Bag 260, Horsham, Victoria, 3401, Australia. [4]Department of Primary Industries, Biosciences Division RMB 1145 Chiltern Valley Road Victoria, 3685, Australia.

The Intergovernmental Panel on Climate Change (IPCC) released their fourth assessment report in 2007 which concluded global warming is clearly occurring and that changes in the global climate system will continue into the future. These changes are expected to have major impact on agricultural systems, particularly as both CO_2 and temperature are expected to increase and more frequent severe weather events, such as drought, are expected to occur. As yet there is very little empirical data about the impact of elevated CO_2 and temperature on pest and pathogen populations and crop production. Consequently, predictions on the future of our major monoculture cropping systems such as wheat remain uncertain. The Department of Primary Industries Victoria, the University of Melbourne and the Australian Greenhouse Office have established a Free-Air CO_2 Enrichment (FACE) research facility at Horsham, Victoria, to study the effects of elevated CO_2 on wheat production in Australia. This facility is being used to study the effects of projected CO_2 concentrations (550ppm) under field conditions on *Barley yellow dwarf virus* in wheat. In addition to the FACE experiments a second study is being established in growth rooms to gather empirical information about the fecundity of BYDV in under elevated temperature. A third study will also be done to determine the ability of the BYDV vector, *Rhopalosiphum padi*, to acquire and transmit the virus under various climatic conditions.

P20.05

Salt inducible Biopolymer Production in Biofilms by *Bacillus megaterium*

Gregory Poi[1], Puah Chum Mok[2], Andrew Ball[1], Cui Taian[3]

School of Biological Sciences, Flinders University, Sturt Road, Bedford Park, Adelaide, SA 5001, Australia
Technology Centre for Biomedical and Life Sciences, Singapore Polytechnic, 500 Dover Road, Singapore 139651
School of Chemical and Life Sciences, Singapore Polytechnic, 500 Dover Road, Singapore 139651

A biofilm-forming strain of *Bacillus megaterium* (culture no.20) was previously isolated for application in the bioremediation of oil contaminated soil and water. This pure culture showed the highest degree of bioflim formation measured using the standard Microtiter Plate Experiment protocol amongst the cultures used. When grown with a high sodium chloride content, large quantities of a white floating biopolymer material was observed, which strongly adhered to the neck of the shake flask. This was in contrast to the other strain of *B. megaterium* (culture no.20), which showed comparatively poor biofilm formation and did not produce any white floating material under the same culture conditions. The white floating material obtained (culture no.20) was denatured with β-mercaptoethanol and heated at 95°C for 20 minutes before being subjected to SDS-PAGE analysis. Interestingly, a protein molecule of about 30Kd in size was observed. The biopolymer formation was highest when the culture was carried out using sodium chloride at concentrations of 0.5% and 5.0%, respectively. The tight distinct band displayed in the SDS-PAGE suggested that we are dealing with a biopolymer of fixed length. The same band was present both of the cultures containing 0.5% and the 5.0% of sodi chloride respectively. When the cell material was spun down a the pellet loaded, the same band was observed with less intens suggesting that the protein was released extracellularly into culture medium. There have been reports that certain strains *Bacillus subtilis, Bacillus anthracis and B. megaterium* produc Poly-γ-glutamate in significant quantities. The structural details the polymeric protein materials produced in our lab are currently under investigation.

P20.06

Gene Regulation Studies of *Leptospirillum* Species Subject to Soluble Nitrogen Starvation

Melissa Corbett[1], Lesley Mutch[1], Helen Watling[2] and Elizab Watkin[1]

[1] School of Biomedical Sciences, Curtin University of Technolo Bentley WA. Parker Centre for Integrated Hydrometallu Solutions
[2] CSIRO Minerals, Karawara WA. Parker Centre for Integra Hydrometallurgy Solutions

Bioleaching is the solubilisation of metals from mineral o catalysed by micro-organisms, an action that occurs naturall many environments. This phenomenon has been capitalized on is now a well established and incorporated technology within mining industry. Members of the genus *Leptospirillum* are routir found within bioleaching systems. They are chemolithoautro whose sole energy source results from the oxidation of ferrous i Understanding the metabolic complexity of *Leptospirillum* necessary for the improvement of bioleaching technolog Nitrogen is an essential element required for the cellular growt all microorganisms. In this study *Leptospirillum* species w assessed for their nitrogen fixation capabilities under aer conditions, in the absence of soluble ammonia.

L. ferrooxidans, *L. ferriphilum* and *L.ferrodiazotrophum* were gr in liquid suspension without a soluble nitrogen source maintained under aerobic conditions. Culture growth was asses by cell counting and iron oxidation. Genes selected to st nitrogen fixation were the *nifHDKEN* operon required for production of nitrogenase, the enzyme essential for cataly atmospheric nitrogen to ammonia, and the *nifSU-hesB-hscB-h* operon for nitrogenase protein assembly. Primers were desig from sequences of previously identified diazotrophs obtained f the NCBI database, and gene expression levels were analyse Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR).

All three strains demonstrated an initial decrease in cell proliferation after soluble nitrogen starvation but growth resu shortly after adaptation to culture conditions. As nitrogen fixa requires a large amount of energy, an initial decrease in cell proliferation is to be expected. When compared to co experiments containing soluble ammonia, differences in F expression levels of the *nifHDKEN* and *nifSU-hesB-hscB-h* operons were detected in all three *Leptosprillum* strains. differences in expression levels of nitrogen fixing genes dete after soluble nitrogen starvation indicates that *Leptospirillum* regulate the genes required to fix atmospheric nitrogen and help to limit nitrogen starvation in bioleaching environments.

P20.07

Population Dynamics of a Low-Grade Chalcopyrite Bioleac Column

Lesley Mutch[1], Helen Watling[2], Elizabeth Watkin[1]

[1]School of Biomedical Sciences, Curtin University, Bentley