

Crop Resource Use Efficiency and Field Phenotyping

at Belton Woods Hotel, Golf & Country Club,
Belton, Nr Grantham, Lincs

on 25-26 March 2013

This conference will consider current and future methods of improving resource capture and utilisation efficiency by food and non-food crops. Resources include light, water and nutrients. The main theme of the conference will be how resource capture and conversion may be improved in crops by genetic and management means. However there will be scope to focus on recent technical developments in screening and phenotyping of plant material for key traits. The impact of environmental goals on achieving optimal resource use efficiency and systems modelling will also be considered. Within the context of these themes, the Conference will address the current performance and future potential of genetic and agronomic strategies to optimize resource capture and utilisation by crops. Papers that bridge academic disciplines are particularly encouraged.

PROGRAMME

MONDAY 25 MARCH

10.00 **REGISTRATION AND COFFEE**

11.00 **WELCOME**

11.10 *Invited Speaker:*

High throughput field phenotyping in cereals

JOSE-LUIS ARAUS, JORDI BORT, MARIA-DOLORS SERRET, ABDELHALIM KHALED, RUT SANCHEZ (University of Barcelona, Spain), LLORENÇ CABRERA-BOSQUET (LEPSE, UMR INRA-SUPAGRO, Montpellier, France) & JILL E CAIRNS (CIMMYT, Southern Africa Regional Office, Harara, Zimbabwe)

Session I : Resource Use Efficiency Improvement

11.45 **The impact of disease control on water-use efficiency**

MIKE GRIMMER (ADAS Boxworth, Cambridge), JULIE SMITH (ADAS Rosemaund, Preston Wynne) & NEIL PAVELEY (ADAS High Mowthorpe)

12.15 **Barley grain number response to a post-anthesis reduction in assimilation capacity**

SHANE KENNEDY (TEAGASC, Carlow, Ireland), IAN J BINGHAM (SRUC, Edinburgh) & JOHN SPINK (TEAGASC, Carlow, Ireland)

12.40 **Automating nitrogen management**

DANIEL KINDRED & ROGER SYLVESTER-BRADLEY (ADAS Boxworth, Cambridge)

13.05 **LUNCH**

14.00 **Exploiting resource use efficiency in ancient wheat species**

ANISHA PARMAR, SEAN MAYES & DEBBIE SPARKES (University of Nottingham, Sutton Bonington Campus, Loughborough)

14.25 **Combined chlorophyll fluorescence and thermography to visualize water use efficiency**

TRACY LAWSON (University of Essex, Colchester)

14.45 **Are genotypic differences in productivity in wheat related to light utilisation and photosynthetic performance?**

ERIC S OBER (Rothamsted Research, Harpenden, Herts)

15.05 **Leaf morphological phenotyping in deletion mutants of rice (*Oryza sativa* L.)**

IAN SMILLIE (University of Nottingham, Sutton Bonington Campus, Loughborough)

15.25 **DISCUSSION**

15.40 **TEA/COFFEE**

16.20 **Manufacturer's presentations**

- Grégoire Hummel of Phenospex
- Photon Systems Instruments
- ADC BioScientific Ltd
- PSI (Photon Systems Instruments)

17.30 **POSTER SESSION**

Posters

Reduction of sink limitation: identification of grain weight determinants in a wheat × spelt population

QUAN XIE, SEAN MAYES & DEBBIE SPARKES (University of Nottingham, Sutton Bonington Campus, Loughborough)

Exploration of favourable traits for nitrogen use efficiency in ancient wheat species

K M C FERNANDO, S MAYES & D L SPARKES (University of Nottingham, Sutton Bonington Campus, Loughborough)

Managing establishment and crop input decisions following reversion from organic farming to a low input cropping system

K RIAL LOVERA, N D CANNON, W P DAVIES & J CONWAY (Royal Agricultural College, Cirencester, Glos)

Increasing seasonal resource capture in the perennial bioenergy crop *Miscanthus*

PAUL ROBSON, JOHN CLIFTON-BROWN & IAIN DONNISON (Institute of Biological, Environmental and Rural Sciences, Aberystwyth University, Plas Gogerddan, Aberystwyth)

Soil fertility-building effects of red clover leys on winter wheat yields and soil nitrogen mineralisation potential

H MOYO, W P DAVIES, N D CANNON, J S CONWAY & G P F LANE (The Royal Agricultural College, Cirencester, Glos)

Effect of nitrogen supply on grain yield, biomass and photosynthesis in wheat

ALI AMAMOU, OORBESSY AJU, JAYALATH DESILVA (University of Nottingham, Sutton Bonington Campus, Loughborough), SIMON GRIFFITHS (John Innes Centre, Norwich), MALCOLM HAWKESFORD (Rothamsted Research, Harpenden, Herts) & JOHN FOULKES (University of Nottingham, Sutton Bonington Campus, Loughborough)

Genetic variation of photosynthetic capacity in wheat

O GAJU, J DE SILVA & J FOULKES (University of Nottingham, Sutton Bonington Campus, Loughborough)

Identification of radiation use efficiency traits in a wheat × spelt population

CHUONG NGUYEN & DEBBIE SPARKES (University of Nottingham, Sutton Bonington Campus, Loughborough)

Quantifying the relationships between pathogen load, disease symptoms and disease tolerance in winter wheat

PETRA KOCK APPELGREN, JOHN SPINK, STEVEN KILDEA (Teagasc, co. Carlow, Ireland), NEIL PAVELEY (ADAS UK Ltd, Boxworth, Cambridge) & JOHN FOULKES (University of Nottingham, Sutton Bonington Campus, Loughborough)

19.30 DINNER

TUESDAY 26 MARCH

Session II : Field Phenotyping; challenges

09.00 *Invited Speaker:*

UAV-based high-resolution remote sensing as an innovative monitoring tool for effective crop management

CHRISTIAN KNOTH & TORSTEN PRINZ (Institute for Geoinformatics, University of Münster, Germany)

09.35 *Invited Speaker:*

Increasing the efficiency of water use of wheat by identification of isotope-based screens indicative of water use, transpiration efficiency and drought tolerance

JOHN FOULKES (University of Nottingham, Sutton Bonington Campus, Loughborough), SIMON GRIFFITHS, SIMON ORFORD (John Innes Centre, Norwich), PEDRO CARVALHO & JAYALATH DESILVA (University of Nottingham, Sutton Bonington Campus, Loughborough)

Session II: Field Phenotyping: Challenges

10.05 **Characterising wheat root systems *ex situ* and in the field**

A J KARLEY, T A VALENTINE, K BINNIE, A K SKIBA, G R SQUIRE (The James Hutton Institute, Invergowrie, Dundee), S BENTLEY, D LEE, G MORREALE & A GREENLAND (NIAB, Cambridge)

10.30 **Development of an appropriate variety testing methodology for assessing nitrogen requirements**

ROGER SYLVESTER-BRADLEY & DANIEL KINDRED (ADAS Boxworth, Cambridge)

10.55 **TEA/COFFEE**

- 11.25 **Association genetics of nitrogen use efficiency parameters in winter barley**
WILLIAM (BILL) THOMAS (James Hutton Institute, Invergowrie, Dundee), GUILLAUME BARRAL-BARRON, DAVID HARRAP (KWS (UK) Ltd, Royston, Herts), ALLAN BOOTH, RICHARD KEITH, CHRIS WARDEN, JOANNE RUSSELL, ROBBIE WAUGH (James Hutton Institute, Invergowrie, Dundee), PETER WERNER (KWS (UK) Ltd, Royston, Herts) & LUKE RAMSAY (James Hutton Institute, Invergowrie, Dundee)
- 11.50 **Identifying high leaf vein density mutations in a large gene stock**
ARYO FELDMAN (International Rice Research Institute)
- 12.10 **Maximising nitrogen use efficiency in winter barley through variety choice and N fertiliser management**
SARAH KENDALL (ADAS Gleadthorpe, Mansfield, Notts), SUSIE ROQUES (ADAS Boxworth, Cambridge) & PETE BERRY (ADAS High Mowthorpe, Malton, N Yorks)

12.35 **POSTER SESSION & LUNCH**

Session III : Crop phenotyping as an interdisciplinary challenge

- 13.45 *Invited Speaker:*
Developing X-ray Computed Tomography as a tool for root biology
SACHA MOONEY, MALCOLM BENNETT, TONY PRIDMORE & CRAIG STURROCK
- 14.15 **Screening for photosynthesis improvement at leaf and canopy level**
ERIK MURCHIE (University of Nottingham, Sutton Bonington Campus, Loughborough)
- 14.40 **Scaling and integrating phenotyping with genetics and genomics**
JOHN DOONAN, ALAN GAY & ANYELA CAMARGO, JOHN DRAPER & CATHERINE HOWARTH (National Plant Phenomics Centre, Aberystwyth University, Wales)
- 15.05 **Non-invasive phenotyping of crops using new imaging technologies**
ANDREW FRENCH (University of Nottingham, Sutton Bonington Campus, Loughborough)
- 15.30 **THANKS & FINAL DISCUSSION**
- 15.45 **TEA & DEPART**