

**To improve the effectiveness of UK genetic science for crops through novel, integrated networks of research**

**Kim Hammond-Kosack**  
**Rothamsted Research**



**4<sup>th</sup> WGIN Stakeholders Meeting 29<sup>th</sup> November 2007**

# The Defra Crop Genetic Improvement Networks

Announced July 2002

**Dr Donal Murphy-Bokern**

**Arable Crop Sciences & Pesticide  
Safety Unit**

**Science Directorate**

**Defra**



# Overall Objectives

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- **Each Crop Genetic Improvement Network =**  
**Virtual Plant Breeding Institute**
- **To use crop breeding for the sustainable development of the arable sector**
- **To connect public sector science to the private sector**

**To recreate the best of the past**

# Where was Defra coming from?

- **Public research - £43 m pa**
  - > £16 m on named crop species
  - > £5 m on targeted research
  - > Little use of LINK
  - > Project based
  - > Pre-competitive
- **Public R&D is only effective in supporting Defra if it results in better varieties**

# Networks established

- Wheat (WGIN)
- Oilseed rape (OREGIN)
- Short rotation coppice
- Pulse crops
- Miscanthus
- Oats



## The longer-term vision

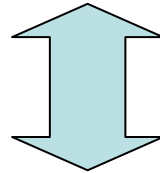
- A strong crop breeding sector deploying the best technologies science can offer
- A strong strategic and applied research base competing effectively for resources
- A strong base for international partnerships
- More resource efficient and productive crops

# The Defra Genetic Improvement Network Comprises Several Parts

**WGIN**

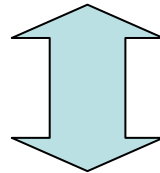
**LINK projects**

**£300K**



**Satellite Projects**

**£300K**



**Core Project**

**£300K**

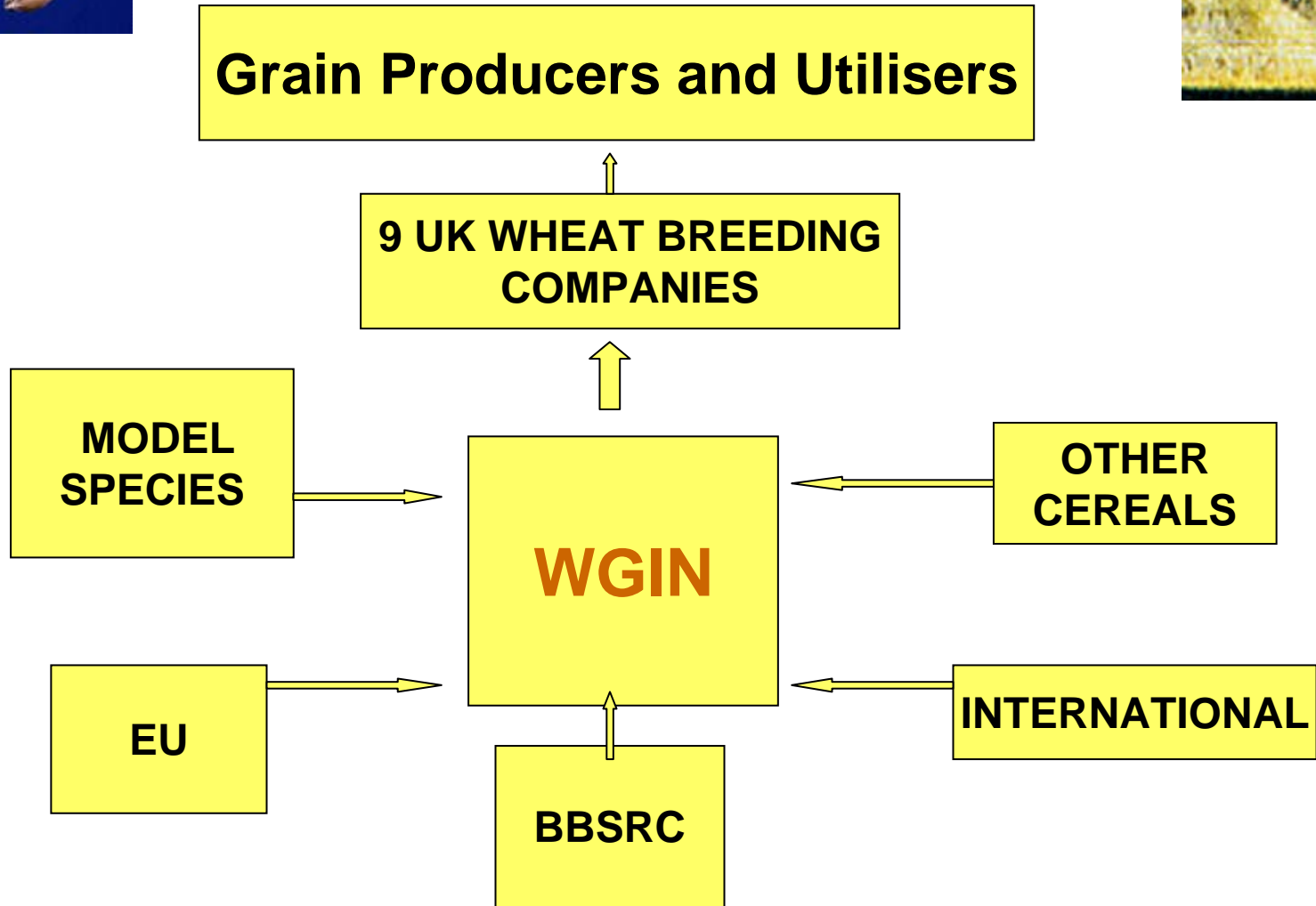
**5 years**

**UK-based breeding companies**

**9 for wheat**



# The Defra WGIN





# The Defra WGIN Core Project

## Aims:

**To Underpin Wheat Improvement by Plant Breeders**

## Approaches:

- 1. Characterisation and provision of genetic resources**
- 2. Genetic mapping and marker development**
- 3. Trait identification**
- 4. Identification and generation of novel variation in key traits : using non-GM approaches**
- 5. Central storage of grain from field trials**
- 6. Liaison and communication**

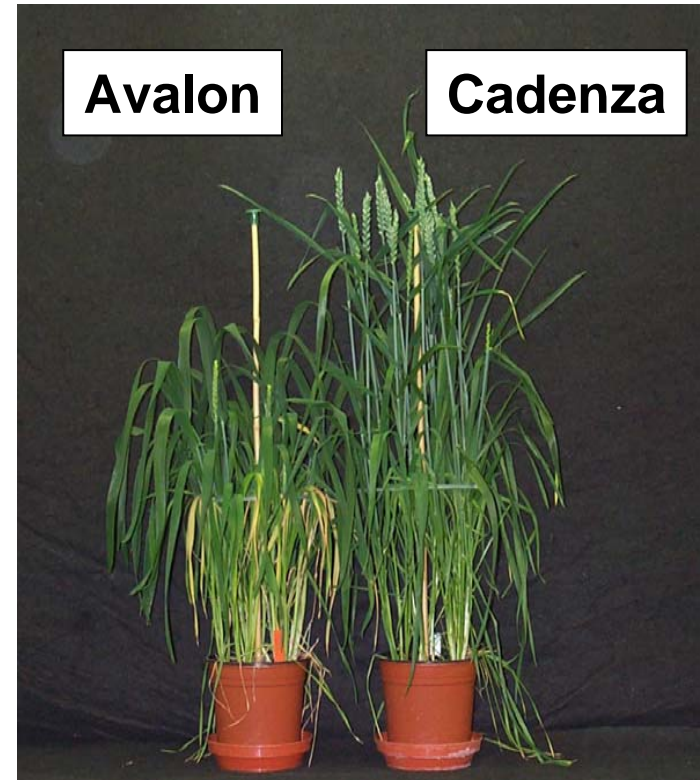
## Funded research partners:

**Rothamsted Research and John Innes Centre**

# Genetic mapping and marker development

- Establish a reference UK mapping population

**Avalon x Cadenza -  
203 double haploid lines**



- Switch to 'within the gene' molecular markers

**> 500,000 wheat ESTs available**

## Trait identification

1. Nitrogen use efficiency (NUE)
2. Reducing disease pressure

***Septoria* leaf blotch**



3. Grain quality

**5 years of field trials**

# Identification and generation of novel variation in key traits

**PCR TILLING technique on**

- EMS mutagenised populations
- Diverse germplasm collections

**Diploid (*T. monococcum*) and Hexaploid wheat**

- exploring allele diversity
- two demonstration projects

**crop height**



**defence signalling**



**The Vavilov  
Institute,  
St. Petersburg  
Russia**

# Management of the Defra WGIN : The Management Team

**Defra**

**Funded partners.**

Rothamsted Research

John Innes Centre

**Other Partners \***

ADAS

University of Nottingham

NIAB

University of Bristol

**BBSRC\***

**UK Wheat breeders\***

**HGCA\***

**( \*Ex-Officio Members)**

Three meetings per year – rotate the location

# **Management of the Defra WGIN : The Stakeholders**

Millers and Bakers

Brewers and Distillers

CCFRA

Livestock Feed Producers

Food processors

Agrochemical/Biotech Companies

Wheat Researchers

Field Trials Contractors

# The Defra WGIN: Dissemination, Liaison and Communication

Annual “Stakeholders’ Forum” (Nov)

A “Cereal Genetics and Genomics Workshop”

A “Traits Workshop”

Workshops with overseas partner organisations:  
CIMMYT, INRA

Web Site ([www.WGIN.org.UK](http://www.WGIN.org.UK) )

Six Monthly Electronic Newsletter

E. mail:wgin.defra@bbsrc.ac.uk



# Establishing new wheat projects

**Hagberg Falling Number – BBSRC, Defra, HGCA  
Univ of Nottingham, Harper Adams, JIC, RRes  
UK / European Wheat Breeders / CCFRA / SWRI**

**Nitrogen Use Efficiency - BBSRC-INRA initiative  
Univ of Nottingham, JIC, INRA Clermont-Ferrand**

**Yield / Quality / Grain Shape / Insect Resistance  
- Crop Science Initiative – BBSRC  
4 Projects: JIC/RRes, IGER and partners**

**EU FP 6 Healthgrain and Bioexploit - RRes**

**Tools and Resources (1 year duration) - BBSRC  
Marker development JIC; Lightscanner RRes**



# Defra

**Donal Murphy-Bokern**  
**Bruno Viegas**

## WGIN (present)

**RRes - Peter Shewry,**  
**Andy Phillips**  
**Kim Hammond-Kosack**  
**Hai-Chun Jing**  
**Carlos Bayon**  
**Elke Anzinger**

**JIC – John Snape**  
**Simon Griffiths**  
**Simon Orford**  
**Leodie Alibert**  
**James Simmonds**  
**Michelle Leverington**

## WGIN (past)

**RRes - Katie Tearall**  
**Sam Irving**

**JIC - Robert Koebner**  
**Christian Rogers**  
**Pauline Stephenson**

**The Plant Breeders**  
**The Management team**

[www.WGIN.org.UK](http://www.WGIN.org.UK)

# WGIN in the wider context

