

# **vCIMMYT ICARDA User Group Meeting Minutes**

5<sup>th</sup> March 2009, 8:30-12:30am

Plant Research Centre, Waite Campus, University of Adelaide

**Co-ordinator and convenor: Ky Mathews**

**Attendees (34):** Ian DeLacy (UQ), Sandra Micallef (UQ), Russell Eastwood (AGT), Haydn Kuchel (AGT), Meiqin Lu (AGT), Jason Reinheimer (AGT), James Edwards (AGT), Iain Barclay (DAFWA/Intergrain), Robert Loughman (DAFWA/Intergrain), Chris Moore (DAFWA/Intergrain), Robin Wilson (DAFWA/Intergrain), Manisha Shankar (DAFWA), Micahel Quinn (UA), Diane Mather (UA), Ken Chalmers (UA), Neale Sutton (NVT), Mui-Keng Tan (NSW DPI), Andrew Milgate (NSW DPI), Greg Grimes (NSW DPI), Bertus Jacobs (LongReach), Marie Applebee (LongReach), Jodine McSweeney (Pacific Seeds), David Moody (DPI Victoria), Urmil Bansal (PBI, Cobbitty), Harbans Bariana (PBI, Cobbitty), Robert Park (PBI, Cobbitty), Harpreet Gill (Agrisearch), Julie Nicol (CIMMYT), David Bonnett (CIMMYT via Skype), Garry Rosewarne (CSIRO), Allan Rattey (CSIRO), John Sheppard (QDPI), Phil Banks (QDPI), Hugh Wallwork (SARDI)

1. [Ky Mathews \(USyd\) – Introduction and Communications Project](#)

Ky provided an overview of the new Communications project (US00045) and reported on the current status of activities.

The aim of the project is to improve access to (and exploitation of) CIMMYT and ICARDA germplasm by Australian wheat breeders. This is achieved by co-ordinating the introduction, quarantine, evaluation, data management of CIMMYT and ICARDA material. The project activities are communicated via e-newsletters and the CAGE website.

Key changes from the 1st phase are:

- a. inclusion of ICARDA germplasm;
- b. more streamlined evaluation of material – seed directly from quarantine to breeding companies;
- c. Improved co-ordination and oversight – the steering committee provides an avenue for actively resolving issues from the user group or within projects. Reports directly to the management committee.

Logistical changes include:

- a. Streamlined evaluation of material
  - i. Agrisearch is no longer involved
  - ii. material to go directly to 3 major breeding companies and PBI Cobbitty from quarantine by May/June post-importation (see the slides for details).

**Action: The ICARDA material will be grown alongside the ESWYT and SAWYT in experimental designs determined by the individual plant breeding companies. It was decided that national checks be included in these trials. These were: Wylacatchem, Yitpi, Axe, Gladuis, Livingstone, Crusader, Gregroy, Lincoln and Magenta. KMathews to confirm this at next year's meeting.**

**It has been suggested (by GRDC/RBrettell) that a southern increase for ICARDA material may be necessary due to vernalisation, however, Garry Rosewarne (CSIRO) has offered to increase it at Ginninderra. The breeding companies will increase it at**

**their southern locations: Horsham (AGT), Wongan Hills (Intergrain), Narrabri or Balaklava (LongReach).**

- b. Steering committee – the members and scope of that committee were defined. The members will be R Trethowan (Chair), K Mathews, R Rainbow (GRDC), D Bonnet, Y Manes (CIMMYT), F Ogonnaya, R Brettell, O Abdalla and M van Ginkel (ICARDA). The breeding representative is R Trethowan.

The agenda and minutes from this meeting will be available on the website.

**Action: It was decided that a pre-breeding representative to this committee was not required. The minutes will be sufficient and available on the website.**

- c. Breeder visits – this year it is to ICARDA from 10-14 May. Attendees are Ian Barclay (DAFWA & Intergrain), M Applebee (LongReach), Russell Eastwood (AGT), R Trethowan, J Sheppard (QDPI).

**Action: It was suggested (and agreed upon) by J Nicol (CIMMYT) that the breeders also visit CIMMYT in Turkey. The current dates are 9-13 at ICARDA, travel to Turkey on 14 and spend 15 and 16 in Turkey. The durum wheat breeders will not attend the visit this year.**

**Action: K Mathews to obtain from GRDC an outline of the proposed projects with ICARDA so that the visiting breeders understand the current project proposals.**

- d. Annual CAGE meeting – this meeting is now annual, rather than biennial. There will be a management meeting in August/September between project leaders to assist in logistics of importation. This will be held at the Australasian Plant Breeding Conference in Cairns in 2009.

## **2. *Juan Juttner (GRDC) – Update on CIMMYT ICARDA projects***

Juan Juttner was unable to attend. He has provided a document outlining GRDCs investment in CIMMYT and ICARDA.

### 3. [Greg Grimes \(AWCC\) – Quarantine project](#)

The material imported in Nov/Dec 2008 are in quarantine at AWCC and SARDI. The ICARDA material was cold treated pre-planting and there are no problems with the material so far. Seed quantities are on target and the expected harvest date is mid-May.

The CIMMYT material was planted in Jan 09 and harvest is expected in early June. The breeder selections are being evaluated at SARDI, only. The primary synthetics had poor germination and seed will be available later than the other material.

The current system for both ICARDA and CIMMYT shipments and AQIS clearance allowed an early planting ensuring that good quantities of material are available to breeders in a timely manner. The communication within the project to maintain a smooth process was achieved.

Greg reviewed the 'wish-list' for this project from the 2008 meeting. The contacts at ICARDA and CIMMYT for managing the incoming seed were known and available.

The description of the lines in the shipments and the numbers was available in early Nov 08. The ICARDA material was received early enough to allow for vernalisation, and it was cold-treated. The quantities required to distribute to breeders will be available from post-entry quarantine. The only point which was not achieved was an earlier shipment of the primary synthetics to allow for their longer growing period.

Greg then gave an overview of the status of the Focused Identification of Germplasm Strategy (FIGS) project (Ken Street et al IWGS 2008). There are 3 sets already defined for Sunn Pest, Russian Wheat Aphid and Powdery Mildew. He has already been approached by individuals regarding these sets, would it be better to have a group approach from the CAGE users/wheat breeding community?

The next planning meeting of FIGS is March 16-20 2009.

**Action: Contact Greg if you want input into the FIGS program.**

4. [\*\*\*Harpreet Gill Singh \(Agrisearch\) – Germplasm Evaluation Trials\*\*\*](#)

The GET trials were grown in 5 locations and Harpreet summarised the results of each of them. The experimental design was a 2 replicate randomised block design, with 200 entries and 10 checks. A site characterisation including latitude/longitude, soil type, average and actual rainfall were reported. For each trial the site mean, best check and number of entries which out-yielded the check were reported. Harpreet then reported on the 2008 seed build up nursery at Dookie. The seed for these nurseries arrived by the end of June allowing an early July planting at Dookie and one in Sep at Ballarat. The usual assessments were taken (see slide) and 402 out of 465 lines yielded more than 500g. He recommended that the timely arrival and appropriate quantity (30g) of seed allows for success in the nursery increases. Agrisearch are available for summer multiplication of seed and conducting METs for breeders and the breeding community.

**Action: The seed will be sent to GGrimes by the end of March. Breeders are requested to make requests in the next month. The data and analyses from Ian DeLacy are available on the website.**

**GGrimes asked when we will make the decision about accessioning seed for lines which were good lines in this project. REastwood suggested it was too preliminary and that 2 years data was required. This was agreed. KMathews to remind the community for CAGE meeting next year.**

**IDeLacy made the point that a seed increase from 4 plants is not sensible. This was not discussed further.**

5. [\*\*\*Ian DeLacy \(UQ\) – 2007 and 2008 GET analyses\*\*\*](#)

Germplasm evaluation trials (GET) and northern region (NR) analyses  
Biplots for PC1 vs PC2 and PC1 vs PC3 for both the 2007 and 2008 GET analyses were presented. These were produced from a GxE analysis performed on single site BLUEs and weights determined from single site spatial analyses. Single site BLUEs and

weights are available for the 2007 trials. Single site BLUPS are available for the 2008 trials.

The plotting points (both genotypes and sites) for the biplots are available on the website. The checks have been highlighted in the biplots so that they can be read more easily.

The entries between 2007 and 2008 are different and so an across-years analysis cannot be performed. For visualisation purposes the biplots from 2007 and 2008 have been superimposed (contact Ian to determine how this was done). Most of the checks were in similar positions across both years. There was some consistency between the two years in how the genotypes discriminated between the environments also.

There were multiple traits available for the 2008 data and a multi-trait PCA was performed. This showed a strong negative correlation between yield and tillering, which, on the surface, is unusual. Some discussion ensued and it was discovered that tillering was scored at zadoks 71 (post-anthesis) and so it is quite possible that tillers were shed at this stage. Varieties such as Gladius do this.

A similar analysis was performed for the Livestock, Northern region data for an early and main trials.

Ian reported that the analyses on the data from breeding companies is in progress but there is some data that he is waiting for.

**Action: It was decided that the users would like the BLUEs, weights, PEV and trial mean but they don't require an across site analysis because they would like to choose their own sites to include. That is, they would prefer a regional analysis for each region, but are happy to do it themselves.**

#### 6. [Sandra Micallef \(UQ\) - CIMMYT ICARDA Database Project](#)

Sandra outlined the new quarantine lists (2009 shipment) which are on the website. Some of the ICARDA pedigrees are not in ICIS and there are ongoing discussions with ICARDA about obtaining these data. Location by Nursery contingency tables of the

number of lines returned with yield and rust data for the 2008 season are provided. It includes data from the 2003 nurseries.

Sandra then updated the group on the IWIS database and its conversion to ICIS at CIMMYT. There is a new person (Arlet Portugal) working on IWIS conversion (to ICIS) at CIMMYT. Arlet has been the ICIS project leader at IRRI for more than 10 years. By the end of this year all CIMMYT breeders will be using the ICIS fieldbook, all data will be in ICIS, pedigree corrections will be done in ICIS and genebank transactions will be handled in ICIS. There will be two database releases each year and these will include data from CIMMYT, ICARDA, Australia and Canada.

The CAGE website has continued to be updated with new items being the newsletters, durum webpage, a FAQ page on how to use the website is under construction. The latter is the same database as the standalone version. There is a new germplasm lists tab, however, this functionality is not yet working for wheat due to some issues with the wheat data which is expected to be resolved in the coming weeks..

Sandra gave an overview of the ICIS2009 workshop which was held in mid-February in Singapore. Updates of ICIS2009 are listed (see slides).

**Action: The germplasm query for wheat will be working as soon as possible – it is the top priority for Arlet Portugal.**

**Reminder1: Any data exchange has to have one of the following GID, CID/SID, QCode and QNo.**

**Reminder2: Registering on the webpage gives access to users to ‘registered only users webpages’, which may be available in the future.**

#### 7. [\*\*Ky Mathews \(USyd\) – DArT analyses\*\*](#)

The 2005 and 2006 shipments were analysed for DArT in 2008. The aim of this presentation is to show the genetic similarities/differences between the material in the 2005 & 2006 shipments.

There were 410 lines from both shipments from C17HRWSN, C39 and 40IBWSN; 22,

M24 and 25SAWSN, ISWSN and Australian materials. Since CIMMYT nurseries contain selections from the same cross the number of crosses within each nursery were identified.

In the two DArT arrays, 954 markers overlapped, these included markers from the wheat, rye and triticale libraries. 24% were not allocated to chromosomes and 6% were allocated to more than one chromosome.

A Jaccard's distance and Ward's clustering was performed on the genotype by marker matrix, simultaneously. This led to the heatmap on slide 5. An 8 group genotype clustering identified major differences between nurseries which can be explained by the absence/presences of the rye translocation (1BL.1RS) and pedigrees.

A histogram of the percentage frequency of genotypes within CIMMYT nurseries and their distribution across the 8 groups is presented in slide 6. (e.g. all the BLUE bars will add up to 100% representing the ISWSN). A summary of the findings is provided on slide 7.

The clustering of markers seemed to fall out at with 6 groups. There were the 1BL.1RS groupings and then a combination of markers on at least 3 chromosomes. The process of determining how the marker groups split up the genotype groups are explained for groups 2-4.

Ky has collaborated with Peter Wenzl at Triticarte to develop a list of SSR markers for traits (disease, agronomic, physiological etc) of interest to the wheat breeding community. This list has two purposes: 1) as the wish list for any wheat material to be screened with (many of them are no doubt already used by plant breeding companies) and 2) to be added to the DArT consensus map, thereby linking DArT markers to the SSRs and making future screening more attainable. The list is available upon request to Ky Mathews, the majority of the list was provided by Suzanne Dreisigacker at CIMMYT and for incoming material this data should be available. Ken Chalmers (UAdelaide) has genotyped these markers in 2 mapping populations. Slide 14 is an update from PWenzl regarding where the consensus

mapping is up to.

Future work will include linkage analysis, DArTs will be performed routinely on CIMMYT and ICARDA nurseries.

**Action1: It was asked what DArT arrays were used to produce these data. High density arrays were used for both DArT services: version 2.5 was used for 2005 shipment (DW08-230) and version 2.6 (current version) was used for the 2006 shipment (DW08-353)**

**Action2: Ian DeLacy raised the issue of monomorphic DArT markers not being reported and therefore loss of information. Ky to follow up with Triticarte and report back to the group.**

8. **[David Moody \(DPI Victoria\) – Current status and future prospects](#)**

David outlined the development of primary synthetics at CIMMYT and how many have been imported into Australia (387 since 2001). David summarised the results of phenotypic assays for a range of abiotic and biotic stresses. The results indicate enormous potential for the use of these materials as sources of disease resistance and tolerance to subsoil constraints (Al, B and salinity).

In the summary table provided, the relative ratings of the control varieties were included as a reference, with results being standardised against the control varieties over the number of years of assessment. Responses of the PS to salinity in a hydroponics assay were provided; a number of the lines were more salt tolerant than Westonia based on Na exclusion and relative biomass production.

Current activities in the project include completing the phenotypic assessment, and a genetic analysis by Guoyou Ye to determine the genetic distance between the PS accessions and to discover associations between DArT markers and resistance traits.

David indicated that difficulties were expected with the association genetic approach due to the high level of linkage disequilibrium expected in the PSs, but it was worthwhile attempting given that Francis Ogonnaya had shown, amongst these accessions, associations between CCN resistance and markers mapping to

known CCN resistance loci.

The project has also developed a large number of backcross derived populations (now at F5 and F7 generation) that were assessed for stripe rust resistance in 2008. Further field evaluation of single plant selections will occur in 2009.

Future steps include demonstrating that genetic novelty is there using BSA – 1 to 2 years. The results of this will determine future funding from GRDC; if evidence of genetic novelty is demonstrated, the elite PS would be used for the introgression line (IL) development, followed by genetic mapping. Matt Hayden (DPI-Bundoorra) is currently working on developing a tool kit of D-genome specific markers to use for the IL development.

Slide 10 provided a list of accessions for the BSA shortlist; these accessions have been crossed with Anneullo, with the progeny currently undergoing single seed descent to develop suitable populations for BSA. Anneullo was chosen for this purpose as it possesses only a low level of resistance to stripe rust, allowing resistance in the progeny to be more easily ascribed to the PS parent. Yitpi has been nominated by the 3 major wheat breeding programs as the recurrent parent for IL development but this variety possesses a higher level of YR resistance and hence was not chosen for use as a parent in the populations for BSA.

Note that there has been a change of staff – Livinus Emebiri has gone to NSW DPI, and David Moody is currently the project caretaker.

**Questions:**

Julie Nicol asked why Sunco was scored only as moderately susceptible to Crown Rot. Hugh Wallwork responded that a national CR workshop had agreed with this classification last year. In the table of data provided, the best of the PS were similar (or slightly superior) to 2-49, which is rated as moderately tolerant. Julie indicated that she has other lines which are more resistant than 2-49.

**Actions:**

**Action1: If you have any data on the accessions nominated in the Table of Slide 10, please forward to David Moody.**

**Action2: David Moody to circulate the Table of Elite accessions to Harbans and Manisha.**

**Action3: Harbans Bariana will look at the accessions list because he has made F3 populations with Westonia and there is stem rust genes in these lines.**

**Action4: GGrimes: Only 3 requests for primary synthetics, please let him know if you want it.**

9. **[R Singh \(CIMMYT\) – Irrigated Bread Improvement Program](#)**

*Julie Nicol (CIMMYT) presented on Ravi Singh's behalf.*

The core breeding priorities for the irrigated bread improvement program were outlined. Ravi grows the material in 5 environments in the 2<sup>nd</sup> year of testing: the raised bed-2 irrigations and raised-bed drip irrigations are most likely the most relevant to Australian breeders/researchers. A list of the disease characterisations of advanced lines was provided.

Data for the 30ESWYT and 42IBWSN, which was sent to Australia in 2007, are available and highlights of the material include: lines with good performance in drought and heat environments; end-use bread making quality of >50% of lines good in environments with average yield < 5t/ha; 60% of lines in the 30ESWYT are Ug99 resistant.

On slide 6 the Bed-Drip Irrigation treatment shows that more than ½ the entries are performing better than Vorobey.

On slide 7 the material that is classified as Type 1a (strong gluten, high protein high extensibility) would be good. This is the variable USETYP in the spreadsheets sent by Ravi Singh.

Slide 8 gives a rust resistance profile of the 31ESWYT (sent Nov 2008). As always Ravi is aiming for durable rust for all rusts.

**Action: Phil Banks asked if the Spot Blotch is the data available. David Bonnett replied that yes it was.**

**A follow-up email to Ravi Singh clarified the issue:**

**Screening for Spot Blotch commenced in 2008-09 crop season (planting early Dec 08).**

**Data was recorded three times but Ravi doesn't have it yet. The 100 M31ESWYT lines were included in this screen. It will be forwarded to the CAGE community once it is available.**

10. **[M Reynolds \(CIMMYT\) – Drought Physiology project](#)**

*Julie Nicol (CIMMYT) presented on Matthew Reynold's behalf.*

A conceptual model for yield has been used to evaluate genetic resources and led to breeding for physiological traits (PT) under drought and/or heat conditions.

He (and his colleagues) have sought to compartmentalise the traits which contribute to yield, and estimate how much this contribution is – harvest index, canopy temperature and transpiration efficiency are some of the higher contributing traits. Principal components analysis helps identify which traits are likely to result in cumulative gene action under drought conditions.

PT breeding has led to a yield advantage in the breeding populations (see also Yann Manes presentation below). PT lines represent 24% of the lines in the 23SAWSN distributed in 2008. The key steps of PT breeding were outlined – see the last slide for relevant references. They have succeeded in cumulating gene action from crossing parents with complementary traits.

11. **[Y Manes \(CIMMYT\) – Drought Bread Improvement Program](#)**

*Julie Nicol (CIMMYT) presented on Matthew Reynold's behalf.*

The first two slides outlined the CIM00012 and CIM00010 projects, their primary tasks and objectives. They are both 5 year projects.

The strategic trial is part of CIM00010 and investigates the importance of stress adaptive traits in different stress environments. This project also includes germplasm development using physiology trait based crosses – elite by elite simple and top crosses and introgressing lines from landraces which are then investigated under drought conditions.

The strategic trial was described in detail – see slides 5 & 6. A PhD student Julian

Pietragalla is working on this trial. (from slide 6 CT = conventional tillage, ZT – zero tillage.)

The next few slides refer to a new approach to drought screening the primary synthetics and it will start the introgression of the best accessions into elite germplasm. Wheat physiology will be screening 843 primaries in 08-09 for physiological traits. The 10-15% best of these will be screened the following year and best entries from two years data introgressed into elite lines.

CIM00010 funds a post-doc position at CIMMYT to support rainfed CIMMYT breeding and pre-breeding, this is Wuletaw Degu.

**Action: The strategic trial contains 30 lines and Yann would like to see it grown in Australia. KMathews to chase this up with the CAGE users.**

**Allan Rattey would like to know if the strategic trial has been screened for vrn and ppd genes. A post-meeting email from Yann Manes said that these have not yet been analysed "However, it is most likely that they are all Ppd insensitive and spring types. The dominant type in CIMMYT material is Ppd1 and having the spring alleles at Vrn B and D locus, and winter allele at VrnA locus."**

## 12. [J Nicol \(CIMMYT\) – Soil Borne Pathogen project](#)

The aim of this project is to identify and use novel sources of resistance against Soil Borne Pathogens (SBP) in wheat. There is specific emphasis on multiple SBP resistance. The plan is to breed these into CIMMYT and Australian backgrounds and supply these via the CIMMYT international nurseries – currently 50 lines at AWCC in quarantine.

Other objectives include:

- a. Molecular characterisation of the novel sources of resistance for specific SBP in useful populations is under negotiation with AWCMMP; and
- b. Production of new mapping populations for root lesion nematode and crown rot. Again under discussion with AWCMMP-GA group (based on feedback from Australian breeders and Diane Mather.)

Yann Manes selects material using marker data and sends it to Julie - it is then phenotyped and Yann selects lines using these data. The winter wheat program routinely screens its semi-arid material.

The nurseries which were sent to Australia Dec 09 contain spring and winter bread wheat, spring and winter durum and Fusarium head scab and crown rot components. With the latter it is known that the pathogen can move from one area to the other on the plant although Julie is pretty sure that the genetics of the two pathogens is not the same. This material will be available in 2010. Many of the lines have Australian pedigrees and Julie is confident that this well-adapted high yielding material.

Julie then discussed three of the six SBP nurseries. Some key points from this discussion were:

- a. Spring wheat – a list of the lines and their resistance profiles
- b. winter wheat, e.g. Sonmez and Altay 2000 are good winter wheats – is this of any interest to Australia? It was agreed that winter wheats are useful for high rainfall and rain-fed regions.
- c. F6 RLN spring wheat - Julie summarised the current understanding of the genetics of resistance to *P.thorneii* (RLN). There is a lot of genetic variation for RLN and it would be of great value to put the different sources together i.e. pyramid RLN resistance. There are two other regions (1B and 3B) of resistance in addition to the major source of resistance was on 6DS which was identified in the line GS50a. The entries in this nursery are an F6 from ½-diallel – a no nematode response. They are in a Pastor based background (and Julie assured us they were not horrible!)

Julie indicated that there is demand for these nurseries, already there are requests. It is vital that as much data as possible is collated and that it is returned. The above point was illustrated with some crown rot data – it is very difficult to work with as it is very variable from year to year and location to location. Thus, several years of field data are required.

Julie is also working on a ICARDA CIMMYT Wheat Improvement Program project with Francis Obgonnaya (ICARDA) where they are looking at mapping populations such as CROC\_1/AE.Squarrosa (224)//Opata by Janz which has resistance to both RLN-Pt and Crown Rot.

**Action: KMathews to include a visit to Turkey on the breeder visit to ICARDA.**

**Action: New mapping populations will be developed within the SBP project – what do the Australian community want to see, what is most interesting to them? A list of these have been given to Diane Mather who will follow up with the breeders.**

**Hugh Wallwork (SARDI) suggested that SOKOLL was a good line to use for it has high RLN resistance.**

**It was suggested that the primary synthetics be screened – Julie suggested that this would be best done with a student.**

**Action: Ky to put this on the steering committee agenda.**

**Action: Julie suggested that it is easier to make crosses for marker populations in Australia and send them to Turkey rather than vice-versa.**

**Action: If you would like to send seed to JNicol in Turkey for screening, please send no more than 10 lines each (20g of each) to Julie by July.**

13. [Osman Abdalla/Francis Ogonnaya \(ICARDA\) – ICARDA wheat update](#)

*(presented by Ky Mathews)*

Wheat production in Central West Asian and Northern Africa (CWANA) was described. The environments are predominantly rainfed, and a combination of spring, winter facultative winter wheats are grown for this region.

The major focus of the breeding program is to develop drought, heat and cold tolerant varieties which are water use efficient and have high yield potential. Other target priority traits are disease related including rusts, Russian Aphid Wheat resistance and others.

Two hundred lines were sent to Australia in Nov 2008. They included selections from the

- a. Advanced Wheat Yield Trials for Low Rainfall(AWYT-LR). Some data from 4 locations in the last season shows the higher yielding lines.
- b. Synthetic derivatives with lines from CHAM 6 crosses yielding high in this 1t/ha location.
- c. A comparison of ICARDA material with Australian cultivars at Tel Hadya – these were expressed as a % of Gladius.
- d. 60 lines from the Russian Wheat Aphid project – 12 lines were selected from FIGS (see Greg Grimes presentation)

Additional proposals for 2009 are to

- a. include lines with Stem Rust Resistance to Ug99 lines which have been tested in Ethiopia and Kenya - they have 211 lines which are APR. Let Francis know if you are interested in them.
- b. Develop mapping populations which are suitable for drought and/or heat stresses. Those which are currently being tested were listed. Francis listed the Australian cultivars currently being used as parents. He would appreciate the breeders nominating 5 more lines from each breeding company which represent the agro-ecological zones.

**Action: The following are action points which KMathews will follow up with the user group about. Please contact her or FOgbonnaya if you are interested in any of the following.**

- a. **Adult Plant Resistance lines for stem rust resistance to Ug99 – is anyone interested in these lines?**
- b. **Mapping populations for drought and heat respectively? – they need Australian collaborators.**
- c. **Mapping populations for drought and heat together? – they need Australian collaborators.**
- d. **Additional Australian parents for mapping populations – 5 nominations from each breeding company.**

**14. [Harbans Bariana \(PBI Cobbitty\) – Rust Screening of CIMMYT nurseries.](#)**

The CIMMYT nurseries were screened for three rust diseases: stem rust, leaf rust and stripe rust. Leaf rust results were not of good quality..

The nurseries screened were 41IBWSN (ZWC07) and the 26 SAWSN (ZWE07). They were screened in two sets, CIM 'G' and CIM 'H' (see the website CAGE Project >> Rust Disease Two stripe rust scores were taken to study disease progress, it appears that a majority of the entries carry seedling genes against Australian pathotypes. A newly detected Yr27 pathotype may knock at least one of the genes. Kingbird sib also appeared to carry seedling resistance to stripe rust.

The 39International Durum Screening Nursery was screened against several stem rust pathotypes. Stem rust resistance genes Sr8b, Sr9e and Sr13 (presumably) were present in various combinations. Sr9e alone was present in a substantial proportion of entries.

**15. [Allan Rattey \(CSIRO\) – Wheat Traits, Genes and Germplasm for Adaptation to Water limited environments in the Northern Region](#)**

The project contains breeding, physiology and genetic components.

The breeding component aims to produce high yielding germplasm, the focus has been to produce high yield lines with large grain size.

The material they have assessed includes 495 synthetic lines, more than 1000 spring wheat lines, selected lines out of IAT and Seri/Babax lines. The trial containing 500 CIMMYT lines from the 2006 nursery shipments was not harvested in 2008 due to excessive rain at harvest. Preliminary data for 495 synthetic + ~600 CIMMYT (2004 nursery shipments) are loaded on CAGE website.

The Seri/Babax (SB) population was developed by Matthew Reynolds (CIMMYT) for investigating physiological traits involved in drought adaptation. One reason for investigating this population is because of the known was high genetic correlation between Obregon and the northern region. Elite SB lines had higher yield combined with larger grain weights than commercial lines. The high yield has been attained by different combinations of traits and these combinations were studied on different

subsets (bifurcated on grain weight and grain number) of the SB population. Slide 5 is the proposed ideotype for high grain yield with large grain weight. Higher number of grains per spike is part of this ideotype and the spikes tend to have a great number of grains at distal ends of the spikelets. There is an interesting interaction between WSC concentration and tiller number, which we are continuing to investigate.

The data presented on slide 6 comes from 16 trials grown between 2006-2008 by CSIRO and under contract QDPI through out the region. The analysis performed was a factor analytic of order 1 (FA(1)). All groups of CIMMYT lines had higher grain yield and significantly higher grain weight. The synthetics had the greatest variation for grain weight. All groups of CIMMYT lines have fewer culms/plant that were heavier and had higher WSC with more grains per spike.

There is a commonality of relatedness in the material and the question being asked is “is the proposed ideotype pedigree independent?”

They are planning on using physiology of phenotypic response to help answer this question. High throughput, non-invasive phenotyping to help understand the relationship between WSC and tillering. This will assist in the physiological understand and provide physiology selection tools.

The genetics component aims to provide markers useful in a breeding program. There was some discussion on the relationship between the traits e.g. the partitioning of carbon into growth rather than tiller number - this relates back to the biplot Ian DeLacy presented where yield and tiller number were negatively related.

16. [Discussion facilitated by John Sheppard.](#)

- a. Pre-breeding representative on steering committee

**Action: decided that this was not necessary. The minutes from that meeting will be available.**

- b. Nomenclature – this related to the fact that 4 different organizations will be increasing the CIMMYT and ICARDA nurseries in future. Thus there will be 4

different seed sources.

**Action: It was decided that it was not necessary to include the different increases in the selection history.**

- c. Data collation – this had been covered in Sandra Micallef’s presentation. **Data needs to be returned by the end of January following the trials and the GID, CID/SID or QCodes must be in these data files.**
- d. Feedback about CAGE data
  - i. CIMMYT data – the group would like to have this better summarized.  
**Action: Ky Mathews will endeavor to work on this.**
  - ii. Rust data – it was proposed that combined analyses could be performed on these data.  
**Action: The group would prefer to see the raw data. No combined analyses are required.**
  - iii. GET data – what analyses would the group like to see  
**Action: From IDelacy’s presentation, single site BLUEs with weights, PEV and site mean (or BLUEs on a site mean scale) included.**
- e. Distribution of seed from 2009 shipment
  - i. CIMMYT nursery breeding company contacts are Bertus Jacobs (LongReach), Chris Moore (DAFWA & Intergrain), Meiqin Lu (AGT), GRoseworthy (CSIRO, CBR) has offered to increase the seed at Ginninderra.
  - ii. Primary synthetics distribution – Harbans Bariana will screen this material.
  - iii. Root Disease Nurseries – they will be distributed in 2010, please contact Julie Nicol if you are interested in them.  
**Action: Cutoff dates for the seed requests will be late April/early May.**
- f. ICARDA visit
  - i. The breeders would like to know what GRDC plans are regarding ICARDA projects. They would like this information before they go to ICARDA in May. This is so that they can comment on future project investments.

- ii. The breeders would like to receive the pedigree data for the material which they will see when they visit in May.
- g. Germplasm Evaluation
  - It was agreed that the ICARDA material would be grown in the same trials as the CIMMYT ESWYT and SAWYT nurseries. Australian checks were also agreed on. These were: Wylacatchem, Yitpi, Axe, Gladuis, Livingstone, Crusader, Gregroy, Lincoln and Magenta.
- h. Durum breeding
  - This was an update on the new durum breeding programs – see slide 4.
- i. Lindsay O’Brien – gave an overview of the drought phenotyping workshop which was chaired by J.Passioura. The review was submitted to GRDC in March 2009. Please direct any questions to Lindsay.