

CAIGE Project Newsletter

CIMMYT- Australia - ICARDA Germplasm Evaluation



May 2020

Welcome to the May edition of CAIGE newsletter

Well it has certainly been an interesting time since we last communicated and the world has changed somewhat with the advent of the coronavirus pandemic (CVP). I start this newsletter by hoping that all of you and your families are well and safe and have adjusted to the new norm of operation for now and are managing to be productive.

The CAIGE team have all been working hard on data analysis, seed preparation and field planting plans and reporting from 2019-20 with Ky and her team at the Australian Centre for Bioinformatics & Biometrics (CBB), and Sally and her team at the Australian Grains Genebank (AGG). We will update on last year's experiments and what is planned for this year in the newsletter.

Since we last communicated we have recently held our CAIGE Steering Committee meeting on April 15th and I am glad to report all is running on track, however several meetings and visits have had to be postponed thanks to CVP. Project leaders, Prof Richard Trethowan for wheat and Ass Prof Mark Dieters for Barley have been working very hard with the CAIGE Steering Committee and GRDC to ensure that CAIGE will continue to deliver valuable germplasm and data to our collaborators and ensure the project continues to thrive.

We also have some slight changes in the core CAIGE team. Our long standing and valued data base leader and CAIGE coordinator from many years previous Ms Sandra Micallef will be reducing her time input into CAIGE from three days a week to one. We welcome Mr Deepak Baranwal to the team as he will be overlapping with Sandra this

year. He is presently completing his PhD on molecular characterisation of rust-resistance in wheat. He has a special section in this report about using the BMS search function to enhance the usability of the CAIGE data base.

By now all collaborators have received their seed for the 2020 season and will be planting Bread Wheat, Durum Wheat and Barley trials across Australia. CIMMYT and ICARDA colleagues are busy with field assessments and harvesting in their respective fields in Mexico and North Africa and we wish them well with that.

As always if you have any questions please don't hesitate to contact me. Stay safe, well and productive and thankfully Agriculture continues regardless of the CPV!

Julie
Dr Julie M Nicol
Coordinator CAIGE project

EVENTS

Due to the ongoing situation with the coronavirus pandemic, most meetings have been delayed or cancelled or organised virtually. The annual general meeting (AGM) cancelled earlier in March 2020 will most likely be held at University of Sydney, Plant Breeding Institute Cobbitty in last week of September 2020.

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AN UPDATE FROM CAIGE LEADER

Leader of the Bread and Durum Wheat component of the CAIGE project Prof Trethowan notes that the new structure of the CAIGE program continues to operate well with efficiencies, thanks to the hard work of many, we continue to improve the flow of germplasm and data. This season, despite COVID-19, is on-track to deliver extensive yield and disease information on the latest bread wheat, durum wheat and barley germplasm from the CGIAR centres. Trial seed, lists and designs have been distributed on-time and the season in NSW, for once, looks promising after recent rain. The only casualty of the COVID-19 crisis was our breeder visits to Mexico and Morocco – while these trips are on ice, the flow of germplasm and information will continue unabated as the CAIGE team work with CIMMYT and ICARDA breeders to identify suitable materials and associated data that will allow us to tailor the germplasm for quarantine in late 2020. On behalf of the entire CAIGE team, we look forward to working with you in 2020 to continue to identify the most relevant and useful materials for Australia.



Leader of the Barley component of the CAIGE project Ass Prof Mark Dieters has indicated that the implementation of the second phase of Barley CAIGE project is now well underway. Under this phase of the project, there have been several changes. Firstly, only barley breeding lines are being imported (i.e. no landraces are to be imported), and importations are now only occurring every second year – first set of 300 lines were selected in 2018 and released from quarantine in 2019. The second set of 300 lines will be selected from across the ICARDA nurseries and trials in Morocco, in May this year, and seed from single heads will be sent to Australia in June/July 2020. Of the 300 lines selected in Morocco in 2018, 270 were successfully increased in 2019, and will be included in yield trials on four sites (York WA, Kalkee Vic, Narrabri NSW and Gatton Qld) in 2020, and smaller amounts of seed have been provided to the breeding companies. Hopefully you will be able to visit these trials during the coming growing season. Phenotypic disease data on many of these lines has been provided by Davinder Singh (University of Sydney) and Lisle Synman (QDAF), using limited quantities of seed supplied ex quarantine (by Brett Lobsey). This disease phenotype data is available on the CAIGE website. It is interesting to note the changes in the pedigree of this material, as many of the lines imported are now being derived from the period when the 2-row spring barley program was being run jointly by ICARDA and CIMMYT. Finally, Laura Ziems (University of Sydney) is making excellent progress with a genome wide association study (GWAS) of leaf rust resistance in barley, and will then move onto net blotch, spot blotch, scald and powdery mildew resistance.



CAIGE 2019 AUSTRALIAN YIELD TRIAL AND PATHOLOGY RESULTS

Barley

Yield trials were conducted in 10 environments including QLD (Gatton), NSW (Breeza, Narrabri), WA (Merredin, Corrigin, Toodyay), VIC (Swan Hill, Kalkee) and SA (Pinaroo, Roseworthy) with 100 unique varieties. Four of the trials were public and the rest private. The variety connectivity between environments was excellent (>97). An FA4 model was fitted to the yield dataset and the total variance accounted for was 81.45%.

There was substantial variety by environment interaction (VEI): The most correlated sites were Corrigin and Toodyay and the least Kalkee and Swan Hill. Breeza was late sown and as such had very low mean yield (0.36 t/ha) whilst the highest yielding sites were Gatton (4.4t/ha) and Toodyay (2.6t/ha).

Many ICARDA lines performed very well at the level or above the level of the best Australian check and visually many lines look excellent.

Mark pointed out that last year yield trial comprised lines that had been yield tested for one year. Mark also indicated that many lines have multiple disease resistance. He commented that Laura Ziemis (formerly UQ now UoS) is working on leaf rust and net blotch resistance data using the genotypic information and the results indicate there are potentially several novel resistance genes in ICARDA lines and landraces evaluated. Furthermore, many of these novel sources are present in breeding lines from ICARDA which is very promising for the breeders.

As with previous years a full data compilation of the yield and disease data has been compiled and circulated to CAIGE collaborators with password protection by Sandra and the public yield trial and pathology data is available on the CAIGE website <http://www.caigeproject.org.au/germplasm-evaluation/barley/disease-screening/>

CAIGE 2019 AUSTRALIAN YIELD TRIAL AND PATHOLOGY RESULTS

Bread Wheat

Twelve yield trial environments were used in 2019 including 312 unique varieties. The sites included NSW (Breeza, Narrabri, Northstar), SA (Balaklava, Roseworthy), VIC (Kalkee, Swan Hill) and WA (Corrigin, Dandaragan and Toodyay). Three of these sites were public (Narrabri, Swan Hill and Corrigin) and 9 private/commercial company (AGT, Intergrain, Edstar Genetics, LRPB and SWS Seeds).

There were 10 environments with good quality yield data used in the final analysis. Balaklava and Roseworthy were both severely affected by frost and not included in the across environment yield analysis.

The variety connectivity between environments is excellent (>170). An FA4 model was fitted to the yield dataset and the total variance accounted for was 67.68%. The highest total mean yielding sites were Toodyay (3.98t/ha) and Narrabri (3.75t/ha) and the lowest yielding were Breeza (0.76t/ha) as late sown, Swan Hill (0.62t/ha) and Junee (0.18t/ha) with severe drought and some frost.

Many lines (both ICARDA and CIMMYT) performed very well at the level and above the level of the best checks and lines looked great. Of note was the AGT check Scepter who performance was outstanding and a hard check to beat across Australia.

As with previous years a full data compilation of the yield and disease data has been compiled and circulated to CAIGE collaborators with password protection by Sandra and a separate data compilation for the public yield trials and pathology data is available on the CAIGE website <http://www.caigeproject.org.au/germplasm-evaluation/bread/data-compilations/>

Durum Wheat

There were seven environments and 394 unique varieties. The sites including NSW (Breeza, North Star, Sunville, Tamworth), VIC (Kaniva) and SA (Roseworthy and Kapunda). Four of these sites were public (Tamworth, Kaniva, Roseworthy and Kapunda) and 3 private/commercial (Breeza, Northstar and Sunville).

Five environments had good quality yield data used in the final analysis. Tamworth was not harvested due to bird damage, and Breeza removed as very late sown. The highest yielding site was Kaniva with Total Mean Yield 4.31t/ha and lowest yielding was Breeza with 0.75t/ha as was late sown.

The variety connectivity between environments is excellent (>97). It was not balanced with not all varieties being represented in all environments, and some not equally replicated. An FA2 model was fitted to the yield dataset and the total variance accounted for was 42.42%.

Many of the CAIGE materials including both CIMMYT and ICARDA performed very well at the level and above the level of the best check and visually looked excellent.

CAIGE AGM and CG VISITS FOR 2020

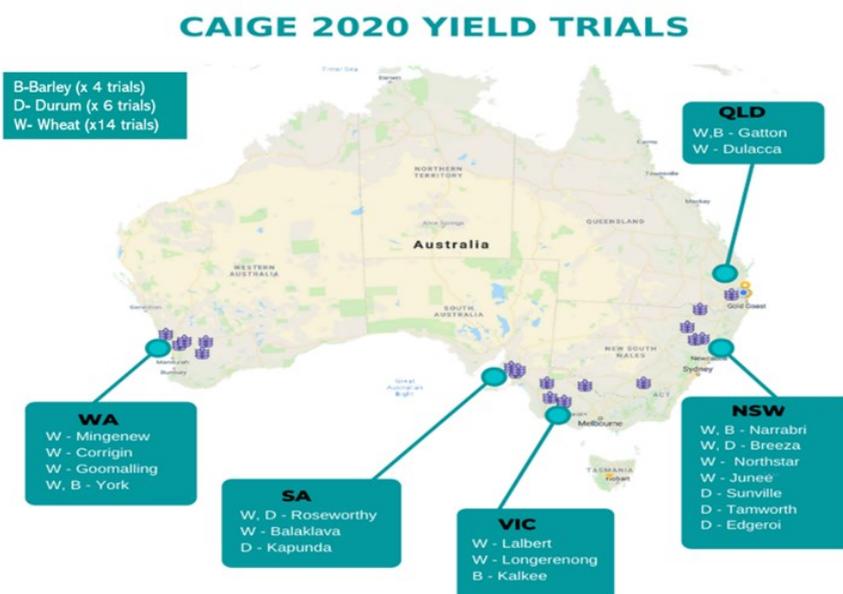
Due to the CVP the AGM was postponed; it will most likely be held in last week of September, 2020 at the University of Sydney, Plant Breeding Institute Cobbitty in conjunction with the breeders' rust meeting.

2020 CAIGE AUSTRALIAN FIELD SEASON Seed Preparation and Distribution

Sally Norton, Nicole Sawyer and their team at the AGG have done a sterling job at preparing all Yield Trials for all three crops and Pathology sets for Bread Wheat and Barley in record time. We also thank our trial collaborators and Ky and her team at CBB for providing the randomisations and field plans.



The efficient, productive and happy seed preparation team at work at the AGG- Kobi Kimberley (left) and Caitlin Mibus (right).



MAP of 2020 CAIGE Yield Trial and field list

Trials and locations

As we move forward with the new CAIGE project this is the last year where we will have seed from both CIMMYT and ICARDA for bread and durum wheat and also some bread wheat lines from Dr Rajaram's program and Matthew Reynolds Physiology lines from CIMMYT Mexico. This year we have the largest trial testing for bread wheat with 14 locations. There are also six locations for Durum wheat and four for Barley as shown above. All collaborators have received their seed and we wish them well with the coming rains and planting. Links to the field maps and field books can be found here <http://www.caigeproject.org.au/caige-2020-trial-design-and-layout/>

QUARANTINE UPDATE

Brett Lobsey has indicated that all is rolling along well. Seed which was received from Morocco from last years selections is now growing in quarantine almost ready to be harvested. This along with some of Matthew Reynolds special wheat physiology nurseries from Mexico will be ready by the end of May 2020 for seed increase under the birdcage at Narrabri PBI station.

Brett has also received;

Sixteen bread wheat lines from ICARDA requested by Dr Livinus Emebiri (Ag NSW, Wagga Wagga) with Sunn Pest and Hessian Fly resistance and/ or tolerance which will undergo increase shortly, and be available early next year.

Forty F5 lines from ICARDAs Durum Wheat Breeder Dr Fillipo Bassi (QCODE: MAS20) which relate to the special ICARDA GRDC project (see report below from Fillipo). He intended to send 100 lines, however 60 of the lines had seed nematodes and were not able to be sent.



***AGG Genetic Resource Manager – Cereals,
Brett Lobsey in Quarantine growth chamber***

Unfortunately approximately 50 durum wheat lines from Mexico related to a GRDC project with CIMMYT did not germinate, and Brett and Julie will look into possibly receiving some of these again with this years shipment from Mexico with Karim.

As usual we thank Brett and his team for their on-going work to ensure the seed is received, quarantined and moved through the pipeline in such a good manner.

If you have any questions please contact Brett Lobsey, Genetic Resource Manager - Cereals | Northern Cropping Systems at brett.lobsey@dpi.nsw.gov.au.

UPDATE ON PHYSIOLOGY LINES FROM MATTHEW REYNOLDS CIMMYT

Last year's CAIGE Bread Wheat Yield trial had several entries from CIMMYT's Physiological Pre-Breeding group from both the ZWY18 (7th SATYN -Stress Adaptive Trait Yield Nursery) and ZSA18 (5th WYCYT – Wheat Yield Collaboration Yield Trial), and many of these entries performed relatively well across Australia (Richard Trethowan has this information). Their specific physiology trait value(s) were reported by Matthew Reynolds and his team in the June 2019 CAIGE Newsletter and can be again be found here <http://www.caigeproject.org.au/germplasm-evaluation/bread/importedbreadwheat/imported-list2018/>.

As mentioned earlier this year's CAIGE yield trial will have several entries from the WYCYT and SATYN special physiology nurseries (these include ZWY19 and ZSA19). There are also several entries which will be increased in the birdcage at Narrabri for inclusion in the 2021 CAIGE Yield Trial (ZWY20 and ZSA20). Links to these nurseries can be found on <http://www.caigeproject.org.au/germplasm-evaluation/bread/donor-data/> (See also this link: Strategic crossing of biomass and HI -source and sink— achieves genetic gains in wheat. *Euphytica*, 213:257-80).

Matthew has provided a great link to their new USAID Feed the Future website Wheat Yield Collaboration Trial (WYCT; <https://feedthefuture.globalinnovationexchange.org/innovation/international-nurseries-containing-wheat-lines-with-outstanding-expression-of-yield-potential-related-traits-and-adaptation-made-available-and-distributed-to-breeders-and-researchers-worldwide>) which explains well the basis for the and how this is used internationally.



CIMMYT's Global Wheat Program Director, Dr Hans J Braun with a local farmer in Pakistan growing Pakistan-13: Third physiological trait line released in South Asia.

More information about the IWYP (International Wheat Yield Partnership) of which CIMMYT, GRDC and many international partners are involved which is a long-term global endeavour that utilizes a collaborative approach to bring together funding from public and private research organizations from a large number of countries to unlock the genetic yield potential of wheat. More information can be found their annual report <https://iwyp.org/>

Matthew and Sivakumar Sukumaran -who leads the physiological pre-breeding operation, indicated that in the last WYCT and SATYN nurseries, preliminary observations suggest that several lines may show resistance to new yellow rust race(s), presumably deriving from the use of exotic parents (i.e. landraces and primary synthetics that had been selected primarily for abiotic stress resistance traits like high biomass and cool canopies). While not the primary intention of the pre-breeding nurseries, 4 lines have been released as cultivars in South Asia by national partners. If you have any questions please feel free to contact with Matthew on m.reynolds@cgiar.org

UPDATE ON DURUM LINES FROM FILIPPO BASSI ICARDA

ICARDA's Durum Breeder Dr Filippo Bassi has most recently sent 40 F5s through the CAIGE portal which relate to the pyramiding of ICARDA's QTLs for abiotic stress with a focus on ICARDA/Australian durum germplasm. These are under increase and will be available early next year from Brett. He has kindly provided a summary of this joint ICARDA/GRDC project here.

In 2014, ICARDA and GRDC have launched a joint project (ID: ICA00012 <https://grdc.com.au/research/projects/project?id=2361>) for the identification and delivering of novel alleles for drought and heat tolerance into Australian durum wheat cultivars. In 2020 the final scientific report was produced (available at GRDC by request). This document is 27 pages long (7 tables and 22 figures), which are not enough to describe all the achievements delivered within the six years project.

The war in Syria delayed the starting date of the activities, precluded the access to some of the advanced physiological equipment, and caused several issues in the ability to gather and test germplasm in the first year. A greenhouse fire and a nematode infestation further delayed the delivery time in the final year of the project. Nevertheless, it was possible to achieve all ambitious milestones, which included the development of novel phenotyping methods and the genetic dissection of six extremely complex traits: heat tolerance, drought tolerance, roots, mineral toxicity, yield potential, and pest resistance.

Good germplasm sources better than Australian cultivars were identified for each trait studied. A total of 46 major QTLs were identified, of which 19 are completely absent from the Australian germplasm, and 23 new KASP markers were validated for use in marker-assisted selection (MAS) to tag 17 of the identified QTLs. Sixty crosses were made between Australian cultivars and ICARDA's donors to introgress nine of the missing QTLs; MAS was used at F₄, and F₆ individuals were shipped in 2020 to Australia for direct use by breeders. Field assessment as part of CAIGE revealed that 4-8% of the ICARDA's germplasm tested annually was superior to commercial varieties when trialled across Australian sites. Also, field studies in Morocco revealed that the ICARDA's germplasm has on average 30% advantage for grain size compared to Australian cultivars (<https://groundcover.grdc.com.au/story/6199521/hard-living-durum-to-toughen-modern-crop/>).

This is the "low hanging fruit" that Australian breeders can quickly convert in yield gain for farmers. Genetic diversity studies also confirmed that strong diversity exist between the Australian germplasm and ICARDA. This is because the ICARDA's program tames wild relatives and landraces in their breeding strategy to deliver top performing elite lines, packed with novel alleles to face the changing climates. A total of six high impact scientific articles were generated by this project, and several exploitable databases have been made available. For further information please contact Filippo at f.bassi@cgiar.org



Filippo Bassi in a Durum wheat field

Hence, as ICARDA's scientist I would like to thank GRDC for the great opportunity and for pushing us to work beyond what we thought possible. This five-years project has achieved the establishment of novel phenotyping methodologies and used them to identify germplasm superior to Australian cultivars for tolerance to several biotic and abiotic stresses. It has delivered this germplasm to the national breeders via CAIGE, and went beyond by identifying the genetic loci responsible for this superiority, marked them with easy to use KASP, and delivered them to Australia via targeted crosses. I believe we have achieved together the development of knowledge and germplasm that will help the Australian breeders delivering ever superior cultivars to their farmers. At ICARDA we do hope this will be only the first of a series of ambitious and forward-thinking projects that we will conduct together.

DURUM CROWN ROT PROJECT UPDATE FROM ANKE MARTIN

As you may recall from previous CAIGE newsletters Anke Martin and her team at USQ are working on a GRDC project: Durum Crown Rot benchmarking for improved grower access to durum varieties with greater Crown Rot resistance. She has kindly provided an update here from their field work last year.

In 2019, durum tolerance trials consisting of 112 lines, including 38 CIMMYT, 60 USQ and 3 SARDI lines plus 6 durum and 5 bread wheat standards were conducted at five sites (Tosari, Narrabri, Roseworthy, Kapunda and Tamworth). Trials included 2 replicates each of two treatments (+/- crown rot inoculum). Inoculum for all sites was produced at USQ. Due to the hot and dry season, yields at harvest were low for all sites for both the inoculated and uninoculated sites, however, significant differences between inoculated and uninoculated plots were observed. At least 15 crowns per plot were sampled for all inoculated plots and for both inoculated and un-inoculated for the standards. Crown rot assessments for the sites have almost been completed. All data will be analysed by SAGI North.

The 38 CIMMYT entries in this nursery relate to the special nursery that CIMMYT and Brett Lobsey pulled together with CAIGE <https://www.caigeproject.org.au/special-sbp-durum-nursery/> Limited seed is available of this material by contacting Brett Lobsey brett.lobsey@dpi.nsw.gov.au Also, of interest more than 56 of these 99 entries have also entered in previous Durum Wheat CAIGE Yield Trials (in the file 'above' you can see the year it was used).

A NEW STRIPE RUST ISOLATE ON DURUM WHEAT

An update from Harbans Bariana at University of Sydney has confirmed a new stripe (yellow) rust pathogen isolate detected recently has special affection for durum varieties. Stripe responses of Australian durum varieties went high during the 2019 crop season. Following phone calls from durum breeders, Harbans Bariana tested material brought under CAIGE shipments from 2015 to 2019 and observed high levels of resistance. Australian variety, Arrivato, carries high level of resistance against this isolate. Harbans believes that high level of resistance among the CAIGE germplasm and in Arrivato is due to three genes packaged in chromosome 1B. It included *Yr24*, *Yr29* (APR) and an additional gene not far from *Yr24*. For further information please contact Harbans at harbans.bariana@sydney.edu.au

PROMISING DIVERSE LEAF RUST RESISTANCE FROM ICARDA BARLEY GERMPLASM

Over the last four years, The Australian Cereal Rust Control Program (ACRCP) at the University of Sydney's Plant Breeding Institute (PBI) has worked hand in hand with the CAIGE program to discover, characterize and utilize new sources of barley leaf rust. The CAIGE Barley Rust Research effort, coordinated by Dr Davinder Singh and Prof Robert Park, has led to the identification of several known and novel sources of resistance to leaf rust.

The rust research team at PBI Cobbitty has screened over 1,000 CAIGE entries with an array of Australian leaf rust pathotypes that were identified from nation-wide pathogenicity surveys conducted by PBI since 1989 (in greenhouse and field) and molecular markers. Using a systemic combined approach of phenotyping and genotyping, the ACRCP team successfully identified many novel sources of resistance, which importantly have included new adult plant resistances (APR). APRs are highly preferred by breeders because of their reputation for durability as they are quantitative, interactive and additive. Dr Laura Ziems is conducting genome wide association studies on a selected panel of CAIGE germplasm to identify the genomic regions associated with these new APR genes. This will assist in developing closely linked markers for marker assisted selection and pyramiding of APR genes for achieving durable resistance. Hybridization and backcrossing have been initiated to transfer the identified resistance genes into backgrounds known for their high performance, but which are highly vulnerable to leaf rust. The germplasm thus developed will be a valuable resource for breeders for further utilization in their breeding programs. For further information please contact Dr Davinder Singh at davinder.singh@sydney.edu.au.

UPDATE ON SOIL BORNE PATHOGENS FROM AMER DABABAT IN CIMMYT TURKEY

Amer has been busy working away in Turkey with his Soil Borne Pathogen team and most recently one of the PhD student Dr Shree Pariyar has published a very good paper on Fusarium Crown Rot and QTLs which can be access on <https://www.nature.com/articles/s41598-020-60190-4>. Amer and colleagues in Turkey and Central Asia have most recently surveyed wheat fields in the Central Asian Republics of Azerbaijan and Kazakhstan and have reported both root rotting fungi and cereal nematodes. A brief summary of this report is given below.

Kazakhstan and Azerbaijan are important wheat producer countries with an annual production of 14.8 and 1.8 million metric tonnes over an area of 12 and 0.67 million hectares, respectively (FAOSTAT, 2020). However, the average wheat production (around 1 ton/ha) is still far below the international wheat yield average especially in Kazakhstan (Abugaliyeva and Morgounov, 2016). This low yield is attributed to various constraints including; lack of fertilizer and water, use of uncertified-old varieties, and soil borne diseases in both countries (Shroyer et al., 1990; Dababat et al., 2020).

Very limited information about the presence and distribution of soil-borne diseases in the cereal-growing areas in both countries existed. Therefore, CIMMYT with partners conducted extensive surveys to collect samples of soil and wheat stems from the main wheat-growing regions in Azerbaijan and Kazakhstan in 2017 and between 2018 and 2019, respectively. The aims of the studies were to (i) investigate the occurrence and distribution of soil borne diseases in the major wheat-growing areas in both countries (ii) describe the soil borne diseases species by morphological and molecular techniques and (iii) evaluate possible intraspecific variation within soil borne diseases populations.

The obtained results from both countries indicated that the most widely and economically important fungal pathogens; such as common root rot (*Bipolaris* spp.), Rhizoctonia root rot (*Rhizoctonia* spp.), Fusarium crown rot (*Fusarium graminearum*, *F. pseudograminearum*, *F. culmorum*, and *F. avenaceum*) and phytoparasitic nematodes; root lesion nematodes (*Pratylenchus thornei* and *P. neglectus*) and cereal cyst nematodes (*Heterodera filipjevi* and *H. avenae*) have been reported based on morphological and molecular tools of which several of them have been reported for the first time. Several findings have been published in different international journals and others are submitted or being prepared now.

Full report is available here:

https://www.dropbox.com/s/vkjz0nqwa0z6kxc/Soilborne%20Disease%20Survey%20Report%20of%20Kazakhstan%20and%20Azerbaijan_30.04.2020.docx?dl=0

IMPACT ASSESSMENT IS UNDERWAY

As reported in the previous CAIGE newsletter there is ongoing work in the new CAIGE project to understand the impact of the CG germplasm on the wheat releases in Australia. This work is being conducted by economists at GRDC and University of Sydney with input from the CAIGE team and collaborators. This study has started with Bread Wheat and in the future both Barley and Durum wheat will be included. Efforts are also underway with CG partners and University of Sydney to look the other direction at the use of Australian Bread Wheat Germplasm has had with the International Nurseries and releases that both CIMMYT and ICARDA. Richard is leading this work with colleagues and will be releasing (pardon the pun) some exciting findings later in the year – stay tuned.

BREEDING MANAGEMENT SYSTEM (BMS)

The 2019 CAIGE data set of Bread wheat, Durum wheat and Barley, collated from our collaborators has been uploaded on the BMS platform. We acknowledge contribution of Robin Wilson and his team at the Integrated Breeding Platform (IBP) in this context. The BMS databases can be accessed from the CAIGE website, by clicking on BMS database on the main menu (picture below) using “guest” as a default user ID and password to see the data collected from publically-funded trials. The CAIGE collaborators should have their own user ID and password to access full dataset. The listed people can contact Deepak Baranwal (deepak.baranwal@sydney.edu.au) for log in and other details. A **booklet** (<http://www.caigeproject.org.au/caige-bms-database-a-search-tool/>) was tailored to give an idea to beginners how the BMS can assist in searching potential CAIGE accessions. We are looking for a few of the collaborators to form a working group to troubleshoot and improve the search functionality of the CAIGE BMS, and if you would like to be involved please contact Deepak and Julie.



WEB STATISTICS

Below statistics highlights the hike in the number of unique visit during last six months. Noticeable increase in number of visitors during March and April 2020 is apparent from the bar graph. It occurs after publishing yield and disease statistical dataset of 2019. Over 42K page visits were recorded from Australia alone which represent three-fourth of total visits. Currently, we are updating our website and you will see changes overtime which we will report on in our next newsletter.



Country	Page Views	Percentage
Australia	42359	75.3%
United States	1868	3.3%
Mexico	1746	3.1%
Morocco	804	1.4%
Canada	711	1.3%
India	652	1.2%
China	619	1.1%
France	613	1.1%
Japan	578	1.0%
Turkey	544	1.0%
Brazil	421	0.7%
Italy	405	0.7%
Singapore	379	0.7%
Kenya	279	0.5%
United Kingdom	262	0.5%

Laughter, the best medicine



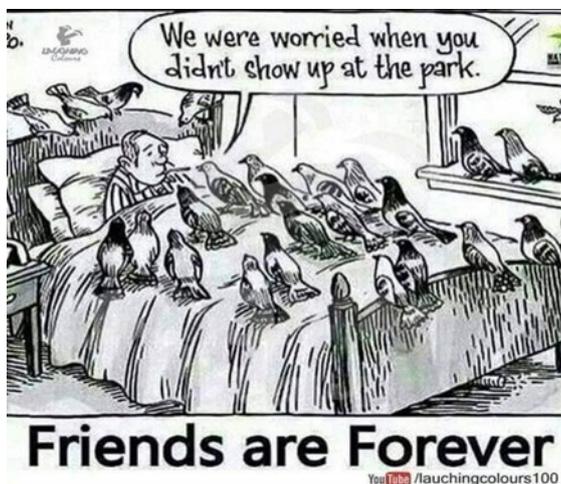
Enjoying Chess during lockdown



You're not completely useless, you can always serve as a bad example.



I threw a boomerang a few years ago. I now live in constant fear.



You don't need a parachute to go skydiving.

You need a parachute to go skydiving twice.

Hear about the new restaurant called Karma?

There's no menu: You get what you deserve.