FINAL REPORT

FOURTH INTERNATIONAL MASTER CLASS

ON

SOILBORNE PATHOGENS OF WHEAT

ANADOLU Research Institute, Eskişehir, TURKEY

20 June - 2 July 2010

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SPONSORS AND CONTRIBUTORS

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Introduction

This fourth International Master Class on Soil Borne Pathogens of Wheat was conceived at three previous Master Classes held on the same subject in Turkey in 2003, China in 2005 and Tunisia in 2008. Both Turkish classes focussed principally on countries within West Asia and North Africa whilst China Class was country specific. Since the training in 2003 in Turkey and Tunisia in 2008 there has been active progress working on SBPs in a number of countries including Turkey, Iran, Syria, Tunisia and Morocco. The key purpose of this fourth Class was to strengthen regional capacity for SBP and build on existing networks and establish new linkages. Efforts in this course were reinforcing the basic principles of the former Master Classes, in addition to encompassing the holistic perspective of the cropping system with special reference to conservation agriculture including the components of crop rotation, minimal soil disturbance and some stubble retention.

The aim of the Fourth International Soil Borne Pathogens of Wheat Master Class was to provide training to cereal pathologists working in regions where soil borne pathogens (SBP) are considered to be constraints to yield, with a focus on principally North Africa and some regions of West Asia. These problems regionally mirror closely those of Australian Cereal Producers.

The Class is designed, through a series of modules, to enhance the participants' ability to understand the biology, pathology and population dynamics of important SBP, including nematodes and root rotting fungi of cereals.

- Isolate, extract and identify these SBP to properly diagnose their SBP problems.
- Understand the methodologies to scientifically establish the loss of one or several of these SBP.
- Understand the possible control options for the different SBP, with an emphasis on the use of host resistance and other environmentally friendly control methods.
- Understand the principles of incorporating resistance of SBP into an active cereal breeding program.
- Understand the application of molecular biology both in the identification of the pathogens and the breeding of disease resistant germplasm against the identified SBP.
- Contribute to increased research capacity building in their home organisation
- Further develop their research management, technical and personal skills
- Establish a regional network of pathologists with key CG pathologists in the region who may work on these SBP.
- Acquire additional international contacts.

Specific issues that where addressed included the identification and extent of problem of SBP in region, specific and focused training on the principles of pathology and breeding to work with these SBP, research priorities, establishing network on SBP for collaboration, data tools, internet and technology transfer.

Participants

The present Master Class was organised with participants particularly from North Africa and also parts of West Asia. Twenty four trainees came from 10 countries including Afghanistan (1), Algeria (1), Australia (2), Iran (5), Iraq (2), Morocco (2), Nepal (1), Tunisia (2), Turkey (7), and USA (1). The ages of the participants varied greatly from PhD students to long term career scientists, and six of them were female. Many of the participants were specifically trained in aspects of Plant Pathology and most were representatives from the Ministries of Agriculture or Universities from their representative countries. A list of participants is given in Attachment 1 and photographs in Attachment 2.

Administration

Thanks are given the leadership of TAGEM including the Director General Dr Masum Burak and the administrative head of Field Crops Research, Dr Vehbi Eser. The Master Class was held in one of the key wheat improvement institutes called the ANADOLU Agricultural Research Institute in Eskişehir on the Central Anatolian Plateau of Turkey in collaboration with ICWIP (ICARDA CIMMYT Wheat Improvement Program) under the coordination of the International Maize and Wheat Improvement Center (CIMMYT International), Turkey Office with Dr Nicol. Special thanks are extended to the Director of the Institute, Dr Yakup Karaman and his administrative support staff including the Deputy Directors Mr Bilal Demir, Celalettin Aygun, the oversight of the guesthouse Mr Umit Ray, Information Technology Support Mr Arda Balkan and the head of food services Mr Onursal Hızlı and his staff for enabling affective logistical arrangements to enable such a successful course.

The key organiser of the Master Class was Dr Julie Nicol, Senior Soil Borne Wheat Pathologist, based in the CIMMYT regional office in Ankara, Turkey. As with the previous Master Classes the program was planned by Dr Nicol in consultation with the Australian lecturing staff, the key local Turkish organising committee (administrative and scientific) and Dr Eric Craswell, Director of the Crawford Fund Master Class Program.

Special thanks are given to local office coordination staff in the CIMMYT ICARDA Office in Turkey especially Ms Seher Turkyilmaz (CIMMYT Finance and Office Coordinator) and Ms Bahar Erdemel (CIMMYT Office Assistant) and Mr Gokhan Gulhan (Logistics Officer). Many thanks are also given to CIMMYT local scientific staff including Dr Amer A Dababat, Dr Gul Erginbas-Orakci and Ms Didem Saglam for their assistance prior and during the course. A visiting high school student from the USA, Miss Molly McKneight supported by a Borlaug-Ruan Summer Internship Program of the World Food Prize Youth Institute helped tremendously with many logistical and administrative parts of the course. The Australian Ambassador to Turkey, Mr Peter Doyle and his wife Jennifer Lee are thanked for hosting the opening of the course at their residence in Ankara.

Instructors

The key teaching experts including both National and International are given in Attachment 3. These included 4 principal scientific experts – two from Australia, one from the United States of America and the other from CIMMYT Turkey. There were in addition eleven guest lecturers including 3 local Turkish scientists, 1 private industry representative, 1 visiting UK scientist and 6 ICWIP scientists representing ICARDA. The full list of this is given in Attachment 3 and some photographs in Attachment 4.

One of the three principal scientific experts, Dr Ian Riley also attended the previous SBP Master Classes, but for both Prof. Stephen Neate and Tim Paultiz this was there first time joining the Master Class. Their experience, professionalism and clear contributions ensured this Class like the others was extremely successful.

Scientifically the National Coordinator for the Soil Borne Pathogens of Wheat program in Turkey, Senior Wheat Breeder and Pathologist, Dr Necmettin Bolat from ANADOLU Research Institute is thanked for his overall assistance to the course and leadership with the SBP program in Turkey.

From ICWIP Dr Amor Yahyaoui (Coordinator of the ICARDA CIMMYT Wheat Improvement Program) gave a holistic over view of the importance of SBP in the region and the CGIAR network. ICWIP scientists from ICARDA Syria joined the course for two days from Syria and added significant contributions to the holistic aspects of wheat improvement systems and implications for SBPs, including talks on foliar pathogens, cereal legume diseases and conservation agriculture. Dr Nicol also gave local experiences of key SBP and how these are currently being addressed within the CGIAR and several National Programs.

Funding

The Crawford Fund provided support from central (Master Class) funds and from the South Australian branch. CIMMYT also provided support, both directly as cash and in providing the time of its staff to coordinate and assist with the logistics of the course. ICARDA likewise provided cash for a participant to join from Iraq and the time for its staff to join two days of the course from Syria.

Budget sources	**US (000$)**
Crawford Fund/ACIAR	38,970
GRDC Australia	15,010
ICWIP –CIMMYT and ICARDA	in-kind +10,000
Crawford Fund SA Branch	9,300
Syngenta	10,000
The Kirkhouse Trust – UK	7,600
USAID	8,000
TAGEM	in-kind
TOTAL	**98,880**

As with previous Master Classes the major donor was The Crawford Fund. In addition15K was provided by GRDC to enable two young Australian scientists (Mr Katherine Linsell and Ms Cassandra Percy) working on cereal nematodes and dryland root rots to join the course and share their experiences, expand their knowledge and create strong international linkages for future research. Both found the course highly beneficial and they have submitted individual reports to GRDC.

The Kirkhouse Trust (UK-based) also provided generous cash for the travel of teaching staff from Australia and some of the international participants. The in-kind support of the teaching experts from Queensland Government Australia, The University of Adelaide and Washington State University (USA) is gratefully acknowledged.

TAGEM are thanked for their logistical arrangements hosting the course and accommodation and their in-kind provision of a greater portion of the food. The Central Research Institute for Field Crops Research Director Dr Isa Ozkan and his staff hosted an excellent field day and barbecue on their Haymana Field Station shared with Ankara University and the Ministry of Agriculture.

USAID also provided support enabling an American student to join the course and one of the key teaching experts from Washington State University.

Program

Full detail of all lectures, practical classes and teachers are shown in the Program in Attachment 5. As with the other SBP Master Classes there was a wide combination of both lectures, interactive practicals, field trips and general discussion throughout.

One of the major advantages of this Master Class was strengthening existing collaborations within the region. For example several of the Iranian, Tunisian and Moroccan participants are already involved with existing projects on SBP from the former training done both in Turkey in 2008 and Tunisia in 2008.

It was also highly advantageous to have ICARDA colleagues join part of the training colleague to bring in several holistic perspectives of integrated pest management within the wheat cropping system including the role of conservation agriculture, legume diseases and foliar pathogens.

As with other Master Classes, the participants were asked to give specific presentations of their local situation reinforced the distribution of the SBP pathogens in the region, and the need to raise the awareness of the issues and find appropriate control measures.

One of the major exercises which was again successfully achieved in this Master Class was the last two days of consolidation and dividing the group into three to work on specific case studies for a research theme and devise a clear strategy of

how to work on a scientific issue of regional importance. The three case studies which were put forward were:

- Control of Soil Borne Pathogens of wheat (including Cereal Nematodes and Dryland Root Rots) in North Africa (Morocco, Tunisia and Algeria) in rainfed wheat systems.
- Understanding the importance and control of Soil Borne Pathogens of Wheat in West Asia (Iran, Iraq and Afghanistan).
- Current knowledge and further research needs for Soil Borne Pathogens of Wheat in Turkey.

All groups worked very hard on consolidating information gathered over the duration of the course and their local experiences. Of note, it was clear that Turkey has already made significant progress in SBP research and some of the younger scientists trained in 2003 course in Turkey are now leading new initiatives within Turkey and were represented among the local teaching experts. The North African group has reinvigorated its research on SBP since the 2008 course and along with CIMMYT and USA both Morocco and Tunisia have a small seeding project to work on SBP (Attachments 6 and 7). The existing participants will return to their countries and be actively involved within the context of this project. The Iranian group have actively worked in Cereal Nematology since the 2003 course, and this training has enabled the capacity building further of scientists to work on Cereal Root Rots and breeding for SBP resistance.

Publications

As with the other two previous Master Classes efforts were made here to ensure that adequate training material was provided which included:

- A CD Rom of the course presentations, photos and contact details was provided at the end of the course to each participant.
- A CD Rom prepared by CIMMYT and leading technical experts covering most important plant pathology texts, in addition to key scanned articles of importance for various SBPs. In total more than 50 publications were copied onto the CD Rom.
- Draft version of the revised 'Theoretical Training Manual for Soil Borne Pathogens of Wheat' in addition to the draft accompanying 'Practical Training Manual for Soil Borne Pathogens of Wheat'.
- More than 8 highly specialised SBP publications valued at 450 USD per person were given to each participant in addition to a book on scientific writing as it is commonly acknowledged one of the major challenges for many national country colleagues is to publish their scientific research. Dr Riley gave an overview of the book and its value to the group. These publications included the following;

  Cereal cyst nematodes: status, research and outlook. Riley I.T., Nicol J.M. and Dababat A.A (eds), 2009 CIMMYT: Ankara, Turkey ISBN: 978-975-407-285-3, pp. 244.

  Cereal Root and Crown Diseases. Wallwork H., 2000. GRDC Publications, Kingston, Canberra, Australia. ISBN: 1-875477-80-2. pp. 58.

Common Diseases of Small Grain Cereals - A Guide to Identification. Zillinksky F.J., 1983. Centro Internacional de Mejoramiento de Maiz y Trigo, pp. 141.

Compendium of Wheat Diseases and Pests, 3rd Edition. Bockus W.W., Bowden R.L., Hunger R.M., Morrill W.L., Murray T.D. and Smiley R.W. (eds), 2010. The American Phytopathological Society, Minnesota, USA. ISBN: 978-0-89054-385-6, pp 171.

Practical Plant Nematology: A field and laboratory guide. Coyne D.L., Nicol J.M. and Claudius-Cole B., 2007. International Institute of Tropical Agriculture ISBN: 978-131-294-7, pp 82.

Seed Testing of Maize and Wheat - A Laboratory Guide. Warham E.J., Butler L.D. and Sutton B.C. (eds) 1995. CIMMYT and CAB International. ISBN: 968-6923-70-5, pp. 84.

The Fusarium Laboratory Manual. Leslie J.F. and Summerell B.A., 2006. Blackwell Published Ltd., Iowa, USA. ISBN-13: 978-0-8138-1919-8, pp. 388.

Writing Scientific Research Articles - Strategy and Steps. Cargill M. and O'Connor P., 2009. John Wiley and Sons Ltd, West Sussex, UK. ISBN: 978-1-4051-8619-3, pp.173.

Certificate Presentation

As with other classes Master Class certificates were presented at the closing dinner. For this purpose the Director of ANADOLU Agricultural Research Institute Dr Yakup Karaman and official teaching experts presented to each successful participant with their certificates. An example of the certificate is given in Attachment 8.

Participant Feedback

Feedback was sought from participants by circulating a SBP course evaluation form which was returned at the end of the course (Attachment 9). This form was a combination of The Crawford Fund, CIMMYT and ICARDA evaluation forms. This proved a very valuable exercise for future planning, since it revealed some areas where the content or the balance of the Class was not optimal.

Twenty four questionnaires were completed and the responses summarised by Prof. Paulitz and are given below.

Questions	Response
In general how would you rate the course?	Excellent 9, good 15
How well the course met its objectives?	Very well 15, well 5
Balance between theory and laboratory work	Very good 7, satisfactory 17
Suitability of teaching methods	Excellent 11, good 12, average 1

Relevance of teaching materials provided	Very good 23, satisfactory 1
Amount of new information provided during the course	3.5 on a scale of 5
Relevance of course content to your work institution	Very relevant 9, relevant 14
Overall length of course in relation to content	Just right 16, a bit too long 6
Number of participants	3.0 on a scale of 5.0 from too many to too few.
Communications: scientists vs participants	Excellent 10, good 13, average 1
Interactions with other participants	Excellent 6, good 14, average 4
Degree of interest generated by the course	4.1 on a scale of 5.0
What do you think is the most important thing you have learned from the Class?	Fungal biology/techniques (9), nematode biology/techniques (8), SBP general biology/techniques (7), international situation/collaboration (4), introduction to molecular techniques (4), resistance/markers/genetics (4), conservation ag/management (2)
What were the two most important aspects of the Class activities for you?	Lectures (17), meeting with other scientists (8), lab sessions (7), discussion groups (4), field work (4), preparation for case studies (2)
What other topics should be added?	Molecular aspects of identification and taxonomy (7), more labs (5), cultural practices (1), IPM (1), resistance (1), statistical basics (1), travel (1), weed science (1)
What topics should be left out?	Molecular (2), nothing (22).
Do you feel confident enough to share what you have learned with peers in your country?	Yes 22, no 2
Following this course, are you willing to take a role of resource person in future in-country courses?	Yes 22, no 2

Will you be able to use new knowledge and skills at your work?	Yes 24, no 0
If not, what are the constraints?	Mostly no answers, but lack of facilities and equipment from 2 respondents
Would you recommend this course to other people?	Yes 23, no 0
Why would you recommend the course?	Knowledge gained on SBP 18, contacts 6.
Did you have any language problems?	Yes 11, no 7, understanding OK, expression problems (3).
What should be done to reinforce this course?	Communication network (6), refresher course (2), more labs (6), more field (1)
Strengths (most useful aspect of course) list 3	Networking (4), discussion sessions (2), good lectures (16), good labs (10), handouts (4), nice location (1), good field (5).
Weakness (least useful aspect of course) list 3	Too few laboratory sessions (4), long hours/workload (6), lack of molecular labs (6), discussion (1)
Was the accommodation satisfactory?	Excellent (9), good (11), average (4)
Was the food satisfactory?	Excellent (13), good (10), poor (1)
Communications- course coordinator vs participants	Excellent (17), good (6), average (1)
Did you have enough time for self study/relax?	Too much (5), just enough (15), not enough (7)
How was the overall logical organisation and coordination?	Excellent (16), good (10), poor (1)
What to improve/change, what would be more relevant for your country/ institution?	General labs increase (6), molecular labs (5), experimental design (1), reduce basic content (1)

Overall conclusions of the course evaluation questionnaires:

- The participants of the course overall were extremely pleased with the course and many indicated they gained new knowledge and information.
- It is clear that language was a barrier for some and this limited the potential learning experience.
- Overall the group felt more laboratory classes would be beneficial.
- Most of the participants plan to use this knowledge on return to their home countries.

Future Action

It became very clear during the course that the groups were very keen to establish and form regional networks of importance with specific SBP. Since the 2008 course in Tunisia a small USAID linkage fund project has been initiated to enable an active research collaboration to be established between North African (Tunisia and Morocco), in collaboration with CIMMYT, ICARDA and US partners including Washington and Oregon State University with defined work programs (Attachments 6 and 7). This will certainly enable the core trained scientists from this and the 2008 North Africa course to further their research with SBP. Efforts are still needed to include other North African countries (Algeria, Libya, Ethiopia).

Turkey continues to be active in SBP research and in particular to screen for resistance to SBP with both National and International germplasm in collaboration within ICWIP – ICARDA CIMMYT Wheat Improvement Program and the IWWIP – International Winter Wheat Improvement Program under the coordination of the CIMMYT SBP program based in Turkey. Furthermore most recently they have developed a new National Project on Soil Borne Pathogens being coordinated by Dr Necmettin Bolat from Eskisehir which actively involves 4 National Institutes. Active research continues on survey and importance of SBP pathogens in the spring wheat production zones with several National projects underway for both Cereal Cyst Nematode and Root Rots. CIMMYT newly appointed post doc Dr Amer Dababat will continue to collaborate with these Turkish colleagues.

With respect to Iran, a large National project in Cereal Nematodes has been running under the coordination of Dr Zahra Tahna Maafi (Iranian Institute of Plant Protection) who was a previous participant in 2003 SBP course in Turkey. This work is moving very well and has clearly established the economic importance of Cereal Cyst Nematode in Iran (see Attachment 10). Significant efforts are now underway from this course to start active research work on Dryland Root Rots of importance, and field and laboratory work has begun this winter season with both Pathologists and Breeders. Iran is very keen to further train its local staff in addition to assisting neighbouring countries particularly Afghanistan and Iraq.

Another strengthening component of this training has been the participation of key nematologists (China, Iran, India, Morocco, Syria, Tunisia,) many of whom were previously involved with former courses in the participation of the First Workshop of the International Cereal Cyst Nematode which was held in Turkey 21-23 October 2009. A published proceedings (see Attachment 10) was prepared for this which provided a clear indicator of the global distribution and importance of the Cereal Cyst Nematode in wheat production systems. This has created ‘International Cereal Cyst Nematode Network’, and a second International meeting is planned for October 2011 in China, where significant work has been initiated since the 2005 master class on SBP.

Dr Nicol extends her thanks especially to The Crawford Fund for their continued support for SBP of Wheat in the region of West Asia, North Africa and China. The Director of the Master Class program Dr Eric Craswell is kindly acknowledged for his assistance, collaboration and also attending the first part of this Class. Thanks

also are given to Australian and American Institutions including the Queensland government Australia, the South Australian Research and Development Institute, and Washington State University for enabling the teaching staff to also participate in the course. Dr Ian Riley is also kindly acknowledged for assistance with compiling the report.

It can be clearly stated that significant knowledge has been transferred and the building blocks of regional and bilateral collaboration have been put in place to enable these important pathogens to be included in the biotic constraints to marginal wheat production systems.

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CIMMYT Senior Soil Borne Pathologist
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August 2010

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Attachment 2 - Photographs of Participants

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Dr	Kumarse	**NAZARI**	**GUEST**	SYRIA	ICARDA	Research Associate	ICARDA, P.O. Box 5466, Aleppo, Syria	K.NAZARI@CGIAR.ORG	963 212213433	-	963 212213490
Dr	Francis	**OGBONNAYA**	**GUEST**	SYRIA	ICARDA	Molecular Genetist	ICARDA, P.O. Box 5466, Aleppo, Syria	f.ogbonnaya@cgiar.org	963 212213433	-	963 212213490
Dr	Colin	**PIGGIN**	**GUEST**	SYRIA	ICARDA	Agronomist	ICARDA, P.O. Box 5466, Aleppo, Syria	c.piggin@cgiar.org	963 212213433	-	963 212213490
Dr	Amor	**YAHYAOUI**	**GUEST**	SYRIA	ICARDA-CIMMYT	ICWIP-Coordinator/ Cereal Pathologist	ICARDA, P.O. Box 5466, Aleppo, Syria	a.yahyaoui@cgiar.org	963 212213433	-	963 212213490
Dr	Necmettin	**BOLAT**	**GUEST**	TURKEY	ATAEM , Eskisehir	National SBP Coordinator, Pathologist/Breeder	Anadolu Tarımsal Araştırma Enstitüsü Karabayır Bağları 6. km. 26002 - Eskişehir	necbolat@hotmail.com	-	90 5354258563	-
Dr	Halil	**ELECKIOGLU**	**GUEST**	TURKEY	Cukurova Univsersity	Nematologist/Professor	Cukurova University, Faculty of Agriculture, Department of Plant Protection, Balcalı Adana, Turkey	halile@mail.cu.edu.tr	90 3223386437	-	90 3223386437
Dr	Mesut	**KESER**	**GUEST**	TURKEY	ICARDA	Winter Wheat Breeder	P.K. 39 Emek 06511 Ankara, Turkey	m.keser@cgiar.org	90 3123448777 3271631, 3271657	90 5054032786	90 3123270798
Dr	Halil	**TOKTAY**	**GUEST**	TURKEY	Plant Protection Research Institute	Nematologist, Deputy Director	P.K. 901321 Adana,Turkey	toktay@yahoo.com	90 3223441683 90 3223441784	90 5337266826	90 3223441702
Dr	Hale	**TUFAN**	**GUEST**	TURKEY	John Innes Centre UK	Plant Genetist	5 Princes St, Norwich NR31AZ, UK	hale.tufan@gmail.com	90 3124903332	-	-
Dr	Amer	**DABABAT**	**ASSISTANT**	TURKEY	CIMMYT	SBP Pathologist	P.K. 39 Emek 06511 Ankara, Turkey	a.dababat@cgiar.org	90 3123448777	90 50304062825	90 3123270798
Dr	Gul	**ERGİNBAŞ ORAKCI**	**ASSISTANT**	TURKEY	CIMMYT	SBP Pathologist	Anadolu Agricultural Research Institute, PK.17 Eskisehir; Turkey	gul_erginbas@hotmail.com g.erginbas@cgiar.org	90 3123448776	90 5307629560	-
Ms	Didem	**SAGLAM**	**ASSISTANT**	TURKEY	CIMMYT/Ankara University	PhD Student	P.K. 39 Emek 06511 Ankara, Turkey	saglamhds@gmail.com	90 3123448777	90 5309263694	90 3123270798
Ms	Aysel	**YORGANCILAR**	**ASSISTANT**	TURKEY	ATAEM, Eskisehir	Head Pathology Program	Anadolu Tarımsal Araştırma Enstitüsü Karabayır Bağları 6. km. 26002 Eskişehir, Turkey	ayselyorgancilar@yahoo.com	-	90 5354258563	-

Attachment 4 - Photographs of Some Instructors and Others

Amer DABABAT

Brigitte SLAATS

Didem SAGLAM

Eric CRASWELL

Gul ERGİNBAŞ ORAKCI

Halil ELEKÇIOGLU

Halil TOKTAY

Ian RILEY

Julie NICOL

Molly McKEIGHT

Stephen NEATE

Timothy PAULITZ

Attachment 5 - Program

Final program: Fourth International Master Class Soil Borne Pathogens of Wheat

ANADOLU Research Institute, Eskişehir, TURKEY, 20 June - July 2010

Day	Date	Item
Saturday	**19**	Participants arrive and over night in Ankara. Welcome cocktail hosted by Australian Ambassador, Departure from Class Hotel at 6pm in taxis
Sunday	**20**	Bus departure from Hotel at 9.30am. Visit Haymana Nematode Trial, Lunch at Golbasi, Bus carries onto Eskisehir. Arrival and dinner in Eskisehir
Monday	**21**	*7.30am breakfast*
		8.30-9.00am Opening, Course outline, Introduction to Staff and Housekeeping
		9.00-9.45am Introduction and Donor Summary
		9.45-10.30am Key Features of Soil Borne Pathogens
		10.30-11.00am Morning Tea
		11.00-12.00am Introduction to Soil Borne Pathogens
		12.00-12.30pm Student discussion about Soil Borne Pathogens
		12.30-1.30pm Lunch
		1.30-5.30pm Practical covering use of microscopes, nematode extraction and isolation of fungi, and overview and field tour Esk Station (divide into 2 groups)
		3.30-4.00pm Afternoon Tea
		Take home message from each trainee exchanged
		5.30-6.30pm spare time
		6.30-7.30pm Dinner
		8.00-9.00pm Slide show and presentation by 4 lecturers - each lecturer 10 minutes and 5 minute question
Tuesday	**22**	*7.30am breakfast*
		8.30-10.30am Biology / Taxonomy of Fungi
		10.30-11.00pm Morning Tea
		11.00-12.30pm Crown Rot Biology and Control
		12.30-1.30pm Lunch
		1.30-5.30pm Laboratory Session: Fusarium
		3.30-4.00pm Afternoon Tea
		5.30-6.00pm Take home message from each trainee exchanged
		6.30-7.30pm Dinner
		8.00-9.30pm Slide show and presentation by 6 trainees - each trainee 10 minutes plus 5 minutes questioning. Katherine LINDSELL (Australia), Atilla OCAL (Turkey), Ali Reza AHMADI (Iran), Fouad MOKRANI (Morocco), Samira CHEKALI (Tunisia) and Khalid TAHA (Iraq)
Wednesday	**23**	*7.30am breakfast*
		8.30-10.30am Biology / Taxonomy of Plant Parasitic Nematodes
		10.30-11.00pm Morning Tea
		11.00-12.30pm Cereal Cyst Nematode and Root Lesion Nematode
		12.30-1.30pm Lunch
		1.30-5.00pm Laboratory Session: CCN and RLN
		3.30-4.00pm Afternoon Tea
		4.00-4.20pm take home message from each trainee exchanged
		4.30 pm trip into Eskisehir for tour and dinner
Thursday	**24**	*7.30am breakfast*
		8.30-9.30am Genetics of Resistance
		9.30-10.00am Discussion about Resistance
		10.00-10.30am Morning Tea
		11.30-12.30pm Screening for Soil Borne Pathogens and identified resistant sources i) root rots, ii) nematodes
		12.30-1.30pm Lunch
		1.30-3.00pm Breeding Techniques and Strategies for Soil Borne Pathogens
		3.00-3.30pm Afternoon Tea
		3.30-5.30pm Field and Growth Room visit for screening for SBP
		5.30-6.00pm Take home message from each trainee exchanged
		6.30-7.30pm Dinner
		8.00-9.30pm Slide show and presentation by 6 trainees - each trainee 10 minutes and 5 minutes question. Shree PARIYNAR (Nepal), Mazhasht GUITI (Iran), Ilker TOPAL (Turkey), Rym BENHALLA (Algeria), Mustafa IMREN (Turkey), Alison THOMPSON (USA)
Friday	**25**	*7.30 am breakfast*
		8.15 - Departure to Istanbul

Day	Date	Item
Saturday	**26**	Istanbul touristic program
Sunday	**27**	Istanbul touristic program
		1.00pm Depature from Istanbul to Eskisehir
		7.30pm Dinner Eskisehir
Monday	**28**	*7.30am breakfast*
		8.30-10.00am Take-all and Common Root Rot Biology
		10.00-10.30am Morning Tea
		10.30-12.30am Other Soil-Borne Fungal/Viral diseases
		12.30-1.30pm Lunch
		1.30-5.00pm Laboratory Session : Fungi
		4.30-5.30pm Afternoon Tea
		5.30-6.00pm Take home message from each trainee exchanged.
		6.30-7.30pm Dinner
		8.00-9.30pm Slide show and presentation by 6 trainees - each trainee 10 minutes and 5 minutes question. Abduallah KILINC (Turkey), Maghsood HOSNI (Iran), Insaf MELKI (Tunisia), Ghaisuddin GHANIZADA (Afghanistan), Brahim EL YOUSFI (Morocco), Cassy MALLIGAN (Australia)
Tuesday	**29**	*7.30am breakfast*
		8.30-10.30am Population Dynamics and Yield Loss to Nematodes
		10.30-11.00am Morning Tea
		11.00-12.30am Other Plant Parasitic Nematodes
		12.30-1.30pm Lunch
		1.30-3.30pm Laboratory Session: Other Plant Parasitic Nematodes
		3.30-4.00pm Afternoon Tea
		4.00-5.30pm Laboratory Session - follow up for Soil Fungi
		5.30-6.00pm Take home message from each trainee exchanged.
		6.30-7.30pm Dinner
		8.00-9.30pm Slide show and presentation by 6 trainees - each trainee 10 minutes and 5 minutes question. Cuneyt KOSEOGLU (Turkey), Touhid MIRAK (Iran), Emre ELVICE (Turkey), Oadi MATNY (Iraq), Dariush SAFAEI (Iran)
Wednesday	**30**	*7.30am breakfast*
		8.30-9.30am Molecular Technologies
		9.30 - 10.30 am Molecular Diagnostics and Marker Assisted Selection.
		10.30-11.00pm Morning Tea
		11.00-12.30am National, International Breeding Programs and integration of Soil Borne Pathogen Resistance
		12.30-1.30pm Lunch
		1.30-3.00pm Web Access
		3.00-3.30pm Afternoon Tea
		3.30-4.00pm Networking
		4.00-5.30pm Group Work on Soil Disease Management Problem
		6.30-7.30pm Dinner
Thursday	**1**	*7.30am breakfast*
		8.30-9.30am Foliar Pathogens of Importance on Wheat
		9.30-10.30am Management of soil-borne diseases on cool-season food legumes.
		10.30-11.00pm Morning Tea
		11.00-12.30 -Novel Industrial Approach towards Nematode Control and Crop Protection Research at Syngenta
		12.30-1.30pm Lunch
		1.30-3.00pm - Conservation Agriculture and relations for Soil Borne Diseases
		3.00-4.00pm Integrated Pest Management Overview
		4.00-4.30pm Afternoon Tea
		4.00-5.30 pm Application of Molecular Tools for Plant Breeding for SBP with key examples
		5.30-6.00pm Take home message from each trainee exchanged
		6.30-7.30pm Dinner
Friday	**2**	*7.30am breakfast*
		8.30-9.30am Exam provided
		9.30-10.00am Morning Tea
		10.30-1.00pm Individual Work Plans and Laboratory/Text Consolidation Time
		1.00-2.00pm Lunch
		2.00-4.00pm Work Plans Discussed with staff in small groups. Other time Laboratory/Text consolidation.
		4.00-4.30pm Afternoon Tea
		4.30-5.30pm Exams returned and discussed
		5.30-6.00pm Round up discussion and course evaluation
		5.30-6.30pm Free Time
		6.30pm Departure for final dinner in Eskisehir
		7.00pm Final Dinner in Eskisehir with Eskisehir Staff
Saturday	**3**	Participants depart from Eskisehir 9.30am for Ankara. Stop at Optimum Shopping Centre on way for lunch and shopping - return to hotel by 5pm. Participants depart
Sunday	**4**	Participants leave

Attachment 6 - Draft Research Agreement for Tunisia

DRAFT RESEARCH AGREEMENT FOR TUNISIA

ICWIP (ICARDA-CIMMYT Wheat Improvement Program), US collaborators (WSU and OSU) and the Tunisian Institutions IRESA and INGC of for the joint seed USAID project 'Sustainable and integrated control of key Dryland Soil Borne Pathogens for sustainable healthy roots and soils for rainfed wheat production systems'

Background to the proposed project

- SBPs (Soil Borne Pathogens) are globally acknowledged to be important in rainfed wheat production systems where limited rotational options are available and post anthesis drought stress is almost inevitable.
- The main key SBPs identified are Cereal Cyst Nematode (*Heterodera* spp.), the root lesion nematode (*Pratylenchus thornei* and/or *P. neglectus*) and the fungus commonly known as Crown Rot (*Fusarium* spp.) .
- Considerable effort from both CIMMYT (under ICWIP) and PNW colleagues for some years have identified sources of host genetic resistance to these pathogens but the effectiveness and usability (in high yielding SW and WW backgrounds) needs to be confirmed and explored.
- Conservation Agriculture is an effective management tool to improve water conservation, soil health and structure, in addition to reducing the input costs of fuel, labor and fertilizer. This technology and its application have been well explored in both PNW USA and Australia in similar cropping systems. In contrast, our knowledge and understanding in WANA is limited. Besides, SBP can be increased in conservation agriculture, especially those that survive on crop residue, such as *Fusarium* spp. causing crown rot. Hence and in order to boost such technology under WANA conditions, an integrated control strategy, where the main component is host resistance, should be implemented.

The following collaborative objectives have been discussed and agreed with the coordinators of the project from ICWIP (Dr Julie Nicol and Dr Bram Govaerts) for the 2010 year with an allocated budget of 10,000USD.

1. **To clearly identify the SBP constraints in Tunisia and evaluate the potential to use and define clear key CA principles required in the region.**
    a. A survey on root diseases in 0910 season on important soil borne fungi (including Crown Rot, Take-All (GGT), Eyespot (*Pseudocerosporella*) across climatic regions. Suggested key contact: *Samia Gargouri (INRAT)*
    b. To understand the importance of moisture stress and the damage caused by Crown Rot under controlled and field conditions. Suggested key contact: *Samira Chekali*
    c. For the coming season conduct a survey of SBP (including CR, RLN and CCN) and disease surveillance on some of the key station trial sites (up to 7) and some of the 70 farmer field sites which are already established for CA. Suggested key focal point: *INGC (in collaboration with INRAT & CRRGC)*
2. **To establish the usefulness of genetic wheat host resistance in SW and WW wheats in WANA and PNW against Cereal Cyst Nematode (CCN), Root Lesion Nematode (RLN) and Crown Rot (CR).**
    a. To establish a natural sick plot of CR in INGC (generated by susceptible DW and residue retention), which could potentially be used in future for field screening. Key contact *INGC* (with guidance INRAT).
    b. Screen 20 lines in total (5 BW, 5 CIMMYT DW, 10 Tunisian DW) for CR, RLN and CCN. For CR it would be done under controlled conditions. Key contact: *Gharbi Salah* (INRAT in collaboration with Najoua Kachouri and Samia Gargouri).
    c. Collect 2 populations of CCN (*H. avenae*) and screen Host Differential for Cereal Cyst Nematode (24 lines). Key contact: *Najoua Kachouri* (INRAT).
    d. CIMMYT to send SW SBP germplasm for evaluation under field conditions in Tunisia. Key contact: Sebei Abdennour (CRRGC).

3. **Where defined appropriate to conduct preliminary monitoring of CA practices on SBPs and make recommendation for appropriate CA systems.**
    a. Monitor existing rotation trial in El Kef for CR. Suggested key contact: *Samira Chekali*
    b. Produce a list of appropriate trials which could be considered for monitoring and make a clear list of the info (year of trial establishment, location, treatments, plot size, design, replicates, and presence of SBP). No more than 3 trials would be monitored. Contact: *Mr Angar Housin* (INGC)
    c. Establish a platform CA trial in collaboration with CRRGC: Contact *Dr Houcine Behini* and *Dr Mansouri Tahar* (CRRGC)

List of identified collaborators

Dr Halim Ben-Haj-Salah, Director General INGC, ingc@planet.tn

Dr Houcine Behini, Agronomist, CRRGC, Beja, houcine.behini@gmail.com

Dr Mansouri Tahar, Machinery specialist, CRRGC, Beja, mansouritah2003@yahoo.fr

Mr Sebei Abdennour, Pathologist, Bread Wheat Breeding CRRGC, Beja, sebeiabdnmour@yahoo.fr

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Mr Moez Fakhfakh, INGC

Mr Angar Housin, INGC, Coordinator CA activities, angarhbb@gmail.com

Dr Allagui Mohamed Bechir INRAT

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Ms Samira Chekali. PhD student Root Rot , INAT samirachekali@yahoo.fr

Dr Ravi Gopal, Agronomist, ICARDA (subject to confirmation) RG.Singh@cgiar.org

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Dr Kim Campbell, Bread Wheat Breeder, Washington State University k.campbell@wsu.edu

Dr Dick Smiley, Soil Borne Pathogen Specialist, Oregon State University richard.smiley@oregonstate.edu

Dr Bram Govaerts, Coordinator CA CIMMYT Mexico b.govaerts@cgiar.org

Dr Julie M Nicol, SBP Leader, CIMMYT, Turkey j.nicol@cgiar.org

Dr Amor Yahyaoui, ICWIP Coordinator a.yahyaoui@cgiar.org

Attachment 7 - Draft Agreement for Morocco

DRAFT AGREEMENT FOR MOROCCO

ICWIP (ICARDA-CIMMYT Wheat Improvement Program), US collaborators (WSU and OSU) and INRA Morocco of for the joint seed USAID project '<u>Sustainable and integrated control of key Dryland Soil Borne Pathogens for sustainably healthy roots and soils for rainfed wheat production systems</u>'

Background to the proposed project

- SBPs (Soil Borne Pathogens) are globally acknowledged to be important in rainfed wheat production systems where limited rotational options are available and post anthesis drought stress is almost inevitable.
- The main key SBPs identified are Cereal Cyst Nematode (*Heterodera* spp.), the root lesion nematode (*Pratylenchus thornei* and/or P. *neglectus*) and the fungus commonly known as Crown Rot (*Fusarium* spp.).
- Considerable effort from both CIMMYT (under ICWIP) and PNW colleagues for some years have identified sources of host genetic resistance to these pathogens but the effectiveness and usability (in high yielding SW and WW backgrounds) needs to be confirmed and explored.
- Conservation Agriculture is an effective management tool to improve water conservation, soil health and structure, in addition to reducing the input costs of fuel, labor and fertilizer. This technology and its application have been well explored in both PNW USA and Australia in similar cropping systems. In contrast, our knowledge and understanding in WANA is limited. Besides, SBP can be increased in conservation agriculture, especially those that survive on crop residue, such as *Fusarium* spp. causing crown rot. Hence and in order to boost such technology under WANA conditions, an integrated control strategy, where the main component is host resistance, should be implemented.

The following collaborative objectives have been discussed and agreed with the coordinators of the project from ICWIP (Dr Julie Nicol and Dr Bram Govaerts) for the 2010 year.

1. **To clearly identify the SBP constraints in Morocco and evaluate the potential to use and define clear key CA principles required in the region.**
    a. Summary existing work has been done in SBP and CA (2010/11). Key focal point: Brahim El Yousfi (INRA SETTAT), Fouad MOKRINI (INRA, Kenitra), Oussama EL GHARRAS (INRA, SETTAT). The compiling of this will be by Abbad Andaloussi (INRA, Rabat). This could be a state of art review for publication.
    b. State of Art Survey: for the coming season (10/11) to conduct a survey for 100 sites around grain filling for SBP (including CR, CRR, RLN and CCN) and general disease surveillance. Each survey takes 1 week per region around Mid April to Mid May. After the survey the samples will be processed in the laboratory to identify the main causal agents. Suggestion to send Fouad MOKRINI to PNW to work with Prof Tim Paulitz on the survey samples (traditional/molecular?). 17-22nd April proposed for the survey and for Prof Paulitz and others to join (Prof Burgess, Prof Neate, Prof Smiley, OSU, Dr Rivoal)..
2. **To establish the usefulness of genetic wheat host resistance in SW and WW wheats in WANA and PNW against Cereal Cyst Nematode (CCN), Root Lesion Nematode (RLN) and Crown Rot (CR).**
    a. To establish 3 natural sick plots for Root Rot screening in different experimental stations – Sidi Elaidi, Jamaat Shaim, Khemis Zemamra (generated by susceptible wheat with inoculation of local isolates with residue retention), which could potentially be used in future for field screening. Key contact: Brahim El Yousfi (INRA, SETTAT),
    b. Controlled Screening: 500 lines for CR under controlled conditions. 50 lines would be screened for CCN, RLN (Pt Pp) and CR – this should include 2nd SBPSW 0910 Turkey (28 lines), 15 lines from GCP, DW from ICARDA/CIMMYT, selected local BW and DW, selected entries from 27SAWSN – SW from Mexico- if you have). Key contact: Brahim El Yousfi (INRA, SETTAT) and Fouad MOKRINI (INRA, Kenitra)
    c. Field screening – 2nd SBPSW 0910 nursery (28 lines) evaluated for phenotype in Meknes and Settat, and evaluated for CR under inoculated field conditions in Settat. Key contact: Brahim El Yousfi (INRA, SETTAT) and Ramdani Abdelhamid (INRA, Meknes).

d. Pathotype evaluation for CCN: the two International CCN nurseries from CIMMYT-TURKEY evaluated under invitro conditions against at least two CCN isolates. Fouad MOKRINI (INRA, Kenitra)

3. **Where defined appropriate to conduct preliminary monitoring of CA practices on SBPs and make recommendation for appropriate CA systems.**
   a. Produce a list of appropriate trials which could be considered for monitoring and make a clear list of the info (year of trial establishment, location, treatments, plot size, design, replicates, and presence of SBP). This includes the INRM (Integrated Natural Resource Management) platform trial has been established for 6 years Based on this list a number of trials could be monitored in future. Contact: Oussama ELGHARRAS.
   b. The possibility to monitor one of the key platform trials in 10/11 season to collect some data on key SBP. Contact: Oussama ELGHARRAS.

Other comments;

Based on the knowledge of pathotype of CCN Sripada will join MAS aspects of the collaboration.
It is suggested in September/October 2011 a workshop could be conducted in Morocco with the group project. Additional support would be required for this.
It is also possible for students to be exchanged within the context of the regional perspectives of the project.

List of identified collaborators

Dr Rachid Dahan, INRA Rabat, Head Scientific Division rachiddahan@yahoo.fr

Dr Brahim El Yousfi, Cereal Pathologist, INRA, Settat. Elyousfi Brahim@yahoo.com

Dr Ramadani Abdelhamid, wheat patho-breeder. INRA, Meknes ramhamid@hotmail.com

Mr Fouad Mokrini, Nematologist, INRA Kenitra fmokrini@yahoo.com fouad_iav@yahoo.fr

Dr Fouad Abbad Andaloussi, Nematologist, INRA Rabat, Head Plant Protection Dept abbadandaloussi@yahoo.fr

Dr Nasserlehaq Nsarellah, Durum wheat breeder nsarellah@yahoo.com

Dr Mohammed Jlibene. Bread wheat breeder jlibene@yahoo.com

Dr Oussama ElGharras, Ag engineering and biosystems, INRA Settat oelgharras@yahoo.com

Dr Abderrahim Essahat, Conservation Agriculture Agronomist aessahat@yahoo.fr

Dr Tim Paulitz, Senior Plant Pathologist, Washington State University. paulitz@wsu.edu

Dr Kim Campbell, Bread Wheat Breeder, Washington State University k.campbell@wsu.edu

Dr Dick Smiley, Soil Borne Pathogen Specialist, Oregon State University richard.smiley@oregonstate.edu

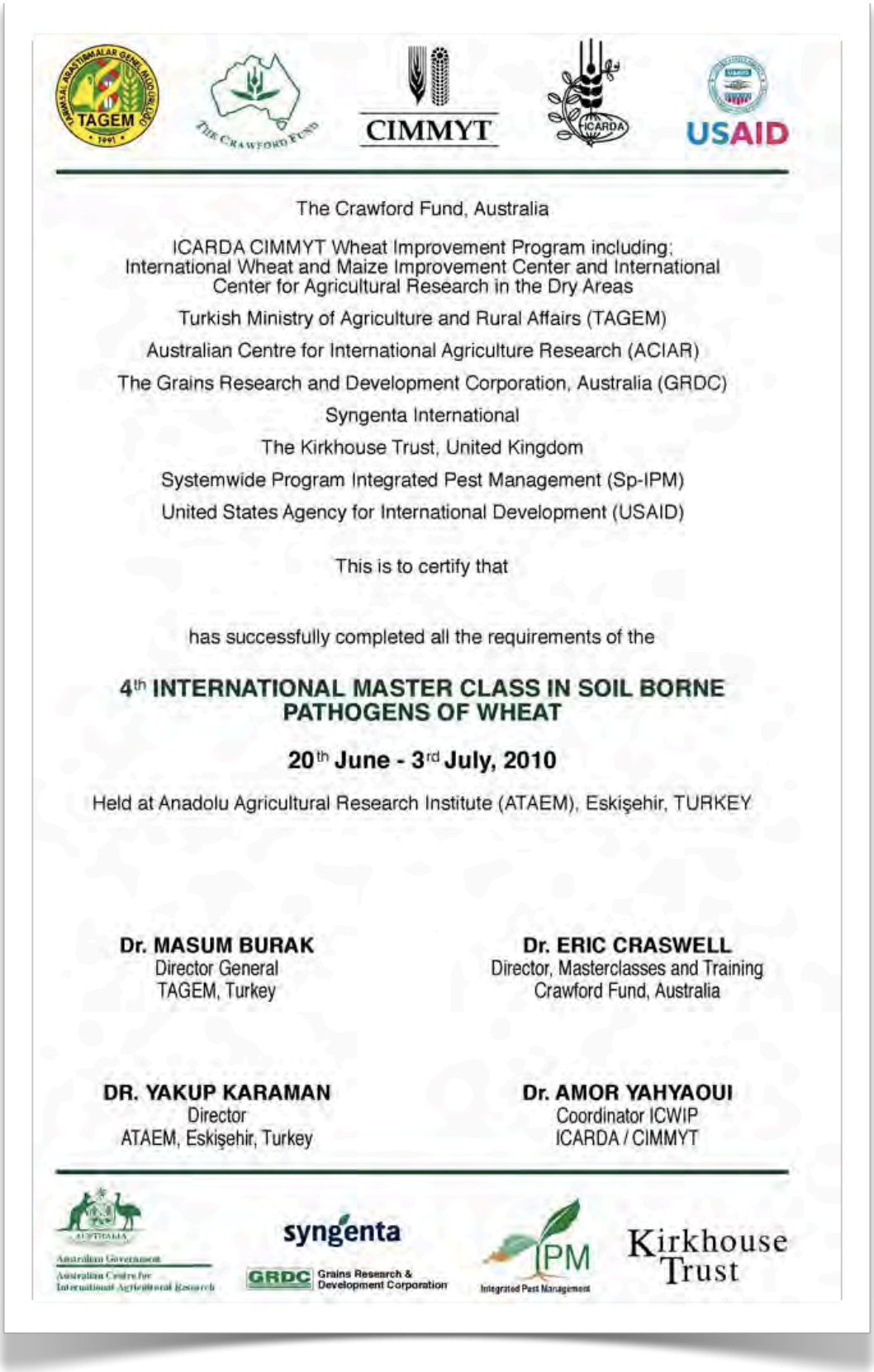
Dr Amor Yahyaoui, ICWIP Coordinator a.yahyaoui@cgiar.org

Dr Ravi Gopal, Agronomist, ICARDA (subject to confirmation) RG.Singh@cgiar.org

Dr Bram Govaerts, Coordinator CA CIMMYT Mexico b.govaerts@cgiar.org

Dr Julie M Nicol, SBP Leader, CIMMYT, Turkey j.nicol@cgiar.org

Attachment 8 - Example Certificate



The Crawford Fund, Australia

ICARDA CIMMYT Wheat Improvement Program including;
International Wheat and Maize Improvement Center and International Center for Agricultural Research in the Dry Areas

Turkish Ministry of Agriculture and Rural Affairs (TAGEM)

Australian Centre for International Agriculture Research (ACIAR)

The Grains Research and Development Corporation, Australia (GRDC)

Syngenta International

The Kirkhouse Trust, United Kingdom

Systemwide Program Integrated Pest Management (Sp-IPM)

United States Agency for International Development (USAID)

This is to certify that

has successfully completed all the requirements of the

4th INTERNATIONAL MASTER CLASS IN SOIL BORNE PATHOGENS OF WHEAT

20th June - 3rd July, 2010

Held at Anadolu Agricultural Research Institute (ATAEM), Eskişehir, TURKEY

Dr. MASUM BURAK
Director General
TAGEM, Turkey

Dr. ERIC CRASWELL
Director, Masterclasses and Training
Crawford Fund, Australia

DR. YAKUP KARAMAN
Director
ATAEM, Eskişehir, Turkey

Dr. AMOR YAHYAOUI
Coordinator ICWIP
ICARDA / CIMMYT

Attachment 9 - Evaluation Questionnaire

Participant Course Evaluation Form

The 4th International Training Course on Soil Borne Pathogens of Wheat

20th June – 3rd July, 2010 Eskisehir

Held at ANADOLU Research Institute Eskisehir in collaboration
with ICWIP (ICARDA CIMMYT Wheat Improvement Program).

Your help in completing this questionnaire is appreciated. The information that you provide will be useful in planning future events like this and will help course organizers improve their materials and presentations.

Name (not obligatory):_____

Current Employer:_____

Position:_____

Postal Address:_____

Email:

Phone (land line):

Phone (cep/mobile):

Fax:

Did you ever participate in **course similar like this** (at different country for more than one month)?
☐ **Yes** ☐ **No**

If yes, could you please country and organization / course topic:

A. What did you think of the course?

In general, I would rate the course as: ☐ Excellent ☐ Good ☐ Average ☐ Poor ☐ Very poor

How well the course met its objectives: ☐ Very well ☐ Well ☐ Somehow ☐ Rather not ☐ Didn't at

Balance between theory and laboratory work: ☐ Very good ☐ Satisfactory ☐ Unsatisfactory

Balance between different topics: ☐ Very good ☐ Satisfactory ☐ Unsatisfactory

Suitability of teaching methods used (e.g. lectures, demonstrations, practical exercises, field visits, discussions, etc.):
☐ Excellent ☐ Good ☐ Average ☐ Poor ☐ Not Suitable

Relevance of provided learning materials and books: ☐ Very good ☐ Satisfactory ☐ Unsatisfactory

Amount of new information provided during course (a lot of new inf.) 5 4 3 2 1 (little new inf.)

Relevance of course content to your work/institution: ☐ Very relevant ☐ Relevant ☐ Somehow ☐ Irrelevant

Overall length of course in relation to content: (too long) 5 4 3 2 1 (too short)

Number of participants: (too many) 5 4 3 2 1 (too few)

Communication: scientists vs. participants ☐ Excellent ☐ Good ☐ Average ☐ Poor ☐ Very Poor

Interactions with other participants: ☐ Excellent ☐ Good ☐ Average ☐ Poor ☐ Very Poor

Degree of interest generated by course: (a lot of new interest) 5 4 3 2 1 (no new interest)

What do you think is the most important thing you have learned from the Class?

_____

_____

_____

What were the <u>two</u> most important aspects of the Class activities for you? (please underline)

- Lectures
- Laboratory sessions
- Discussion groups
- Field work
- Preparation of Case Studies
- Meeting with other scientists with similar interests
- Something other than the above – give details

_____

_____

B. What other topics should be added?

_____

_____

_____

C. What topics should be left out?

_____

_____

_____

D. Impact

Do you feel confident enough to share what you have learned with peers in your country? ☐ **Yes** ☐ **No**

Following this course, are you willing to take role of resource person in future in-country courses? ☐ **Yes** ☐ **No**

Will you be able to use new knowledge and skills at your work (at current institution)? ☐ **Yes** ☐ **No**

If not, what are the constraints?

_____

_____

_____

_____

Would you recommend course like this to other people? ☐ **Yes** ☐ **No**

Why yes/not?_____

What type of further interaction with CIMMYT ICARDA Scientists, Australian/US teaching staff do you expect/prefer?
Science –

Training –

Did you have any language problems? If so, please give details.

_____

_____

What should be done now to reinforce the activities of this Class?

_____

_____

E. Strengths & weaknesses

Please list what you consider to be 3 strengths and 3 weaknesses of the course

Strengths – most useful aspects of course	Weaknesses – least useful aspects of course
1.	1.
2.	2.
3.	3.

F. Logistics and administration

Was the accommodation satisfactory? ☐ Excellent ☐ Good ☐ Average ☐ Poor ☐ Very poor

Was the food satisfactory? ☐ Excellent ☐ Good ☐ Average ☐ Poor ☐ Very poor

Communication- course coordinator vs. participants: ☐ Excellent ☐ Good ☐ Average ☐ Poor ☐ Very Poor

Did you have enough time for self study / relax? ☐ More than needed ☐ Just Enough ☐ Not enough

How was the overall logistical organization and coordination? ☐ Excellent ☐ Good ☐ Average ☐ Poor ☐ Very

G. Additional Comments	Please write any comments or suggestions you may

What to improve/change; what would be more relevant for your country/institution; etc.

Many thanks for taking the time to fill out this survey

Dr Julie Nicol
Course Coordinator
CIMMYT Soil Borne Wheat Scientist

Attachment 10 - Related Publications

Tunisia

Chekali S, S Gargouri, T Paulitz, JM Nicol, M Rezgui, B Nasraouia. The affects of *Fusarium culmorum* and water stress on durum wheat in Tunisia. (submitted to Crop Protection 2010)

Iran

Hajihasani A, ZT Maafi, JM Nicol, S Rezaee (2010). Effect of the cereal cyst nematode, *Heterodera filipjevi*, on wheat in microplot trials. *Nematology* 12: 357-363.

Hajihasani A, ZT Maafi, JM Nicol, A. Seraji (2010). Relationships between population densities of the cereal cyst nematode, *Heterodera latipons* and yield losses of winter wheat in microplots. *Australasian Plant Pathology* 39: 530-535.

Turkey/Australia

Obanor F, G Erginbas-Orakci, B A Tunali, JM Nicol and S. Chakraborty (2010) *Fusarium culmorum* is a single phylogenetic species based on multilocus sequence analysis. *Fungal Biology* 114: 753-765.

Şahin E, JM Nicol, İH Elekçioğlu, R Rivoal (2010). Hatching of *Heterodera filipjevi* in controlled and natural temperature conditions in Turkey. *Nematology* 12: 193-200.

Özarslandan M, A Özarslandan, J Nicol, İH Elekçioğlu (accepted 2010). Tahıl Kist Nematodu, *Heterodera filipjevi* (Madzhidov) Stelter'nin patotipinin belirlenmesi ve Buğday Genotiplerinin, *Heterodera filipjevi* Popülasyonlarına Karşı Dayanıklılıklarının Araştırılması [Determination of the pathotypes of *Heterodera filipjevi* populations and resistance to *Heterodera filipjevi* (Madzhidov) Stelter populations in wheat genotypes]. *Türkiye Entomoloji Dergisi* [Turkish Journal of Entomology] (in press).

Global

CIE (Centre for International Economics) 2009. 'Potential Economic Impact of a Crawford Master Class: Soil Borne Pathogens and Cereal Cyst Nematodes.' Centre for International Economics, Canberra, 22 pp.

Nicol JM, LW Burgess, IT Riley, H Wallwork (2010) 'The ATSE Crawford International Master Class series on soil borne pathogens of wheat. In Proceedings of the Rovira Rhizosphere Symposium - Celebrating 50 years of Rhizosphere research.' (Eds VVSR Gupta, M Ryder, J Radcliffe) (The ATSE Crawford Fund, Melbourne, Australia). ISBN 9781921388071. Pp 97-108.

Riley IT, JM Nicol, AA Dababat eds (2009) 'Cereal cyst nematodes: status, research and outlook.' (CIMMYT: Ankara, Turkey). Proceedings of the First Workshop of the International Cereal Cyst Nematode Initiative, 21-23 October, Antalya, Turkey 2009. ISBN 978-975-0407-285-3. 244 pp.

Attachment 11 - Selected Photographs

Plate 1. Key international teaching staff and senior management from ANADOLU Research Institute involved in the Fourth International Master Class on Soilborne Pathogens of Wheat, Turkey 2010.

Plate 2. Participants of the Fourth International Master Class on Soilborne Pathogens of Wheat, Turkey 2010.

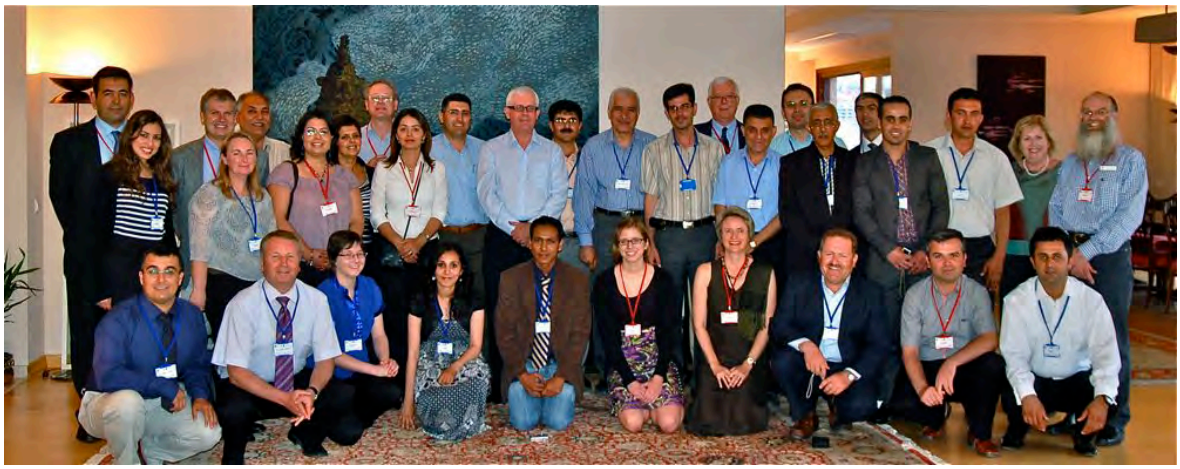


Plate 3. Welcome reception at the Australian ambassador's residence hosted by The Ambassador, Mr Peter Doyle and his wife Ms Jennifer Lee with participants and some of the international teaching staff and representatives from the Central Field Crops Research Institute, Ankara.

Plate 4. Participants visiting the cereal cyst nematode trial on Haymana Experimental Station with international teaching staff and colleagues from the Central Field Crops Research Institute, Ankara and Ankara University.

Plate 5. Ms Percy demonstrating single spore culturing technique for *Fusarium* spp. in a laboratory session at the ANADOLU Research Institute.

Plate 6. Participant Dr Brahim El Yousfi learning automated Fenwick Can extraction method from the soil for sedentary nematodes assisted by Ms Didem Saglam in a laboratory session at the ANADOLU Research Institute.

Plate 7. Prof. Halil Elekçioglu explaining basic taxomomy of plant parasitic nematodes to partipcants in a laboratory session at the ANADOLU Research Institute.

Plate 8. Dr Nicol explaining cereal cyst nematode tolerance trial at the ANADOLU Research Institute to partipants and key factors to consider when conducting field work.

Plate 9. National Coordinator of the Soil Borne Pathogens of Wheat program, Dr Necmettin Bolat from the ANADOLU Research Institute explaining the variety releases by the Institute and their soilborne pathogen resistance traits, and other abiotic and biotic traits of value.