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Sustainable Intensification

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This year's annual conference is titled "The Business of Food Security: Profitability, Sustainability and Risk" and will focus on the importance of collaboration and partnership between the public, private and not-for-profit sectors to achieve sustainable intensification and improved food security.

Overarching issues in any consideration of sustainable intensification relate to land and water constraints on food production and underpin discussion at the conference. The following is from a longer piece (referenced at the end of this article) by Dr Colin Chartres, our Director of Training and former Director General of the International Water Management Institute (IWMI), and Dr Andrew Noble, Senior Fellow with IWMI and formerly the Research Programme Manager for the Land and Water Resources at the Australian Centre for International Agricultural Research.

Introduction

To feed 9 billion or more people by the second half of this century will require a major rethink and paradigm shift in the way we conduct agriculture. Agriculture currently uses approximately 40% of the terrestrial land surface, is the major withdrawer and user of fresh water resources and contributes 17% of greenhouse gas emissions. In turn, agriculture will itself be detrimentally affected by climate change in many regions of the world.

Even if we can reduce the rate of increase in demand for food through strategies including altered diets and reduced waste, population

growth and increasing demand for dairy products and meat means that agricultural production will have to increase. Given the current pressures on natural resources, this will have to be achieved by some form of agricultural intensification.

However, increasing production or just maintaining current levels of production must be achieved with much less impact on the environment. Therefore, it is not just intensification of agriculture, but 'sustainable intensification' which we need to place at the forefront of the aforementioned paradigm shift.

As background reading for "The Business of Food Security" conference, this article examines ways in which we can harmonize agriculture and the environment, and highlights how the private sector can be a positive force in these efforts.

Why Sustainable Intensification?

A business-as-usual approach to agriculture in terms of water use is no longer tenable if we are to feed an expected population of over 9 billion by mid-century. Various forecasts suggest that we need to produce between 60-110% more food over 2005-07 levels by 2050. However, current levels of production already are causing significant loss of arable land as a result of land degradation including salinization, soil structural decline and erosion, biodiversity decline and urbanization, not to mention damage to ecosystem services including fresh water, fisheries habitat, pollination and biodiversity.

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Some have argued that if current trends of greater agricultural intensification in richer nations and greater land clearing (extensification) in poorer nations were to continue, around 1 billion hectares of land would be cleared globally by 2050, with significant increased greenhouse gas emissions.

In the light of these issues, there is international concern about just how we can increase agricultural productivity to deliver the food to feed a growing population. The concern is exacerbated by reports that since 1980 the proportion of overseas development assistance to agriculture has dropped from almost 12% to less than 5%, and, according to my Crawford Fund colleague, Dr Tony Fischer, the average annual rate in cereal yield growth has also declined from 3.2% in 1960 to 1.5% in 2000.

Reducing food waste was raised at last year's Crawford Fund conference as one answer to cope with greater food demand and to reduce pressure on the environment. Similarly, shifting developed country consumption patterns to "healthy" diets that contain lower proportions of animal protein and thus require less water for their production has also been proposed. Additionally, the encouragement of trade in commodities from highly productive agricultural areas to regions less well endowed with a productive natural resource base for agriculture, will also be beneficial. However, agricultural productivity has to be lifted, particularly in much of the developing world, for the mid-century food target to be met.

There is a need to shift the focus in agricultural development from that of "productivity enhancement" to sustainable intensification that enhances productivity, contributes to global sustainability and the eradication of poverty as well as raises resilience.

Sustainable intensification of agricultural production, using methodologies and technologies that are in harmony, rather than in competition, with the environment will make an important contribution to global sustainability.

Principles and solutions for sustainable intensification

Debates around solutions that will no doubt be raised at our conference range from increased use of GMOs, closing yield gaps, conventional breeding, and improved drought tolerance, through to greater adoption of the concept of payment for ecosystem services.



In addition to these solutions there are a number of other pathways that are considered in our original article as helping the drive to sustainable agriculture such as:

- Reducing food waste and dietary change
- Reclamation of salinized lands
- Landcare and stewardship movements
- Food and product certification schemes
- Supply/value chain approaches.

Outcomes from a Crawford Fund sponsored workshop at the University of Queensland last November concluded that better matching crops, varieties and management to seasonal conditions is likely to increase productivity and reduce risks both in smallholder and large scale commercial agriculture. But targets, time-frames, measurable indicators and methods necessary to achieve sustainable intensification remain loosely defined. This inhibits any informed analyses of emerging trade-offs between the multiple functions of agriculture: food and fibre production, environmental and socio-economic outputs. It is clear that the quantification and analysis of these trade-offs will require new thinking beyond the traditionally restricted focus upon raising yields.

Given the focus on the private sector's role for sustainable intensification at this year's conference, certification schemes and supply/value chain approaches bear further consideration and are outlined here.

Food and product certification schemes

In recent years a number of industry driven certification and sustainability codes have been developed that can have substantial impact on farmers' and processors' financial bottom line and environmental sustainability.

It's been argued that in Australia, the demand for foods that are produced under environmentally sustainable standards has been slow to take off because customers do not perceive these products as offering any special benefits and customers distrust the claims made by organisations. Other research has found that empirical evidence that sustainable certification has significant benefits is limited; and that outside of organic production, sustainable certification puts additional demands and cost burdens on farmers.

More recently, however, given concerns about the quality and safety of food exports emanating from China, there appears to be an increasing demand for clean and sustainable food production. Currently a number of certification schemes (such as the Rainforest Alliance's certification, validation and verification processes focused on crops like timber, tea and coffee; the Round Table on Sustainable Palm Oil, Nestlé's sustainable cocoa plan and Unilever's Sustainable Agriculture Code (SAC)) appear to be gaining traction in the market place.

These types of schemes tend to work in two ways. The first enables consumers to make informed choices on the

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sustainability of products that they purchase on a daily basis. The second is that unless producers can meet the criteria specified by the certification or codes, companies will not buy their products. The latter is the philosophy behind the Unilever SAC and the company's other responsible sourcing policies. These extend not only to the physical and environmental conditions of production, but also often cover the way labour is hired and treated.

Whilst there is ongoing debate about the extent to which all these certification schemes actually work, whether they can be subverted or worked round by unscrupulous providers and to what extent they do protect biodiversity and the environment, it is certain that they impart a strong market pull in terms of sustainable food production, which will lead to substantial environmental benefits.

Supply/value chain approaches

Looking at the entire supply/value chain can not only benefit companies but also farmers and consumers through the production of high quality sustainable products, which in turn may see farmers investing in their natural resources base. However, sometimes supply chain approaches need government

policy environments and governance systems to be fully effective. In Australia stewardship systems such as Landcare and Water Stewardship may assist, but in some countries the lack of planning and regulation are not helpful. For example, a recent study by the International Water Management Institute and Nestlé examined the water footprint and production value of several pasture, rice and wheat systems in the Indian Punjab, where the depth to groundwater has been increasing rapidly over recent decades. The results demonstrated how farmers could optimize financial yields and minimize groundwater decline, but would need to reduce rice production.

However, to be effective over a wide scale, such results would need interventions by policy makers to shift rice production from the drier west of the country to the wetter east and probably changes in attitudes amongst farmers from being rice growers to rice buyers.

Whilst supply/value chain driven reform of agricultural production may not always have beneficial outcomes, there is little doubt that a motivated private sector has much to offer in terms of driving the sustainability agenda. However the above example demonstrates the complexities of the trade-offs that will

be required if agriculture is to intensify sustainably.

Conclusions

It is clear that we have a major challenge to feed 9 billion people. Few would argue that we should improve the protection of our natural resources that sustain agricultural production and ecosystem services. Given the limited impact of government in many countries, the challenge to do this falls to some extent on the private sector. The challenge is for governments and the private sector to develop an agenda that increases the supply of nourishing, clean food without further environmental degradation. This will require further development and application of supply chain, certification and land and water stewardship schemes backed up by improved governance/regulatory schemes and their policing. These, coupled with reducing food waste and reducing meat and dairy consumption, might give us some hope of a globally sustainable agricultural system.

Powerpoint presentations and full proceedings of the Crawford Fund conference "The Business of Food Security: Profitability, Sustainability and Risk" will be available in the weeks and months after the conference on 10-12 August. The original article mentioned at the opening of this article is available at *J Food Security* (2015) 7: 235-245; DOI 10.1007/s12571-01500425-1

2015 Crawford Fund Medal MERYL J WILLIAMS, PhD, FTSE

The impact of international agricultural research comes down to people – the leaders and researchers with the passion and commitment to pursue outcomes for food security. In 2010 the Crawford Fund decided to recognise people who have made a considerable and continued contribution to international agricultural research with the Crawford Fund Medal.

Dr Meryl Williams will be awarded a Crawford Fund Medal at our annual conference this year by The Honourable Penelope Wensley AC, Chair of the Council of the Australian Institute of Marine Science – an institution formerly headed by Meryl.

Many will know that Meryl was formerly Director General of the WorldFish Center (1994-2004), during which time she concentrated the focus of WorldFish on eradicating poverty, improving people's nutrition, and reducing

pressure on the environment. She was also the Chair of the Commission of the Australian Centre for International Agricultural Research.

Meryl has worked for nearly 40 years in Australian and international fisheries, aquaculture, aquatic resource conservation and agricultural research and development. Currently, she is focusing on research and advocacy on women and gender in aquaculture and fisheries, and information and science for fair and responsible fish production for food security and nutrition.

More details and a photo slideshow of Meryls achievements are on our website.

Meryl Williams, former Chair of the ACIAR Commission, launches the Crawford Fund's "Healing Wounds" report with former Fund Chair, The Hon Neil Andrew



Making the business of **plant breeding** more responsive to **changing market demands**

At the conference this year, Dr Marco Ferroni from the Syngenta Foundation for Sustainable Agriculture will be highlighting public/private and not-for-profit sector partnerships for impact at scale. One such partnership is supported by the Alliance for Agricultural R&D for Food Security, formed by the Australian International Food Security Research Centre of the Australian Centre for International Agricultural Research (AIFSRC/AIAR), the Crawford Fund and the Syngenta Foundation for Sustainable Agriculture (SFSA), and is managed by the University of Queensland, Global Change Institute. The Co-Project Leaders, Vivienne Anthony of SFSA and Gabrielle Persley from the Crawford Fund and UQ/GCI, have provided the following update on the project.

A new project on "Demand-led plant variety design for emerging markets in Africa" is addressing the conundrum of low adoption of new plant varieties for many food security crops in the countries of sub Saharan Africa (SSA). On average, the adoption rate across 20 crops in 30 countries of SSA is about 35% (Walker 2014). Comparative

adoption rates of new plant varieties in Asia are over 80% and in Latin America 60%. The project commenced in July 2014. It has three objectives:

1. Plant variety design: To enable plant breeders to develop more high-performing varieties that meet customer requirements and market demand
2. Education and training: To build capacity within plant breeding programs on demand-led variety design
3. Policy analysis and advocacy: To provide evidence to support new policy development and investments in plant breeding.

In its first year of operations, the project has developed strong partnerships with African regional research and educational institutions, notably the African Centre for Crop Improvement (ACCI) at the University of KwaZulu Natal in South Africa; Biosciences eastern and central Africa in Nairobi Kenya (BecA); and the West Africa Crop Improvement Centre (WACCI) at the University of Ghana. An educators group comprising these organisations and several other African and

international partners is preparing a new curriculum module on "Demand-led plant variety design".

The educators group has met twice, once at BecA in Nairobi (November 2014) and once at WACCI in Accra (April 2015) to prepare the module content. The design of the course content is taking account of the experience of national and international breeding programs in Africa, as well as approaches taken by private seed companies to assess market demand in the design of future varieties.

The education module will be available for use as part of the syllabus for post graduate education of plant breeders, for example in the MSc and PhD courses in plant breeding offered by ACCI and WACCI in east and southern Africa and west Africa. It will also be made available as part of professional development of plant breeders. The Crawford Fund is planning on conducting a Master Class on the subject, in conjunction with BecA in 2015.

The project is also looking in depth at a number of case studies to identify best practice in demand-led plant breeding in both the private and public sectors and to apply these principles in future variety design. The initial case studies in Africa are on tomato in Ghana and beans in Rwanda. The experiences of plant breeding in Australia to respond to changing market demands as well as the biological imperatives of drought, pests and diseases are also being examined.

The intended outputs of the project over its three years are:

- An innovative education module for teaching the best approaches to plant variety design
- A cadre of plant breeders in Africa implementing demand-led approaches in national and international plant breeding programmes
- Connectivity between breeders, government policy makers and private sector crop value chains to enable seed systems to be populated with sought-after, new improved varieties.

For further information, please see the project web resource at <http://www.syngentafoundation.org/index.cfm?pageID=781>



Educators meeting with demand-led project team at the University of Ghana

MAKING THE PUBLIC AWARE

Our public awareness campaign continues with events, media activities, journalist visits and an active social media effort. We have a monthly e-newsletter and you can keep up-to-date with our regular feature stories and news reports on our website, through our @CrawfordFund Twitter site and videos on our YouTube site. A few of our policy development and public awareness activities are below:

MORE THAN A CONFERENCE

As we lead up to the Fund's key annual public awareness event, we're pleased to be getting such a positive response to our chosen topic on partnerships between the public, private and not-for-profit sectors for sustainable intensification and food security. In addition to the conference events this week, we have developed a range of stakeholder engagements in briefings, roundtable discussions, and additional public and closed events for our speakers to spread the word further than those who are able to attend our conference.

SEEDS OF TIME

Our Sir John Crawford Address presenter, Dr Cary Fowler, will be engaged this week in our special scholars' day. We are particularly appreciative of the enthusiasm and support of Questacon, the national science centre, for hosting our scholar day this year. Cary will be introduced by The Hon Ian Macfarlane, Minister for Industry and Science, to a special nationally live video streamed event for Australian school children on the importance of biodiversity conservation and his own career journey. In addition, we are pleased to offer the first showing of "Seeds of Time" a feature length documentary that traces the crusade by Cary to build the 'doomsday seed vault' on the Norwegian island of Svalbard. Tickets for the 12 August event may still be available so ask someone from the Fund.



BIOSECURITY CHANGE CHAMPIONS

The Fund has a continued involvement in the Australia-Africa Plant Biosecurity Partnership which is funded by Australian International Food Security Research Centre within ACIAR. The consortium for the project is headed by the Plant Biosecurity CRC, with CABI, CSIRO and the Crawford Fund and we are seeking to assist build biosecurity capability in a range of African countries to impact farmer incomes, food security and safe regional trade of agricultural products in their home countries. Part of our role in the project is in training the group in skills to assist them become 'biosecurity change champions'. The next step in the project is a workshop to be held in Nairobi in August, before they come to Australia for biosecurity and 'soft skills' training later in the year.

BREAD FROM STONES

Readers may recall our 2013 conference "Mining, Agriculture & Development: Bread from Stones?" held in partnership with the Africa Australia Research Forum. It highlighted the issues and the need for fruitful partnerships between the mining and agriculture industries for food security. The Fund has



Bread and Stones

Co-investing in mining and agriculture in Africa

M.P. McHenry and G.J. Persley

AUGUST 2015



since partnered with the Africa Research Group at Murdoch University to develop the next brief in our "Wider Canvas" series, as well as a longer paper that seeks to clarify some of the opportunities of mining sector in partnering, co-locating, or developing parallel investments with the agricultural sector. The documents will be launched at this year's Africa Australia Research Forum in Perth in late August.

SEEING IS BELIEVING

Elsewhere in this newsletter we have announced the winner of the Fund's third Food Security Journalism Award – Sarina Locke from ABC Rural. Sarina joins our two previous winners, Elizabeth Finkel and James Mitchell Crow. Winners of the award receive a visit to a developing country to view and report on agriculture for development projects. Separate "Seeing is Believing" visits are also organised with current plans including a visit for documentary maker, Sally Ingleton, to visit South East Asia to develop short videos on Crawford Fund training and Australian supported agriculture projects.

NEW VIDEOS APLENTY

We have stepped up our use of videos of late with a range of new stories on our YouTube site. These include interviews with Master Class participants; volunteers we've had in Laos; a compilation from one of our events encouraging young Australians in their study, careers and volunteering efforts for development; and past conference scholars reporting on the impact of the experience of our conference and scholars' day. Once again we have students from the University of Western Sydney at our 2015 conference doing short interviews with delegates to put together a compilation reporting on this year's event – if you're reading this at our conference, please get involved!

STATE COMMITTEES SUPPORTING YOUNG SCIENTISTS

In addition to all our State Committees supporting young Australians to attend our conference and special scholar day, our Queensland and Tasmania



Mock media interviews underway in Nairobi

committees are now providing special grants to young agricultural students to encourage an international component to their study.

2015 MASTER CLASS IN COMMUNICATING WITH STAKEHOLDERS

There have been two Crawford Fund communication master classes this year, in Kenya and, the latest, in India which was arranged for 25 researchers and extension officers involved in the International Rice Research Institute's mega project on stress tolerant rice. More on both of these events are on our website.

INTERNATIONAL AND AUSTRALIAN FOOD SECURITY EVENTS

The Fund is supporting the upcoming Global Youth in Agriculture Summit in Canberra in August and is pleased to be involved in more international and stakeholder symposia. We are managing the media efforts associated with the University of Sydney's nutrition conference in August, and the International Wheat Conference (IWC) and Borlaug Global Rust Initiative workshop in September. We are also providing scholarships for overseas researchers for the Wheat Breeding Technology Workshop being organised around the IWC by our former conference scholar, Dr Lee Hickey of QAAFI.

Big Boost to our Conference Scholars Program

As part of the Fund's efforts to encourage young people in their study, careers and volunteering in international agricultural research, we have almost doubled the number of young Australians that are being supported to attend our conference and special 'scholar day' this year.

In addition, we are very grateful to the Australian Agricultural and Resource Economics Society, Elanco and the Gardiner Foundation for the financial support for additional scholars to attend, and to those individuals who made personal donations towards this project as part of their registration to the conference. We also have arranged with Bayer CropScience Pty Ltd and the Future Farmers Network to welcome four delegates from the Global Youth Ag-Summit who will be reporting to the Summit of 100 young leaders from around the world on the Crawford Fund conference.

In total, we have 46 young Australians coming along, and we are also welcoming other young people who are registered for the conference to our special 'scholar day' to learn more about the international agriculture for development scene, the impact it has and the opportunities it provides.

You will find a video on our YouTube site and a booklet from past scholars to explain the benefit to the young Australians who do become Crawford Fund Young Scholars. This year's group of successful applicants are:

Mary Abdelsayed, *Holstein Australia*
Gurion Ang, *The University of Queensland (UQ)*
Naveenkumar Athiyannan, *CSIRO*
Jen Bond, *Mallee Sustainable Farming*
Tom Borowski, *The University of Sydney*
David Brunton, *South Australian Research and Development Institute (SARDI)*
Ritika Chowdhary, *CSIRO*
James Cowley, *The University of Adelaide*
Brittany Dahl, *Australian National University (ANU)*
Massimiliano De Antoni Migliorati, *Queensland University of Technology*
Manannan Donoghoe, *The University of Sydney*
Nikki Dumbrell, *The University of Western Australia (UWA)*
Jenny Eather, *ANU*
Martin Foerster, *Monash University*
Brodie Foster, *UQ*

Sharna Holman, *The University of Sydney*
Lachlan Hunter, *UWA*
David Innes, *UQ*
Monal Lal, *James Cook University*
Benjamen Lenehan, *The University of Sydney*
Sam Malfroy, *Plant Health Australia*
Elena Martin Avila, *ANU*
Miriam McCormack, *University of Tasmania*
Anika Miller-Cooper, *UQ*
Anika Molesworth, *Charles Sturt University (CSU)*
Joe Moore, *CSU*
Katie Mulder, *University of Tasmania*
Usana Nantawan, *Griffith University*
Johanna Nielsen, *University of Southern Queensland*
Hannah Osborn, *ANU*
Victoria Pilbeam, *ANU*

John Rivers, *ANU*
Tom Rochford, *Deakin University*
Caspar Roxburgh, *Queensland Alliance for Agricultural and Food Innovation*
Sahibzada Shafiuallah, *CSU*
Kelly Stanger, *The University of Melbourne*
Sally Stead, *The University of Melbourne*
Tanapan Sukee, *The University of Melbourne*
Jessica Tan, *SARDI*
Bezaye Tessema, *University of New England*
Kimberley Tilbrook, *CSIRO*
Muhammad Tufail, *CSU*
Hannah White, *La Trobe University*
Megan Williams, *The University of Melbourne*
Josephine Wright, *The University of Sydney*
Shuanxi Zhou, *CSIRO*

CRAWFORD FUND **TRAINING** FOR IMPACT

We provide here a selection of reports as a sample of the training that the Fund has most recently supported for young agricultural scientists from developing countries in a broad range of skills from countries in the Pacific, Asia and Africa. The back cover of "Highlights" shows some of the training planned in the coming months.

MASTER CLASS AND TRAINING REVIEW

Rather than reporting on the Master Classes we have held recently, we will report here on the recent review of our Master Class and training programs by our Director of Training, Dr Colin Chartres, with contributions by Dr Helen Scott-Orr and Dr Simon Hearn and around 70 people in different organizations who were interviewed. The purpose of the review was to revitalise the program and enable more focused and demand-led training, and to define key training challenges requiring our support.

Since the early 1990s, over 1000 individuals have attended more than 50 Master Classes and almost 10,000 individuals from around 100 countries have attended our wide variety of training programs.

Four overarching themes for training emerged and have been approved by the board as a focus in the future:

- Market Access, Biosecurity and Food Policy;
- Sustaining Agriculture's Natural Resource Base;
- Risk and Adaptation to Global Change; and
- Cross Cutting Issues—such as gender and youth, science communication and management, and information and communications technology opportunities. These will be incorporated in the design and application of all Crawford Fund Master Class and training activities.

It was also agreed, that over the next two to three years, focus should be given to training activities in:

1. Market access and biosecurity
2. Water and soil management with respect to sustainable intensification of agriculture
3. Research management training and innovation systems; and
4. Platforms including information technology and communication.

A copy of the full review and recommendations is available on our website and in coming months we will be approaching possible partners,

supporters and participants for our new refocused training activities. If you would like more information, please contact us via Crawford@crawfondfund.org, or our Training Director, Dr Colin Chartres (colin.chartres@crawfondfund.org). A brochure to explain how you can partner and be part of our Master Classes is now available on our website.

STATE TRAINING PROGRAMS

ACT

Seed technology for better trees

Forestry is a significant sector in Vietnam and contributes to household income and trade. Wood processing is also a key contributor to the country's external earnings. An evaluation of the land in 1995 estimated that up to 42 per cent of forested area had been lost. Rejuvenation is now a primary objective of the government.

The Institute for Forest Tree Improvement and Biotechnology (IFTIB) plays a leading role in providing high quality improved seed of key tree species required for planting programs, and for carrying out research for the forestry sector.

The Crawford Fund supported training by the CSIRO Plant Industry's Australia Tree Seed Centre around tree seed technology and seedbank management for visitors from Vietnam, Ms Duong Thanh Hoa and Tran Thi Hanh.

Ms Hoa is responsible for managing the IFTIB Seed Store which includes maintaining a collection of high quality tree seed, documenting and maintaining the identity of the collection, packing and dispatch of seed and facilitating the safe and effective import and export of seed from the centre. Ms Hanh works with Ms Hoa in the seed store.

They both spent a month at the National Research Collections Australia at CSIRO in Canberra taking part in activities that included setting up germination tests, laboratory work and seed collection.

"From this training I will apply what I learnt to our tree seed centre in Vietnam. This will enable us to get the good quality of forest tree seed - genetic and physiology - so that we can improve the growth of plantation and bring the benefits to forest growers," said Ms Hoa.

NSW

Extension training in Myanmar

To strengthen institutional capacity, extension services, and rural livelihoods in the Central Dry Zone and Delta regions of Myanmar – The Crawford Fund supported a six-day workshop on Participatory Extension Training of Trainers.

The training was part of the ACIAR Myanmar Livelihoods & Extension Project, led by Dr Julian Prior from the University of New England. It aims to expose future trainers to the core



Ms Hanh & Ms Hoa setting up seed germination tests

concepts of participatory research and extension approaches – and demonstrate how various agencies can collaborate. Thirty-four staff from the Ministry of Agriculture and Irrigation and Ministry of Livestock, Fisheries & Regional Development were involved.

The course began with a theoretical component on participatory training concepts, followed by training in participatory methods. Fieldwork was conducted in teams, then reviewed, interpreted and analysed.

The participatory approach and techniques used with farmers was filmed during the training. The PRA training documentary was telecast on the Myanmar Farmers Channel and the PRA training also gained press coverage in the national Nay Pyi Taw newspaper.

"A Participatory Extension Training of Trainers Module in Burmese that can be adopted for future courses is currently being developed, based on feedback from the trainees. It is expected the module will be used by Yezin Agricultural University (YAU) and University of Veterinary Science (UVS) and by the Ministry of Agriculture and Irrigation's Central Agricultural Research and Training Centre (CARTC) for pre- and in-service training for extension workers and managers. It will also be provided as an open-access resource online," said Dr Prior.

QUEENSLAND

Improving sweetpotato virus diagnostics

Sweetpotato is the main food staple in Papua New Guinea, a valuable source of nutrition in Fiji, and a food crop of growing importance in Australia. Like all living organisms, sweetpotato can be affected by disease. In fact, research by Queensland Department of Agriculture, Fisheries and Forestry (DAFF) has shown that crop yields can be substantially increased by a process that removes viruses from the vegetable. The disease free planting material obtained by this process is referred to as Pathogen Tested (PT).

The Crawford Fund recently sponsored two young sweetpotato scientists, Myla Deros and Wilfred Wau from PNG's National Agricultural Research Institute (NARI) to attend a virus diagnostics workshop held in Queensland. Myla is currently involved in an important Australian Centre for International Agricultural Research (ACIAR) funded sweetpotato project, led by Mike Hughes



Female farmers in Myanmar displaying their seasonal calendar

of DAFF, studying PT sweetpotato and virus reinfection. She also maintains NARI's PT sweetpotato planting material. Wilfred, based in Lae in the PNG lowlands, is working with PT on sweetpotato crop development. Also attending the course were researchers from the Secretariat of the Pacific Community Fiji, International Potato Center Peru, NARI and DAFF.

The workshop, funded through ACIAR and developed by Sandra Dennien (DAFF), involved both theory and practical training in the use of virus diagnostic tools. The Australian Sweetpotato Growers Association Inc organised a field day to coincide with the workshop – providing the Australian industry and participants the opportunity to meet and discuss research and its in-field applications.

"The workshop has not only improved the individual skills of farmers but it will see them receiving better planting material, enhance the quality of international sweetpotato variety transfers, and improve the communication and collaboration of this specialist group of scientists," said Myla Deros.

SOUTH AUSTRALIA

Understanding phosphorus in International Year of Soils

Many readers would know that 2015 is the International Year of Soils so it is fitting to highlight some of our soil-focused training initiatives. Supported by The Crawford Fund, scientist and PhD candidate Kenneth Mbene, visited the

University of South Australia's Centre for Environmental Risk Assessment and Remediation (CERAR) where he investigated the key agricultural nutrient – phosphorus.

Understanding more about phosphorus is critical because it is essential for plant growth and has no alternative source apart from phosphate rock. The nutrient is currently added to soil in the form of fertiliser, which all modern agriculture systems depend on.

Mbene has taken what he learnt from his time in Australia back to his home country of Cameroon.

"We have to be particularly careful in Cameroon because most Cameroonian soil is from a volcanic origin and is phosphorus deficient, meaning we have to supplement the soil with fertilisers," he said.

Time is running out according to CERAR's Chair in Environmental Science, Professor Nanithi Bolan, who says the world could see a food security crisis in the near future due to the decline in phosphorus availability.

"The good news is that phosphorus can be captured and recycled and this is the area we are focussing on. One option is through animal manure management. Poultry manure is rich in plant nutrients including phosphorus," Prof Bolan says.

Mbene hopes his research will be able to provide advice to both Cameroonian farmers and the government.

"I have acquired advanced knowledge on nutrient management in organic farming which will make Cameroon agricultural production systems more sustainable.



Kenneth Mbene learns about phosphorus

This visit exposed me to a wide range of instruments that are used for soil testing in Australia, and also to research scientists in the domain of soil science which will directly improve the networking in soil science research between Cameroon and other countries," Mbene said.

VICTORIA

Supporting dairy farming in West Java

In recent years, milk production in West Java has declined, unable to sustain milk production relative to levels achieved in East Java. Many challenges exist for smallholder dairy farmers in West Java, which include limited forage quality and nutrition for dairy cows, poor milk quality and hygiene, and competing urban pressures. For this reason, the West Java government recommended a capacity building program to be provided for dairy advisers to improve their knowledge and skills to help support dairy industry development.

A five-day workshop was conducted in Lembang with 28 dairy advisers attending. It was jointly supported by The Crawford Fund, Victorian Government and the Government of West Java. Participants were selected from advisers that had regular contact with the farmers and were likely to be more actively involved with technology transfer at the smallholder dairy (SHD) level.

The workshop was delivered by Zita

Ritchie, Dairy Extension Officer with the Victorian Government and Dairy Consultant and a former Crawford Fund Conference Scholarship awardee and John Moran, who the Fund has supported in his development of a range of important books on dairying for developing countries.

Training included presentations and group discussion on topics such as rearing young stock, feeding and nutrition, breeding, animal health and welfare, heat stress and housing design, milk quality and hygiene. A visit to a nearby model farm allowed advisers to apply the theory discussed during the workshop.

"This workshop was effective in meeting the outcomes by increasing the knowledge of these advisers – but to lead change, follow-up workshops would be advisable. Building more practical components into this type of workshop would also be beneficial as it would provide advisers with further practical skills that they can apply and demonstrate in a farmer context," said Ms Ritchie.

WESTERN AUSTRALIA

Controlling weeds safely

In Bangladesh farmers often use herbicide without following any rules or regulations and without taking safety precautions. For this reason The Crawford Fund sponsored three Bangladeshi trainees to participate in a training program in research techniques to investigate weed control by herbicide application in conservation agriculture.

The training included herbicide use for safe and effective weed control and herbicide screening of crops for herbicide tolerance. Through a range of activities presented by experts from the Department of Agriculture and Food Western Australia (DAFWA) the trainees were exposed to theories, techniques and demonstrations across many aspects of weed control to prevent resistance development and identify cultivar tolerance. A mini field trial was set-up to study herbicide efficacy.

"Trainees now have the knowledge to calibrate the backpack sprayers before herbicide application. They learnt that when herbicide is applied in the field at the proper time and following correct procedures, it increases efficacy, reduces waste/drifts and prevents residual toxicity. Trainees also learnt that rotation of herbicides from different modes of action can delay herbicide resistance in weeds," said Dr Abul Hashem from DAFWA.

With the help of DAFWA's biometrician, trainees were able to use statistical

techniques to analyse the data collected from the mini trial. Trainees visited different regional stations of DAFWA to investigate herbicide efficacy and tolerance trials. Trainees also had an opportunity to attend the Liebe Group Spring Field Day in Buntine where they visited different trial sites.

TASMANIA

Cultural conservation with wood in PNG

The complex social system and private land ownership in PNG means that more integrated approach to conservation is required, which preserves natural and cultural values in areas such as wood production and agriculture. Training of forest workers, planners and landowners in the identification of these values is key to the effectiveness of forest conservation in PNG.

With the support of The Crawford Fund, Dr Sarah Munks from the University of Tasmania and Dr Peter McIntosh from the Forest Practices Authority, led a Train the Trainer course aiming to provide PNG scientists with the skills necessary to develop user-friendly technical guidelines and mentor others in the field.

Compliance auditing, assessment of soil erosion, regional planning, best-practice road construction and satellite imaging, were just some topics addressed.

This training is part of a broader FAO initiative, which has received Crawford Fund support, that aims to promote sustainable forest management by developing effective systems of forest planning, monitoring and control in PNG.

NORTHERN TERRITORY

Boosting biosecurity in SE Asia

Partnering with Murdoch University, The Crawford Fund recently supported training in postharvest grain storage. The training was a coordinated effort between Crawford Fund programs in the Northern Territory, Western Australia and New South Wales.

The workshop was delivered in collaboration with the Department of Agriculture and Food Western Australia (DAFWA) and the participants were from flour milling companies in South East Asia who are clients of Cooperative Bulk Handling (CBH), with which The Crawford Fund has collaborated in the past.

The training builds on recent training at Murdoch University for PNG, Lao and Cambodian biosecurity officials and a previously run and highly successful Crawford-Plant Biosecurity Cooperative Research Centre funded Grain Biosecurity Training course in 2011.

The training covered chemical and non-chemical control of stored grain pests, and biosecurity for the post harvest grains industry. The participants gained

experience in the principles of grain storage and fumigation to control pests and thus avoid postharvest losses, which have been reported to be up to 40 per cent.

The participants also acquired skills in the early identification of key pests of grains, and an understanding of the need for grain protection and biosecurity for international import and export trade.

"The major long-term outcome of the

training activity is reduced grain loss and improved biosecurity practices by end users of Australian grain, resulting in improved food security in South East Asia. All participants reported that they will be recommending significant changes to their company storages, and/or fumigation policies and procedures," said Dr Kirsty Bayliss, Academic Chair of Biosecurity and Food Security at Murdoch University.

CRAWFORD FUND Prestigious Awards

Crawford Fund Fellowship:

Ms Aye Sandar Phyo from Myanmar

The 2015 Crawford Fund Fellowship has been awarded to Ms Aye Sandar Phyo from Myanmar. Ms Phyo is a Research Associate at the Asian Institute of Technology. She has a Master of Science (Regional and Rural Development Planning) from the Asian Institute of Technology in Thailand.

The focus of Sandar's research is the application of socioeconomic research to support improved agricultural practice. By linking agricultural innovations with social science knowledge on the social, cultural and institutional settings, agricultural innovations may be designed

and adapted to better suit the local and regional context, and have more lasting impact for smallholder households.

Since joining the ACIAR funded project Strengthening Institutional Capacity, Extension Services and Rural Livelihoods in the Central Dry Zone and Ayeyarwaddy Delta Regions of Myanmar, Sandar has led qualitative and quantitative analysis of household livelihoods, change and rural dynamics.

More details on Sandar's work are in the citation on our website and we will be reporting on her visit as it's underway.



Our 2015 Food Security Journalism Award: **Ms Sarina Locke**

The Fund's public awareness program has been supporting journalists to visit developing countries for some years to experience and report on international agricultural research projects with what we've dubbed 'seeing is believing' trips. To complement this public awareness strategy, we joined with the Australian Council of Agricultural Journalists in 2013 to launch our Food Security Journalism Award. The competition aims to encourage working Australian journalists to investigate the important roles that agricultural research, training and rural development play in global food security.

Our 2015 winner of the award is Ms

Sarina Locke, an award winning radio journalist with ABC Rural, for her story on the aftermath of destructive Cyclone Pam in Vanuatu. Her article considered Vanuatu's fruit and vegetable crops, livestock and fisheries and how they had suffered extensive damage from Cyclone Pam and interviewed ACIAR about its projects, who were vulnerable and how quick recovery could happen.

Sarina will take up her prize – a 'seeing is believing' visit to a developing country - in the coming year and her award was announced at our conference dinner on 10 August. Her winning entry is on our website.



Nominate a Hero: Derek Tribe Award

The Crawford Fund Derek Tribe Award marks the outstanding contributions of Emeritus Professor Derek Tribe AO OBE FTSE, Foundation Director of the Crawford Fund.

It is made biennially to a citizen of a developing country in recognition of their distinguished contributions to the application of research in agriculture or natural resource management in a

developing country or countries.

We are now calling for nominations of developing country researchers by Australian researchers or researchers from international agricultural centres for the 2015 Derek Tribe Award. The recipient will undertake a visit of about two weeks to Australian agricultural centres to enhance networks and linkages and extend those networks

within his or her home country. The recipient will also attend a public event to receive the Award and to deliver The Crawford Fund Derek Tribe Award Address.

All details on the nomination process are on our website and the closing date for nominations is 30 September 2015.

CONTRIBUTORS 2015

We wish to thank the following contributors who have supported our training and public awareness activities this year:

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Australian Agricultural and Resource Economics Society
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Murdoch University
NSW Department of Primary Industries
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Private donors
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HEARING FROM OUR AVIDs

The Crawford Fund continues to assist with the placement of young Australians in agriculture projects in developing countries in communication, research and extension positions through the Australian Government's "Australian Volunteers for International Development" or AVID program. The following report is by an AVID in Ethiopia - Gabrielle Morrison.

"I am working as a communications volunteer in Addis Ababa, Ethiopia under the Australian Volunteers for International Development program in partnership with the Crawford Fund. Whilst living in Addis has its challenges (crossing the street and living from time to time without electricity or water) it is a city on the move with extensive construction and citizens who are friendly and welcoming of the international community.

My host organisation icipe (International Centre of Insect Physiology and Ecology) has a mission to alleviate poverty, assist with food security and generally improve the health of people in the tropics by researching the helpful and harmful aspects of insects and then applying this research.

The most interesting and enjoyable part of my job is spending time visiting the various projects that icipe run in Ethiopia and then writing stories and case studies for various publications. These projects include training

and assistance for farmers in modern beekeeping, management and education of malaria, eradication of tsetse fly and projects in the push-pull agricultural technology, an integrated pest management strategy that also controls Striga, a major weed in the area.

All of these projects change the lives of people living in the target communities. The beekeeping projects give additional income to families, but it is often women who are the big winners. When I interviewed women who were attending a woman only beekeeping course run by icipe, the additional income from the honey sales was usually used for educating the children and also ensuring that everyone in the family had enough to eat. Some women even told me that now they can eat lunch.

If an opportunity presents itself, I recommend working in Africa and joining with other members of the international community to alleviate poverty and create opportunities for all members of society".



Gabrielle (second from left) at work in Ethiopia

What is the Crawford Fund?

The Crawford Fund's purpose is to encourage investment in international agricultural research (IAR) by governments and the private sector, in the belief that it is an essential, high priority, international activity.

We believe that IAR holds the key to alleviating rural poverty in developing countries, and can thus open the door to economic progress. Good news is worth sharing, and the Fund's Public Awareness Campaign increases understanding of the importance and potential of IAR, its achievements and needs.

The Fund also has a training program that fills a niche by offering practical, highly focused non-degree instruction to men and women engaged in agricultural research and management in developing countries.

HIGHLIGHTS is the Crawford Fund newsletter. Letters from readers are welcome and should be sent to the editor, Cathy Reade at cathy.reade@crawfordfund.org

Highlights and other publications and materials are on our website:

www.crawfordfund.org

Twitter @crawfordfund

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THE CRAWFORD FUND
For a Food Secure World

Awards and Training Courses supported by The Crawford Fund

The following awards to individuals and courses for groups will be reported in future newsletters:

Training awards to individuals:

Ms Rifka Hamami & Mr Sahar Bennani - Tunisia - Wheat breeding technology workshop, to be held concurrently with the 9th International Wheat Conference in Australia.

Dr Rudiyanto - Indonesia - Digital mapping of peatlands

Ms Khonesavath Chittarath - Laos - Use of PCR to diagnose plant viruses infecting vegetables in Laos

Ms Nopmanee Suvannang - Laos - Soil fertility Assessment by quality assured soil testing laboratories

Mr Muse Opiang - Development of technical guidelines for PNG natural and cultural value propositions to support the implementation of the PNG Logging Code of Practice

Mr Dipendra Pokharel - Nepal - Molecular techniques for wheat improvement for adaptation to drought stress



Training courses to groups:

Indonesia: Critical capacity building in context of Natural Resources and Indigenous Livelihoods for marine resource management practitioners from Eastern Indonesia

Several countries - Student ambassadors Roots Symposium

Several countries - Tropical Agriculture Conference 2015: Meeting the productivity change in the tropics

Indonesia - Design, implementation and application of livestock identification systems

Thailand - Improving smallholder linkages to high value markets through direct marketing

Uganda - Improving crop yield in Sub-Saharan Africa, Phase II

Several countries - Expert workshops linked to International Mango Symposium

Fiji - Training in ecologically-based rodent management

India - Converting wastewater into resource: Beneficial and safe reuse of waste and wastewater in peri-urban agriculture in India

Timor Leste and Indonesia - Social Dimensions of Agricultural Research and Extension

Laos and Vietnam - Furniture design with the focus on solid and veneered furniture products