ANNEX 12

Report on the visit to CABI, Egham UK

by

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17-18 Feb 2015

Three members of the Science Review Team (Nicola Spence, Jeff Waage[2] and Geoff Hawtin) visited the CABI site at Egham on 17-18 February, together Andrew Bennett as a resource person acting on behalf of the Board of Trustees. This report outlines the main observations of the team and raises a number of issues that require further attention within the review. The various topics are considered below in no particular order of importance.

The team took time to understand the role of science within CABI. It is clearly at the heart of CABI's programme and almost all that CABI does in one way or another is linked to the science programmes. However, CABI has not produced a 'stand-alone' science strategy so the team was unable to consult any such document, although key elements of a science strategy are embedded in the institute's medium term business plan, 2014-2016. Thus the boundaries of the review are somewhat imprecise and we apologize in advance if anyone feels we have either overstepped our mandate or failed to address important issues.

We express our thanks to all those who took the time to meet with us during the visit and who shared with us their valuable thoughts and insights.

Schedule and people met: See Annex 1.

1) CABI's Role in Scientific Research:
A key question at the back of the mind of the reviewers in Egham, and to be considered at all stages of the review process, is the extent to which CABI should carry out its own primary research as opposed to catalysing, fostering, facilitating, synthesising and supporting the research of others. To what extent should CABI undertake primary research in the regions as compared to UK and Switzerland? (We note the 'pressure' being put on CABI as a supplier and facilitator of primary research, in China, India and elsewhere). There was a common feeling among those interviewed and the team members themselves that it is probably critical for CABI to carry out world-class scientific research in at least a few key areas, and maintain very credible expertise across a range of other areas in order to have the scientific credibility to play an effective facilitating and catalytic role.

2) CABI's Comparative Advantage:

[1] 17th February only
[2] 17th February only

Interviewees agreed that CABI is one of only a very small number of international, public institutions worldwide that have a major research focus on plant health. CABI thus has a clear comparative advantage and role to play in on the world stage. Furthermore, CABI has carved out a particular niche for itself within this broad arena in a number of key areas. The integrated management of pests, diseases and weeds, invasive species and biological control are all areas in which CABI has significant expertise and for which it is recognized globally.

Sanitary and Phytosanitary measures (SPS), quarantine as well as fungal and bacterial identification are also widely recognized areas of expertise and there appears to be growing strength in ecological and ecosystem health. Some of the documentation provided to the team also mentions soils (soil health – or the impact of soils on plant health?) but we heard little about it during our visit and expect to hear more from reviews of the Centres, especially Africa.

On the other hand, areas that have been important in the past but that seem to have fallen behind somewhat in recent years include research based on the use of the fungal collection, consolidated efforts targeting specific commodities and arguably the development of new biopesticides. CABI's competitive advantage in trade matters (beyond SPS and plant health related non-tariff barriers) is also questionable compared, for example, to that of such organizations as UNCTAD, World Bank, IFRPI, the Regional Development Banks and IIED

While, as mentioned above, Biological Control is an area where CABI has a strong international reputation and world-class expertise, questions were raised about the relative lack of uptake of biological control solutions around the world, and the implications of this for government and donor funding in the longer term.

3) 'One CABI':
We heard a lot about CABI's efforts to forge itself into a coherent, single institution, recognizing that for largely historical and funding reasons, it has faced particular challenges in achieving the degree of integration desired. While the process still has a way to go, very considerable progress has clearly been made over recent years, thanks in large measure to Plantwise.

The co-location of the CABI biological control and mycological research at the Egham site created a clash of science cultures that has taken some time to integrate. However, based on some strong common features of these research groups, including experience in working in highly regulated biological laboratories and a growing interest in developing molecular tools for diagnosis and research, together with a generally more business- and project-focused approach and the recruitment of new and talented young staff, the consolidated UK programme appears to have considerable energy.

All people consulted believed strongly in 'One CABI'. However, the current structure of CABI across the various centres is somewhat confusing with a large number of not always well-defined or delineated global or 'local' themes,

priorities, programmes, research areas, activities, platforms, etc. Furthermore, in spite of efforts to secure funding for activities across the Centres, concerns were raised that there are still significant incentives for each Centre to fundraise in isolation – and mainly for its own activities. Countering this may need some further thinking regarding financial targets for research funding and the distribution of funds within and across Centres. The fragmentation of funding is often accentuated by donors who provide regional and bilateral channels of funding – and little for genuinely global activities. This exacerbates efforts to bring together CABI's modest and widely spread scientific team and programme, and limits CABI's ability to take full advantage of its unique capacity to mount global programmes from several connected Centres.

If perverse incentives do indeed exist that counter the 'One CABI' ideal, then these need to be looked at carefully by management and to the extent possible, countered. Positive incentives for greater integration that might be further considered by management include expanding the number of CABI-wide themes lead by staff based in the regions and further encouraging the exchange of scientific staff between the various Centres, ideally for extended periods of time.

4) Partnerships:
CABI collaborates with a large number of partners throughout the world. Within UK we heard about significant partnerships with Royal Holloway University (situated near the CABI Egham site) and Imperial College. Other partnerships mentioned included the Universities of Reading, Bristol and Bangor, Kew Gardens, NHM and Campden BRI. While there are doubtless others, we did get an impression that it might be possible to make more use of the excellent UK science base, for example, through a greater outsourcing of specific areas of the work. Biometrics, molecular analyses and certain aspects of social science, for example, might all be candidates for additional outsourcing.

The UK Centre appears to be making rather less use of students and student projects than, for instance, the Swiss Station, where there is a long tradition of student support. The Team felt that building the cadre of project students could help CABI to strengthen its research activity and build UK and international partnerships.

5) Quality of CABI's Science:
The question arises as to how to analyse and interpret staff publication data given the often divergent requirements of producing information and publications that will on the one hand maximize impact in farmers' fields and on the other have greatest scientific impact. In light of CABI's mission, what weight should be given to publications and other products aimed at policy makers, extension workers and farmers? How should review/overview articles, book chapters and/or keynote addresses at international conferences be compared to publications in high impact factor journals? We note that publishing in high impact factor journals is not only important with respect to the standing of CABI scientists among it their peers, but is also important to

many donors, including Dfid, that increasingly provide competitive funding and for whom scientific credibility is an important factor in determining the allocation of their resources. At the same time, publication by CABI scientists of research syntheses in book chapters, often associated with key presentations at international conferences, helps to build and maintain CABI's reputation as a scientific authority in its focus disciplines.

6) Publishing in Open Access Journals:
CABI has an open access policy for its data and publications, yet publishing in open access journals can be expensive. Greater provision needs to be made by CABI to support these costs and they should be included, to the extent possible, in all project submissions to donors. We encourage CABI to have a consistent approach to implementing open access policy across the organisation.

7) Access to the scientific literature:
Access to the scientific literature is an issue for many CABI scientists. Library subscriptions are very expensive but for copyright reasons scientists do not have access to many of the journals provided to CABI for abstracting, even though they are on the server in Wallingford. Special, often individual arrangements have to be made to access literature e.g. through Royal Holloway and elsewhere, and this was considered a less than satisfactory solution by many of those consulted. However, beyond just recommending that management give this more attention, it may be hard for the Review Team to make any more specific – and helpful - suggestions

8) Monitoring and Evaluation
We were informed that a new M&E strategy is expected to be available in the first quarter of 2015. This is an area of critical importance to the quality of science at CABI and for institutional learning. The review team should aim to review and endorse – or otherwise comment on – the strategy. We also note that upgrading of staff skills in M&E has also taken place recently though a course specifically designed for CABI by the International NGO Training and Research Centre (INTRAC).

9) Plantwise:
Plantwise is the flagship project of CABI. However, the Review Team recognises that as the programme is primarily concerned with the delivery to farmers of knowledge on the management of pests and diseases, it generally falls outside the TORs and scope of the Science Review. We also recognise that the programme has already been subject to several recent external reviews and that more are in the pipeline. Nevertheless, given that Plantwise interfaces with CABI science in a large number of ways, there are several areas to be considered in the current review, including:
a) The need for further research and development of techniques to help validate the data and ensure the accuracy of information in the Knowledge Bank,
b) The possible further modification of Plant Clinic data collection so as to create more robust and higher quality data sets which are comparable across

agroecosystems and regions, and through time, as a basis for scientific analysis and publication
c) Developing research projects within Plantwise programmes, to understand the adoption of management practices by farmers, their scalability and impact, leading to publications in international journals. This will require CABI investment or partnership in social science and economic research.
d) Giving more attention to the use of Plantwise data to identify key pest, disease and other problems faced by farmers, to improve research priority setting by member countries and to identify areas for original and demand-led CABI research.

While CABI should undoubtedly consider further developing its strategies for mining this information, before the Knowledge Bank can fulfil its full potential it will be important to find ways to further strengthen the quality and accuracy of the data collected though the Plant Clinics. While significant efforts are being made at the national level to validate the data, we were informed that these are not always as effective as they could be. However, given the political sensitivity of much of the data – fuelled largely by concerns about potential impacts on international trade - not all the information in the databases is currently publicly available. This significantly curtails the potential use of the Knowledge Bank especially for regional and global analyses, and further efforts are needed to address and overcome these concerns. CABI is a global leader in the area of open access to data and Plantwise offers an important opportunity to promote this.

10) Identifying Commercial Opportunities:
CABI has spun-off a commercial company, Conidia, to develop, manufacture and market innovative tests to detect microbiological contamination in fuels. The issue arises as to how CABI identifies such commercial opportunities arising from its research, including when and where to take out intellectual property protection (especially patents) of its research outputs. Who provides commercial advice and support: internal/external? How can this be strengthened?

11) Training
Training is an important concern of CABI, especially in the Delémont Centre, and strengthening human resources capacity in developing countries is an area in which an even greater contribution could be made. Furthermore, allowing staff to undertake higher degrees while still employed by CABI is an important way to build staff strength.

Although hosting MSc and PhD students at Egham (e.g. from Imperial College or Royal Holloway) is an excellent way to augment research capacity, CABI can only afford to host students who make net positive contributions to its research programmes and publications. In this context training should not be undertaken unless it is fully paid for, or has scientific benefits that outweigh costs.

With respect to non-degree courses at Egham, we note that the training facilities are only used for student courses for about 2-3 weeks per year.

12) Invasives: the 'Big Push'

The 'Big Push' is a major international effort in invasive pests and weeds that is being planned as CABI's next large, high-profile initiative. It owes much to the demonstrable success of Plantwise in generating funding for a successful, cross-CABI investment in the development of a major programme. An initial case statement was prepared for donors in 2014 with seed funding for initial activities being provided in 2015. The team visiting Egham considered this to be an important and exciting initiative. However, it remains to be seen whether or not donors can be persuaded of the importance of invasives. CABI scientists appreciate that while invasives have major development and economic impacts, the evidence base for this is presently poor. A successful Big Push programme will depend on a strong evidence base, which will require expertise and original research into the social and economic impacts of invasives, both in terms of evaluating past programmes and predicting the socioecomic impact of future programmes. We endorse CABI's current efforts to develop such an evidence base but feel that more may be needed and urgently. Currently available studies reported in the literature are often anecdotal and of poor scientific quality, and CABI will need new partners with economics, social and health science expertise to develop a convincing argument for the Big Push campaign.

13) Social Sciences

The need for CABI to develop a socio-economic research strategy and for strengthening its research capacity in this area were raised by several of the staff we met – as well as in the staff survey. This is, of course, a very broad field and CABI will need to decide which areas to develop and strengthen – and how. Possible areas for socio-economic science research (broadly defined) at CABI could include, for example:

- Monitoring and evaluation: both the social impact of CABI associated interventions as well as macro-economic impacts. Both *ex-ante* and *ex-post* M&E studies are needed.
- The socio-economic impact of invasive species, especially on the livelihoods of the poor and particularly with a view to promoting greater government and policy support for tacking this problem.
- Studies on adoption of CABI (and other) research, e.g.to address the question of how small-scale farmers obtain and process their information and knowledge and why so many current 'on-the-shelf' solutions to pest and disease problems have not been more widely adopted.

Access is thus needed to a range of social science disciplines including micro- and macro-economics, anthropology, sociology, and gender research. While the team sees a need for CABI to seek additional strength in all such areas to support the current and expected future research portfolio, a decision will be needed on the extent to which CABI should seek to develop its own internal expertise, which is currently somewhat rudimentary, and the extent to which it can access such expertise through appropriate partnerships.

14) Bioservices

Fungal collections: A number of issues were raised in connection with the management of the living fungal collection. While it is a potentially valuable resource it appears to be underused, and given that is it just one of many similar collections worldwide (it comprises about 30,000 accessions compared to a total of more than 400,000 accessions within Europe alone) consideration needs to be given to its future. Should it be retained or given (or sold) to another organization such as Kew Gardens (to which the fungarium was devolved earlier, together with responsibility for mycological taxonomy)? Should it be retained just as a resource for identification services or should efforts be made to make greater use of it? If the collection is retained, greater efforts should be made to link the microbial database with phenotypic data, data on metabolic pathways etc. However, it seems the private sector has only a limited interest in using the collection to develop new commercial products.

There is also an issue about repatriation of collections, particularly to developing countries; whilst this could reduce the burden and cost for CABI there is a risk that collections will be lost unless a duplicate set is retained by CABI or other appropriate institution. There is an opportunity to help develop technical capability in these countries, but a lack of resources to facilitate this.

Plans were described for expanding the molecular identification work though developing the capacity at Egham to undertake next generation DNA sequencing work and mass spectroscopy (MALDI-TOF MS). While such techniques are very powerful and could revolutionise CABI's identification work, there is a risk in investing in technology that cannot be supported in the long term, so the Review team recommends that CABI look first at opportunities for partnership or out-sourcing before embarking on such an in-house laboratory development and investment programme.

CABI has a unique opportunity to be first to see and identify new or emerging pests and diseases of global concern (eg banana wilt, maize lethal necrosis, cassava brown streak) via its Plantwise plant clinics. CABI is very well placed to build on such early warnings through mobilizing research efforts in partnership with other organisations. However, resources are needed to be able to do this. As pointed out in the last Science Review, CABI needs to be clear about what it needs to protect and develop its own capability in this regard and to identify partners to complement this capability.

The work on biopesticides is an important area for CABI – especially in relation to its work on integrated pest, disease and weed control. While much of the work focuses on the use of biopesticides in the field, there also appears to be a desire to continue the work on the development of new biopesticides. The use of mycoinsecticides to control arthropod pests and endophytic microorganisms as protectants in seed dressings were both cited as exciting areas of work. However, it is unclear where funding for this is likely to come from as there seems to have been relatively little success in attracting private investment.

15) Nematology:

Nematodes are important worldwide both as pests as well as actual and potential biocontol agents. However, there is a significant lack of nematologists worldwide with CABI being among the few international research organizations having such expertise. Whilst this remains an important niche for CABI, the institute now lacks critical mass and if this area of work is to be maintained, it will be important to develop strong links with nematologists in the UK and worldwide to maintain and enhance capability.

16) Food Safety:
Food safety is increasingly being recognised as a problem worldwide. Contamination can occur at any point throughout the food chain and many food safety problems originate in the field. This is an area in which CABI has expressed an interest to expand its activities, especially in the areas of pest and disease problems that arise post harvest and in chemical residues in foodstuffs. CABI's foray into this area to date would indicate a significant potential for working with the private sector, as exemplified by the work that will hopefully be funded by Nestlé on aflotoxins in dairy products in Pakistan, and by Unilever on pesticide residues in tea in India. Although not an overcrowded field, there are a number of alternative suppliers who could be regarded as either – or both - potential competitors and partners (e.g. Campden BRI and Fera).

17) New Initiative on Seeds:
We were informed that CABI is considering strengthening its work to help small-scale farmers produce and market clean, pest and disease-free seed. However we were not given any details regarding current thinking with respect geographic focus, crop focus, how it would be integrated with the other work of CABI, which donor agencies are being considered for funding, etc.

18) Nagoya Protocol
CBD/Nagoya are greatly influencing CABI's ability to access living materials (both importing into and exporting from UK and other member and non-member countries). This applies equally to plant materials, insects and pathogens for research (including identification) as well as actual and potential biocontrol agents. CABI is currently working with member countries to try to develop mutually acceptable and effective access and benefit sharing protocols that are in line with Nagoya (and where appropriate, the International Treaty on Plant Genetic Resources for Food and Agriculture). While the effort is to be applauded, the Review Team is not overly confident that it will be possible to reach a satisfactory solution with all member countries in the short-medium term. Nevertheless, continued efforts should made, especially in association with the Treaty Secretariats and others, and ideally going beyond just developing effective mechanisms with member countries but contributing to a workable implementation of the Nagoya Protocol appropriate for all countries. A significant breakthrough in this area could be of major benefit to countries around the world.

19) Biometrics:
CABI does not have a full-time in-house biometrician to assist scientists in its experimental design and data analyses. We were informed that it is

sometimes possible to access this expertise elsewhere but that few formal arrangements exist for staff to obtain the biometrical and statistical advice they need on a regular basis. This appears to be an important area for management to address and one that could have a significant impact on research quality. This would be particularly valuable if, as suggested above, CABI considers modifying its Plant Clinic data collection to generate robust and high quality data sets for scientific analysis.

20) Commodities:
Traditionally CABI has had considerable strength in a range of commodities of world importance (coffee, cacao, tea, oil palm, cotton, sugar cane etc.). However, much of this has diminished over recent years due to a lack of funding. The demise of the Common Fund for Commodities has been one factor but donors in general seem increasingly unwilling to fund research that they feel should be funded by the industry – and getting funds from the institutions that serve the respective industries has proven to be difficult. There is no indication that this situation is likely to change any time soon. The question arises as to whether CABI should continue to portray itself as having a significant programme devoted to commodities or whether it should just integrate any work that is does on specific commodities into other relevant areas of its overall programme.

21) Trade:
CABI's programme of work on trade appears to be primarily concerned with support for strengthening national SPS measures and issues relating to the disruption of trade due to the risk of spreading pests, diseases and weeds. The work is often linked to specific commodities. Demand for CABI's involvement appears to be high and while this is clearly an area of comparative advantage for CABI, there does not seem to be a very strong research element in the programme. Another stated objective of the work on trade is to find ways "… to better integrate smallholders into value chains so as to improve access to markets". CABI's role and comparative advantage is less clear here given the relative weakeness of economics, marketing and other relevant expertise within the institute.

22) Succession Planning:
The age distribution of scientific staff appears to be somewhat bimodal with, on the one hand, a large number of junior scientists and on the other many staff approaching retirement. The general lack of mid-career staff, at least at Egham, has important implications for filling positions vacated by senior staff members as they retire over the next few years. If significant disruption to the scientific programme is to be avoided, it is important to further develop staff succession plans and to implement them as soon as possible.

23) Management:
Under the current CABI senior management structure the individual with the greatest responsibility for the oversight of science has the position of Chief Scientist – essentially an advisory position with little line management responsibility. The Global Theme leaders are also essentially coordination positions with relatively little line management or budgetary responsibility. On

the other hand Centre directors have the primary responsibility for the scientific programme at their Centre, but report to the Global Programme Director not to the specific Theme Directors or Chief Scientific Officer. Most research institutions today have a Director of Research or equivalent with budgetary and line-management responsibility for the research, ensuring they have the tools they need for the effective integration of science across all programmes. We do not believe the current somewhat fragmented organizational structure is the most conducive for a strong, well-integrated science programme and for implementing ‘One CABI’. The impending retirement of several senior managers might provide an opportunity to reconsider the senior management team structure.

ANNEX 1

Programme for the visit of
Andrew Bennett, Geoff Hawtin, Nicola Spence and Jeff Waage (17th only)
to
CABI Egham
17th and 18th February 2015

Tuesday 17th February			
Time	**Blue Room unless otherwise indicated**		
11.00 – 12.00	Team Orientation – feed-back so far, issues emerging, questions, division of roles	Matthew Cock (by telephone if required)	Chief Scientist
12.00 – 13.00	Lunch	Dick Shaw	Country Director, E-UK & Bioservices Regional Co-ordinator (North), Invasive Species
13.00 – 14.00	Tour of Facilities	Dick Shaw	
14.00 - 15.00	Interviews with Arthropod Biocontrol (Labs and Blue Meeting Room)	Steve Edgington	Deputy Arthropod Biocontrol Manager Head of Nematology
15.00 – 16.00	Interviews with Invasives	Carol Ellison Alex Brook	Invasive Species, Theme Co-ordinator Project Manager (IS & Ecologist)
16.00 – 17.00	Interviews with Bioservices – Molecular, Identifications and UKAS (Labs and Blue Room)	Mike Reeve Alan Buddie Thelma Caine Matt Ryan	Consultant, Bioservices Molecular Operations Manager Identifications Operations Manager GRC Curator
17.00 – 18.00	Wrap up and programme for 18th February	Matthew Cock (by telephone if required)	
18.00	Andrew and Geoff to: Savill Court Hotel, Bishops Gate, Windsor, Surrey TW20 0XN Tel: +44 (0)1784 472000 http://www.savillcourt.com/		

Wednesday 18th February			
Time	**Blue Room unless otherwise indicated**		
09.00 – 10.00	Interviews with Bioservices – Industrial Lab and Bioservices as a Theme (Labs and Blue Room)	Paul Bridge David Smith	Global Director, Bioservices Director, Biological Resources
10.00 – 11.00	Interviews with Trade and Commodities	Julie Flood	Senior Global Director, Trade and Commodities
11.00 – 12.00	Interviews with Plantwise – Diagnostic and Advisory Service	Rob Reeder	Knowledge for Development, Theme Co-ordinator
12.00 – 13.00	Lunch and discussions on Prince 2 processes and Project Development Group activities	Dick Shaw Janet Stewart Carol Steel	Project Development Director Corporate Projects Manager
13.00 – 15.00	Wind-up, conclusions and follow-up	Matthew (by telephone if required)	