

Future planning for capacity in plant pathology



Mikael Hirsch

Principal Scientist, Plant
Biosecurity Department of
Agriculture Fisheries and Forestry
GPO Box 858, Canberra, ACT 2601
Tel (02) 6272 4047
Fax (02) 6272 3307
Email mikael.hirsch@daff.gov.au

We are all familiar with the three constants of life: death, taxes – and strategic planning. As professionals, we are frequently getting involved in developing vision statements, strategies for change, action plans, performance indicators, impact metrics, review processes and so on. Strategic planning goes in cycles. At the national level we are now engaged in a new exercise, setting broad directions for the future of rural research and, in particular, biosecurity science. This is likely to impact on the future of professionals in microbiology and beyond. As always with these exercises, it is the ‘journey’ rather than the ‘destination’ that is important, as it enables us to take stock and reflect on where we are heading in terms of future capacity. This paper outlines some of these planning activities and earlier findings, with a focus on future capacity in plant pathology, but the lessons apply to all readers of this journal. It is important that members of the Australian Society for Microbiology (ASM) and other professional societies engage in these strategic planning efforts to shape our own future.

Looking back to the mid-nineties

In 1994, the Australasian Plant Pathology Society (APPS) celebrated its 25-year anniversary. To mark the occasion, a series of short ‘Future Perspective’ articles were published in the Society’s journal under the headings of teaching¹, disease management², research³, extension⁴, biotechnology⁵, funding⁶, agroindustry⁷, and Plant Health Committee⁸ points of view. Collectively, these papers provide some interesting insights into the key issues that back then were seen as critical ‘influencers’ for the future of plant pathology:

- Agricultural science courses at universities are failing to attract adequate numbers of students to meet future demands.
- Structural changes in the delivery of extension services by the private sector will take time to resolve but may increasingly benefit end-users.

- There is a shift in research funding towards short-term and externally funded positions leading to a decline in long-term positions and job security.
- Young scientists tend to seek the high-profile area of biotechnology as future careers. Growth in this area was expected to offer new tools and insights at the molecular level of plant diseases but could lead to declining attention to taxonomy, diagnostics and other traditional fields of plant pathology.
- Research outcomes from molecular biology should be integrated with more conventional sciences but will require stronger collaboration between the various strands of plant pathology.
- Agricultural systems will become more complex, with new crops and diseases requiring the continuous development of better and integrated disease control methods. However, there will continue to be a need for on-the-ground problem-solving skills in disease management.

Eighteen years later, one cannot help but note that many of these projections are still valid. The expectations of biotechnology in 1994 were to enhance the understanding of the molecular basis of how plant pathogens interacted with their host and to open up new avenues for plant pathology diagnostics. Even though much progress has been made since, many plant pathologists remain concerned about job security and the viability of other traditional fields of plant pathology.

More recent developments

A lot of progress has been made since the mid-nineties, but three areas are particularly relevant.

Firstly, the concept of biosecurity. This has been defined as “a strategic and integrated approach that encompasses the policy and regulatory frameworks ... that analyse and manage risks in the sectors of food safety, animal life and health, and plant life and health, including associated environmental risk”⁹. Prof. Lester Burgess noted in 2003 that “the establishment of the World Trade Organisation and this new concept of biosecurity will have major impact on the role and responsibility of plant pathologist as they may become engaged in market access and plant health issues or when responding to incursions”¹⁰.

Secondly, a national research priority framework was developed in 2002 followed by more specific priorities for rural research¹¹, which gave a new and explicit focus for biosecurity research and development (R&D) under a theme of Safeguarding Australia.

Thirdly, a capability study for plant pathology and entomology was initiated by the former Cooperative Research Centre for Tropical Plant Pathology in 2006 to identify the future need of the sector¹². It made a number of significant findings across the two disciplines including:

- In plant pathology, the sub-disciplines of nematology, bacteriology and virology appeared to be fragile. In entomology, the enabling sub-discipline of taxonomy/systematics was under threat.
- With increasing emphasis on biosecurity, there will be a need for increased capability to meet the community's expectations.
- Of more concern was the finding that nearly half of all survey respondents indicated they are likely to leave their employment in these fields within the next 10 years; this loss is much larger than normal retirements and likely caused by lack of job security, limited tenure and short-term project funding.

It is difficult to see whether much has changed; even more difficult to get a precise figure of the impact of research funding mechanisms. However, some data suggest that the relative share of rural R&D corporation expenditure for biosecurity research has remained steady compared with the overall rural research investment.

The Rural Research and Development Council recently released a Strategic Investment Plan¹³. In 2008–09 the total investment in biosecurity R&D was \$40m or about 8.8% out of a total R&D expenditure by the corporations. This compares well with an analysis by Dr Glen Kile¹⁴ who reported that the corporations spent \$23m or 9.3% of the total 1993–94 expenditures on pest, disease and weed research.

Nevertheless, whilst the total funding for agricultural research has increased since the mid-1990s, there has been significant shift in the composition with reductions in investments by state governments contrasted by increases in the university sector, cooperative research centres and private investments¹⁵. This raises new issues for directing research planning towards meeting the immediate needs of governments

Current national strategic planning activities

National strategic planning activities for biosecurity are now clearly back on the agenda. A National Plant Biosecurity Strategy¹⁶ has been developed as a 10-year plan for governments, industries and the community to improve national capacity in plant biosecurity. Ten strategies, underpinned by recommendations and actions, have been formulated to respond to the challenges currently facing the system. These are to:

1. Adopt nationally consistent plant biosecurity legislation, regulations and approaches where possible within each state and territory government's overarching legislative framework.
2. Establish a nationally coordinated surveillance system.
3. Build Australia's ability to prepare for, and respond to, pest incursions.
4. Expand Australia's plant biosecurity training capacity and capability.
5. Create a nationally integrated diagnostic network.
6. Enhance national management systems for established pests.

7. Establish an integrated national approach to plant biosecurity education and awareness.
8. Develop a national framework for plant biosecurity research.
9. Adopt systems and mechanisms for the efficient and effective distribution, communication and uptake of plant biosecurity information.
10. Monitor the integrity of the plant biosecurity system.

On the biosecurity R&D side, a new momentum has been generated for a national science strategy. The Primary Industries Ministerial Council has established a National Primary Industries Research, Development and Extension (RD&E) Framework¹⁷ together with the rural R&D corporations, CSIRO and the Council of Deans of Agriculture from the university sector. The aim is to foster greater collaboration and overcome fragmentation through joint planning and investments, and several sector strategies have already been developed and new cross-institutional coordination concepts are now emerging. Over time it is hoped that these RD&E strategies will lead to significant changes in how research is carried out nationally and translated into local practices across the primary industry sectors. Within this framework, biosecurity RD&E has been identified as a key cross-sector priority, and at the time of writing a capability survey is under way, which will provide a much better inventory of current biosecurity research capabilities that will allow a more collegiate ability to plan for future capacity in plant pathology and related disciplines at the national level.

Whilst it easy to slide back into the comfort of "strategic planning, here we go again", it is actually critical that the relevant professions, including plant pathologists but also other areas within the ASM, engage strongly with these exercises. With a high level of political commitment, it is a major opportunity to address some of the long-standing issues outlined earlier and to reposition the microbiological professions in a much more integrated world.

Key issues for future capacity planning

However, there are two key issues that affect these forward planning exercises for plant pathology and related fields:

1. Lack of a clearly articulated vision for the future of plant pathology.
2. Lack of quantitative data and analytical ability to assess future capacity needs.

In terms of vision and strategy for plant pathology as a whole, successive Presidents of APPS have called for action at their address at the Society's biennial conferences¹⁸. Nevertheless, Australia does not as yet have a clearly articulated vision for plant pathology. The American Phytopathological Society¹⁹ has released a draft vision statement for discussion, which at first glance could easily be validated and adopted to reflect a vision for plant pathology in Australia and be used to guide overall priority setting for this sector. It proposes five areas of endeavour:

1. Research to build knowledge of the biology of plant-microbe interactions.

2. Research to develop knowledge-based disease management strategies.
3. The application and practice of plant pathology.
4. The education of plant pathologists.
5. Outreach, coordination and communication.

It is also of some concern that we do not capture quality baseline data on a regular basis to develop trends and information on potential long-term impact from lack of future capacity. In the area of plant pathology there is good anecdotal evidence of a lack of taxonomists, virologists, bacteriologists and so on, and the role of herbaria and collections has been debated over many years in Australia^{20,21} and internationally²², but we need hard data across several biosecurity disciplines. Indeed, concerns in the USA about the future availability of plant pathologists, declining capacity for education and training, as well as declining government funding for research have led to a really good question of “where the next Norman Borlaug will come from”²³.

The way forward

There are some positive steps in this direction. These include the establishment of a new national network of plant diagnostic laboratories, a postgraduate curriculum in plant biosecurity²⁴, the establishment of the Australian Centre of Excellence for Risk Analysis, and new funding for the National Plant Biosecurity Cooperative Research Centre.

But more is needed, and the answer to building future capacity in plant pathology rests within the profession itself taking a direct interest in its future as a whole and contributing to achieving useful outcomes from the national plant biosecurity strategy as well as the biosecurity RD&E strategy.

Beyond the plant pathology discipline, the professional societies (including the ASM) should play a key role in developing and shaping new linkages across different disciplines of biosecurity and microbiology in general. Indeed, former President of the APPS David Guest has recently said that “as a professional society and as individuals we can and must influence policy and decision making processes”²⁵ and this might equally apply to other applied science fields such as entomology, microbiology, molecular biology and so on.

I suggest that the professional societies could facilitate a collective and forward-looking ‘future exercise’, possibly by a focus group of younger scientists from across the molecular biology and biosecurity-related professional societies being asked to develop a new over-the-horizon biosecurity vision for the future as a platform for planning for future capacity and capabilities.

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Biography

Dr Mikael Hirsch is Principal Scientist, Plant Biosecurity with the Department of Agriculture, Fisheries and Forestry. Prior to joining the Department in 2010, he spent 16 years with CSIRO Food, Health and Lifesciences Group, where he held responsibility for a range of biotechnology policy issues, including gene technology regulatory compliance and was adviser to the OECD on bioeconomy issues, as well as being involved in a number of research and development strategy activities, including the Primary Industries Standing Committee (PISC) Food and Nutrition Science Strategy. He has pursued a broad agriculture-focused science and regulatory career with CSIRO and the South Australian Government and has an academic background in plant pathology, physiology and biochemistry.