Australasian Plant Pathol. (2016) 45:321–325
DOI 10.1007/s13313-016-0410-y

ORIGINAL PAPER

Research supervision: what can the Australasian Plant Pathology Society contribute?

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Received: 15 February 2016 / Accepted: 21 March 2016 / Published online: 1 April 2016

Abstract The presidential address to the 20th Australasian Plant Pathology Society (APPS) conference focussed on aspects of the supervision of research students and early career researchers (ECR) and the benefits the Society offers to support career development in plant pathology. The importance of effective communication and the role of the supervisor in mentoring were discussed. A review of the benefits offered to students and ECRs established that, while support for student members was generally well-regarded, there was scope to increase awareness of the opportunities on offer amongst the target audience. Responses to a questionnaire sent to selected experienced supervisors in Australia and New Zealand revealed that the majority of higher degree by research and honours graduates pursued a career that involved plant pathology at some time. Few supervisors provided information about coursework master students. Domestic Australian or New Zealand higher degree by research graduates were more likely to be members of APPS than other cohorts. The need for career paths and succession planning was discussed in the context of a survey of capability in plant pathology and entomology conducted in 2012.

Keywords Research students · Early career researchers · Postgraduate students

Presidential address to the 20th biennial Australasian Plant Pathology Conference, Fremantle, Australia, 14–16 September 2015

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Introduction

Presidential addresses at past conferences have covered a wide range of topics, often touching on the role and activities of the Australasian Plant Pathology Society (APPS). However, none that I could find gave specific consideration to research students and early career researchers working in plant pathology. For a society such as APPS to maintain a healthy and vibrant membership and to flourish in the future, we must invest in attracting and retaining students and early career researchers.

As an academic with a long career in teaching and supervising research students and early career researchers, and as a member of APPS since 1987, this presented an opportunity to explore what the Society does for these researchers and what might be improved.

In this paper, I will consider research training and what supervisors, colleagues and APPS can do to support career development in plant pathology. I have defined research students as those undertaking honours projects, higher degrees by research (HDR, master and PhD) or a research project as part of a coursework master degree. The term early career researcher (ECR) typically refers to a postdoctoral researcher in the first 5 years (full-time equivalent) after completion of a research degree but I have expanded it here to include personnel who are engaged in research, but not enrolled in a higher degree, in the 5 or so years following completion of an undergraduate or coursework master degree.

Research supervision

The ideal scenario for an enjoyable and successful research experience might involve: a bright, enthusiastic and dedicated

student or ECR; an experienced, enthusiastic and committed supervisory team, the members of which have complementary skills; an engaging and achievable project; generous funding; ready access to all the infrastructure and resources required; a friendly and supportive peer group and general working environment; and a strong network of collaborators. Rarely do all of these factors coincide, nor are all essential for a successful outcome. However, a good student/ECR-supervisor relationship is necessary to provide a positive experience for the junior researcher and for the supervisor alike. There will be challenges to overcome in most research projects, but a student or ECR should feel supported through this learning experience by their supervisor rather than being left to sink or swim. My own experience as a PhD student brought home to me the importance of engaged and supportive supervision, whether provided by the supervisor(s) or by those who may assist as unofficial supervisors.

Key aspects of a good supervisor-student or supervisor-staff relationship are mutual respect and communication. Communication skills and the ability to work as part of a team often feature in the selection criteria in job advertisements, and should be considered also by a student choosing a supervisor and vice versa. Tools such as questionnaires that promote discussions about expectations are available to help students and supervisors understand each other's approaches to communication (Kiley and Cadman 1997) and may help to avoid potential problems. A friendly and supportive atmosphere in the lab group can also facilitate communication. The importance of seeking outside help, for example from a postgraduate coordinator or colleague, if communication problems arise cannot be understated.

Mentoring by supervisors, colleagues and peers is important for the development of essential career-related skills, including effective communication. Supervisors and senior scientists are well placed to encourage and assist students and ECRs to take on responsibilities, such as chairing a conference session, reviewing a paper, or volunteering to help at scientific and community events, activities that will provide useful experience and strengthen the *curriculum vitae*. Introducing our junior scientists to experts in their field, such as at conferences, provides opportunities for them to initiate and build networks. As noted so eloquently by David Guest of Brian Deverall, "As his student, I am forever grateful for his wisdom and friendship, … and the doors he quietly opened for me" (Guest 2015).

Communication and research skills are important facets of career development. In a survey of capability in plant pathology and entomology in Australia and New Zealand in 2012, commissioned by APPS and the Australian Entomological Society, these attributes were rated close to 4.5/5 by respondents in terms of their importance in their future employees (Howie 2012).

APPS offerings to support researcher development

APPS can play a role in helping members, especially students and ECRs, to develop and enhance research and communication skills as they relate to plant pathology. David Guest noted in his presidential address in 2001, that professional societies like APPS play "an important role in nurturing the careers of young plant pathologists" (Guest 2001). The continuing evolution from specialist to more generalist courses and degree programs across Australasia has only increased the need for the ongoing development of discipline-specific skills in the workplace.

Students are encouraged to join APPS through a 50 % discount on the subscription rate, but there is no discount for ECRs and there is no mechanism for recording membership of the latter. Membership of the Society fluctuates, largely in response to the timing of the biennial conference (Fig. 1). Student membership also fluctuates and from 2008 to 2015 ranged from 25 to 88, or 5 to 21 % of membership, with no evidence of a conference effect. The peak in 2012 coincided with a student recruitment drive, led by management committee member Daniel Hüberli, which suggests that further targeted recruitment may be advantageous. The use of social media should be a component of any efforts to recruit students and ECRs.

I reviewed the benefits offered by APPS to student and ECR members to identify additional features that might be instigated to support career development in plant pathology and encourage membership of the Society. Current benefits include: reduced membership fee for enrolled students; reduced registration fee and competitive bursaries to attend the biennial conference and meetings of APPS Special Interest Groups (SIG); student and ECR networking events at biennial conferences; seminars and workshops at regional level; the APPS-Phytopathological Society of Japan student exchange program; competitive awards from the Society's Advancing Plant Pathology Fund – Australia; the Allen Kerr Postgraduate Prize, for which supervisors nominate recent outstanding PhD

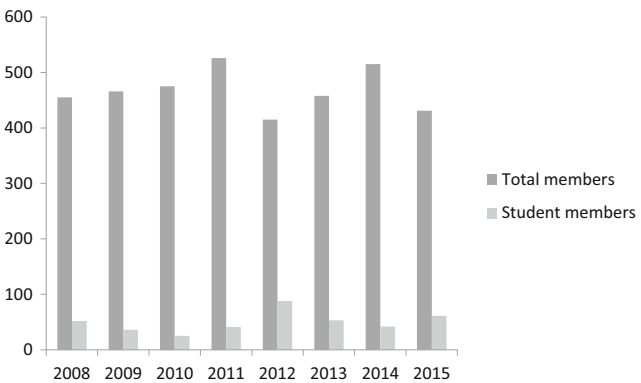

Fig. 1 Total and student membership of the Australasian Plant Pathology Society 2008–2015 (data provided by P. Williamson, Business manager, APPS)

graduates; and prizes for presentations at biennial conferences and SIG meetings (see www.appsnet.org). An informal survey of 20 current students and PhD graduates, which resulted in 14 responses, showed these offerings to be well-regarded. However, there was clearly scope for the Society, acting through supervisors, to raise awareness about these opportunities and their potential benefits. Suggestions for improvement included broadening exchange programs to cover countries in addition to Japan and offering an "ECR of the year" award to match the Allen Kerr Postgraduate Prize. Holding webinars was suggested as a means of increasing participation of members based outside regional centres. The regions are funded according to the number of members in that state or territory, yet a considerable proportion of members may be located too far away to attend APPS activities held in a capital city; such arrangements would address this equity issue as well as broadening the range of benefits.

Progression from student to full-subscription membership

APPS does not keep track of the career paths of student members nor of their progression to full-subscription membership, so information was sought from supervisors. A simple, informal survey of 22 experienced supervisors across Australia and New Zealand, with approximately equal representation of females and males and all current members of APPS, was undertaken via email and resulted in 21 responses.

The questions posed were designed to establish the proportion of HDR, coursework master and honours students who had undertaken projects in plant pathology under the academic's supervision (as principal supervisor) and who had pursued a career that involved plant pathology (at any time). A student who completed an honours or master degree followed by a PhD with the same principal supervisor was counted in the category of their highest qualification in an effort to minimise duplication. Information about domestic and international students was collected separately. Supervisors were also asked to note how many of these graduates were members of APPS in 2015.

The outcomes of the survey are presented in Tables 1 and 2. Domestic HDR and honours students formed the largest cohorts, followed by international HDRs (Table 1). Supervisors were more likely to have information about the careers of their HDR students than other cohorts and least was known about coursework master graduates, these being the only cohorts where "not known" outweighed information about career. Except for the coursework master group, the number of graduates reported to have careers that involved plant pathology exceeds that not pursuing a career in the discipline or not known. Of the 258 Australian and New Zealand HDR graduates reported, 65 % had a career that involved plant pathology at some time after graduation, 27 % did not and supervisors were unable to comment on 8 %. The percentages for international HDR, domestic and international honours students were broadly similar. Some of the honours and master students would be engaged in plant pathology through research towards a higher degree.

Twelve of the supervisors provided information about the membership status of their graduates or provided names that could be checked against the APPS database. Among the domestic HDR students included here, 40 % were members of APPS in 2015 (Table 2). The question concerned the individual's career plant pathology at any time after graduation, whereas information about membership of APPS was for 2015 only, so individuals may have worked in the discipline since graduation but no longer be active in the field, be taking a career break, consider membership unimportant or simply have neglected to renew their membership.

Of the international students, 31 % of coursework master graduates were APPS members in 2015, and half were known to be undertaking PhD research. However, few or no international HDR or honours graduates were members of APPS at the time. These graduates often return to employment in their home country and may find renewal as a full member unnecessary or expensive. Several international graduates who had been student members said that the subscription was too expensive compared with their salaries when they returned to their country of origin. Domestic graduates may also allow their membership to lapse, particularly if their student subscription was paid from project or institutional funds. The Society may wish to consider a reduced rate for ECRs for a few years after graduation, to encourage continuation of membership while on a starting salary.

Student members are most likely to continue membership after graduation if they have jobs as plant pathologists in Australasia. Employment destinations for domestic plant pathology graduates include academia, state/territory departments of agriculture or primary industries and other government or private agencies. In the outcomes of the capability survey of 2012, Howie reported that 65 % of respondents were concerned about employment opportunities in plant pathology and entomology, 59 % were concerned about career progression and 73 % about tenure or funding constraints. Of the 155 respondents who were active in plant pathology, 23 % expected to leave the field by 2017, increasing to 44 % by 2027, mostly due to retirement. Although Howie (2012) expressed concern about "loss of skills, inadequate succession planning and lack of new talent", these figures do suggest that positions should become available in the coming years, provided they do not disappear when the incumbents retire. Although plant pathology may lose new talent due to lack of career path and succession planning in the sector, the standard of the presentations by students and ECRs at the APPS biennial conference

Table 1 Graduate careers in plant pathology

Number of graduates				
Degree program[a]	Career involving plant pathology[b]	Career not involving plant pathology	No information provided	Total
Domestic higher degree by research	168 (65 %)	69 (27 %)	21 (8 %)	258
Domestic coursework master	3 (30 %)	0	7 (70 %)	10
Domestic honours	109 (53 %)	47(23 %)	48 (24 %)	204
International higher degree by research	91 (70 %)	29 (22 %)	10 (8 %)	130
International coursework master	22 (36 %)	7 (11 %)	32 (52 %)	61
International honours	8 (57 %)	4 (29 %)	2 (14 %)	14

[a] Graduates who completed a degree involving research supervised by 21 experienced supervisors in Australia and New Zealand. Domestic means a citizen or permanent resident of Australia or New Zealand; International means all other nationalities

[b] Graduates who worked in plant pathology at any time after completing the degree program

in September 2015 inspired confidence that there is no lack of talent per se in plant pathology in Australasia.

The challenges of impending retirements and succession planning have elicited a response from several industry bodies in Australia. The Grains Research and Development Corporation (GRDC) has recognised the need for a whole-of-industry approach to building skills and capacity and Horticultural Innovation Australia will have a Leadership and Development Fund for capacity building. The Plant Biosecurity Cooperative Research Centre has embedded education and training throughout its research programs, to train the next generation of biosecurity experts under supervision by academics and industry or government practitioners. The South Australian Grains Industry Trust and GRDC have established a traineeship with the University of Adelaide and the South Australian Research and Development Institute to identify and support young people who have the ability to provide leadership in the agricultural sector in the future. The APPS has a role to play in engaging with those organisations and with regulatory bodies which make decisions based on expertise in plant pathology to ensure that support of plant pathology trainees is given due consideration.

Investment in training and succession planning must address the lack of women and minority groups in senior positions, an issue that affects many disciplines and industries. This issue was raised during a networking session for students and ECRs at the APPS biennial conference in 2013. About half of the Society's current student and ECR members are female and I would like to think that their career prospects are as good as those of their male counterparts. APPS in recent years has improved the gender balance among office-bearers and distinguished members. Women have been well-represented amongst regional councillors and members of the management committee over time. The first female president, Caroline Mohammed, was elected in 2009, 40 years after the Society was founded, followed by three consecutive female presidents. The first awards of fellowships to women were in 2011, with a third in 2015. There is

Table 2 Graduates in plant pathology and membership of the Australasian Plant Pathology Society (APPS)

Number of graduates		
Degree program[a]	Career involving plant pathology[b]	Member of APPS in 2015
Domestic higher degree by research	92	37 (40 %)
Domestic coursework master	3	1 (25 %)
Domestic honours	38	9 (24 %)
International higher degree by research	35	2 (6 %)
International coursework master	13	4 (31 %)
International honours	7	0

[a] Students who completed a degree involving research supervised by 12 experienced supervisors in Australia and New Zealand. Domestic means a citizen or permanent resident of Australia or New Zealand; International means all other nationalities

[b] Graduates who worked in plant pathology at any time after completing the degree program

scope for improvement and engagement with programs such as the new Science Australia Gender Equity (SAGE) initiative (http://www.sciencegenderequity.org.au) may be of benefit.

Conclusions

The APPS offers a range of opportunities for students and ECRs to develop their careers in the discipline, including conferences, workshops, networking events and awards which can foster development of the skills in communication and research that are sought after by employers. However, there is scope to offer more incentives directed specifically towards ECRs. There is also a need to raise awareness of the current provisions among both cohorts. Supervisors are well-placed to encourage their students and ECRs to join the Society and to make the most of the benefits on offer.

Acknowledgments I am grateful to the supervisors who provided information about graduates and their careers in plant pathology and to the students and graduates who provided comments about the Society's offerings for students and ECRs. I thank Peter Williamson for providing information from the APPS database, Amanda Able for helpful suggestions and comments on drafts, my lab group for constructive criticism of the presentation, and my husband Kong and children Daniel and Suzanne for their support and encouragement.

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