Submission to the Senate Education, Employment and Workplace Relations Committees Higher education and skills training to support future demand in agriculture and agribusiness in Australia.

Committee Secretary
Senate Education, Employment and Workplace Relations Committees
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Canberra ACE 2600

Dear Committee Members,

I offer this submission because I am very concerned by the diminishing pool of skilled agricultural research scientists and technicians in Australia at a time when our population approaches 23 million and the world which our agricultural lands help to feed and clothe passes 7 billion.

The overriding factor which must prompt government leaders to address the decline in skilled persons in the agricultural sector is the need to be concerned about food security. Each year an addition 80 million people live on our planet and must be fed with limited and, in some cases, diminishing resources.

I believe that the decline in agricultural education is not being taken as seriously as it should most foods are available throughout the year, and not just when in season, and there is a lack of appreciation by most of society of the technology needed to produce cheap, safe and healthy food. In short, agriculture is being taken for granted.

I suggest that we as a society must appreciate the value of the agricultural sector to our food security. Supporting a viable pool of skilled research and technically trained persons is essential.

Some major challenges for Agriculture in Australia.
The ability of Australians to feed ourselves as the population increases is highly dependent on the availability of adequate land, sufficient water, affordable energy (petroleum products at present), nutrients such as phosphorus, and crop management chemicals. There are threats to the availability and affordability of each of these components.

At the same time there are conflicting demands

- for land (urban sprawl, mining) in addition to losses of productive land to salinity, acidity, erosion and nutrient exhaustion,
- for water (for the environment and industries),
- for energy, firstly from petroleum products which are increasing in price as demand outweighs supply, and secondly, the diversion of food crops to the energy industries such as ethanol for vehicles or biofuels from other feed stocks which are grown on agricultural land

- for essential , non-renewable nutrients. A key nutrient on which Australia is highly dependent is Phosphorus (P) and this must be viewed seriously due to declines in the availability and the P-content of rock phosphates and the fact that much of the usable P is found in politically unstable regions of the world (e.g. Morocco). Per capita we use 21 Kg P annually in Australasia which is 8.8 times the average for the world of 2.4 Kg (see attachment A). While this figure is due to the relatively low population and the substantial export of bulk agricultural commodities containing phosphorus it reveals that Australian agriculture is very vulnerable if supplies of rock P or P-fertilizer are restricted. We must learn to use P much more efficiently. I have data to show that efficient cultivars can be found using simple traditional breeding techniques and these would save wheat producers alone approximately 30 million dollars per year.

Consideration 1. The adequacy of funding and priority given by Governments at the Federal, State and Territory level to agriculture and agribusiness higher education and vocational education and training,

Students are more likely to study agriculture if they have a rural connection but they are at a considerable disadvantage to city based students during university or vocational training years. They are more likely to come from families with lower disposable income and unlike many city students need extra funds to allow them to travel away from home to study and struggle to find funds to cover living costs.

The training of agricultural scientists is relatively high compared to the cost to train economists and students in many arts courses. Intensive training in the laboratory, in the field and by way of excursions to a wide range of agricultural industries and geographic regions is a prerequisite to graduating students with a sound understanding of the needs of the agricultural sector.

Consideration 2. The Reasons and impacts of the decline in agriculture and related educational facilities

Australia is highly urbanised so there are relatively few young people with an affinity for or understanding of the land and the business of food production. The community as a whole has a poor appreciation of the skills required to produce food but at the same time expect farmers to maintain the environment.

I believe there is lack of appreciation of the career opportunities (as opposed to jobs) which are available to (young) people with agricultural science skills. In total contrast, young people are choosing what appear to be more rewarding careers in the financial, legal, computer / mobile phone-based technology industries and other non-agricultural pursuits.

A common response by young people who choose a city-based career over an agricultural career is " I was offered more money and a company car in my first year out". Some also see that the regional areas of Australia offer limited opportunities for partners and children

and inferior medical and social opportunities. However, there are also many career opportunities for agricultural scientists which are based in the city, for example, biosecurity, post-harvest physiology, food processing, product development, health and nutrition roles etc.

In summary, agricultural scientists, like many medical specialists, may be under the impression that they must accept some disadvantages if they elect to live and work in regional Australia. However, there are many advantages for those who chose to live in regional Australia. These advantages do not outweigh the attractions of the city for enough of the students we would welcome into regional Australia.

Consideration 3. Solutions to address the widening gap between skilled labour supply and demand

Recommendations.

1. Promote the opportunities available to scientists with a wide range of interests to work in agricultural industries at city and rural locations
2. Promote the rewards to scientists and the community from roles in the agricultural sector.
3. Through a movement such a Scientist-in-Schools promote in Australian schools the career opportunities which are available in the agricultural sector. Suggestions 1 and 2 could be web-based with personal backup.
4. Appoint a high profile personality to work with the media (TV, radio and newspaper) to promote the importance of agriculture to the whole community. An "Agricultural Dr Karl".
5. Increase the remuneration of undergraduate and post graduate scholarships for agricultural science and provide living allowances to offset the higher costs born by students from regional areas.
6. Provide adequate funding for training institutions to offer and deliver courses which produce graduates who have been exposed to laboratory and field situations across a wide geographic area.
7. Establish and fund a Cooperative Research Centre (or equivalent) dedicated to Food Security and Quality Food Production in the face of declining resources of water, energy and nutrients.
8. Involve major food processors and the supermarket chains in the research and production of food (as part of items 4 to 7 above).

Consideration 4. The impacts of any shortage on agricultural research

Funds invested in agricultural research pay a handsome return on investment (in the range 15 to 25% and even higher in some surveys). Funds invested in undergraduate and post-graduate education are an important part of this investment.

Like any investment there will be some projects which give a return in the short term; others will make a return over a long term (5 to 30 years) and, as in any investment, some

projects may produce no tangible return. That is not to say it should not have been undertaken because a negative research finding often saves food producers from trying something new and wasting their own funds. The value of some of the work by agricultural researchers is less obvious because it stops losses rather than producing gains. The programme to counter rust in cereal crops is a prime example. If this program did not exist, annual losses of more than $100m would occur.

But agricultural research is only as good as the team who do the research. In my experience, a viable pool of scientists must be maintained. This facilitates the formation of teams which are considerably more productive than the simple sum of the individuals. The science they produce is more complete and usually more timely. Having a pool of scientists also allows individual scientists to specialise in their area. These scientists may be 'invisible' for many years until a crisis arises and is solved by their accumulated knowledge. Let me cite an example.

In the 1970's Australia the wheat belt was infected by a new to Australia disease called Stripe Rust. Most wheat cultivars at that time were susceptible to this fungus and yields were expected to suffer. One wheat breeder, Mr Ron Martin, based at the DPI Temora Research Station had anticipated such an invasion and had quietly maintained lines of wheat to counter this situation. When funding is limited, it is foresight such as this which is lost. The winners are not just farmers. The winners are the whole Australian community including the income generated by maintaining exports.

Food security is an Australian challenge, not just the responsibility of our farmers.

If the population of Australia increases by the predicted 45% by 2030, we will become more dependent on our agricultural sector and therefore we must maintain a skilled workforce in proportion to the challenges which will arise – both in terms of food security and in maintaining the environment.

Consideration 5. The economic impacts of labour shortages on Australia's export orientated agricultural industries

Australian produce must be of the highest international standard – in terms of appearance, shelf life, nutritional quality, and free of undesirable chemicals. The knowledge required to ensure success at each step in the production line for food should not be underestimated. From land preparation to crop management, through harvest and delivery, and during processing, transport and display specialists and /or significant experience are essential. A shortage of the necessary skills at any step can jeopardise the amount and the quality of the food offered to the consumer.

To some extent a lack of suitable skilled labour can be replaced by new technologies. Rapid, reliable and low cost assessment of ripeness, shelf life and other attributes is possible for many fruits and vegetables (e.g., using user-friendly, non-destructive techniques such as near infrared spectroscopy). The development and maintenance of such technology

require highly skilled agricultural scientists but the routine operators require more vocational training.

Who am I?

I have devoted over 40 years of my life to agricultural research – 30 years with the NSW Department of Agriculture, 5 years with Charles Sturt University as Professor of Irrigation. I also spent 8 years as a Program Manager in the CRC for Sustainable Rice production and these led to strong links with the University of Sydney. For the past 6 years in "active retirement" I have maintained my links with the NSW Department of Agriculture, Charles Sturt and Sydney Universities.

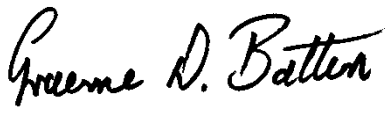
In that time, I have personally witnessed serious reductions in the number of staff, financial support for research projects and succession planning within the public sector. A concomitant increase in the private sector has not occurred; it only occurs where short term economic gains can be made. Many important positions have been lost and with them the chance for Australia to maintain or improve its ability to ensure food security.

Some of the reasons I continue to be an active researcher in my 'retirement years' are

- There is no support for others to continue some of the promising lines of research which I pioneered,
- The rapid increase in the population of the world AND AUSTRALIA mean that agriculture must play in increasingly vital role to feed and clothe people,
- Agriculture is the basis for world peace because food security is paramount.

With respect I tender this submission.

Yours sincerely,



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ATTACHMENT.

The 2011 paper **T*he critical role of phosphorus on world production of cereal grains and legume seeds*, by Lott, Kolasa, Batten and Campbell** is attached to provide some data on the reliance on the plant-essential nutrient phosphorus for world food production and hence food security. The data in Table 2 reveal that on average each Australia utilizes 21 kg P which is 8.8 times more phosphorus per person than the average person worldwide. Peak P is predicted to occur in a few decades but even if this is a pessimistic estimate, research must be in progress now to ensure that P does not impact on the ability of Australia to feed itself.

Many Australian scientists have been world leaders in plant nutrient research. In the Lott et al. paper we report that opportunities for reducing our dependence on P have been identified but these need to utilized. At a recent Nutrient Management Forum I suggested that the importance task of finding ways to improve the use of P and to capitalise on these findings for commercial gains could be achieved via a Cooperative Research Centre or equivalent.