Associate Professor Nigel Andrew
Centre for Behavioural and Physiological Ecology
Zoology, University of New England
Armidale NSW 2351 Australia
Ph: +612 6773 2937, Fax: +612 6773 3814
e-mail: nigel.andrew@une.edu.au

Crop pollination: more than honeybees

- In 2007 Australia's agricultural industries were worth approximately $30 billion annually (DAFF 2007)
  - $1.8 billion\annum of this are crops that are responsive to insect pollination;
  - It is generally assumed that honeybees are the key pollinator, both feral and managed;
  - However other insects pollinate up to 60% of crops. This includes native bees; flies; beetles; moths butterflies; wasps; and ants. However we know very little about these key service providers.
- **Native pollinators provide $1.08 billion/ annum to Australia's agriculture. This is an extremely high reliance on a poorly known and recognised service!**

Pollination occurring in selected crops for successful yield (as percentage of yield)

Commodity	% pollination occurring of yield	Commodity	% pollination occurring of yield	Commodity	% pollination occurring of yield
Tree Crops		**Broadacre Crops**		**Seed Production**	
Almond	100	Canola	15	Beans	10
Apple	100	Cotton	10	Broccoli	100
Apricot	70	Soybeans	10-60	Brussel Sprouts	100
Avocado	100	Sunflower	30-100	Cabbage	100
Cherries	90			Canola seed	100
Citrus*	0-80	**Vine crops**		Carrot	100
Macadamia	90	Blueberry	100	Cauliflower	100
Mango	90	Cucumber	100	Celery	100
Nectarine	60	Kiwi	80	Clover	100
Peach	60	Pumpkin	100	Lucerne	100
Pear*	50-100	Rockmelon	100	Mustard	100
Plum & prune	70	Watermelon	70	Onions	100

* depends on variety

Source: Monck, M., Gordon, J. & Hanslow, K. 2008. *Analysis of the market for pollination services in Australia*. RIRDC Publication No 08/058, Rural Industries Research and Development Corporation, Canberra.

- Pollinators require other sources of nectar when crops are not flowering. Key areas are primarily remnant vegetation adjacent to crops.

KEY ISSUES

- Agricultural areas with remnant native vegetation are known to be more productive
  - increased crop yields
  - pollination of crops
  - maintaining more water in the landscape reducing need for irrigation
  - reduction of pests requiring less inputs or management actions
- Pollination of non-managed honeybees is not known and valued.
  - Remember our reliance on non-honeybee pollinators: $1.08 billion/ annum!
- Engage farmers and families in rural and regional Australia in scientific research that is meaningful and robust using citizen science.

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Project requiring funding to overcome Australia's pollination information gap

Pollination Australia: what is pollinating our crops?

Australia-wide citizen science project based at the University of New England.

Farmers/ citizens collect pollinators using vane traps in crop and adjacent remnant vegetation;

Specimens sent to UNE to initial identification and imaging;

Citizens upload data to cloud server.

Use current expertise: CSIRO taxonomists; Atlas of Living Australia;

Specimen sent to Barcode of Life database for DNA barcoding;

Verified species identifications go back to farmers;

Pollinator management strategies and educational tools made available to farming communities, schools and local land services;

Why University of New England is ideal location for this project:

- expertise in nation-wide citizen science projects;
- expertise in running nationwide research;
- expertise in pollination ecology and agronomy;
- commitment to regional and rural Australia;
- New England Natural History Museum can house and maintain specimens;
- UNE is only Australian university to teach Entomology as a full second year undergraduate course and insect-plant Interactions at third year. Research and citizen science can be embedded into the curriculum. Students have exposure to real world applications of research and can work with farming communities around Australia – many of our students are form these communities;
- strong linkages with RDC's, CSIRO and private companies;
- ability to export the knowledge, technology and techniques learnt to an International market.

Initial three year project timeline

Personnel: Research facilitator ($130,011/year including oncosts); Outreach officer ($95,488/ year incl oncosts); Sample curator ($87,548/year including oncosts). 3 Year cost: $939, 141.

Equipment: 2 vane traps/ farm (main crop and remnant): $10 / vane trap. 100 farms: $2000; Vials: 2400 - $2400

Postage: equipment packs sent to properties: samples sent back to UNE for processing: $7.80 postage paid envelope – 100 farms * 12 seasonal samples* $7.80 = $9,360

Citizen Science web database: *ecodb* $26/ month: $1560; Barcode of Life Database (Species verifications): $40,000

Outreach:

5 town hall meetings/ state & territory in first and third year: 5 * 8 * $1000 * 2 years = $80,000

Development of learning materials: $46, 000

Total cost for three year project: $1,120,461