The need for aversion agents for managing flying-foxes on crops and the difficulties in attracting research funds

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ABSTRACT

No research funds have been made available to produce aversion agents and/or tactics to reduce the need for orchardists to cull flying-foxes to protect their crops. This has occurred despite many years of effort by growers to attract research funds from government and industry groups. It appears the research needed to manage flying-foxes on crops is far from complete and there has been no summary or correlation of the many research papers published that suggests a way forward. Now that the Grey-headed Flying-fox has been listed as Vulnerable, I have the fear that orchardists will lose out as some bat carers and researchers may not support research into aversion agents. Orchardists have been badly let down on all counts as research funds have not been forthcoming, and they are being victimised and portrayed in the media as enemies of the environment. Orchardists are, in fact, feeding flying-foxes in times of natural habitat food scarcity. A reward we and the community at large could get is the release of funds for research into aversion agents, coupled with funding for research into alternative food sources for flying-foxes. Orchardists did not create the problems that face them. Orchardists are not the bad guys. We are as much affected as the flying-foxes. I believe aversion agents should be thoroughly researched. It will take a combined effort of many groups to lobby Government for this to be realised.

Introduction

Bat carers and researchers have done a tremendous job in bringing to public notice the plight of Grey-headed Flying-foxes and the impact of habitat loss on the bats. However, it is necessary to take into account the ramifications of habitat loss on all creatures, including human beings. Orchardists pay the price of habitat loss when flying-foxes feed on their crops. No research funds have been made available for aversion agents and/or tactics to reduce the need for orchardists to cull flying-foxes to protect their crops, and orchardists are regarded as "the enemy" by some conservation groups, as reported in the media (Sydney Morning Herald April 5, 1997, pg 7; The Australian April 7, 1999, pg 5; The Weekend Australian April 17-18, 1999). This mind-set needs to be turned around and this forum is as good a starting point as any.

Past attempts to attract funding for research

The conference about flying-foxes and netting held at Hornsby on 29th April 1992 was lauded by the media and politicians of the time as a great step forward in cooperation between farmers and conservationists (Blade 1992). I was asked to chair that conference by NSW NPWS and accepted, as it was an excellent opportunity for orchardists to gain the support of bat carers to push for funds from the NSW Government for research into flying-foxes and aversion agents. It is unfortunate that we did not achieve a united front between bat carers and orchardists at that time to lobby government for research funds. We may well have been in a totally different position today.

Pages 63 - 69 in *Managing the Grey-headed Flying-fox as a Threatened Species in New South Wales*, edited by Peggy Eby and Daniel Lunney, 2002. Royal Zoological Society of New South Wales, Mosman NSW.

I have been working on the flying-fox issue for just on 15 years and have studied many reports and papers by many research scientists over this period (for example papers in Hall and Hughes 1986; Slack 1990; Blade 1992; Turner 1994). It appears the research needed to manage flying-foxes on crops is far from complete and there has been no summary or correlation of the many research papers published that suggests a way forward.

From my perspective there seems to be a difference of opinion in the flying-fox research work being carried out by different researchers on the role of flying-foxes in the environment, their migrations (Eby 1991; Spencer *et al.* 1991; Parry-Jones and Augee 1992), numbers (Richards and Hall 1998; Eby *et al.* 1999; Tidemann 1999), etc. Is this disagreement taken by government as a reason for funds not being made available for research into flying-foxes and aversion agents?

I have been involved in extensive correspondence and several meetings with NSW National Parks and Wildlife Service and the Department of Agriculture. My experience for many years was that neither of these agencies wanted to take ownership of the flying-fox problem. Individual officers of NSW Agriculture worked to assist growers in controlling flying-foxes (e.g. Slack and Reilly 1990; Ullio 1992; Slack and Ullio 2000). However, my perception is the Department as a whole did not want to know about the problem. Yet the Department must be involved. The list of different fruits being attacked grows each year as flying-foxes, finding less and less natural food, try out new cultivated crops (Rogers 2002). Even the flowers of some crops have been eaten. John Rogers, in his submission, lists at least some of the new crops being attacked.

Since the listing of Grey-headed Flying-foxes as Vulnerable, NPWS takes ownership of flying-fox management but is only prepared to offer 'in kind support' to any research proposal for flying-foxes on crops (Debus 2001). The listing may also have encouraged change in the position of NSW Agriculture, although the message is confused. The NSW Minister for Agriculture sent two letters voicing conflicting views on flying-fox research on one day, June 14, 2001. One letter indicated that the position of the Department had not changed (Amery 2001a). The other stated that NSW Agriculture was looking at research funding for flying-foxes on crops (Amery 2001b).

The frustrations of orchardists in NSW and Queensland have been further compounded in that the research levies they pay to industry organizations cannot be brought to bear on funding into aversion agents for flying-foxes because it is not an industry-wide problem and does not affect the majority of fruit growers. Victorian, South Australian and Western Australian growers do not have a problem with flying-foxes. Therefore, we in NSW and Queensland are out-voted every time on the research issue. Another reason the votes fail is that all orchardists agree that it is the Government's responsibility to fund research, not orchardists', as it is the loss of habitat that is the prime cause of the problem (Tidemann *et al.* 1999).

The current position

Now that the Grey-headed Flying-fox has been listed as Vulnerable, I have the fear that once again orchardists will lose out as some bat carers and researchers may not support research into aversion agents, believing orchardists will not be allowed to cull anyway. There is a view that orchardists who do not net should just "put up with the predation that occurs and harvest what you can", as one parliamentarian wrote in a letter to me (Jones 2001).

The State Government seems to be of the opinion that orchardists must either net their crops or find the money for research into flying-foxes and aversion agents through industry levies despite our failure to attract industry-wide support (correspondence supporting this view is extensive, examples include: Amery 1995; 1996; 1999; 2001a; Debus 1996; 1999). I feel government believes we created the problem by planting orchards in flying-fox areas. Therefore, why should Government pay? However, I believe the State and Federal Governments are as much to blame as any other section of the community. After all, Government departments continue to release large tracts of flying-fox habitat for logging, such as west of Nowra, and approve broad acre clearing for industries such as cotton and sugar cane (Environment Protection Authority of NSW 1997).

A letter dated 14 June 2001 from Richard Amery (Minister for Primary Industries) to Peta Seaton (Shadow Minister for the Environment) denotes a change of direction of policy by NSW Agriculture (Amery 2001b). Mr Amery writes, "Unfortunately this approach (netting) is

expensive and not all types of fruit crops can be netted successfully". That says a lot. There are many and varied reasons why orchardists cannot net, and those orchardists should be listened to and catered for by research into aversion agents.

Orchardists have been badly let down on all counts as research funds have not been forthcoming, and they are being victimised and portrayed in the media as enemies of the environment. Orchardists are, in fact, feeding flying-foxes in times of natural habitat food scarcity. Normally those starving and lactating flying-foxes would have died. A reward we and the community at large could get is the release of funds for research into aversion agents, coupled with funding for research into alternative food sources for flying-foxes, e.g. alternative areas of native food planted on government owned land.

The problems of netting

Several growers have given detailed accounts of the problems associated with netting (Comensoli 2002; Gough 2002; Rogers 2002). I would like to add my concerns to theirs.

Let me give you just one very bad instance of many that have been brought to my attention since the Hornsby conference. A lychee grower had tried many methods of deterring flying-foxes. He eventually decided on total exclusion netting. It worked. Not one lychee was taken by flying-foxes. Unfortunately, Pepperspot, a fungal disease, took over in the micro-climate created under the netting, and only about 10% of the crop was harvested. How then does he pay for the netting? Incidentally, he and others in the area are cyclone-prone and unable to insure their structures. You might call that a triple whammy.

On a more personal note: I could not possibly net my orchard as I have five neighbours, two of them directly in front of my orchard and within 30 metres. Can you imagine the ruckus if I were to net? Increasingly, the neighbours of fruit growers in coastal NSW are not primary producers, but people with an urban background that live in rural areas and work in cities. They have little understanding of farming practices, but local governments must consider their concerns. Some of these people find netting visually offensive and pressure fruit growers and local governments not to net orchards.

On the adjacent southern and eastern boundaries of my orchard, is thick, combustible bushland, which at times goes up in flames. I can water my orchard to protect the trees from bushfires, but I cannot protect against wind-born embers burning through the netting. Insurance adds to the already prohibitive costs of netting.

Please don't tell me to plant a buffer of trees as the orchard would end up with three tiers of shade, and water and nutrients previously available to the orchard would be taken up by trees in the buffer zone. The security aspect in our area also needs to be taken into account.

Financially, netting my orchard would undoubtedly be my downfall, as the returns simply are not there to justify the expense. I have survived as an orchardist for 43 years. Aversion agents would be a welcome addition to my orchard management. There are many and varied reasons why orchardists do not and cannot net. Listen to them.

Research into netted orchards

An in-depth study needs to be carried out on the effects of netting to the environment under the net, and in relation to the extended environment outside the net, in many different topographic and geographic locations, instead of leaving it to orchardists to manage as best they can. Some of the problems experienced are horrendous, yet there are advantages. These problems have been experienced by various fruit growers. They need to be substantiated by research before they can be resolved.

What is the effect, for instance, of the exclusion of birds and some insects from the free exchange that is normal in an unnetted orchard? What is the effect of netting on insect, fungal and viral diseases of fruit trees in an enclosed situation, given that a new microclimate has been established? Do these insect, fungal and viral diseases build up over a period of time under the net? Why do some fruit trees shed their leaves early under net? What is the effect of this for future crops on those trees? What experiences have orchardists had in relation to chemical usage? Do they need to use more or less, and in what circumstances?

There is no after-sales help from netting suppliers, nor management advice available from any Government department on the problems being encountered under netting. Perhaps this is because of a lack of knowledge of the effects created by the change in the environment and micro-climate under the net.

It is now obvious that netting, though very effective against flying-foxes, birds and some insects and possibly hail, is not the universal panacea it was touted to be. There are also those orchardists who, for many reasons, cannot net but are regarded by the environmentalists and government as being (for want of a better word) recalcitrant. One of the issues of netting is that only the positive side is presented to the public by testimonials of orchardists. Thus orchardists who are having management problems and bad experiences, or who could not possibly net, are not consulted or published at all.

Obviously, aversion agents are necessary to help fill the gaps. Just how much expense, how many hoops and obstacles does an orchardist have to go through to produce a piece of fruit with ever-diminishing returns?

Where to from here? An orchardist's perspective

These are my views after many years of involvement with the flying-fox problem.

First of all, biodiversity is essential to this planet for the well-being of animals, plants and creatures of all descriptions. In this context flying-foxes have their place. However, I have seen no evidence that flying-foxes are essential to forests.

Can human beings regenerate forests better than flying-foxes? I believe the answer is "yes, we do". Every tree we plant has a far greater chance of survival than the hit and miss dispersal of seeds by flying-foxes.

Is pollination by flying-foxes essential for eucalypts and other tree species? Once again, I believe the surprising answer is "no". There are numerous pollinators that are attracted to these trees, including European honey-bees. Australia's apiarists use eucalypts extensively. I believe their bees must be pollinating the flowers. Human beings have taken on the role of dispersal of pollinated seeds, as do birds and other animals.

To ensure a healthy biodiversity, which includes flying-foxes, orchardists need many tools to work with. Netting works for some. Wailers and scare guns cannot be run at night in many orchard areas due to restrictions on noise. Therefore noise will be of little use as an aversion tactic when flying-foxes are foraging on food. The flying-fox has exceptional sight and smell sensors. Aversion agents of taste (Rayner 1995), touch, smell and pain will no doubt fill the gaps for most orchardists.

Funding for research into these aversion agents is the responsibility of the State and Federal Governments, not orchardists, as it is the loss of habitat which is the root cause of the problem, and government is responsible for that.

Probably the quickest method of aversion to implement would be fright. Shotgun shells can easily be converted to shells containing low-density bio-degradable 2mm beads which will, when fired, scare the flying-fox, not kill it. (The present requirement is for orchardists to use No. 4 shot which will kill them outright.) I understand that researchers believe flying-foxes communicate with each other and that a frightened flying-fox will go back to its camp and communicate to other flying-foxes that the orchard is a "no go" area (Tidemann 2002).

Smoke is also likely to be a successful aversion agent. It is well known among orchardists that flying-foxes do not like smoke. Smoke from bush fires spells danger as well as being an uncomfortable experience for flying-fox, unlike other smells which they would probably be quite used to in their colonies.

There has been much research into smoke and smoking of tobacco on a human level over the years. This research has included the development of techniques to analyse the chemical components of smoke. This could possibly be redirected into developing smoke-based aversion agents, keeping in mind that flying-foxes have an exceptionally greater olfactory sense than do human beings. Perhaps smoke pots used to suppress frost could be modified as a flying-fox aversion agent?

Attractants could also be a form of aversion agent, i.e. to spray from the air a section of natural habitat away from orchards with a substance preferred by a flying-fox (Oldfield 1997). Monitoring of forest flora will be necessary to forecast the critical time to apply spray.

A "brain storm" or "think tank" has not to my knowledge been promulgated by NSW NPWS and NSW Agriculture to think of ways of managing flying-foxes. This is needed.

The biology of flying-foxes seems to be well understood, therefore it should not be too hard to work out the strengths and weaknesses to which aversion agents could be applied. Where are the funds to do this?

The development of aversion agents and tactics will not only benefit orchardists. They could also be used to assist management of difficult roosts (Smith 2002; Tidemann 2002; West 2002).

The development of aversion agents could possibly be an export earner, as countries which have similar problems to ours with flying-foxes and other nuisance animals would probably be very interested.

Paying the price of public good conservation will be necessary if orchardists are precluded from protecting their crops and therefore their livelihood. Financial compensation will need to be forthcoming from Government.

Orchardists did not create the problems that face them. Orchardists are not the bad guys. We are as much affected as the flying-foxes. More and more sections of the community are now feeling the effects of flying-fox predation, as stated by the Scientific Committee in its Final Determination (Dickman and Fleming 2002). The more people, businesses, botanical gardens, schools, housing subdivisions, remnant rainforest, caravan parks, etc that are affected, the more pressure will need to be brought to bear on State and Federal Governments to provide funds for research.

I believe aversion agents should be thoroughly researched, though that is not to say that other avenues should be closed. I would welcome any further information that could be offered. Our State Government budgeted for a $360 million surplus in the 2001-2002 budget papers, some of which could easily be allocated to research flying-foxes and aversion agents. It will take a combined effort of many groups to lobby Government for this to be realised. Are then all the various interest groups assembled here today prepared to unite to push for research funds, especially into aversion agents?

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QUESTIONS & ANSWERS

CHRIS DICKMAN: Thank you, John. Some important issues have been raised. Are there questions?

GWEN PARRY-JONES: (Wambina Flying Fox Education and Research Centre) I entirely agree with a lot of what you've said, Mr Bicknell, but I do take exception to the fact that you said that after the conference in Hornsby that we didn't try and get money for research, because I can assure you, we have been beating our heads against a brick wall ever since then. What research we have done has been at our own expense.

JOHN BICKNELL: Well, okay. Now, I can answer that, because not once have I received a letter from you. Why shouldn't you? Are you trying to help us?

GWEN PARRY-JONES: Of course.

JOHN BICKNELL: Okay. We want cooperation with you. We want you to join with us.

GWEN PARRY-JONES: Well, we have been writing letters to the government. I've got files and files of letters written to the government. You've never written to me, but nevertheless - - -

JOHN BICKNELL: I have sent you - - -

GWEN PARRY-JONES: No, you haven't.

JOHN BICKNELL: To your daughter.

GWEN PARRY-JONES: We haven't had any help at all from the government and all our research that we have done has been at our own expense.

CHRIS DICKMAN: We need to move on. Thank you, John.