Area-wide management of insect-vectored viral and bacterial diseases

What is area-wide management?

Although, historically, area wide management (AWM) has been mostly applied to management of insect pests, it also has potential for controlling plant diseases, particularly those with aerial dispersal mechanisms such as insect-vectored viruses and bacteria. This type of management is contrasted with traditional management, essentially by scale and co-ordination. In AWM control tactics are applied over a broad area, incorporating multiple premises to maintain pest and pathogen populations below economic impact levels.

Tomato big bud phytoplasma affecting capsicum

Why do we need area-wide management?

AWM strategies for vector-borne diseases will help to prevent or minimise the development of insecticide resistance in vector populations, improve the efficiency of biological agents released for control of vectors, and better protect host resistance genes against the emergence of resistance-breaking strains of the viruses. It also provides management options when host resistance genes are not available. For example, a shortage of seed supply of desired lines or the introduction of new viruses against which available resistance genes are not effective.

Aphids colonising a weed host

AWM is compatible with Integrated Pest Management (IPM) as management options are often the same. The options are simply applied at an area wide scale, in a co-ordinated manner, rather than on an individual property basis. While the preventative actions of one grower may benefit other producers nearby, the collective actions will provide greater benefit to growers across the whole region. Given the highly mobile nature of many insect pests it is unreasonable to expect management on a single block or property will be sufficient to prevent longer distance movement. Within a district, migratory insect populations are very common and highly influenced by weather conditions and cultural practices. Using an AWM strategy, the overall insect vector populations are suppressed within the district, and subsequently, the potential spread of the insect-vectored viruses and bacteria is also supressed. Area wide control of alternative weed hosts of both the insect vectors and the pathogens provide substantial benefits in preventing the primary introduction of the pathogens into crops each season. This should include the management of public areas within a district in addition to production areas.

Who should be involved in area-wide management?

Growers of crops that are directly affected by the vector-borne diseases should consider a co-ordinated approach to disease management. This would include development of insecticide spray regimes to minimise risk of reduction or loss of efficacy for key active chemical agents. This in turn will ideally lead to a reduction in pesticide applications and thus lower costs for growers, and lowered impacts on human health and the environment. Growers should minimise growth of weeds surrounding and within their properties to reduce levels of the pathogens and vectors responsible for disease spread. Reduction or elimination of adult insect

vectors in crops following the final harvest and prior to crop destruction is very important in reducing or preventing spread of the pathogens into other crops still in production.

Growers of crops within the district which are not directly affected by the diseases also need to be involved. For example, cucurbit (zucchini and pumpkin) growers are not affected by Capsicum chlorosis virus and can thus tolerate comparatively higher populations of thrips, the virus vector, without financial penalties. These higher populations, however, are of great concern to capsicum growers within that district as this virus causes significant financial penalties to them and requires management. Similarly, weed populations harbouring pathogens and vectors on these properties are of concern.

Beet pseudo yellows virus affecting cucumber

In the same way, local council should accept responsibility for control of weeds and insect populations in public areas, particularly roadsides within production areas, or aim to develop strategies with growers to do this. Crop consultants and resellers also have a major role in implementing AWM in terms of promoting responsible pesticide use and recognising the relationships between the cropping systems in an area and the influence of these on pest and disease levels.

Further information

For further information please contact:

Cherie Gambley (cherie.gambley@daf.qld.gov.au or Mobile 0423 200 211)

This project has been funded by Hort Innovation using vegetable industry levies and contributions from the Australian Government with co-investment from the Queensland Department of Agriculture and Fisheries; Victorian Department of Economic Development, Jobs, Transport and Resources; The Northern Territory Department of Primary Industry and Resources; the Western Australia Department of Primary Industries and Regional Development and the University of Tasmania. It is supported by a second smaller project led by the New South Wales Department of Primary Industries and similarly funded by Hort Innovation using vegetable industry levies and contributions from the Australian Government and NSW DPI.