Guidelines for Environmental Assurance in Australian Horticulture

Developed by:

HORTICULTURE FOR TOMORROW

Managed by Horticulture Australia Limitedî

Second Edition – 2014

Horticulture for tomorrow

HAL

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Where to start?

How you use these guidelines is a matter of personal choice. Some people may like to start at the front cover and read to the last page – but you don't have to. The Guidelines are designed so you can get a quick overview of the issues and then prioritise the areas on which you want to focus for your business.

These guidelines have three main components:

- Introductory sections that provide background information about the issues and the guidelines;
- The main working sections to help you assess and manage your enterprise. These sections cover risk assessment, suggested practices, monitoring and recording options, and references and further resources; and
- A series of practical tools and resources to help you.

We recommend that you choose to start in one the following two ways.

1: Start with the Risk Assessments

The guidelines cover a total of 20 different topics, divided into eight numbered sections. At the start of each major topic, there is a simple Risk Assessment diagram that asks key questions about your enterprise.

Work your way through each Risk Assessment, answering the questions.

If you end up at a **HIGH RISK** sign you need to take some action. Read the Suggested Practices for the topic to explore your options.

If you end up at a **LOW RISK** sign you probably do not have a significant problem. However, you may want to read on to check your understanding of the issues.

By working through all the Risk Assessments you can prioritise issues that may need attention on your property.

or 2: Start with the Review Checklist

Another way to get an overview is to start with the Review Checklist. The checklist covers the major environmental assurance issues dealt with in the main text of the guidelines. By working through the checklist you will get an idea of your priority areas and you can then read the relevant topic in more detail.

The Checklist is divided into tables covering a range of topics. Select a topic and turn to the matching section in the guidelines and look for the Risk Assessment diagram. By working though the Risk Assessment you can quickly determine if that particular topic is relevant to your business.

If the topic is relevant to for your business, complete the relevant checklist table and record the answers.

Read the Suggested Practices for the topic to explore your management options.

The guidelines also provide information about monitoring options and sources of additional information for each topic.

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Introduction

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Acknowledgements

Title: Guidelines for Environmental Assurance in Australian Horticulture – Second Edition 2014

Published by: Horticulture Australia Ltd (HAL)

Date: First printed 2006 (First Edition); updated 2014 (Second Edition)

Email: horticulturefortomorrow@horticulture.com.au

Internet: www.horticulturefortomorrow.com.au

Citation: Kelly, A. (Ed, 2nd Edition) (2014); Lovell, J. (2006). Guidelines for Environmental Assurance in Australian Horticulture, Horticulture for Tomorrow, Horticulture Australia Ltd, Sydney.

The first edition of the Guidelines for Environmental Assurance in Australian Horticulture was originally launched in 2006 as an output from Horticulture for Tomorrow, a national project supported by Australia's horticultural industries, funded by the Natural Heritage Trust through the Australian Government's Pathways to Industry EMS Program, and managed by Horticulture Australia Ltd (HAL). For more background on the Horticulture for Tomorrow initiative, see the website www.horticulturefortomorrow.com.au

The original guidelines were developed by Jane Lovell, Tasmanian Quality Assured, with input and advice from many people.

This second edition of Guidelines for Environmental Assurance in Australian Horticulture was edited by Alison Kelly, Principle, Alison Kelly Consulting, and acknowledges the continual hard work of all involved in updating these guidelines.

The 2014 revision has been funded by HAL as part of the across-industry program. The Australian Government provides matched funds for all HAL's R&D activities.

The following people are particularly acknowledged for their contribution to the review:

- Richard Bennett, Product Integrity Manager, HAL;
- Kevin Bodnaruk, AKC Consulting Pty/Ltd;
- Anne-Maree Boland, Partner, RM Consulting Group;
- Jordan Brooke-Barnett, Environment Coordinator, Ausveg;
- Andy Chambers, Director, Seed Consulting Services;
- Clare Hamilton-Bate, National Program Manager, Freshcare Ltd;
- Anthony Kachenko, Research and Market Development Manager, Nursery & Garden Industry Australia;
- Naomi King, Development Horticulturist, AgriScience Queensland Department of Agriculture, Fisheries and Forestry;
- Andreas Klieber, Coles;
- Brenda Kranz, Portfolio Manager – Natural Resources, Integrated Pest Management;
- Peter Melville, Portfolio Manager – Natural Resources, Climate, Training and Leadership, HAL;
- Jane Muller, Senior Research and Policy Officer, Growcom;
- Simon Newett, Principle Extension Horticulturist, Agri-Science Queensland, Department of Agriculture, Fisheries and Forestry QLD;
- Charles Thompson, Senior Fellow, RM Consulting Group; and
- Production of this document has been managed by Rachel Bennett.

As part of the 2014 revision of this document, a new section on Climate Adaptation was developed and included. The author, Alison Kelly, acknowledges the following people for their contribution to the new section:

- Snow Barlow, Professor of Horticulture & Viticulture, University of Melbourne;
- Andy Chambers, Director, Seed Consulting Services;
- Peter Deuter, Senior Principal Horticulturist, Horticulture and Forestry Science, Department of Agriculture, Fisheries and Forestry (Queensland); and
- David Putland, Manager – Energy & Climate, Growcom.

Significant cross-reference was made between this document and:

- Banana Best Management Practice Environmental Guidelines (2013);
- EnviroVeg: The Environmental Management System cycle – Plan, Do, Check, Review – of continuous improvement (Version 3, August 2011); and
- Freshcare Environmental Code of Practice (2011); and
- Nursery Industry Accreditation Scheme Australia (NIASA) Best Management Practice Guidelines (5th Edition 2013) and Nursery & Garden Industry Australia Environmental Management System (EcoHort) for production nurseries (2nd Edition 2013).

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Introduction

Australian horticulture industry

Australia's horticultural industries produce fruit, vegetables, nuts, mushrooms, herbs and spices, nursery products, turf, cut flowers and extractive crops. Together these industries generated a farm-gate value of approximately $8.7 billion in 2011-12, making horticulture Australia's third largest agricultural industry by value.

While estimates vary, the industry is made up of approximately 18,200 businesses (including wine and table grape production). The majority of businesses are small-scale family farms – though there is a trend towards an increasing number of medium to large scale operations.

Horticulture is a highly diverse industry operating in a broad range of locations and environments, and using a wide variety of production methods. Horticultural enterprises commonly operate in highly sensitive environments such as the Murray-Darling Basin, in catchments that drain to the Great Barrier Reef, or in close proximity to urban areas. The total area under horticultural production in Australia is estimated to be 289,300 hectares. Production locations tend to be concentrated in areas where there are fertile, well-drained soils, appropriate topography, reliable access to high quality water, and reasonable access to transport infrastructure and labour supply.

Australian horticultural industries make an important contribution to the nation's prosperity, especially in terms of providing food security, health and nutrition, and are a stimulus for regional economies. On-farm, healthy soils and water rights are major assets, along with crop genetics. See Figure 1 below.

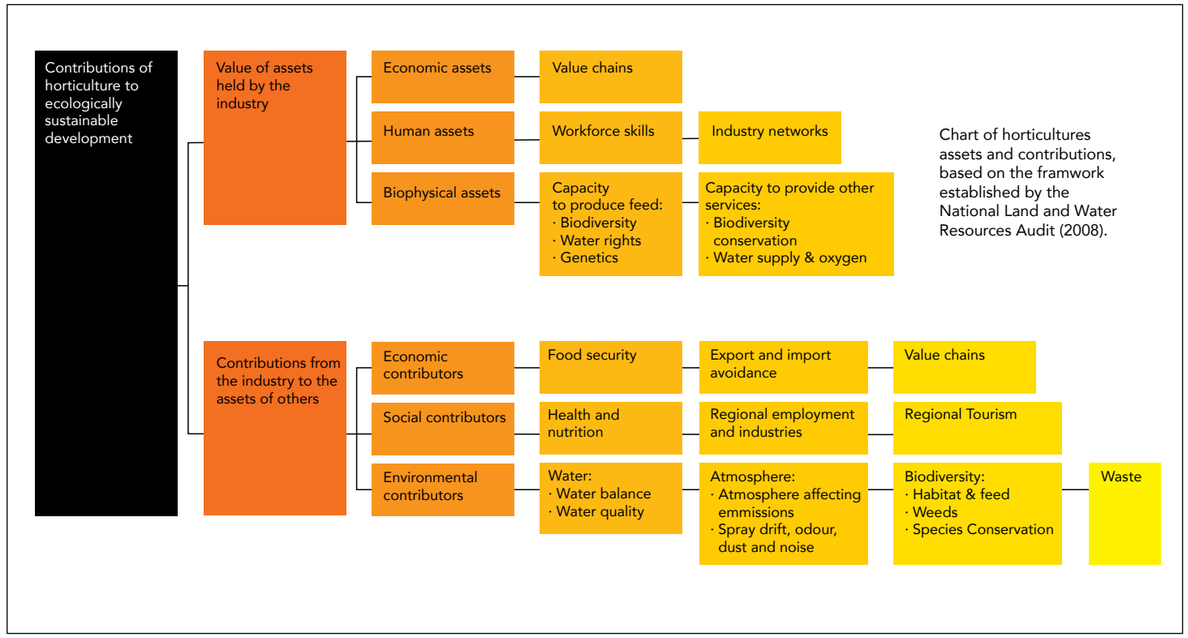

Chart of horticultures assets and contributions, based on the framwork established by the National Land and Water Resources Audit (2008).

Figure 1: Chart of horticulture's assests and contributions, based on the framework established by the National Land & Water Resources Audit (2008). Source: Day P (2010).

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Across society, there is a move towards improving the environmental sustainability of our activities. Most industries invest in research and development that seeks to:

- Optimise the efficiency of natural resource use;
- Reduce the impacts of production or products on the environment;
- Monitor and document the environmental outcomes of management efforts.

The Australian horticulture industry has a strong record of seeking to proactively address matters of environmental sustainability. Horticulture Australia Ltd (HAL) plays an important role in facilitating investment in research, development and extension (RD&E) aimed at improving environmental management.

The National RD&E Framework for Horticulture (the Horticulture Framework) delivers the provisions of the National Framework for the horticultural industries, state government agencies working in horticulture, and Australian Government programs related to horticulture (including HAL). The Horticulture Framework was developed by the National Horticultural Research Network (NHRN) in 2010 and has been endorsed by all the horticultural industries, except the vegetable industry. HAL is a member of the NHRN.

Future environmental constraints for horticulture

The future holds many challenges. These include increasing competition for land and water, limits on inputs, the effects of changing rainfall and temperature patterns, threats from pests and weeds, pollution, overexploitation of resources, the impacts of consumer food choices and consumption, and increasing community expectations about how our land and oceans are managed.

Climate change as a consequence of the enhanced greenhouse effect will have both positive and negative impacts on horticulture. According to international scientific evidence, the most likely changes in our climate will be an increase in temperature of up to 2 °C over the next 50-100 years and more variable rainfall events. The warming of the atmosphere may also influence precipitation intensity, types and patterns, wind directions and intensity, and the frequency and severity of extreme weather events.

For further information on GLOBAL scenarios visit http://www.ipcc.ch/. For further information on DOMESTIC scenarios visit the CSIRO website http://www.csiro.au/Outcomes/Climate/Climate-Change-Book.aspx (Specifically Chapter 3: Future Australian climate scenarios).

Climate change will not proceed smoothly. There is a risk of abrupt changes as the climate shifts from one state to another as a result of feedbacks in the climate system. This will mean increased risk for growers and changes in the way crops are grown. Consequently, adaptation options will need to expand from incremental adaptation options to more transformational strategies as greater levels of climate change are observed.

Besides the negative effects, potential benefits and fresh opportunities also arise from climate change. Higher temperatures may enhance production from horticulture and pastures in the continent's cool regions and the positive effects of higher levels of carbon dioxide on plant growth may partly offset the negative effects of higher evaporation or decreased rainfall.

See Section: Climate adaptation for more information.

Aside from the physical impacts of climate change on horticultural products and businesses, the industry will also be impacted by the global demand for food, increasing demand for productivity growth in response to this global demand, and the impacts of climate change policy.

The world's population is projected to reach around 8 billion by 2025. As the world economy shifts from west to east, millions of people are likely to move out of poverty and the middle class is predicted to grow from 1.8 billion in 2010 to 3.2 billion in 2020 and 4.9 billion in 2030. Increased demand for food across the world will create new export opportunities for the Australian food industry.

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The quantity and quality of food we produce is directly affected by the condition of natural resources– including biodiversity, soil, water, native vegetation and oceans. The future reliability and access to these resources in the future will be directly impacted by climate change. However, the effects of climate change will vary greatly between regions and industries.

The Australian horticulture sector has historically been successfully adapting to the challenges of changes in climate, water availability and weather extremes, and the industry continues to value improvements in production efficiencies and best management practices as approaches to managing ongoing variability and change.

Our food industry will only be able to grow if it can produce more food with the same or fewer natural resources. At the same time, growers will need to adapt their practices to reduce the impacts of unavoidable climate change and climate variability, and take advantage of potential opportunities from these processes. This will require a very high standard of crop management in order for producers to use and manage productive natural resources sustainably so we can produce food today and for future generations.

Horticulture and environmental assurance

The diversity of industries within horticulture means that a wide variety of production systems are used and businesses are located in a broad range of locations. Environmental management is often complex and multifaceted.

Most horticultural production systems are highly intensive (often highly reliant on irrigation, fertilisers and pesticides) and usually highly efficient (generating high yields per unit of land, water and fertilisers used).

For a horticultural business, environmental assurance is a means of demonstrating the use of management practices that achieve the level of environmental protection expected of itself and by its customers, the community and other interested parties.

A key feature of the environmental assurance process is risk assessment and using recognised practices to minimise or prevent (current or future) environmental impacts. A business can demonstrate management of environmental issues through self-assessment, or by seeking assessment from its customers or an independent (or third) party, typically an auditor.

Drivers for environmental assurance in horticulture

Horticultural producers have a fundamental interest and pivotal role in protecting, and where necessary and practical, enhancing and restoring natural resources. Assuring the long-term sustainability of natural resources directly affects the long-term sustainability of horticultural businesses.

There are many drivers for the development of environmental assurance programs in horticulture. The three main drivers identified through an environmental audit in 2011 (HAL Project Reference AH11005):

- Practices that improve production efficiency. The environmental assurance process may highlight areas where improvements can be made to benefit the sustainability of the business, for instance by reducing waste or nutrient leaching and thereby saving money:
- *Improved or alternative inputs that reduce environmental impacts or increase efficiency. An environmental assurance process gives a horticultural producer confidence that their chosen management practices are effective in protecting natural assets such as soils and water, and minimising the risk of causing negative environmental impacts; and*
- Evidence to demonstrate sound environmental performance or improvement over time. Put simply, community interest in environmental issues is increasing and our competitors are catching up fast. So it makes good business sense for the horticultural sector to develop a way to demonstrate its commitment to sound environmental and natural resource management.

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Underpinning the above drivers are reducing potential for regulation, maintaining market access/meeting market demand, addressing consumer perceptions and meeting the needs of future generations under a changing climate.

The notion of 'clean and green' has been used to market Australian horticultural produce for years. Industry and government have put considerable effort into developing and implementing food safety programs that clearly justify the 'clean' label. Environmental management systems provide horticultural producers the tools to prove its 'green' environmental credentials.

Many horticultural markets are beginning to demand that their suppliers demonstrate an acceptable level of environmental management. Access to key markets may be jeopardised if horticultural businesses cannot provide this in addition to food safety and quality assurance.

Developing an industry-driven and industry-wide approach to environmental assurance demonstrates a broad commitment to environmental management. In turn, this commitment should alleviate the need to resort to increased regulation. Industry will also be in a better position to maintain long-term access to natural resources (especially water) by demonstrating sustainable use and management of these resources.

A widespread uptake of environmental assurance processes that are credible and consistent will help to maintain community confidence in the professionalism of the horticultural industry and its commitment to careful environmental management and protection of Australia's natural resources.

Environmental impacts associated with fresh produce

Horticultural activities have both positive and negative impacts on the external environment. Many relationships are complex (e.g. biodiversity) and poorly understood, let alone valued.

Potential environmental impacts are changes that may occur in the environment as a result of horticulture production practices. Risk assessment is required to determine whether the potential environmental impact is likely to occur within a particular enterprise, and to determine the likely significance of the impact, based on the management of each practice.

A comprehensive summary of environmental impacts associated with fresh produce is provided in an impact identification Table 1. The nursery industry's Eco-Hort program also outlines the environmental risks associated with nursery production systems.

The impact identification table details potential on-farm and off-farm environmental impacts from horticultural operations. The impacts are considered for each process step, making the link between activities and environmental 'hazards'.

In addition to these physical environmental issues, a number of other management considerations are also relevant, including:

- Environmental risk assessment processes;
- Climate risk assessment and adaptation planning;
- Farm planning, environmental management planning, and adaptive management systems;
- Environmental monitoring at farm, catchment and regional scales;
- Participation in market-based environmental assurance/certification schemes;
- Participation in community-based regional or catchment scale natural resource and environmental management initiatives;
- Compliance with environmental regulations.

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Category	Hazard	Specific environmental impact
Land and soil	Soil erosion	Sedimentation of rivers/waterways Reduction of water quality – nutrients and agricultural chemicals entering rivers/ waterways – eutrophication
	Soil structure	Compaction Increased run off Soil erosion, sedimentation of rivers/waterways Nutrient depletion
	Salinity	Reduction of arable land Spread of saline water and land Adverse impact on flora and fauna – loss of biodiversity
	Soil acidity and alkalinity	Loss of productivity Reduction of arable land
	Sodicity	Reduction of arable land Soil erosion Soil waterlogging
	Soil degradation	Compaction Increased run off Soil erosion, sedimentation of rivers/waterways Nutrient depletion
Water	Inefficient use of resources	Insufficient water supply/environmental flow Depletion of water table Adverse impact on flora and fauna – loss of biodiversity Rising water table and waterlogging Salinity Soil erosion Nutrient leaching Contamination of waterways
	Inappropriate water quality	Reduction of water quality Contamination by fertiliser, eutrophication Contamination by agricultural chemicals Contamination by fuels and oils Sedimentation
Chemicals	Inappropriate storage of chemicals	Contamination of surface/groundwater Contamination of drinking water Adverse effect on flora and fauna – loss of biodiversity
	Inappropriate application	Contamination of surface/groundwater Contamination of drinking water Adverse affect on flora and fauna – loss of biodiversity Soil contamination Adverse impact on other crops Adverse impact on neighbours
	Inappropriate disposal of agricultural chemicals, surplus agricultural chemicals, rinsates, chemical containers	Contamination of surface/groundwater Contamination of drinking water Adverse affect on flora and fauna – loss of biodiversity Soil contamination
	Spray drift	Disruption of Integrated Pest Management strategies Health risk for local residents Contamination of surface/groundwater Contamination of drinking water Adverse affect on flora and fauna – loss of biodiversity Adverse affect on surrounding crops
Nutrients	Inappropriate use of resources	Soil acidification Adverse impact on flora and fauna – loss of biodiversity
	Misplacement of fertiliser	Reduction of water quality – eutrophication Adverse impact on flora and fauna – loss of biodiversity
Biodiversity	Loss of biodiversity	Clearing of land Reduction of wildlife corridors Loss of aquatic habitat Change in pest species present
Waste	Inappropriate disposal of waste	Contamination of soil and water Adverse affect on flora and fauna – loss of biodiversity Greenhouse gas emission – global warming and climate change Inconvenience to local residents
	Inefficient use of resources	Wasting non-renewable resources Greenhouses gas emission – global warming and climate change Waste disposal sites required (landfill)
Air	Dust	Sedimentation of waterways Soil erosion Inconvenience for local residents
	Smoke	Creation of greenhouse gases – global warming Inconvenience for local residents
	Noise	Disturbance Inconvenience for local residents Adverse impact on fauna – loss of biodiversity
Energy & greenhouse gases	Inefficient use of resources	Creation of greenhouse gases – global warming & climate change Wasting non-renewable resources

Table 1: Environmental Impacts Identification Table. Source: Lovell J (2006).

Levels of environmental systems

Each of these levels, environmental assurance, Best Management Practices and Environmental Management Systems, involve assessment of environmental impacts or risks, and all advocate appropriate actions to address environmentally significant issues.

Environmental assurance

Environmental assurance provides a generic checklist of recognised environmental best practices. It does not allow for certification in its own right; being completed through self-assessment and not third-party audited.

Best Management Practices (BMPs)

Best management practices (BMPs) provide specific techniques, operational practices and industry guidelines for establishing, achieving and reviewing best production methods and management of resources within a business. BMPs provide more detailed and tailored information than environmental assurance guidelines. BMPs may relate to any aspect of a business operation, e.g. food safety BMPs, environmental BMPs, etc. BMPs provide:

- Information on suggested management practices based on research and development and recognized industry best practices;
- Resources that may be specific to regional conditions or to industry or commodity requirements;
- A mechanism against which an individual business can review their existing practices. Implementation of BMPs are often a business's first step towards achieving formal certification to a recognized program or standard.

Environmental Management Systems (EMS)

An Environmental Management System, or EMS, describes any systematic approach to managing the impacts an enterprise has on the environment. EMS is one of the tools available to help a business deliver environmental assurance.

EMS provides a process for the business to keep track of all the information needed to demonstrate to both business managers and external parties it is meeting the environmental assurance standard established. EMS also offers businesses 'continuous improvement', that is, a risk assessment- based pathway to continuously improve their management systems. It encourages a business to 'plan, do, check and review' at regular intervals and across all aspects of the production cycle (see Table 2). A business would not necessarily need a comprehensive EMS in place to demonstrate compliance with the environmental assurance standard.

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System	Version	Training	Certification	Branding	Online Tool
Environmental Assessment – self-assessment only					
Horticulture Environmental Assurance Guidelines	2006	No	No	No	PDF only
Best Management Practice – industry or regional self-assessment tool					
Banana BMP	2013	Yes	No	No	Yes
EnviroVeg Self-assessment Tool	2011	Yes	No	Yes	Yes (members only)
Nursery Industry Accreditation Scheme Australia (NIASA) BMP (production nursery)	2013	Yes	No	No	No
Growcom's Farm Management System	2013	Yes	No	No	No
Pineapple BMP	2009	No	No	No	No
Freshcare Winery/ Viticulture	2011/ 2013	Yes	Yes	Yes	No
DairySAT	2012	No	No	No	Yes
Environmental Management System – environmental certification through third party audit					
Freshcare Environment Code of Practice	2011	Yes	Yes	Yes	No
EnviroVeg Platinum	2011	Yes	Yes	Yes	Yes (members only)
EcoHort (production nursery)	2013	Yes	Yes	Yes	No
ePar (golf and recreation)	2013	Yes	Yes	Yes	No
Eco-Warranty (banana and mushrooms)	2010	Yes	Yes	Yes	No
Certified Land Management	2013	Yes	Yes	Yes	Yes (members only)
Cotton BMP	2013	Yes	Yes	Yes	Yes
ISO14001	2009	Yes	Yes	Yes	No
GlobalG.A.P.*	2013	Yes	Yes	Yes	No
Linking Environment And Farming (LEAF)	2012	Yes	Yes	Yes	Yes (members only)

KEY: BMP – Best management practice – industry or regional self-assessment tool
EMS – Environmental Management System – environmental certification through third party audit
*This is a quality assurance system that has an environmental component.

Table 2: Classification of existing environmental systems within relevant to horticulture.

A note on organic farming

Organic farming is a unique form of agriculture that avoids using synthetic chemicals, artificial fertilisers or genetically modified (GM) organisms. A focus on environmentally sustainable practices is a requirement of organic certification and standards.

Basic principles of organic farming include:

- Achieving optimum quantities of produce and food of high nutritional quality without using artificial fertilisers or synthetic chemicals;
- Preferring renewable resources and conserving energy, soil and water; and
- Minimising the use of non-renewable resources and avoiding polluting activities.

The premium for certified organic products is based on both the basic principles of organic farming and the perception in the marketplace that organic food is produced in clean environments.

The Australian Certified Organic Standard (ACOS) 2013 outlines the requirements for marketing produce as certified organic in Australia. Its scope includes organic production, manufacturing, processing and retailing. While the standard describes parameters for compliance, it does not override legislative requirements but differentiates organic agricultural practices from traditional farming practices.

The ACOS considers all other primary production or food preparation that does not conform to the ACOS standard as 'conventional' production. These guidelines would therefore be seen to cover 'conventional' horticulture production.

For more information on organic farming methods visit the Australian Organics website http://austorganic.com.

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Catchment scale - Natural Resource Management (NRM)

Natural Resource Management (NRM) is the way in which resources like soil, water and vegetation are managed. It is fundamental to sustainable agricultural production. It is also sound business practice to ensure the resources we depend on for production are used efficiently and are in optimal condition.

A commercial business approach to risk management requires that future operations are free from potentially adverse environmental consequences. This need is strengthened by the trend in Australia to set targets for regional environmental outcomes – and an expectation that industry will do its bit to help achieve them. Many growers also accept a 'duty of care' to protect and enhance the environment – leaving their land in good shape for the next generation.

The Australian Government, in association with state and territory governments, has identified 54 regions covering all of Australia. Natural resource management regions are based on catchments or bioregions.

For natural resource management to be successful, it is important that management activities are coordinated between growers and other natural resource managers in their regions, such as Landcare groups, NRM groups and catchment management authorities. This gives the region a greater likelihood of achieving more wholistic natural resource goals and reduces the risk of individual actions being fragmented and inefficient.

NRM groups and catchment authorities may have already developed environmental objectives or targets for your region. This information is useful because it:

- Assists your activities to feed into the regional targets;
- May provide you with opportunities for financial assistance in achieving your own property goals; and
- Can provide guidance on what the local environmental issues are. For instance, if salinity has been identified as an issue in your area this may prompt you to consider in greater detail whether your property might be at risk of developing salinity problems.

Information about NRM groups/catchment authorities in your region can be obtained from http://www.nrm.gov.au/about/nrm/regions/index.html.

The Horticulture NRM Strategy is an industry-wide initiative that sets out horticulture's national NRM agenda. It fits with other activities under the umbrella of 'Horticulture for Tomorrow' and provides a blueprint for future activities.

Development of the guidelines

The original version of the guidelines launched in 2006 were produced by Horticulture for Tomorrow – a national project supported by Australia's horticultural industries and funded by the Natural Heritage Trust, through the Australian Government's Pathways to Industry EMS Program (2004-2006).

In late 2003, the Australian Government consulted with industry and community groups on its Environmental Management Systems (EMS) policy. Following these consultations, the Australian Government announced new directions, which included the Pathways to Industry EMS Program. Through the program, the Australian Government offered to assist industry to implement an EMS or environmental assurance 'pathway' that positioned its members for the future. Horticulture Australia Limited (HAL) and the Horticulture Australia Council (HAC) accepted the invitation to lead, coordinate and manage the project to ensure whole-of-industry goals were identified and addressed in developing a pathways framework for industry environmental assurance.

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The guidelines (1st Edition) were the key output for addressing environmental assurance developed over 18 months and comprehensively trialed by 190 growers and 40 industry experts across Australia.

A series of meetings reviewed and discussed existing environmental management programs and supporting resources developed for horticultural industries in recent years. A scoping study identified the key regulatory and market drivers in Australian domestic and export markets and provided context for the guidelines.

A risk assessment approach, consistent with HACCP (Hazard Analysis Critical Control Point) and traditionally used for food safety, identified processes used in horticulture industries and the potential for significant environmental impact if process steps were not managed appropriately. Further information resources were also identified to link these guidelines with other industry-specific guidelines and programs.

The guidelines were then created by building on existing material and work in progress, and by drawing on information from a number of sources to develop a consolidated reference document based on the most up-to-date scientific and industry knowledge available at the time.

Revision of guidelines in 2014

Since the release of the guidelines in 2006, Horticulture for Tomorrow has become a benchmark for HAL due to its success in delivery, evaluation and raising awareness of the environmental issues facing Australian horticulture.

There have been advances in this area since the first edition of the guidelines were launched, including the development of industry systems (vegetables, bananas, pineapples and nursery systems), changes to Government funding programs relevant to this area (Caring for Our Country), development of the horticulture recognition framework and retailer activity (Coles support for Ausveg EnviroVeg Platinum, Freshcare Environmental v2 and GlobalGAP v4).

The across-industry committee agreed that these developments needed to be incorporated within the guidelines and consequently HAL commissioned an external consultant, Alison Kelly – Alison Kelly Consulting, to undertake the revision in late 2014.

The revision included consultation with existing system owners, industry stakeholders and relevant experts. Concurrently, the Horticulture for Tomorrow website was significantly revised. See www.horticulturefortomorrow.com.au.

Continual improvement

It is recognised that the guidelines will need to be periodically reviewed due to changing understanding of the issues, risks, technologies and management approaches. Feedback on the guidelines is welcomed and can be directed to Horticulture Australia Limited.

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References and further resources

(web links accurate as at 11 February 2014)

Note: A number of Horticulture Australia Limited (HAL)-funded project final reports have been identified as references within this document. This is by no means representative of all the research & development (R&D) or final reports available in this area. For full list of HAL final reports visit the HAL website www.horticulture.com.au. Alternatively, contact HAL or your peak industry body for more information on research & development outcomes specific to your industry.

Australian Bureau of Statistics 2013 - Australian Farming in Brief (Note: Source for horticulture business statistics) http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/7106.0Main+Features42013 Australian Certified Organic (2013) Australian Certified Organic Standard, Australian Organic http://austorganic.com/wp-content/uploads/2013/11/ACOS-2013-final.pdf

Australian Government Caring for Our Country website - NRM regions http://www.nrm.gov.au/about/nrm/regions/index.html

Australian Government Department of Agriculture Forestry and Fisheries - Australian Horticulture Fact Sheet (Note: Source for value and land-use of horticulture statistics) http://www.daff.gov.au/agriculture-food/food/publications/hort-fact-sheet

Australian Government Department of Agriculture Forestry and Fisheries - National Food Plan (Note: Source for future challenges). http://www.daff.gov.au/agriculture-food/food/publications/national_food_plan/white-paper

CSIRO (2011) Future Australian climate scenarios, CSIRO. http://www.csiro.au/Outcomes/Climate/Climate-Change-Book.aspx

Day, P. (2010) Environmental Contributions from Australian Horticulture, An information stocktake, Final Report – HAL Project Reference HG08059, Horticulture Australia Limited, Sydney, NSW. www.horticulture.com.au

Day, P. (2006) Horticulture Natural Resource Management Strategy, Horticulture Australia Limited, Sydney, NSW. www.horticulturefortomorrow.com.au

Freshcare (2011) The Freshcare Environmental Manual, 2nd Edition. Freshcare, Sydney, NSW. www.freshcare.com.au

HAL (2011) Climate change: Managing variability and carbon, Vegetable Industry Development Program, Horticulture Australia Ltd, Sydney, NSW. http://ausveg.businesscatalyst.com/rnd/fact%20sheets/Climate%20Change%20and%20Managing%20Carbon.pdf

Intergovernmental Panel on Climate Change http://www.ipcc.ch/

Lovell, J. (2006) Guidelines for Environmental Assurance in Australian Horticulture – First Edition, Horticulture Australia Limited, Sydney, NSW.

Muller, J; Knudsen, L; Hauser, S; Putland, D (2012) Environmental investment audit for the Australian horticulture industry, Final Report - HAL Project Reference AH11005, Horticulture Australia Limited, Sydney, NSW. www.horticulture.com.au

National Horticulture Research Network (2010) Horticulture National RD&E Framework: A plan for future investment in Australia's horticultural industries, Part of the National Primary Industries Research, Development and Extension Framework, NHRN. http://www.npirdef.org/cms_strategy/7

NLWRA (2008) Signposts for Australian agriculture: The Australian horticulture industry. National Land and Water Resources Audit, Canberra, ACT. http://lwa.gov.au/files/products/national-land-and-water-resources-audit/pn21405/pn21405.pdf

Nursery and Garden Industry Australia (Second Edition 2013) EcoHort - the environmental management system for Australian nursery production, NGIA, Sydney, NSW. http://www.ngia.com.au (Source for environmental impacts of production nurseries).

Stokes, CJ and Howden, SM. (2011) Adapting agriculture to climate change, Chapter 7 of Climate Change: Science and Solutions for Australia, CSIRO. http://www.publish.csiro.au/?act=view_file&file_id=CSIRO_CC_Chapter%207.pdf

Horticulture Australia

How to use the guidelines

Purpose of these guidelines

The guidelines have been developed to provide a common platform for all horticultural industries in Australia interested in implementing an environmental assurance process.

They are the national, industry-wide approach to recognising sound environmental and natural resource management in the horticulture sector. They provide a variety of suggested practices to address common environmental issues, whether the enterprise produces fresh or processing produce, cut flowers, nuts, turf or potted plants. It is recognised that the suggested practices need to be considered in combination with other, sometimes competing, environmental and business issues. Changing one component of a farm system can impact on other practices. Management is often about balancing competing resource requirements.

Scope of the guidelines

The guidelines are designed to provide:

- An overview of the priority environmental management issues of concern in the horticultural sector in general;
- Guidance on how a business can assess its environmental risks;
- Guidance on practices that are recommended for addressing environmental and natural resource management issues; and
- Suggestions for monitoring and recording to demonstrate that environmental management outcomes are being met.

The guidelines cover the growing, harvesting, packing, storage and dispatch stages of horticultural production. Horticultural production includes fresh fruit, vegetables, flowers, nursery products, nuts, herbs, mushrooms and turf supplied for sale to customers in the wholesale, retail, and food service sectors or for further processing across all climate zones in Australia. It does not cover the production of sprouts and minimally processed products (e.g. fresh cuts) or grapes for wine production.

In effect, we have endeavoured to produce a guide that applies to a hypothetical Australian horticultural business that grows every conceivable horticultural product. Not all issues will apply to every business. If the issue applies, you should address it; if it doesn't apply, move on to the next one.

The guidelines provide a platform for creating environmental auditing and certification options that deal with Australian environmental issues, but do not in themselves deliver certification. Businesses further down the formal EMS pathway may need to seek more site and crop specific information.

It is important to recognise that the guidelines are not a substitute for local, state or national legislative requirements. Given the breadth and variation of legislative requirements across Australia, it is strongly recommended that specific information be sought from relevant authorities to ensure compliance.

Who are the guidelines for?

The guidelines are targeted at horticulture enterprises with a basic understanding of production and environmental issues.

The guidelines can be used by:

- Individual businesses to implement an environmental assurance process;
- Horticultural industry groups to guide the development of environmental programs tailored to their needs on a product or regional basis; established food safety and quality assurance schemes that offer optional environmental certification choices; and
- Other stakeholders such as government, education and training, catchment management bodies, retailers, financial institutions and utilities.

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Horticultural commodities that are covered includes fresh fruit, vegetables, flowers, nursery products, nuts, herbs, mushrooms and turf supplied for sale to customers in the wholesale, retail, and food service sectors or for further processing across all climate zones in Australia. The guidelines do not cover the production of sprouts and minimally processed products (e.g. fresh cuts) or grapes for wine production. For wine grape growers click here.

Note that some commodities have there own industry-specific environmental systems available, including:

- Bananas
- Nursery
- Pineapples
- Vegetables

For banana growers:

The Banana Best Management Practices (BMP) – Environmental Guidelines were launched at the 2013 Banana Industry Congress to demonstrate the industry's commitment to the responsible management of natural resources.

The Banana Industry BMP provides a system for growers to assess their current practices against an industry benchmark and access information to assist with practice change. Key features are comprehensive information, intuitive layout for ease of use, and access to additional resources that are only a mouse click away in the online version.

These guidelines have been developed in collaboration with the banana industry, using an industry consultative group with producers from the major production regions in QLD, NSW and WA, to ensure that the focus is on practical, regionally appropriate best management practices. Technical specialists in government agencies and the private sector have also reviewed the guidelines and provided input.

The guidelines have been designed as a valuable resource for all banana farming businesses, whether they already have Environmental Management Systems (EMS) or are assessing their environmental performance for the first time. The Guidelines reflects the structure of the Freshcare Environmental Code, which is administered by Freshcare, of which ABGC is a stakeholder. Businesses audited under other systems will also find it highly valuable.

For more information on the Banana BMP Environmental Guidelines, see www.abgc.org.au.

For pineapple producers:

The Pineapple Best Practice Manual provides a practical reference for Queensland pineapple growers to the current 'best practices'. The manual covers all elements of how to grow pineapples with minimal environmental risk. There are 35 chapters that cover all elements of production, from site selection to product specifications.

The manual is not available online, so for more information contact:

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For vegetable producers:

The EnviroVeg Program is a highly successful and industry-led environmental program developed specifically for Australian vegetable growers. EnviroVeg provides growers with guidelines and information on how to manage their business in an environmentally responsible manner.

The basic annual self-assessment program is offered free to all National Vegetable Levy paying growers throughout Australia. Once growers have submitted a minimum of one Self-Assessment and achieved a score of 85% or greater and submitted an Environmental Action Plan to AUSVEG they can then opt to move to higher levels of membership. Moving to higher levels requires the grower to subject their operation to third party audits, which require additional proof of compliance. Auditing costs are met by the grower. In return, participating growers are rewarded through increased recognition of their environmental performance and access to rewards such as use of the EnviroVeg logo in their businesses.

EnviroVeg Platinum was launched in April 2013 and is an independently assessed version of the EnviroVeg Program that offers growers access to rewards including use of the EnviroVeg logo if growers choose to submit their operations to environmental audit. The Scheme involves a number of record keeping requirements on top of what is currently required by EnviroVeg, although has been designed to work into existing Quality Assurance schemes and be easy to implement for the grower. AUSVEG has teamed up with leading retailer Coles to deliver this Scheme.

All documentation relating to the scheme and further information is available on the AUSVEG website www.ausveg.com.au or contact the AUSVEG Environment Coordinator by calling (03) 9882 0277 or emailing jordan.brooke-barnett@ausveg.com.au.

For wine grape growers:

Freshcare Ltd together with the Winemakers Federation of Australia (WFA) have developed the Freshcare Environmental Code – Viticulture and associated workbooks to provide wine grape growers with an industry specific environmental program to assist them in gaining certification to a recognised environmental standard. Compliance with the Freshcare Environmental Code of Practice is one of the steps required in the process of gaining EntWine accreditation.

Entwine Australia is the wine industry's national environmental assurance program. It provides Australian winemakers and wine grape growers with formal certification of their practices according to recognised international standards.

For more information visit http://www.freshcare.com.au/COPVit or http://wfa.org.au/entwineaustralia/

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Guideline sections

Introduction

Introductory sections provide background information about the issues and the guidelines. A table summarises the key environmental impacts associated with horticultural production, giving a useful overview of topics covered in the main part of the document

Assessing and managing your enterprise – Chapters 1-8

The main working sections help you assess and manage your enterprise. These sections cover risk assessment, suggested practices, monitoring and recording options, and references and further resources.

Risk assessment diagrams are provided to assess the risk of potential environmental impacts occurring and the good agricultural practices required to prevent or minimise the impact. This section provides information to help understand why the risk of impact varies. Some of the risk diagrams contain environmental indicators that are based on research, professional advice, legislative requirements and other guidelines.

List of references and resources - References that may assist producers to find additional information regarding a specific issue have been included in each chapter.

Climate adaptation

Adaptation is the ability to adapt to unavoidable climate change. Successful adaptation to climate change will require flexible, risk-based approaches that deal with future uncertainty and provide strategies that are robust enough to cope with a range of possible local climate outcomes and variations.

Due to horticulture's dependence on natural resources, especially irrigation, it is inherently vulnerable to climate change and variability. This new section outlines the potential impacts of climate change, the potential approaches for adaptation and highlights further resources that growers can access in order to consider their adaptation options.

Practical tools and resources

Legislation requirements

As laws and regulations can vary considerably between topics, states and regions this section provides advice on how to find out what laws apply to your property.

Process steps and inputs

Flow diagrams which detail the process steps and inputs for the major stages of field crop production, nursery production, field packing and shed packing. The diagrams show the range of steps that may occur for each process and the inputs and practices that may result in environmental impact.

Environmental impact identification table

The impact identification table details potential on-farm and off-farm environmental impacts from horticultural operations. The impacts are considered for each process step, making the link between activities and environmental 'hazards'.

A significant environmental impact is defined as any negative change to the environment resulting from business practices that varies from the environmental outcomes acceptable to industry, the community, regulators and markets.

Further resources

References that may assist producers to find additional information.

Review checklist

The checklist provides a way of recording your progress through the guidelines and for identifying actions needed to address any environmental issues you uncover. By completing the checklist each year you can track your progress over time and build up

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Glossary

Acid sulphate soil – the common name given to soils containing iron sulphides.

Acidity – the strength (concentration of hydrogen [H+] ions) of an acidic substance; measured as pH. Acid substances have a pH of 1 – 7. The opposite of alkalinity.

Alkalinity – the strength (concentration of hydrogen [H+] ions) of an alkaline substance; measured as pH. Alkaline substances have a pH of 7 – 14. The opposite of acidity.

Biochar – the carbon-rich solid product resulting from the heating of biomass in an oxygen-limited environment. Due to its highly aromatic structure, biochar is chemically and biologically more stable compared with the organic matter from which it was made. Consequently it is often used to sequester carbon and improve soil fertility.

Biodiversity – the variety of life on our planet, measurable as the variety within species, between species, and the variety of ecosystems.

Bund – an embankment, wall or other structure designed to trap or contain liquids.

Carbon footprinting – a measure of how much greenhouse gas emissions specific human activities release.

Carbon sequestration – the storage of carbon that would otherwise be released into the atmosphere.

Climate adaptation – the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damage, to take advantage of opportunities, or to cope with the consequences.

Climate change – this term is commonly used interchangeably with 'global warming' and 'the greenhouse effect' but is a more descriptive term. Climate change refers to the buildup of man-made gases in the atmosphere that trap the sun's heat, causing changes in weather patterns on a global scale. The effects include changes in rainfall patterns, sea level rise, potential droughts, habitat loss and heat stress.

Climate mitigation – involves reducing the sources of greenhouse gases and creating or enhancing carbon sinks.

Constructed wetland – conversion of an area into a wetland by building dikes, small dams and/or shaping land to provide an appropriate water regime for hydrophytic vegetation.

Crop coefficient (Kc) – the proportion of water used by individual crops compared to the water that is used by a reference crop. The reference crop is a green, uniform, actively-growing crop such as grass or lucerne.

Environmental flow – water provisions needed to sustain the ecological values of our water.

Eutrophication – the enrichment of water by nitrogen or phosphorus, causing algae and higher forms of plant life to grow too fast which disturbs the balance of organisms present in water and the quality of the water concerned.

Evapotranspiration (ETo) – refers to the total loss of water from a green, uniform, actively growing reference crop such as grass or lucerne. ETo is calculated from wind speed, solar radiation, humidity and temperature.

Field capacity – refers to the soil water content after rainfall or irrigation at the point where drainage stops.

Fertigation – the application of nutrients through irrigation systems.

Greenhouse gases – gases that trap the heat of the sun in the Earth's atmosphere, producing the greenhouse effect. The two major greenhouse gases are water vapor and carbon dioxide. Other greenhouse gases include methane, ozone, chlorofluorocarbons and nitrous oxide.

Groundwater – water tha infiltrates the soil and is stored in slowly flowing reservoirs (aquifers); used loosely to refer to any water beneath the land surface.

Leaching fraction – leaching is applying irrigation water in excess of soil moisture depletion level to remove salts in the root zone. The excess water, expressed as a percentage of the applied irrigation water, is the leaching fraction.

Natural Resource Management (NRM) – describes the management of our natural resources – land, soil, native vegetation, biodiversity, and water (both fresh and marine).

Nutrient – element or compound essential for animal and plant growth. Common nutrients in fertilizer include nitrogen, phosphorus and potassium.

Nutrient leaching – the process by which soluble nutirents in the soil are washed into a lower layer of soil or are dissolved and carried away by water.

Readily available water (RAW) – the amount of water in the soil that is readily available to the crop. This is between field capacity and a no-stress situation.

Regulated deficit irrigation (RDI) – an irrigation strategy to manipulate vegetative growth, yield and quality with water stress.

Rhizosphere – the zone of soil surrounding a plant root where the biology and chemistry of the soil are influenced by the root.

Riparian land – any land that adjoins or directly influences a body of water and includes: land immediately alongside small creeks and rivers, including the river bank itself; gullies and dips that sometimes run with water; areas surrounding lakes; and wetlands and river floodplains that interact with the river in times of flood.

Salinity – a measure of how much salt there is in water or soil.

Sedimentation – the accumulation of earthy matter (soil and mineral particles) washed into a river or other water body, normally by erosion, which settles on the bottom.

Sodicity – a sodic soil has an exchangeable sodium percentage (ESP) of more than 6. This means that sodium comprises more than 6% of the total exchangeable cations in the soil.

Soil carbon – soil carbon is all the carbon found in the soil from both living things and nonliving sources such as carbonates. It is sometimes referred to as total soil carbon.

Soil organic carbon (SOC) – as measured by laboratory analysis is all soil carbon from plant and animal sources at various stages of decomposition. It does not include new plant and animal material as much of this decomposes easily, with carbon released quickly to the atmosphere as carbon dioxide. It is also known as total organic carbon and organic carbon. Soil organic carbon is around 58% of soil organic matter.

Soil erosion – the wearing away of land surface by wind or water. Erosion occurs naturally from weather or run-off, but can be intensified by land-clearing practices related to farming, residential or industrial development, road building or timber cutting.

Soil organic matter (SOM) – soil organic matter is the matter found in the soil associated with living things. It includes living organisms, fresh residues, well rotted organic matter, silica-occluded plant carbon (phytoliths), charcoal, nitrogen, sulphur, phosphorus and compounds beneficial to horticultural production and soil health in general, such as plant promotant chemicals. Soil organic matter is not tested in soil analysis, but can be calculated by multiplying the soil organic carbon test result by 1.75.

Substrate – any growing medium used in place of soil, for example potting mix.

Turbidity – a measure of water clarity or 'murkiness'. Soil particles in water increase the turbidity.

Water quality – a term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

Water table – the level below which soil or rock is saturated with water.

Water use efficiency (WUE) – WUE is calculated by the amount of yield produced per megalitre (ML) of irrigation water applied. It can also be calculated by the production value in dollars per ML of irrigation water applied.

Wildlife corridors – is a link of wildlife habitat, generally native vegetation, which joins two or more larger areas of similar wildlife habitat.