The development of a Hazard Analysis and Critical Control Point based risk management plan for the Australian nursery industry

John Bradshaw
AFFS Horticulture

Project Number: NY03046

NY03046

This report is published by Horticulture Australia Ltd to pass on information concerning horticultural research and development undertaken for the nursery industry.

The research contained in this report was funded by Horticulture Australia Ltd with the financial support of the nursery industry.

All expressions of opinion are not to be regarded as expressing the opinion of Horticulture Australia Ltd or any authority of the Australian Government.

The Company and the Australian Government accept no responsibility for any of the opinions or the accuracy of the information contained in this report and readers should rely upon their own enquiries in making decisions concerning their own interests.

ISBN 0 7341 1019 7

Published and distributed by:
Horticultural Australia Ltd
Level 1
50 Carrington Street
Sydney NSW 2000
Telephone: (02) 8295 2300
Fax: (02) 8295 2399
E-Mail: horticulture@horticulture.com.au

© Copyright 2005

Know-how for Horticulture™

Project ID: NY03046 (31 October 2004)

Nursery Hazard Analysis & Critical Control Point (HACCP) based risk management plan

Matthew Rogers
John Bagshaw

Department of Primary Industries & Fisheries, Queensland

Project ID: NY03046

Project leader

John Bagshaw
80 Meiers Rd, Indooroopilly Qld 5068

Purpose of report

The Nursery Industry Accreditation Scheme, Australia (NIASA) has provided a blueprint for professional management of production nurseries and growing media suppliers since 1994.

This project was commissioned by Nursery & Garden Industry, Australia to conduct a generic Hazard Analysis & Critical Control Point (HACCP)-based risk assessment of production nurseries and growing media supply businesses in order to review the activities described in NIASA. The project assessed plant health, quarantine and, where relevant, food safety risks. The HACCP-based risk assessment aims to augment and validate the NIASA best management practice guidelines.

Acknowledgements

Funding for this project was provided by:

- Horticulture Australia Ltd
- Nursery & Garden Industry Australia

We are grateful to the following people who provided valuable contributions to the development of the HACCP plans:
John McDonald, Nursery Industry Development Officer, Qld.
Edda Keskula,, Nursery Industry Development officer, SA.
Michael Danelon, Nursery Industry Development Officer, NSW & ACT.
Keith Bodman, Director of Horticulture, Environmental Sciences and Rural Studies, Challenger TAFE, WA.

Date of Report: 31 October 2004

Any recommendations contained in this publication do not necessarily represent current Horticulture Australia policy. No person should act on the basis of the contents of this publication, whether as to matters of fact or opinion or other content, without first obtaining specific, independent professional advice in respect of the matters set out in this publication.

Table of Contents

Figures

Media Summary

This project was commissioned by Nursery & Garden Industry, Australia (NGIA) to conduct a generic HACCP-based risk assessment of production nurseries and growing media supply businesses in order to review the activities described in the Nursery Industry Accreditation Scheme, Australia (NIASA) Best Management Practice guidelines. The HACCP methodology has been applied to assess plant health hazards, quarantine hazards and food safety hazards.

The project has shown that NIASA has identified and described most practices to manage plant health hazards in these businesses. The HACCP process did identify some minor gaps in NIASA and recommended some extra records and written procedures to facilitate good management of risks including monitoring and auditing of key activities.

Introduction

Hazard Analysis & Critical Control Point (HACCP) is one of many risk management tools developed to identify and control, prevent and/or reduce food safety hazards within a food production system. It is an internationally recognised risk management technique that was initially developed in the early 1960's in the United Stated as a joint initiative of NASA, the US Army and Pillsbury to ensure astronauts avoided food poisoning while in space. Over the past forty years HACCP has been adapted and adopted by the food industry generally as a standard risk management tool.

HACCP requires a systematic science based process to be undertaken to identify all chemical, physical and microbiological hazards in a food production system and then identify points of control where potential food safety hazards must be controlled, prevented and/or reduced. Food business managers must then change their production processes to manage these hazards rather than rely only on end-point inspection, testing and possible rejection of food products.

In the USA, HACCP is mandatory in the meat and seafood processing and fruit juice industries. Many sectors of the Australian food industry now use the HACCP technique for quality assurance, from primary production through to use by the consumer.

An internationally accepted HACCP methodology has been developed under the auspices of the Codex Alimentarius Commission, an international committee responsible for setting standards related to food issues (Codex Alimentarius Commission 1997)

HACCP is a rigorous risk management tool, so in theory can be applied to identify and assess any type of risk, not just food safety risks in food production facilities. This project was commissioned by Nursery & Garden Industry, Australia (NGIA) to conduct a generic HACCP-based risk assessment of production nurseries and growing media supply businesses in order to review the activities described in the Nursery Industry Accreditation Scheme, Australia (NIASA) Best Management Practice guidelines. NIASA primarily addresses hazards to plant health, so we have applied the HACCP methodology to plant health hazards, but have also included quarantine and food safety hazards.

Strategy and methodology

Strategy

This project has used the internationally recognised HACCP risk assessment methodology to review and assess risks to plant health, quarantine and food safety in wholesale nursery stock and growing media production processes. The risk assessment process enables a critical analysis of the Nursery Industry Accreditation Scheme, Australia (NIASA) best management practice guidelines. The result is a document that verifies and underpins the NIASA best management practice guidelines and identifies gaps in the guidelines that may need to be addressed.

Methodology

The HACCP methodology used in this project follows the steps developed by a WHO/FAO international food standards group called the Codex Alimentarius Commission.

HACCP plans have been prepared for production nurseries (container production and in-ground production) and growing media suppliers. The production nursery plans include aspects of growing media production because many production nurseries source growing media components and prepare their own media.

The scope of the HACCP plans for production nurseries includes:

- Plant health, quarantine and food safety hazards. Food safety hazards have been included because some nurseries produce edible plants or plant parts for sale, for example, herb seedlings and fruiting shrubs and trees.
- Plant production processes from sourcing raw materials to point of despatch.

The scope of the HACCP plan for growing media suppliers includes:

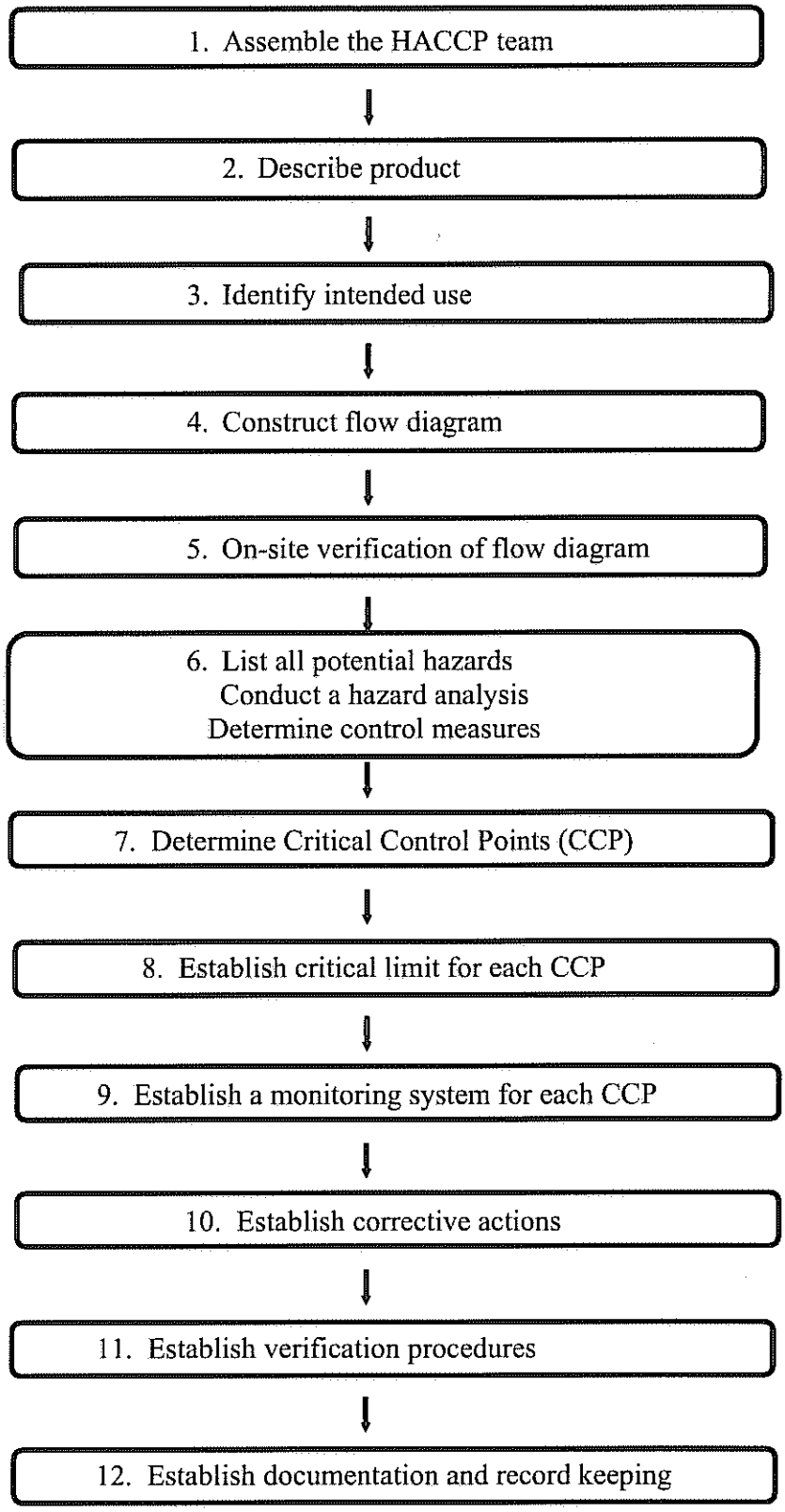
- Plant health hazards and quarantine hazards.
- Growing media production processes from sourcing raw materials to point of despatch.

Generic process flow diagrams for container production, in-ground production and growing media supplier businesses have been prepared and are included in the relevant HACCP plans (refer to Appendices 1 and 2). These diagrams identify all the processes used by production nurseries and growing media suppliers to produce their saleable products.

Documentation produced from following the HACCP methodology forms a HACCP plan. The HACCP plan includes three main documents, a Hazard Analysis Report, a HACCP Table and a Verification Table.

The HACCP methodology follows the 12 steps outlined in **Figure 1**. This methodology was developed for use by individual businesses, so in this generic nursery industry HACCP plan we have skipped the first three steps; "Assemble the HACCP team", "Describe product" and "Identify intended use", and started with the step "Construct flow diagram".

Figure 1. Logic sequence for application of Codex HACCP



Taken from: Codex Alimentarius Commission (CAC) 1997.

The process flow diagrams in Appendices 1 and 2 are the documented results of Steps 4 and 5. In step 5, we verified the process flow diagrams using reference nurseries and growing media suppliers in South-East Queensland and in discussions with Nursery Industry Development Officers.

The Hazard Analysis Reports in Appendices 1 and 2 are the documented results of Step 6. That is, they list all potential hazards for each process step outlined in the process flow charts, the significance of each hazard and control measures for each hazard. The analysis of hazards to determine their level of significance is described in more detail in Appendices 1 and 2 under the heading "Hazard Analysis Process".

Hazards rated as highly significant, and their control measures, are then transferred from the Hazard Analysis Reports into the HACCP Tables in Appendices 1 and 2. Further treatment (that is, steps 7 to 12 of the HACCP process) of highly significant hazards is then documented in the HACCP Tables. Steps 7 to 12 ensure that:

- control measures for critical hazards are rigorously monitored and corrected if outside defined limits of performance,
- the HACCP plan and it's implementation is regularly audited, and
- documentation is sufficient to facilitate monitoring and auditing, and good management.

In Codex HACCP, a critical control point (CCP) relates to food safety hazards only. In our HACCP process applied to nursery production, the scope includes plant health hazards, quarantine hazards and food safety hazards. We have labelled significant plant health hazards as critical control points (CCP), quarantine hazards as critical quarantine points (CQP) and food safety hazards as critical safety points (CSP).

The Verification and Validation Schedules in Appendices 1 and 2 summarise the monitoring activities that a business needs to implement in order to assure themselves that the HACCP plan is working correctly and that identified hazards are being adequately managed.

Discussion

Benefits of HACCP

The HACCP process forces a very rigorous and systematic risk analysis of a business providing a very high likelihood that all potential hazards or risks are identified. The treatment of these risks is also very rigorous and systematic. As a result, if the HACCP plan is well implemented and maintained the possibility of a business suffering the risks being analysed is very low, and procedures will be in place to quickly find and correct problems if they occur.

The aim of the HACCP process is to prevent identified hazards by focussing on the practices used in a business, rather than inspecting and rejecting products at the end of the production process. It is more cost-effective to prevent problems at the source, rather than identify and deal with them after they have happened. Some risks cannot be identified at the end of a production system by inspection so prevention is really the only option for these risks. Examples are early microbial plant contamination before plants show symptoms, or food safety micro-organisms that are invisible to the human eye.

Limitations of using HACCP for nursery plant and growing media production

Although HACCP was developed for the food industry to manage food safety hazards, the principles used for identification of hazards can be transferred to other types of businesses when the scope is changed to include hazards applicable to that business.
So we have applied HACCP to nursery and growing media production businesses by assessing hazards to plant health and quarantine as well as food safety.

However, because HACCP was specifically developed for the processing food industry, applying steps 7, 8 and 10 of Codex HACCP to nursery production does have its challenges. For example, identifying CCP's, CQP's and specific critical limits, and providing scientific validation may be difficult in a plant production facility having a wide diversity of products, growing conditions, management strategies and customer requirements.

Limitation of developing a generic HACCP plan for a whole industry

HACCP was designed to analyse individual food production businesses rather than the components of an entire industry. In this project we have applied the Codex HACCP process generically to the whole nursery industry. Thus while we have been able to effectively identify most of the hazards that may apply to a wide range of nurseries, identifying their control measures and assessing them has been necessarily generalised to maintain relevance for all situations.

For an individual business to apply this generic HACCP plan, they would have to look at the generalised information in the HACCP tables in Appendices 1 and 2, then think about and document the various specific actions they could take in their situation that would meet the intent of the generalised information in the HACCP plan.

Gaps in NIASA identified by the HACCP process

The HACCP process used in this project confirms that much of the NIASA best management practice guidelines addresses the key risks to plant health in a nursery production business.

Plant quarantine issues are briefly mentioned in the NIASA best management practice guidelines but not addressed in any detail.

Food safety risks were included in the scope of the HACCP process, however most food safety risks were assessed as having low significance. The only food safety risk that emerged as a CSP in the HACCP Table was the risk of edible parts of plants being contaminated with pesticide residues above maximum residue limits (MRL) as a result of pest control measures.

The HACCP process has identified the following aspects that are not clearly documented in the NIASA best management practice guidelines

Container and In-ground production nurseries

- Sourcing plant containers from approved suppliers. There is a possibility that nurseries may purchase recycled containers externally, constituting a plant health risk if the containers

have not been adequately disinfested and disinfected. This applies also to quarantine pests that may be spread on containers from areas where quarantine pests are present.

- Selecting reputable suppliers of propagation stock and media. The NIASA guidelines has a good section on preventing spread of disease from motherstock plantings (Section 1.1.3) and other references about sourcing growing media and propagation material from NIASA accredited suppliers. However little has been said about spreading quarantine pests and diseases in these products. The NIASA guidelines briefly mention this issue in Section 1.2.3, however there is a need to expand this into a separate section about quarantine pests and diseases.

- Fertiliser storage. If poorly stored, there is a small possibility that opened fertiliser bags could be contaminated with plant pathogens from soil or water. Similarly nurseries need to ensure that packaging, labels, plant detailing and other equipment is stored in a way that will prevent contamination with plant pathogens. This is not currently mentioned in the NIASA guidelines. Storage of key items such as growing media and pots is well covered in the guidelines.

- Pesticide residues and human pathogens on edible plant parts. This of course would only apply to nurseries that grow plants with edible plant parts, for example more mature fruit trees with hanging fruit or herb seedlings. Practices need to be in place to ensure maximum residue limits are not exceeded if the plants are sprayed with pesticide or to prevent consumption of the product until residues are below the MRL. Irrigation water disinfestation treatments for plant pathogens, assuming they are regularly monitored and effective, will also prevent possible human diseases. Town water that has been treated and used for domestic household purposes (not 'Grey Water') is not likely to cause any plant or human health problems.

- Soil conditions for in-ground production affecting plant growth. Soil structure, depth, salinity or sodicity are not easily corrected and can be detrimental to plant health. Drainage practices and practices to manage soil pests and diseases is well documented in the guidelines.

Growing media production

- Source media components from approved suppliers free of quarantine pests. As with production nurseries, the issue of preventing spread of quarantine pests and diseases is only very briefly noted in the NIASA guidelines. A separate section is needed in the NIASA guidelines to discuss quarantine issues and best management practices relevant to both production nurseries and growing media businesses.

Documentation

The HACCP plan has identified 14 records and three procedures, along with Interstate Certification Assurance (ICA) and quarantine documents to support the HACCP plan. These are documented in the "Records" column of the HACCP Tables in Appendices 1 and 2.

The aim of these records is to facilitate individual businesses to improve management of risks identified in the HACCP plan, and facilitate more objective internal and external auditing of businesses that implement a HACCP system.

We encourage businesses to use their existing records and documents as the basis of the HACCP recording system and upgrade where needed to conform to the recording requirements of the HACCP plan. The names of the records and procedures we have used in the HACCP plan are meant to be indicative of the types of information that need to be recorded. Businesses would not be expected to change documents or names of documents to the same as mentioned in the HACCP Tables, rather they would identify information they currently keep (in whatever form) that would meet the needs of the HACCP plan, and either adapt current records and procedures or create new ones to fill gaps in information recording between their current system and the requirements of the HACCP plan.

To facilitate this process Appendix 3 has been developed which lists the titles of the records and procedures identified in the HACCP Tables in Appendices 1 and 2, provides guidance about what the documents relate to and the information that needs to be recorded. The Appendix also mentions record templates documented in the NIASA Best Management Practice guidelines and other Best Management Practice guidelines developed for the nursery industry.

Critical factors in implementing HACCP

For an individual business to effectively implement and maintain a HACCP system a number of factors must be considered:

- Developing a HACCP program in a business involves significant management commitment. The manager/owner needs to drive the development and implementation of the system.
- Staff need to be involved in planning and provided with suitable training and support to do the tasks outlined in the HACCP plan. Simple written procedures for key tasks that are reinforced by managers will help staff to implement the plan.
- Invest in monitoring and improvement. This is often the biggest challenge to a business intent on dealing with day-to-day production of their products. A good monitoring program will ensure the business will keep on top of potential risks to their business.

Recommendations

- The HACCP plan be tested and reviewed by trialing implementation with cooperating nurseries. Implementation of this generic HACCP plan will require individual businesses to identify specific actions they could take in their situation that would meet the intent of the generic information in the HACCP plan.

- Nursery Industry Development Officers attend a familiarisation workshop to enable them to understand the principles and process of HACCP and to enable them to support nurseries that may wish to implement their own HACCP program.

- The NIASA Best Management Practice Guidelines be reviewed by the NIASA Committee to consider the gaps and extra documentation identified as a result of this HACCP project for inclusion in the guidelines.

- Consideration be given to widening the scope of this HACCP plan to include workplace health and safety hazards in the next phase of its development.

Bibliography

Anonymous (2001) Pesticide Management Diary CD ROM, NGIA, Sydney, Australia

AS/NZS 4360: 2004 Risk Management. Standards Australia, Sydney

Atkinson (ed) (1997) Nursery industry water management best practice guidelines Australia. Nursery industry Assoc of Aust, Epping NSW (Reprinted 1999).

Briercliffe, TJ (2000) Development of HACCP based quality management systems in ornamental horticultural production. Proc XIVth Int. Symp. on Hort. Economics (p103-108). Acta Hort 536 ISHS.

Centre for Pesticide Application & Safety (2002) Best practice manual for pesticide application in the Nursery and Garden Industry CD ROM. UQ, Gatton, Qld.

Codex Alimentarius Commission (CAC) 1997. Hazard Analysis and Critical Control Point (HACCP) System and Guidelines for its Application. Alinorm 97/13A, Appendix 2, Vol 1B Supplement, Rev. 3, CAC, Rome.

Cresswell, GC & Huett, DO (1996) Managing nursery runoff – techniques to reduce nutrient leaching from pots. NSW Agriculture, Wollongbar, NSW.

Goodwin, S et al (2002) Integrated Pest Management in Ornamentals: Information guide, NSW Agriculture, Orange, NSW.

Hazard Analysis and Critical Control Point (HACCP) System Handbook (1997), QA/HACCP Group, Centre for Food Technology, DPI, Brisbane, Qld.

HB 436: 2004 Risk Management Guidelines-Companion to AS/NZS 4360:2004. Standards Australia, Sydney

Nursery & Garden Industry Australia (2003). Nursery Industry Accreditation Scheme, Australia Best Management Practice Guidelines. NGIA, Sydney.

Recommended international code of practice general principles of food hygiene *CAC/RCP 1-1969, Rev. 3-1997, Amd. (1999).*

Rolfe et al (2000) Managing water in plant nurseries. NSW Agriculture, Orange NSW.

APPENDIX 1

HAZARD ANALYSIS AND CRITICAL CONTROL POINT (HACCP) PLAN

CONTAINER AND IN-GROUND PRODUCTION NURSERY SYSTEM

Contents **No.**

DEFINITIONS

Critical Control Point (CCP)	A point of control in the process where a potential plant health hazard identified in *Hazard Analysis Report* is of **High or Extreme** significance. Control measures must be taken to reduce, eliminate or control the hazard.
Critical Quarantine Point (CQP)	A point of control in the process where a potential quarantine hazard identified in *Hazard Analysis Report* is of **High or Extreme** significance. Control measures must be taken to reduce, eliminate or control the hazard.
Critical Safety Point (CSP)	A point of control in the process where a potential food safety hazard identified in *Hazard Analysis Report* is of **High or Extreme** significance. Control measures must be taken to reduce, eliminate or control the hazard.
Hazard Analysis Report	A tabulated record of all *Potential Hazards* that affect or have the potential to affect the product(s) under analysis. The significance of each hazard is rated as a low risk, moderate risk, high risk or extreme risk and control measures for each *Potential Hazard* are stated.
HACCP Table	A tabulated report on the *Potential Hazards* identified in the Hazard Analysis Report that have either been rated as high or extreme risk. Critical limits for each *Potential Hazard* of high or extreme significance are transferred form the *Hazard Analysis Report* and stated. *Monitoring* activities are stated to ensure *Critical Limits* are not exceeded. *Corrective Action* is identified if deviation of limits occur. Records identified for the maintenance of the system.
Consequence (Con)	What are the consequences if the risk occurs? This is rated as either one, two, three, four or five.
Likelihood (Like)	What is the likelihood of the risk occurring? This is rated as either almost certain, likely, possible, unlikely or rare.
Significance (Sig)	What is the significance to the health status of the plant(s)/growing media, ability to meet quarantine and plant health requirements of the product given the *consequence* and *likelihood* of the risk? This is rated as either low, moderate, high or extreme.
Corrective Action	Any action to be taken when the results of monitoring indicate a loss of control.

Critical limit	The boundaries of acceptability for control measures.
Control Measure	Any actions or activity that can be used to prevent or eliminate a hazard or reduce it to an acceptable level.
Potential Hazards	A food safety, plant health or quarantine agent or occurrence, or condition with the potential to cause adverse effect on plant health or quarantine access to domestic and international markets to the final product at the point of sale or despatch.
Monitor	The act of conducting a planned sequence of observations or measurements to assess whether a *CCP* is under control.
Validation	Obtaining evidence the elements of the HACCP plan are effective.
Verification	The application of methods, procedures, tests and other evaluations, in addition to monitoring, to determine compliance with the HACCP plan.
Flow Chart	A systematic representation of the sequence of processes (steps or operations) used in a business.
HACCP (Hazard Analysis and Critical Control Point)	A system that identifies, evaluates, and controls hazards that are significant for product quality.
HACCP Plan	A logical and systematic method of establishing the context, identifying, analysing, evaluating, treating, monitoring and communicating hazards associated within a process that will enable organisations to minimise losses and maximise opportunities.
ICA	Interstate Certification Assurance. A system of plant health certification based on quality management principles to ensure that produce consigned to intra or interstate markets meets specified quarantine requirements.
Risk	The level of a potential plant health, food safety or quarantine hazard occurring to the final product(s). It is measured in terms of *Low, Medium, High or Extreme*.

PURPOSE AND SCOPE

This HACCP Plan provides an overview of the processes involved in a production plant nursery. This HACCP Plan has been prepared in accordance with the CODEX Alimentarius Guidelines for HACCP.

Scope of this HACCP plan

Hazards associated with the propagation and growing of plants from seeds through to vegetative matter including plants in containers and in ground production within a production plant nursery system through to dispatch. Hazards under analysis are plant health, plant quarantine and food safety.

HACCP TEAM

NAME	POSITION	ORGANISATION
J Bagshaw	Team Leader	Dept of Primary Industries and Fisheries, Queensland
M Rogers	Hazard analysis, risk management and HACCP expert	Dept of Primary Industries and Fisheries, Queensland
J McDonald	Nursery Industry Development Officer	Nursery and Garden Industry Queensland

DETERMINING POINTS OF CONTROL

The method used to establish CCP's, CQP's and CSP's within this HACCP plan has been based on the significance of each hazard as determined by the hazard analysis process.

All hazards defined as highly (H) or extremely (E) significant within the Hazard Analysis Report have been carried over to the HACCP Table as either a CCP, CQP or CSP. These hazards are all monitored and a record of that activity maintained.

Hazards defined as low (L) or moderate (M) significance within the Hazard Analysis Report have not been carried over to the HACCP Table because these hazards are considered to be an acceptable level of risk.

HAZARD ANALYSIS PROCESS

The method used to separate minor acceptable hazards from major non-acceptable hazards is shown in Tables below. The establishment of risk has been based on the significance of each hazard as determined by a Hazard Analysis Report. To establish a level of significance two factors are considered. These are consequences (Cons) and likelihood (Like).

RECORDS

The records listed in the HACCP Table for container nurseries and in-ground nurseries are explained more fully in Appendix 3.

Measure of Consequences or (**Cons**)

Level	Descriptor	Description
1	Insignificant	Plant Health – No detectable damage or injury to the plant. Quarantine – No detectable quarantine risk, direct movement following relevant checks. Food Safety – No detectable contamination or hazard.
2	Minor	Plant Health – Minor impact on plant which may cause customer complaint. Quarantine – Minor quarantine risk detected and product maybe held for further inspection, treatment or documentation check then released. Food Safety – Minor contamination or food safety hazard.
3	Moderate	Plant Health – Moderate impact on plant, may be easily treated and limited scope for customer complaint Quarantine – Moderate quarantine risk detected and product maybe held for further inspection, treatment or documentation check then released. Food Safety - Moderate illness or injury, not life-threatening.
4	Major	Plant Health – Serious impact on plant, may not be easily treated and scope for major customer complaints. Quarantine – Serious quarantine risk detected, product rejected, destroyed or returned. Food Safety – Serious food safety risk, may cause wide spread illness or injury but not life threatening.
5	Catastrophic	Plant Health – Critical and widespread impact on plants, uncontrollable and widespread customer complaints. Quarantine – Critical quarantine risk detected, product rejected, destroyed or returned and suspension of trade. Food Safety - Critical food safety risk, causing wide spread illness and possible death.

Measure of Likelihood or (**Like**)

Level	Descriptor	Description
A	Almost certain	Is expected to occur in most circumstances.
B	Likely	Will probably occur in most circumstances.
C	Possible	Might occur at some time.
D	Unlikely	Could occur at some time.
E	Rare	May occur only in exceptional circumstances.

Level of Significance or (**Sig**)

Likelihood	Consequences				
	1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
A (almost certain)	**H**	**H**	**E**	**E**	**E**
B (likely)	**M**	**H**	**H**	**E**	**E**
C (Possible)	**L**	**M**	**H**	**E**	**E**
D (unlikely)	**L**	**L**	**M**	**H**	**E**
E (rare)	**L**	**L**	**M**	**H**	**H**

E = Extreme risk; immediate action required.

H = High risk; senior management attention needed.

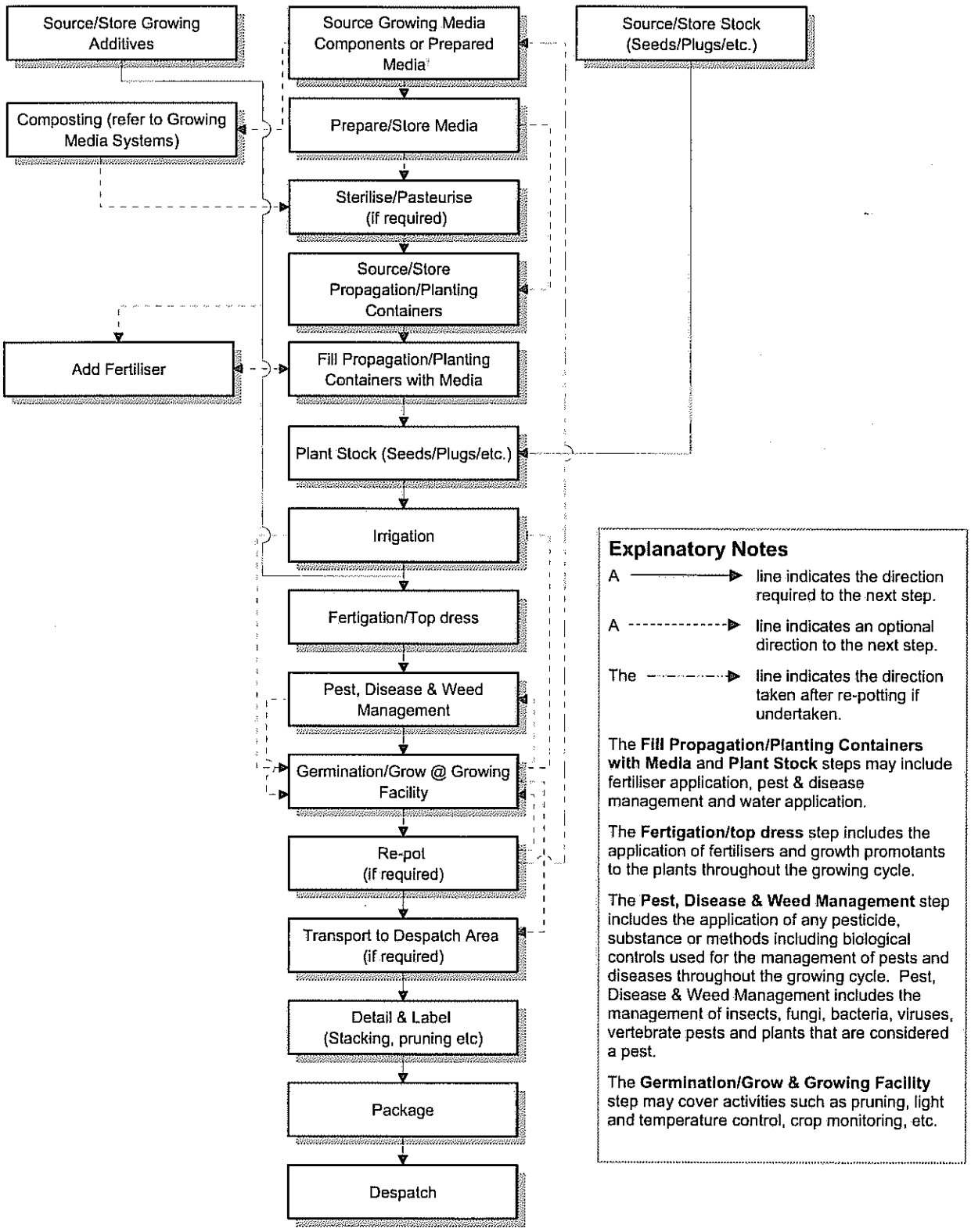
M = Moderate risk; management responsibility must be specified.

L = Low risk; managed by routine procedures.

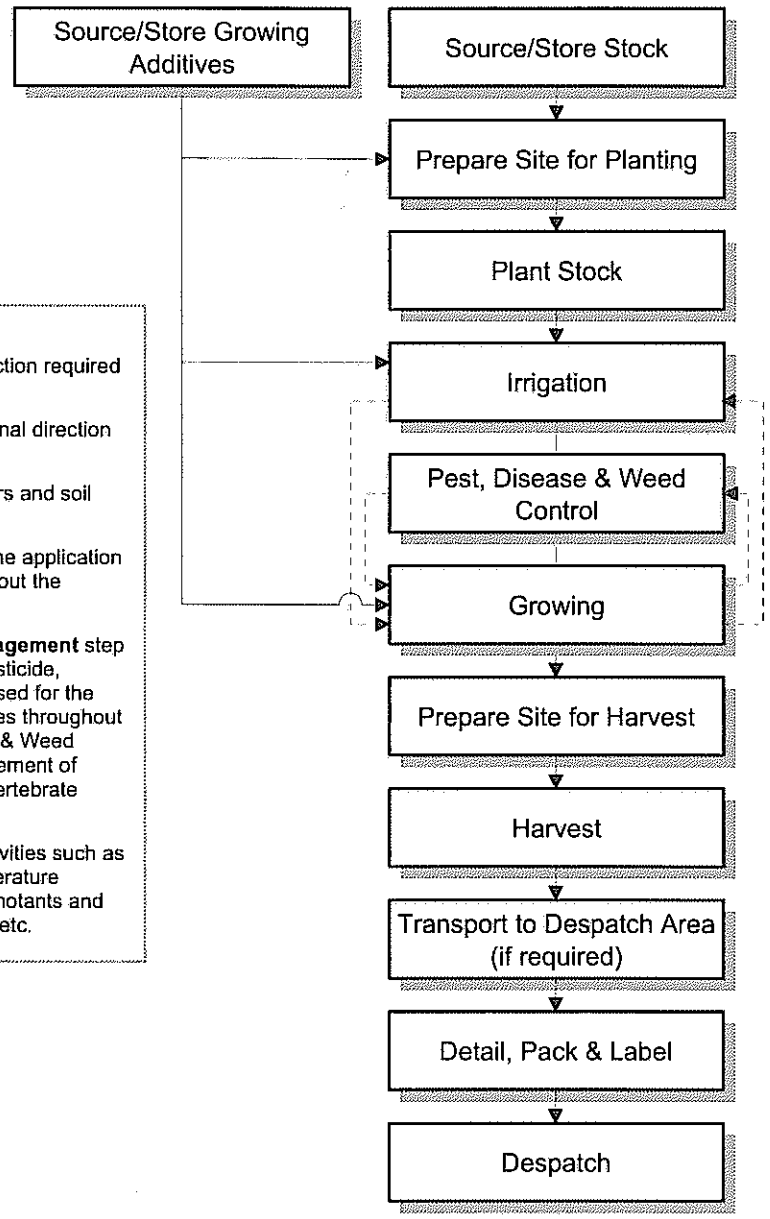
FLOW DIAGRAMS

The following flow diagrams represent the general process steps carried out by a production nursery.

Production Process – Container Production



Production Process - In Ground Production



Explanatory Notes

A ------▶ line indicates the direction required to the next step.

A line indicates an optional direction to the next step.

Growing additives include fertilisers and soil ameliorants.

The **Irrigation** step may include the application of fertilisers for fertigation throughout the growing cycle.

The **Pest, Disease & Weed Management** step includes the application of any pesticide, substance or biological controls used for the management of pests and diseases throughout the growing cycle. Pest, Disease & Weed Management includes the management of insects, fungi, bacteria, viruses, vertebrate pests and weeds.

The **Growing** step may cover activities such as pruning, fertilising, light and temperature control, application of growth promotants and soil ameliorants, crop monitoring, etc.

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Sourcing Growing Media Components or Prepared Media	Plant Health	Source material contaminated with plant pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds) (refer 1.1 NIASA BMP).	Media components and tools, containers, preparation surfaces, transportation etc contaminated with plant pathogens or other pests (insects & weed seeds).	4	D	H	Could cause major loss of product and market(s).	Source media and media components from approved suppliers that have the ability to supply and transport media that is free from plant pathogens & other pests (refer Appendix 1 NIASA BMP). Sample and test all media at delivery or before use (refer Appendix 2 section A2 NIASA BMP).
		Source material not meeting nursery quality specifications	Not correctly formulated by supplier.	4	D	H		Select reputable supplier and communicate requirements
	Quarantine	Source material contaminated with known quarantine pests (such as Red Imported Fire Ant, silver Leaf White Fly or Western Flower Thrips) or plant pathogens.	Source materials contaminated with known quarantine pests or pathogens.	4	C	E	Serious quarantine risk detected that could occur some time.	Source media and media components from approved suppliers that have the ability to supply and transport media that is free from known quarantine pests or pathogens.
	Food Safety	Nil						
Composting *Note: Refer to Growing Media system HACCP Plan) for details on this step.*								

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Prepare/Store Media	Plant Health	Media cross contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Preparation surfaces, storage facilities and equipment contaminated with plant pathogens or other pests (insects & weed seeds).	3	C	H	Could cause major loss of product and market(s).	Regularly clean and disinfest equipment and facilities used to prepare and store media (refer 1.1.4, 1.1.5, 1.1.12, 1.2.1 & A 3.6 NIASA BMP). Exclude runoff water, contaminated, untreated soil and other materials or items that may cause contamination of storage areas (refer Appendix 3 NIASA BMP).
	Quarantine	N/A						
	Food Safety	Nil						
Sterilise/Pasteurise Media	Plant Health	Media contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Sterilisation/pasteurisation process ineffective in disinfecting media contaminated with plant pathogens or other pests (insects & weed seeds).	3	C	H	Could cause major loss of product and market(s).	Sterilise/pasteurise media and media components using an approved method (refer Appendix 3 NIASA BMP).
	Quarantine	N/A						
	Food Safety	Nil						

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Source/Store Propagation/ Planting Containers	Plant Health	Containers contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Inadequate and/or inappropriate storage and handling of propagation/planting containers.	3	C	H	Could cause minor loss of product and market(s).	Source containers from approved suppliers that have the ability to supply containers that are free from pathogens and other pests (insects & weed seeds). Store new and clean, disinfected containers above ground level (refer 1.1.15 NIASA BMP). Clean and treat used containers to eliminate contamination of plant pathogens and other pests (insects & weed seeds) (refer 1.1.15 NIASA BMP). Regularly clean and control weeds in & around container storage facilities (refer 1.2.1 NIASA BMP).
Source/Store Propagation/ Planting Containers (cont.)	Quarantine	Containers contaminated with known quarantine pests (such as Red Imported Fire Ant, silver Leaf White Fly or Western Flower Thrips) or plant pathogens.	Source materials contaminated with known quarantine pests or plant pathogens.	4	C	E	Serious quarantine risk detected that could occur some time.	Source containers from approved suppliers that have the ability to supply and transport containers that are free from known quarantine pests and pathogens.
	Food Safety	Nil						

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Fill Propagation/ Planting containers with Media	Plant Health	Media and containers contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Inadequate and/or poor hygiene and sanitation of potting facilities and staff.	3	C	H	Moderate impact on plants, may be easily treated. Might occur sometimes.	Regularly clean and disinfest potting facilities and equipment (refer 1.1.4, 1.1.5, 1.1.12 & 1.2.1 NIASA BMP). Regularly clean up and discard spilt media around potting facilities (refer 1.1.9 & 1.1.12 NIASA BMP). Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4 – 1.1.8 1.1.14 & Appendix 8 NIASA BMP). Used containers must be reasonably clean & disinfected using an approved method before reuse (refer 1.1.15 NIASA BMP).
	Quarantine	N/A						
	Food Safety	Nil						

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Add Fertiliser	Plant Health	Poor or slow plant growth.	Incorrect supply of nutrients to plant.	3	C	H	Moderate impact on plants, may be easily treated. Might occur sometimes.	Supply plant with correct amount and type of nutrients to ensure good plant growth and longevity until supplied to the customer (refer 2.5 & Appendix 4 NIASA BMP). Implement and maintain plant growth practices that minimise nutrient leaching (refer 2.5 & Appendix 4 NIASA BMP).
	Quarantine	N/A						
	Food Safety	Nil						
Source/Store Propagation Stock	Plant Health	Plants and propagules contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Inadequate and/or poor hygiene and sanitation of sourced stock.	4	C	E	Serious impact on plants that may not be easily fixed that might occur at some time.	Source plants and propagules from approved suppliers able to supply material that is free from plant pathogens and other pests (insects & weed seeds). If required hold plants and propagules in quarantine area and monitor for signs of pests and disease (refer 1.1.11 NIASA BMP). Source propagules from motherstock that is free from plant pathogens & other pests (refer 1.1.3 NIASA BMP). Treat propagules if required.

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Source/Store Propagation Stock (cont.)	Quarantine	Containers, plants & plant propagules contaminated with known quarantine pests (such as Red Imported Fire Ant, silver Leaf White Fly or Western Flower Thrips) or plant pathogens. *Note: This hazard analysis relates to hazards associated with the final product (refer definition of Potential Hazard) therefore further quarantine pests and diseases will not be known or addressed until the destination of the product is determined at the Despatch Step*	Inadequate or no management of quarantine pests or pathogens in source stock and containers.	4	C	E	Serious quarantine risk detected that could occur some time.	Source plants & plant propagules from approved suppliers that have the ability to supply and transport plants that are free from known quarantine pests and pathogens. If required hold plants & plant propagules in quarantine area and monitor for signs of pests and disease (refer 1.1.11 7 1.11.16 NIASA BMP).
	Food Safety	Nil						

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Planting (Seeds/Plugs/etc.)	Plant Health	Planting stock & propagules contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Source plants & plant propagules (seeds/plugs/etc.) contaminated with plant pathogens and other pests. Inadequate and/or poor hygiene and sanitation of facilities and staff.	3	C	H	Moderate impact on plants, may be easily treated. Might occur sometimes.	Regularly clean and disinfest potting facilities and equipment (refer 1.1.4, 1.1.5, 1.1.12 & 1.2.1 NIASA BMP). Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4 – 1.1.8 & 1.1.14 NIASA BMP).
	Quarantine	See 'Despatch"						
	Food Safety	Nil						
Source/Store Growing Additives (For example wetting agents, polymer gels or other materials designed to improve growing media characteristics)	Plant Health	Additives contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Additives contaminated with plant pathogens and other pests before delivery or during storage.	3	C	H	Moderate impact on plants, may be easily treated. Might occur sometimes.	Source growing additives from approved suppliers that have the ability to supply and transport materials that are free from plant pathogens and pests (refer Appendix 1 NIASA BMP). Regularly clean and disinfest delivery & storage facilities and equipment. Keep away from soil (refer 1.1.4, 1.1.5 & 1.2.1 NIASA BMP). Exclude runoff water, soil and other materials or items that may cause contamination of storage areas (refer Appendix 3 NIASA BMP).
	Quarantine	See 'Despatch"						
	Food Safety	Nil						

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Irrigation	Plant Health	Stock contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Water supply contaminated with pathogens or other pests.	4	C	E	Major impact on plants, may be easily treated. Might occur sometimes.	Check and treat (if required) water sourced and stored from areas that could cause contamination by plant pathogens (refer 1.1.1, 2.1 & Appendix 4 NIASA BMP).
		Poor or slow plant growth.	Inadequate or excess supply of water to plants. Water quality unsuitable for plant growth Nutrients leached out of plant root zones.	3	C	H	Moderate impact on plants, may be easily treated. Might occur sometimes.	Efficiently supply plants with water to ensure good plant growth until supplied to the customer, but minimise nutrient loss from drainage (refer 2.5 & Appendix 4 NIASA BMP). Use plant growth practices that reduce leaching (refer 2.5 & Appendix 4 NIASA BMP). Regularly check water source for pH, EC and other quality factors as appropriate. Treat as needed (refer 2.1 NIASA BMP)
	Quarantine	See 'Despatch"						
	Food Safety	Edible parts of plants contaminated with human pathogens.	Water supply contaminated with human pathogens. (refer Nursery Papers 2001/5)	4	D	H	Minor contamination or food safety hazard which could occur at some time.	If growing edible plant parts, check and treat (if required) water sourced and stored from areas that could cause contamination by food safety pathogens (refer 1.1.1, 2.1 & Appendix 4 NIASA BMP).

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Fertigation/Top Dress	Plant Health	Stock contaminated with plant pathogens as described above (refer 1.1.1 NIASA BMP).	Fertilisers contaminated with pathogens.	4	D	H	Major impact on plants, may be easily treated. Might occur sometimes.	Source and store fertilisers used to fertigate and top dress in a way that prevents contamination by plant pathogens
		Poor or slow plant growth.	Incorrect supply of nutrients to plants.	3	C	H	Moderate impact on plants, may be easily treated. Might occur sometimes.	Supply plants with correct amounts of appropriate nutrients to ensure good plant growth until supplied to the customer (refer 2.5 & Appendix 4 NIASA BMP). Use practices that minimise nutrient leaching. Check all growing media for pH and EC at delivery or before use (refer 2.5 & Appendix 4 NIASA BMP).
	Quarantine	See 'Despatch"						
	Food Safety	Edible parts of plants contaminated with food safety pathogens or chemical hazards in fertiliser.	Water supply contaminated with food safety pathogens. Unacceptable fertigation product residues on edible plant parts	2	D	L	Minor contamination or food safety hazard which could occur at some time.	Check and treat (if required) fertigation water sourced and stored in areas that could cause contamination by food safety pathogens (refer 1.1.1, 2.1 & Appendix 4 NIASA BMP). Ensure fertilisers used in overhead fertigation are low in heavy metals and free of toxins or other unacceptable chemicals.

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Pest, Disease & Weed Management	Plant Health	Plant stock destroyed, damaged or debilitated by diseases, pest insects weeds or pest animals.	Ineffective or absence of a pest management program. Poor hygiene.	5	C	E	Major impact on plants, may be easily treated. Might occur sometimes	Implement a pest management program. Use Integrated Pest Management principles where possible. Refer 1.2.2 Appendix 7 NIASA BMP, Cenre for Pesticide Application & Safety (2002) & Goodwin et al (2002). Select and maintain appropriate pesticide application equipment. Refer 1.2.4 & Appendix 7 NIASA BMP, Centre for Pesticide Application & Safetyl (2002). Train staff responsible for implementation of the pest management program (refer 1.2.2 & Appendix 7 NIASA BMP). Staff practice good hygiene as described in other steps.
	Quarantine	See 'Despatch'						

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Pest, Disease & Weed Management (cont.)	Food Safety	Edible parts of plants contaminated with pesticide residues above Maximum Residue Limit (MRL).	Pesticides not used in accordance with labelled directions.	3	C	H	Could cause illness or injury and legal prosecution.	Use pesticides in accordance with label directions. Select and maintain appropriate pesticide application equipment. Refer 1.2.4 & Appendix 7 NIASA BMP, Centre for Pesticide Application & Safety (2002). Train staff responsible for implementation of the pest management program (refer 1.2.2 & Appendix 7 NIASA BMP).

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Germination & Growing	Plant Health	Poor or slow plant growth.	Infection by plant pathogens. Damage to plant by wind and dust. Insufficient or incorrect lighting. incorrect temperature control. Incorrect supply of nutrients to the plant.	4	C	E	Serious impact on plants that may not be easily fixed which might occur at some time.	As necessary, construct wind breaks or other methods of wind/dust control to protect plants (refer 2.2 NIASA BMP). Establish and maintain lighting regimes in growing areas suited to the needs of the species. As necessary establish facilities to acclimatise plants to light level used by the customer (refer 2.3 NIASA BMP). As necessary and practicable establish and maintain a stable temperature environment for good plant growth (refer 2.2 NIASA BMP). Refer to "*Irrigation /Fertigation* potential hazard of Incorrect supply of nutrients to the plant" for control measures.

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Germination & Growing (cont.)	Plant Health	Poor or slow plant growth.	Inappropriate container size causing root binding.	2	C	M	Moderate impact on plants that may not be easily fixed which might occur at some time.	Re-pot plants as needed considering the container size relevant to the growth of the plant over the time spent in the container (refer 2.7 NIASA BMP).
		Stock contaminated with plant pathogens as described above (refer 1.1.1 NIASA BMP).	Unsuitable growing surface materials and poor siting of growing beds and benches.	4	C	E	Serious impact on plants that may not be easily fixed which might occur at some time.	Select suitable materials and sites for growing beds and benches that isolates plants from sources of plant pathogen contamination (refer 1.1.16 NIASA BMP).
	Quarantine	See 'Despatch"						
	Food Safety	Edible part of plants contaminated with food safety hazards (pathogens, glass etc)	Inadequate and/or poor hygiene and sanitation of facilities and staff.	2	D	L	Minor contamination or food safety hazard that could occur at some time.	Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4 – 1.1.8 & 1.1.14 NIASA BMP).
Re-pot	Plant Health	Poor or slow plant growth.	Inappropriate container size causing root binding.	2	C	M	Moderate impact on plants, may be easily treated. Might occur sometimes.	At the time of re-potting consider the container size relevant to the growth of the plant over the time spent in the container (refer 2.7 NIASA BMP).
		Media and containers contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Inadequate and/or poor hygiene and sanitation of potting facilities and staff.	3	C	H	Moderate impact on plants, may be easily treated. Might occur sometimes.	Refer above to control measures for "Fill Propagation/Planting containers with Media".
	Quarantine	See 'Despatch"						

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Re-pot (cont.)	Food Safety	Edible part of plants contaminated with food safety hazards (pathogens, glass, dust/dirt etc)	Inadequate and/or poor hygiene and sanitation of facilities and staff.	2	D	L	Minor contamination or food safety hazard which could occur at some time.	Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4 – 1.1.8 & 1.1.14 NIASA BMP). Regularly clean and sanitise re-potting equipment
Transport to Despatch Area	Plant Health	Stock contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Inadequate and/or poor hygiene and sanitation of transport equipment and staff. Pathways and roads not adequately covered.	4	C	E	Serious impact on plants that may not be easily fixed which might occur at some time.	Regularly clean and disinfest transport equipment. Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4, 1.1.8 & 1.2.1 NIASA BMP). Cover pathways and roads adjacent to beds and benches with materials to reduce contamination from soil (dust) and water (refer 1.1.10 & 1.1.16 NIASA BMP).
	Quarantine	See 'Despatch"						
	Food Safety	Edible part of plants contaminated with food safety hazards (pathogens, glass, dust/dirt etc)	Inadequate and/or poor hygiene and sanitation of transport equipment and staff. Pathways and roads not adequately covered.	2	D	L	Minor contamination or food safety hazard which could occur at some time.	Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4 – 1.1.8 & 1.1.14 NIASA BMP). Cover pathways and roads adjacent to beds and benches.

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Detailing & Label (stacking, pruning etc)	Plant Health	Stock contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Inadequate and/or poor hygiene and sanitation of pruning equipment etc and staff.	4	C	E	Serious impact on plants that may not be easily fixed which might occur at some time.	Regularly clean and disinfest equipment. (Refer 1.1.13 NIASA BMP) Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4, 1.1.8 & 1.2.1 NIASA BMP).
	Quarantine	See 'Despatch"						
	Food Safety	Edible part of plants contaminated with food safety hazards (pathogens, glass, dust/dirt etc)	Inadequate and/or poor hygiene and sanitation of transport equipment and staff.	2	D	L	Minor contamination or food safety hazard which could occur at some time.	Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4 – 1.1.8 & 1.1.14 NIASA BMP).
Packaging	Plant Health	Stock contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Inadequate and/or poor hygiene and sanitation of packaging and staff.	4	C	E	Serious impact on plants that may not be easily fixed which might occur at some time.	Regularly check, clean and disinfest storage areas, packaging and staff (refer 1.1.4, 1.1.8, 1.1.13 & 1.2.1 NIASA BMP).
	Quarantine	See 'Despatch"						
	Food Safety	Edible part of plants contaminated with food safety hazards (pathogens, glass, dust/dirt etc)	Inadequate and/or poor hygiene and sanitation of transport equipment and staff.	2	D	L	Minor contamination or food safety hazard which could occur at some time.	Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4 – 1.1.8 & 1.1.14 NIASA BMP).

HAZARD ANALYSIS REPORT (CONTAINER PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Despatch	Plant Health	Nil						
	Quarantine	Quarantine requirements of importing authority (Area/Region, State or Country) not met. i.e. product infested or contaminated with quarantine pest or disease. Incorrect or incomplete documentation (phytosanitary or plant health certificate).	Stock contaminated with quarantine pests or diseases.	4	C	E	Serious quarantine risk detected that could occur some time.	If relevant, maintain vigilance to prevent quarantine pests or pathogens harbouring on the property or infesting plants, growing media, containers or packaging. Determine importing authorities quarantine requirements for product(s) to be despatched Inspect or test plants before despatch for signs of quarantine pests and diseases. Treat product for quarantine pests and diseases as required. Prepare documentation as required. If required hold plants in outgoing quarantine area and monitor for signs of pests and disease before despatch (refer 1.1.11 NIASA BMP).
	Food Safety	Nil						

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Sourcing Growing Media Components or Prepared Media	Source material contaminated with pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds) (refer 1.1 & 1.1.2 NIASA BMP).	Source media and media components from approved suppliers that have the ability to supply and transport media that is free from plant pathogens & pests (refer Appendix 1 NIASA BMP) and meets quality requirements. Sample and test all media	CCP	All growing media shall be practically free from pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds)	Who: Authorised Person **What**: (A)Check approved supplier status for all growing media supplied. (B) Sample, inspect or test in coming media. **When**: (A) At receival or before use of any growing media. (B) At delivery or before use. **Where**: Nursery. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Review/cancel/suspend approved supplier's status or seek growing media from another approved source. (B) Treat, reinspect and use or reject. **When**: (A) At delivery or before use. (B) Before use. **Where**: Nursery. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Record (or suppliers invoice).
	Source material not meeting nursery quality specifications	Sample and test media and media components at delivery or before use (refer Appendix 2 section A2 NIASA BMP).	CCP	Growing media or component quality meets nursery specifications (pH and EC)			Growing media quality record.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Sourcing Growing Media Components or Prepared Media (cont.)	Source material contaminated with known quarantine pests (such as Red Imported Fire Ant, silver Leaf White Fly or Western Flower Thrips) or pathogens.	Source media and media components from approved suppliers that have the ability to supply and transport media that is free from known quarantine pests or pathogens.	CQP	All growing media shall be practically free from known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or plant pathogens.	Who: Authorised Person **What:** (A) Check approved supplier status for all growing media supplied. (B) Sample, inspect or test in coming media. **When:** (A) At receival or before use of any growing media. (B) At delivery or prior to use. **Where**: Nursery. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What:** (A) Review/cancel/suspend approved supplier's status or seek growing media from another approved source. (B) Treat, reinspect and use or reject. **When:** (A) At delivery or before use. (B) Before use. **Where**: Nursery. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Record (or suppliers invoice).
Composting *Note: Refer to Growing Media system HACCP Plan for details on this step.*							

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Prepare/ Store Media	Media cross contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Regularly clean and disinfest equipment and facilities used to prepare and store media (refer 1.1.4, 1.1.5, 1.1.12 & 1.2.1 NIASA BMP). Exclude runoff water, contaminated, untreated soil and other materials or items that may cause contamination of media storage areas (refer Appendix 3 NIASA BMP).	CCP	(A) Full compliance with Appendix 1 Section A.1.2 NIASA BMP. (B) Full compliance with Appendix 1 section A.1.5 NIASA BMP.	**Who**: Authorised Person. **What**: Conduct inspection of media preparation/storage facilities. **When**: Daily or as required. **Where**: Media preparation/storage facilities. **How**: Documentation, inspection and testing	**Who**: Authorised Person. **What**: Identify non-complying facilities and treat, reinspect facilities. **When**: At time of non-compliance. **Where**: Nursery. **How**: **Document remedial and corrective action.**	Cleaning and Sanitation Work Procedure. Corrective Action Report.
Sterilise/ Pasteurise Media	Media contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Treat media and media components adequately using an approved method (refer Appendix 3 NIASA BMP).	CCP	Full compliance with Appendix 3 NIASA BMP.	**Who**: Authorised Person. **What**: Conduct inspection of media treatment and/or sample treated media. **When**: Each treatment or as required. **Where**: Nursery. **How**: Visual inspection and documentation.	**Who**: Authorised Person. **What**: Identify non – complying media and re-treat or reject. **When**: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Growing Media Disinfestation Record. Sterilisation &/or pasteurisation Work Procedure. Corrective Action Report.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Source/Store Propagation/ Planting Containers	Containers contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Source containers from approved suppliers that have the ability to supply containers that are free from pathogens and other pests (insects & weed seeds). Store new and clean, disinfected containers above ground level (refer 1.1.15 NIASA BMP). Clean and treat used containers to eliminate contamination of plant pathogens and other pests (insects & weed seeds) (refer 1.1.15 NIASA BMP). Regularly control weeds in & around container storage facilities (refer 1.2.1 NIASA BMP).	CCP	All new containers stored in an above ground clean environment. Used containers treated in a fresh 0.4% hypochlorite solution for at least 20 mins or other approved method. All containers inspected for cleanliness before use. Weeds controlled in & around container storage facilities.	**Who**: Authorised Person. **What**: Check treatment of containers. **When**: At time of treatment. **Where**: Treatment facility. **How**: Inspection and documentation.	**Who**: Authorised Person. **What**: Identify non-complying containers and reject. **When**: At time of non-compliance. **Where**: Nursery. **How: Document remedial and corrective action.**	Sterilisation &/or pasteurisation Work Procedure. Corrective Action Report.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Source/Store Propagation/ Planting Containers (cont.)	Containers contaminated with known quarantine pests (such as Red Imported Fire Ant, silver Leaf White Fly or Western Flower Thrips) or plant pathogens	Containers sourced from approved supplier that has the ability to supply and transport containers that are free from known quarantine pests or pathogens.	CQP	All propagation/ planting containers shall be practically free from known quarantine pests and plant pathogens	Who: Authorised Person **What**: (A) Check approved supplier status for all delivered containers supplied. (B) Inspect all containers. **When**: (A) At receival or before use of any containers. (B) At delivery or prior to use. **Where**: Nursery. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Review/cancel/suspend approved supplier's status or seek containers from another approved source. (B) Treat, reinspect and use or reject. **When**: (A) At delivery or before use. (B) Before use. **Where**: Nursery. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Record.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Fill Propagation/ Planting containers with Media	Media and Containers contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Regularly clean and disinfest potting facilities and equipment (refer 1.1.4, 1.1.5, 1.1.12 & 1.2.1 NIASA BMP). Regularly clean up and discard spilt media around potting facilities (refer 1.1.9 & 1.1.12 NIASA BMP). Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4 – 1.1.8 1.1.14 7 Appendix 8 NIASA BMP). Used containers must be reasonably clean & disinfected using an approved method before reuse (refer 1.1.15 NIASA BMP).	CCP	Full compliance with Sections 1.1.4 – 1.1.15 & 1.2.1 NIASA BMP.	**Who**: Authorised Person. **What**: Conduct inspection of media, containers and potting facilities. **When**: Daily when potting. **Where**: Potting facilities. **How**: Documentation, inspection and testing	**Who**: Authorised Person. **What**: Identify non-complying media, containers and facilities treat, reinspect or reject media, containers and facilities. **When**: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Add Fertiliser	Poor or slow plant growth.	Provide plants with correct amounts of appropriate nutrients to ensure good plant growth and longevity until supplied to the customer (refer 2.5 NIASA BMP). Implement and maintain plant growth practices that minimise nutrient leaching (refer 2.5 NIASA BMP).	CCP	Correct fertiliser type and quantity to ensure healthy growth.	**Who**: Authorised Person. **What**: Check fertilise type and quality. **When**: At application. **Where**: Nursery. **How**: Visual inspection.	**Who**: Authorised Person. **What**: Apply or reapply correct type and/or amount of fertiliser. **When**: At time of non-compliance. **Where**: Nursery. **How**: Applying fertiliser.	Growing Media Specification. Fertiliser Application Procedure. Corrective Action Report.
Source/Store Propagation Stock	Plants and propagules contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Source plants and propagules from approved suppliers able to supply material free from plant pathogens and other pests (insects & weed seeds). If required hold and monitor plants and propagules in designated quarantine area (refer 1.1.11 NIASA). Source propagules from motherstock free from plant pathogens & other pests (refer 1.1.3 NIASA). Treat propagules with registered pesticides if required.	CCP	All stock shall be practically free from pathogens i.e. *Phytophthora spp.*, *Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds).	**Who**: Authorised Person **What**: (A) Check approved supplier status for all stock supplied. (B) Sample, inspect or test stock. **When**: (A) At recieval or before use of any stock. (B) At delivery or before use. **Where**: Nursery. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Review/cancel/suspend approved supplier's status or seek stock from another approved source. (B) Treat, reinspect and use or reject. **When**: (A) At delivery or before use. (B) Before use. **Where**: Nursery. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Sheet. Pesticide Application Record. Corrective Action Report.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Source/Store Propagation Stock (cont.)	Containers, plants & plant propagules contaminated with known quarantine pests (such as Red Imported Fire Ant, silver Leaf White Fly or Western Flower Thrips) or plant pathogens.	Source plants from approved suppliers that have the ability to supply and transport plants that are free from known quarantine pests and diseases. If required hold plants in quarantine area and monitor for signs of pests and disease (refer 1.1.11 NIASA BMP). Treat propagules with registered pesticides if required.	CQP	All stock shall be practically free from known quarantine pests (such as Red Imported Fire Ant, silver Leaf White Fly or Western Flower Thrips) or plant pathogens.	Who: Authorised Person **What**: (A) Check approved supplier status for all stock supplied. (B) Sample, inspect or test in stock. (C) Check that ICA or quarantine documents accompany delivery. **When**: (A) At receival or before use of any stock. (B) At delivery or before use. **Where**: Nursery. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Review/cancel/suspend approved supplier's status or seek stock from another approved source. (B) Treat, reinspect and use or reject. **When**: (A) At delivery or before use. (B) Before use. **Where**: Nursery. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Sheet. Pesticide Application Record ICA or quarantine records. Corrective Action Report.
Planting (Seeds, plugs, tube stock etc)	Planting stock & propagules contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Regularly clean and disinfest potting facilities and equipment (refer 1.1.4, 1.1.5, 1.1.12 & 1.2.1 NIASA BMP). Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4 – 1.1.8 & 1.1.14 NIASA BMP).	CCP	Full compliance with Sections 1.1.4 – 1.1.15 & 1.2.1 NIASA BMP.	**Who**: Authorised Person. **What**: Conduct inspection of plant stock and planting facilities. **When**: Daily when potting. **Where**: Potting facilities. **How**: Observe, question and document.	**Who**: Authorised Person. **What**: Identify non-complying plant stock and reject and/or clean facilities. **When**: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Source/Store Growing Additives	Additives contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Source growing additives from approved suppliers that have the ability to supply and transport materials that are free from plant pathogens and pests (refer Appendix 1 NIASA BMP). Regularly clean and disinfest storage facilities and equipment (refer 1.1.4, 1.1.5 & 1.2.1 NIASA BMP). Exclude runoff water, soil and other materials or items that may cause contamination of storage areas (refer Appendix 3 NIASA BMP).	CCP	All media additives shall be practically free from pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds) (B) Full compliance with Sections 1.1.4 – 1.1.15 & 1.2.1 NIASA BMP.	**What**: (A) Check approved supplier status for all additives supplied. (B) Sample, inspect or test additives. **When**: (A) At receival or before use of any stock. (B) Daily when potting. **Where**: Potting facilities. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Review/cancel/suspend approved supplier's status or seek stock from another approved source. (B) Treat, reinspect and use, or reject. **When**: (A) At delivery or before use. (B) Before use. **Where**: Potting facilities. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Sheet. Corrective Action Report.
Irrigation	Stock contaminated with plant pathogens as described above (refer 1.1.1 NIASA BMP).	Check and, if required, treat water sourced and stored from areas that could cause contamination by plant pathogens (refer 1.1.1, 2.1 & Appendix 4 NIASA BMP).	CCP	All irrigation or fertigation water shall be free from plant pathogens and other pests (insects & weed seeds)	**Who**: Authorised Person. **What**: Conduct inspection or test of water source. **When**: Monthly. **Where**: Nursery. **How**: Documentation, inspection and testing.	**Who**: Authorised Person. **What**: Identify non-compiling water and reject and/or treat. **When**: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Water Disinfestation Record. Corrective Action Report.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Irrigation	Poor or slow plant growth.	Efficiently supply plants with water to ensure good plant growth until supplied to the customer, but minimise nutrient loss from drainage (refer 2.5 & Appendix 4 NIASA BMP). Use plant growth practices that reduce loss of water (refer 2.5 & Appendix 4 NIASA BMP). Regularly check water source for pH, EC and other quality factors as appropriate. Treat as needed (refer 2.1 NIASA BMP)	CCP	Plants shall be supplied with water to ensure good plant growth and maintain leaching fraction between 12-20%.	**Who**: Authorised Person. **What**: Check watering system, water quality at source, leaching fraction and plant health/growth. **When**: At application and during growth. **Where**: Water source & Nursery. **How**: Visual inspection & water testing.	**Who**: Authorised Person. **What**: Adjust or readjust water quantities applied. **When**: As required. **Where**: Nursery. **How**: Applying water through irrigation system. Treat water if required.	Irrigation Water Quality Record Corrective Action Report.
Irrigation	Edible parts of plants contaminated with human pathogens.	If growing edible plant parts, check and treat (if required) water sourced and stored from areas that could cause contamination by food safety pathogens (refer 1.1.1, 2.1 & Appendix 4 NIASA BMP, "Managing water in plant nurseries' NSW Agriculture).	CSP	Effective water disinfestation treatment (refer 1.1.1 NIASA BMP & "Managing water in plant nurseries' NSW Agriculture).	**Who**: Authorised Person. **What**: Check water for disinfestation effectiveness. **When**: At application and during growth. **Where**: Water source & Nursery. **How**: Water testing, check treatment process.	**Who**: Authorised Person. **What**: Review disinfestation process & re-treat water. **When**: As required. **Where**: Nursery. **How**: Review treatment and treat water if required.	Water Disinfestation Record. Corrective Action Report.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Fertigation/ Top Dress	Stock contaminated with pathogens as described above (refer 1.1.1 NIASA BMP).	Source and store fertilisers used to fertigate and top dress in a way that prevents contamination by plant pathogens (refer 1.1.1, 2.1 & Appendix 4 NIASA BMP).	CCP	Fertilisers used to fertigate and top dress shall be practically free from pathogens and other pests (insects & weed seeds)	**Who**: Authorised Person. **What**: Conduct inspection or test of fertilisers and storage area. **When**: Monthly or as required. **Where**: Nursery. **How**: Documentation, inspection and testing.	**Who**: Authorised Person. **What**: Identify non-complying fertiliser and reject and/or treat. **When**: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Approved Supplier Register. Corrective Action Report.
	Poor or slow plant growth.	Supply plants with correct amounts of appropriate nutrients to ensure good plant growth until supplied to the customer (refer 2.5 & Appendix 4 NIASA BMP). Check all growing media for pH and EC at delivery or before use (refer 2.5 & Appendix 4 NIASA BMP).	CCP	Apply correct fertiliser type and quantity to ensure healthy plant growth. Growing media meets customer specifications for pH & EC	**Who**: Authorised Person. **What**: (A) Check plants for symptoms of nutrient deficiency or toxicity, and growth. (B) Check growing media for pH and EC at delivery or before use. (C) Check in-field growing media for EC & pH **When**: (A) During growth cycle. (B) At delivery or before use (C) During growth cycle. **Where**: Nursery. **How**: Visual inspection.	**Who**: Authorised Person. **What**: Review fertiliser program. Apply or reapply correct type and quantity of fertiliser. **When**: At time of non-compliance. **Where**: Nursery. **How**: Applying fertiliser.	Fertiliser Application procedure. Growing Media Quality Record. Corrective Action Report.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Pest, Disease & Weed Management	Stock destroyed or damaged by pests (disease, insects or animals and weeds).	Implement a pest management program (Integrated Pest Management where possible). (Refer 1.2.2, Appendix 7 NIASA BMP & Goodwin S et al 2002). Select and maintain appropriate pesticide application equipment (refer 1.2.4, Appendix 7 NIASA BMP & Centre for Pesticide Application & Safety(2002) CD Rom). Train staff responsible for implementation of the pest management program (refer 1.2.2 & Appendix 7 NIASA BMP).	CCP	All stock shall be practically free from insect pests, diseases, weeds and animals pests.	**Who**: Authorised Person **What**: (A) Check stock for signs of insect pests and beneficials, disease and weeds. (B) Check and calibrate pest application equipment **When**: (A) Weekly or more often as required. (B) Annually or as required **Where**: Nursery production areas. **How**: Visual inspection and actions.	**Who**: Authorised Person **What**: (A) Implement appropriate pest management actions. (B) Service & re-calibrate pest application equipment **When**: At time of non-compliance. **Where**: Nursery. **How**: Through pest management program.	IPM Crop Monitoring Records (refer Goodwin S et al (2002) Integrated Pest Management in Ornamentals: Information Guide, NSW Agriculture). Pesticide Application Record. Corrective Action Report. Calibration Schedule.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Pest, Disease & Weed Management (cont.)	Edible parts of plants contaminated with pesticide residues above Maximum Residue Limit (MRL). *Note: This hazard only applies to stock that may be consumed as food by humans and animals.*	Use pesticides in accordance with label directions. Select and maintain appropriate pesticide application equipment (refer 1.2.4 & Appendix 7 NIASA BMP). Train staff responsible for implementation of the pest management program (refer 1.2.2 & Appendix 7 NIASA BMP).	CSP	Only registered chemicals used. Chemicals applied in accordance with manufacturer's guidelines. Manufacturer's recommended withholding periods adhered to. No excessive MRL's on tested product.	**Who**: Authorised Person **What**: Check spray record for correct chemicals, mixing concentration and application rates. Check that withholding periods have been observed. **When**: Before transport to despatch area. **How**: Visual inspection of records. **Where**: Nursery.	**Who**: Authorised Person **What**: Isolate and dispose or re-direct nonconforming product. **When**: If nonconforming product is detected. **How**: Dump or re-direct product. **Where**: Nursery.	Pesticide Application Record. Corrective Action Report.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Germination & Growing	Poor or slow plant growth.	As necessary, construct wind breaks or other methods of wind/dust control to protect plants (refer 2.2 NIASA BMP). Establish and maintain lighting regimes in growing areas suited to the needs of the species. As necessary establish facilities to acclimatise plants to light level used by the customer (refer 2.3 NIASA BMP). As necessary and practicable establish and maintain a stable temperature environment for good plant growth (refer 2.2 NIASA BMP). Refer above to control measures for ***Irrigation/Fertigation*** (Incorrect supply of nutrients to the plant).	CCP	Correct environmental conditions with an appropriate supply of light, moisture heat and nutrients to ensure healthy growth.	**Who**: Authorised Person. **What**: Check levels of light, heat, nutrients and wind damage. **When**: Daily or as required. **Where**: Nursery production area. **How**: Visual inspection.	**Who**: Authorised Person. **What**: Apply or reapply correct type and amount of light, heat and nutrients. Review wind control methods **When**: At time of non-compliance. **Where**: Nursery production area. **How**: Crop husbandry practices.	Corrective Action Report.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Germination & Growing (cont.)	Stock contaminated with pathogens as described above (refer 1.1.1 NIASA BMP).	Select suitable materials and sites for growing beds and benches that isolate plants from sources of plant pathogen contamination (refer 1.1.16 NIASA BMP).	CCP	All stock shall be free from pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds).	**Who**: Authorised Person **What**: (A) Check stock for signs of disease, pests and weeds. **When**: Weekly or more often as required. **Where**: Nursery production areas. **How**: Visual inspection and actions.	**Who**: Authorised Person **What**: (A) Implement appropriate pest management and hygiene actions. (B) Improve growing beds & benches **When**: At time of non-compliance. **Where**: Nursery. **How**: Through pest management program.	Corrective Action Report.
Re-pot	Media and containers contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Refer to control measures for *Fill Propagation/Planting containers with Media.* If required treat with registered fungicide	CCP	As above.	**Who**: Authorised Person **What**: (A) Check stock for signs of disease, pests and weeds. **When**: Weekly or more often as required. **Where**: Nursery production areas. **How**: Visual inspection and actions.	**Who**: Authorised Person **What**: Implement appropriate pest management, sanitation and hygiene to control pathogens & pests. **When**: At time of non-compliance. **Where**: Nursery. **How**: Through pest management program.	Cleaning and Sanitation Procedure IPM Crop Monitoring records (refer Goodwin S et al (2002) Pesticide Application Record. Corrective Action Report.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Transport to Despatch Area	Plant stock contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Regularly clean and disinfest transport equipment and staff (refer 1.1.4, 1.1.8 & 1.2.1 NIASA BMP). Cover pathways and roads adjacent to beds and benches with materials to reduce contamination with soil (dust) and water (refer 1.1.16 NIASA BMP).	CCP	As above.	**Who**: Authorised Person. **What**: Conduct inspection of transport, equipment and pathways/roads used to transport stock. **When: On-going** **Where**: Nursery. **How**: Visual inspection and document.	**Who**: Authorised Person. **What**: Identify non complying transport equipment and reject and/or clean. Repair pathways & roads. **When**: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.
Detailing & Label (stacking, pruning etc)	Stock contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Regularly clean and disinfest equipment and staff (refer 1.1.4, 1.1.8 & 1.2.1 NIASA BMP).	CCP	As above.	**Who**: Authorised Person. **What**: Inspect equipment used in detailing & labelling. **When**: Before use. **Where**: Nursery. **How**: Visual inspection and document.	**Who**: Authorised Person. **What**: Identify non-complying equipment, and reject and/or clean. **When**: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Packaging	Stock contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Regularly check, clean and disinfest storage areas and packaging. (refer 1.1.4, 1.1.8 & 1.2.1 NIASA BMP).	CCP	As above.	**Who**: Authorised Person. **What**: Conduct inspection of packaging and packaging equipment. **When**: Before use. **Where**: Nursery. **How**: Visual inspection.	**Who**: Authorised Person. **What**: Identify non-complying packaging or equipment, and reject and/or clean as required. **When**: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.

HACCP TABLE (CONTAINER PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Despatch	Quarantine requirements of importing authority (Area/Region, State or Country) not met. Ie. Product infested or contaminated with quarantine pest or disease. Incorrect or incomplete documentation (phytosanitary or plant health certificate).	Determine importing authorities quarantine requirements for product(s) to be despatched Inspect plants before despatch for signs of quarantine pests and diseases. Treat product for quarantine pests and diseases as required. Prepare required documentation as required. If required hold plants in quarantine area and monitor for signs of pests and disease before despatch (refer 1.1.11 NIASA BMP).	CQP	All products shall be free from quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens. All products shall be accompanied by correct and complete documentation.	**Who**: Authorised Person **What**: (A) Sample, inspect or test all out going product in accordance with the quarantine requirements of the importing authority. (B) Check all documentation is correct and complete. **When**: Before despatch. **Where**: Nursery. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Treat, reinspect and use or reject. (B) Amend &/or reissue incorrect or incomplete documentation. **When**: Before despatch. **Where**: Nursery. **How**: Inspection, testing and Documentation.	Materials Despatch Record or Invoice. Copies of relevant ICA or quarantine documents Corrective Action Report.

VERIFICATION AND VALIDATION SCHEDULE (CONTAINER PRODUCTION SYSTEM)

ACTIVITY	DESCRIPTION	FREQUENCY	RESPONSIBILITY	RECORDS
External audit of HACCP plan	Verify that activities comply with documented requirements. Identify areas of poor performance and opportunities for improvement.	At least annually	Authorised Person	Audit report Corrective Action Report
Microbial testing of plants and growing media	Test product and media for pathogens eg. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp.*	At least annually	Authorised Person	Analysis Report
Disinfestation system testing	Test water for effectiveness of disinfestation (eg chlorine, pH, filtration).	Monthly	Authorised Person	Water Disinfestation Report
Review hazards	HACCP team reviews hazards	Once/year or after changes	Authorised Person	Hazards Analysis Report & HACCP Tables
Validate critical limits	Check that critical limits are still appropriate.	Once/year	Authorised Person	Industry papers, NIASA Best Management Practices
Calibrate testing equipment	Ensure equipment is accurate.	As needed	Authorised Person	Calibration Schedule

HAZARD ANALYSIS REPORT (IN GROUND PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Source/Store Planting Stock	Plant Health	Source material is contaminated with pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds) (refer 1.1 & 1.1.2 NIASA BMP).	Inadequate and/or poor hygiene and sanitation of sourced stock.	4	C	E	Serious impact on plants that may not be easily fixed which might occur at some time.	Source plants from approved suppliers that have the ability to supply plants that are free from plant pathogens and other pests (insects & weed propagules). If required hold plants in quarantine area and monitor for signs of pests and disease (refer 1.1.11 NIASA BMP).
	Quarantine	Source material or containers contaminated with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens. *Note: This hazard analysis relates to hazards associated with the final product therefore further quarantine pests and diseases will not be addressed until the destination of the product is determined at the Despatch Step*	Inadequate or no management of quarantine pests in source stock or packaging.	4	C	E	Serious quarantine risk detected that could occur some time.	Source plants from approved suppliers that have the ability to supply and transport plants that are free from known quarantine pests and diseases. If required hold plants in quarantine area and monitor for signs of quarantine pests and diseases (refer 1.1.11 NIASA BMP).
	Food Safety	Nil						

HAZARD ANALYSIS REPORT (IN GROUND PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Source/Store Growing Additives (for example fertilisers and soil ameliorants)	Plant Health	Stock contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Additives contaminated with pathogens and other pests before delivery or during storage.	3	C	H	Moderate impact on plants, may be easily treated. Might occur sometimes.	Source growing additives from approved suppliers that have the ability to supply and transport additives that are free from pathogens (refer Appendix 1 NIASA BMP). Do not store in contact with infested soil. Regularly clean and disinfest storage facilities and equipment.
	Quarantine	N/A						
	Food Safety	Nil						
Prepare Site for Planting	Plant Health	Stock contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Ground contaminated with pathogens and other pests before planting.	3	C	H	Moderate impact on plants, may be easily treated. Might occur sometimes.	Only use areas tested free of soil-borne pathogens OR Disinfect contaminated sites with approved treatment. Prevent off-site water entering production area. Prepare site for good drainage. Use raised beds where soil type does not allow good drainage. Restrict vehicle and animal access to the site. Rotate production areas. (Refer 1.1.17,Appendix 2 & in-ground prodn App NIASA BMP).
	Quarantine	N/A						
	Food Safety	Nil						

HAZARD ANALYSIS REPORT (IN GROUND PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Plant Stock	Plant Health	Stock contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Inadequate and/or poor hygiene and sanitation of facilities and staff.	3	C	H	Moderate impact on plants, may be easily treated. Might occur sometimes.	Regularly clean and disinfest planting equipment. Staff regularly wash hands and maintain good hygiene practices (refer 1.1.14 NIASA BMP).
	Quarantine	N/A						
	Food Safety	Nil						
Irrigation	Plant Health	Stock contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Water supply contaminated with pathogens or other pests.	4	C	E	Major impact on plants, may be easily treated. Might occur sometimes.	Check and treat water sourced and stored from areas that could cause contamination by plant pathogens. Refer 1.1.1 & in-ground prodn App NIASA BMP, Rolfe et al (2000).
		Poor or slow plant growth.	Poor quality water Inadequate supply and distribution of water to plants.	3	C	H	Moderate impact on plants, may be easily treated. Might occur sometimes.	Check & treat (if required) water quality. Refer Rolfe et al (2000). Supply adequate amounts of water to plants to ensure good plant growth until supplied to the customer Select a suitable irrigation system and regularly maintain it. (Refer 2.1 NIASA BMP, Rolfe et al (2000)
	Quarantine	N/A						

HAZARD ANALYSIS REPORT (IN GROUND PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Irrigation (cont).	Food Safety	Edible parts of plants contaminated with human pathogens	Water supply contaminated with pathogens affecting humans (refer Nursery Papers 2001/5).	4	D	H	Minor contamination or food safety hazard that could occur at some time.	If growing edible plant parts, check and treat (if required) water sourced and stored from areas that could cause contamination by food safety pathogens.
Pest, Disease & Weed Management	Plant Health	Stock destroyed or damaged by disease, pests insects or animals and weeds).	Ineffective, or absence of a, pest, disease and weed management program.	5	C	E	Serious impact on plants that may not be easily fixed which might occur at some time.	Implement a pest management program (Integrated Pest Management) where possible (refer 1.2, App 7 & in-ground prodn App NIASA BMP, Centre for Pesticide Application & Safety [2002]). Select and maintain appropriate pesticide application equipment (refer 1.2.4 NIASA BMP, Centre for Pesticide Application & Safety [2002]). Train staff responsible for implementation of the pest management program (refer 1.2.4 NIASA BMP, Centre for Pesticide Application & Safety [2002]).
	Quarantine	N/A						

HAZARD ANALYSIS REPORT (IN GROUND PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Pest, Disease & Weed Management (cont).	Food Safety	Edible parts of plants contaminated with pesticides above Maximum Residue Limit (MRL).	Pesticides not used in accordance with label directions.	3	C	H	Could cause illness or injury and legal prosecution.	Use pesticides in accordance with label directions. Select and maintain appropriate pesticide application equipment Train staff responsible for implementation of the pest management program. Refer 1.2 NIASA BMP, Centre for Pesticide Application & Safety (2002)

HAZARD ANALYSIS REPORT (IN GROUND PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Growing	Plant Health	Poor or slow plant growth.	Damage to plant by wind or dust. Incorrect supply of nutrients to the plant. Inappropriate light levels. Poor soil conditions	4	C	E	Serious impact on plants that may not be easily fixed which might occur at some time.	As necessary, construct wind breaks or other methods of wind/dust control to protect plants (refer 2.2 & in-ground prodn App NIASA BMP). Select and apply quantities and type of fertiliser to meet plant needs (refer 2.5 NIASA BMP). As necessary acclimatise plants to light level used by the customer (refer 2.3 NIASA BMP). As necessary and practicable establish and maintain a stable temperature environment for good plant growth (refer 2.4 NIASA BMP). Take measures to improve and maintain good soil structure. Avoid saline or sodic soils or soils with other conditions detrimental to plant growth that are difficult to remedy.

HAZARD ANALYSIS REPORT (IN GROUND PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Growing (cont.)	Plant Health	Stock contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Poor drainage and soil brought in on vehicles and animals. Dump sites containing waste vegetation harbouring pathogens & pests, and contaminating production area	4	C	E	Serious impact on plants that may not be easily fixed which might occur at some time.	Regularly maintain drains. Restrict vehicle and animal access to the growing area (refer 1.1.17 NIASA BMP) Bury, burn or remove all waste vegetation from production site. Ensure dump sites cannot contaminate production areas (refer in-ground App NIASA BMP).
	Quarantine	N/A						
	Food Safety	Edible plant parts contaminated with human pathogens.	Inadequate and/or poor staff hygiene and sanitation. Use of raw animal manures	2	D	L	Minor contamination or food safety hazard which could occur at some time.	Staff regularly maintain good hygiene practices (refer 1.1.4 – 1.1.8 1, 1.14 & Appendix 8 NIASA BMP). Avoid use of raw animal manures.
Prepare Site for Harvest	Plant Health	Stock contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Inadequate and/or poor hygiene and sanitation of equipment and staff.	3	C	H	Moderate impact on plants, may not be easily treated. Might occur sometimes.	Staff regularly maintain and sanitise equipment and practice good hygiene (refer 1.1.4 – 1.1.8 1.1.14 & Appendix 8 NIASA BMP).
		Poor or slow plant growth.	Plant damaged during site preparation.	3	C	H	Moderate impact on plants, may not be easily treated. Might occur sometimes.	Select suitable equipment and methods for harvesting. Train staff to avoid plant damage.
	Quarantine	N/A						
	Food Safety	Nil						

HAZARD ANALYSIS REPORT (IN GROUND PRODUCTION SYSTEM

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Harvest	Plant Health	Stock contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Inadequate and/or poor hygiene and sanitation of equipment and staff. Unused crop material harbouring pathogens and pests.	3	C	H	Moderate impact on plants, may not be easily treated. Might occur sometimes.	Staff regularly maintain and sanitise equipment and practice good hygiene practices (refer 1.1.4 – 1.1.8 1.1.14 & Appendix 8 NIASA BMP). Remove all unused crop material at harvest. (Refer in-ground prodn App NIASA BMP).
		Poor or slow plant growth.	Plants damaged during harvest.	3	C	H	Moderate impact on plants, may not be easily treated. Might occur sometimes.	Select suitable equipment and methods for harvesting. Use suitable harvesting procedures and train staff to avoid plant damage
	Quarantine	N/A						
	Food Safety	Edible plant parts contaminated with human pathogens.	Inadequate and/or poor staff hygiene and sanitation.	2	D	L	Minor contamination or food safety hazard that is unlikely.	Staff regularly maintain good hygiene practices practices (refer 1.1.4 – 1.1.8 1.1.14 & Appendix 8 NIASA BMP).

HAZARD ANALYSIS REPORT (IN GROUND PRODUCTION SYSTEM)

Transport to Despatch Area	Plant Health	Stock contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Inadequate and/or poor hygiene and sanitation of transport equipment and staff. Plant pathogen-infected soil from roads contaminate harvested plants.	4	C	E	Serious impact on plants that may not be easily fixed which might occur at some time.	Regularly clean and disinfest transport equipment. Refer 1.1.7 NIASA BMP). Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4 – 1.1.8 1.1.14 & Appendix 8 NIASA BMP). Cover pathways and roads with materials to reduce contamination of plants with soil (dust) and water (refer 1.1.10 NIASA BMP).
	Quarantine	N/A						
	Food Safety	Edible plant parts contaminated with human pathogens	Inadequate and/or poor hygiene and sanitation of transport equipment and staff. Pathways and roads not adequately covered.	2	D	L	Minor contamination or food safety hazard that is unlikely.	Regularly clean and disinfest transport equipment. Refer 1.1.7 NIASA BMP). Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4 – 1.1.8 1.1.14 & Appendix 8 NIASA BMP). Cover pathways and roads with materials to reduce contamination of plants with human pathogens

HAZARD ANALYSIS REPORT (IN GROUND PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like ratin g	Level of Sig	Reason for Significance	Control Measure
Detail, Pack & Label (stacking, pruning, root balling etc)	Plant Health	Stock contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Inadequate and/or poor hygiene and sanitation of equipment, staff and handling/storage areas. Balling sawdust contaminated. Contaminated water used for washing & preparing root balls.	4	C	E	Serious impact on plants that may not be easily fixed which might occur at some time.	Regularly clean and disinfest handling area, equipment and balling material storage area. Balling material storage area sealed and well-drained (Refer 1.1.4-1.1.6 & in-ground prodn App NIASA BMP) Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4 – 1.1.8 1.1.14 & Appendix 8 NIASA BMP). Check and treat (if required) water used for washing & preparing root balls (Refer in-ground prodn App NIASA BMP)
	Quarantine	N/A						
	Food Safety	Stock contaminated with human pathogens or physical hazard (dust/dirt etc)	Inadequate and/or poor hygiene and sanitation of equipment and staff.	2	D	L	Minor contamination or food safety hazard that could occur sometimes.	Regularly clean & disinfest equipment (Refer 1.1.4-1.1.6 NIASA BMP) Staff regularly wash hands and maintain good hygiene practices (refer 1.1.4 – 1.1.8 1.1.14 & Appendix 8 NIASA BMP).

HAZARD ANALYSIS REPORT (IN GROUND PRODUCTION SYSTEM)

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Despatch	Plant Health	Stock contaminated with plant pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Inadequate and/or poor hygiene and sanitation of equipment and staff.	4	C	E	Serious impact on plants that may not be easily fixed which might occur at some time	Handling areas sealed and well drained. Regularly clean and disinfest handling area and equipment. Staff regularly wash hands and maintain good hygiene practices. Refer 1.1.4 – 1.1.8, 1.14, Appendix 8 and in-ground prodn App NIASA BMP).
	Quarantine	Quarantine requirements of importing authority (Area/Region, State or Country) not met. i.e. product infested or contaminated with quarantine pest or disease. Incorrect or incomplete documentation (phytosanitary or plant health certificate).	Stock contaminated with quarantine pests or diseases.	4	C	E	Serious quarantine risk that could occur sometimes.	Determine importing authorities quarantine requirements for product(s) to be despatched. Inspect plants before despatch for signs of quarantine pests and diseases. Treat product for quarantine pests and diseases as required. Prepare required documentation as required. If required hold plants in quarantine area and monitor for signs of pests and disease before despatch
	Food Safety	Nil						

HACCP TABLE (IN GROUND PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Source/Store Stock	Source plants & plant propagules contaminated with plant pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds) (refer 1.1 & 1.1.2 NIASA BMP).	Source plant stock from approved suppliers that have the ability to supply materials free from plant pathogens and other pests (insects & weed propagules). If required hold plants in quarantine area and monitor for signs of pests and disease (refer 1.1.11 NIASA BMP).	CCP	All stock shall be practically free from pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed propagules).	**Who**: Authorised Person **What**: (A) Check approved supplier status for all stock supplied. (B) Sample, inspect or test incoming stock. **When**: (A) At receival or before use of any stock. (B) At delivery or before use. **Where**: Nursery. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Review/cancel/suspend approved supplier's status or seek stock from another approved source. (B) Treat, reinspect and use or reject. **When**: (A) At delivery or before use. (B) Before use. **Where**: Nursery. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Record. Corrective Action Report.

HACCP TABLE (IN GROUND PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Source/Store Stock (cont.)	Source material or containers contaminated with known quarantine pests (such as Red Imported Fire Ant, silver Leaf White Fly or Western Flower Thrips) or diseases.	Source stock from approved suppliers that have the ability to supply and transport plants that are free from known quarantine pests and diseases. If required hold stock in quarantine area and monitor for signs of quarantine pests and diseases (refer 1.1.11 NIASA BMP).	CQP	All stock shall be practically free from known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or diseases.	**Who**: Authorised Person **What**: (A) Check approved supplier status for all stock supplied. (B) Sample, inspect or test stock. **When**: (A) At receival or before use of any stock. (B) At delivery or before use. **Where**: Nursery. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Review/cancel/suspend approved supplier's status or seek stock from another approved source. (B) Treat, reinspect and use or reject. **When**: (A) At delivery or before use. (B) Before use. **Where**: Nursery. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Record. Corrective Action Report.

HACCP TABLE (IN GROUND PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Source/Store Growing Additives (for example fertilisers and soil ameliorants)	Additives contaminated with pathogens and other pests as described above.	Source growing additives from approved suppliers that have the ability to supply and transport additives that are free from pathogens and other pests (refer Appendix 1 NIASA BMP). Do not store in contact with infested soil. Regularly clean and disinfest storage facilities and equipment.	CCP	All growing additives shall be practically free from pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds)	**What**: (A) Check approved supplier status for all additives supplied. (B) Sample, inspect or test additives and storage conditions. **When**: At receival or before use. **Where**: Nursery. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Review/cancel/suspend approved supplier's status or seek stock from another approved source. (B) Treat, reinspect and use or reject additives. Improve storage area conditions & sanitation. **When**: (A) At delivery or before use. (B) Before use. **Where**: Nursery. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Record. Corrective Action Report.

HACCP TABLE (IN GROUND PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Prepare Site for Planting	Stock contaminated with pathogens and other pests as described above.	Only use areas tested free of soil-borne pathogens OR Disinfect contaminated sites with approved treatment. Prevent off-site water entering production area. Prepare site for good drainage. Use raised beds where soil type does not allow good drainage. Restrict vehicle and animal access to the site. Rotate production areas. (Refer 1.1.17,Appendix 2 & in-ground prodn App NIASA BMP).	CCP	All stock shall be practically free from pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds)	**What:** (A) Sample, inspect or test soil at site for pathogens and drainage. **When**: Before preparation for planting. **Where**: Nursery. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: Treat site, retest & use if free of pathogens, or select a new pathogen-free site. Improve drainage if inadequate. **When:** Before using site. **Where**: Nursery. **How**: Documentation, inspection and testing.	Soil Pathogen Testing & Disinfestation Record Corrective Action Sheet
Planting Stock	Stock contaminated with pathogens and other pests as described above.	Regularly clean and disinfest planting equipment. Staff regularly maintain good hygiene practices (refer 1.1.4 – 1.1.8, 1.14 & Appendix 8 NIASA BMP).	CCP	Full compliance with 1.1.4 – 1.1.8, 1.14 & Appendix 8 NIASA BMP.	**Who**: Authorised Person. **What**: Conduct inspection of plant stock, planting equipment and staff hygeine. **When**: Before planting. **Where**: Nursery. **How**: Observe, question and document.	**Who**: Authorised Person. **What**: Identify non – complying plant stock and reject. Re-clean and sanitise equipment. Retrain staff. **When**: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.

HACCP TABLE (IN GROUND PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Irrigation	Stock contaminated with pathogens and other pests as described above	Check and treat water sourced and stored from areas that could cause contamination by plant pathogens and other pests. Refer 1.1.1 NIASA BMP, Rolfe et al (2000).	CCP	All irrigation water shall be practically free from pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds)	**Who**: Authorised Person. **What**: Regularly test water source. **When**: At least monthly. **Where**: Nursery. **How**: Documentation, inspection and testing.	**Who**: Authorised Person. **What**: Identify non-complying water and treat. **When**: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Irrigation Water Quality Record Water Disinfestation Record. Corrective Action Report.
	Poor or slow plant growth.	Check & treat (if required) water quality. Refer Rolfe et al (2000). Supply adequate amounts of water to plants to ensure good plant growth until supplied to the customer Select a suitable irrigation system and regularly maintain it. (Refer 2.1 NIASA BMP, Rolfe et al (2000)	CCP	Plants shall be supplied with correct amount of suitable quality water that ensures good plant growth.	**Who**: Authorised Person. **What**: (A) Check soil moisture levels, irrigation system and plant health/growth. (B) Check water quality **When**: (A) At application and during growth. (B) At least monthly **Where**: Nursery. **How**: Visual inspection.	**Who**: Authorised Person. **What**: (A) Apply or reapply water, maintain irrigation system. (B) Treat water supply **When**: As required. **Where**: Nursery. **How**: Applying water through irrigation system.	Corrective Action Report.

HACCP TABLE (IN GROUND PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Irrigation (cont)	Edible parts of plants contaminated with human pathogens	If growing edible plant parts, check and treat (if required) water sourced and stored from areas that could cause contamination by food safety pathogens (refer 1.1.1, 2.1, Appendix 4 NIASA BMP & "Managing water in plant nurseries' NSW Agriculture).	CSP	Effective water disinfestation treatment (refer 1.1.1 NIASA BMP & "Managing water in plant nurseries' NSW Agriculture).	**Who**: Authorised Person. **What**: Check water for disinfestation effectiveness. **When**: If edible plant parts grown, check regularly during growth. **Where**: Water source & Nursery. **How**: Water testing, check treatment process.	**Who**: Authorised Person. **What**: Review disinfestation process & re-treat water. **When**: As required. **Where**: Nursery. **How**: Review treatment and treat water if required.	Water Disinfestation Record

HACCP TABLE (IN GROUND PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Pest, Disease & Weed Management	Stock destroyed or damaged by pests (diseases, insects, animals and weeds).	Implement a suitable pest management program (Integrated Pest Management) where possible (refer 1.2 & App 7 NIASA BMP, CPAS [2002]) CD ROM.) Select and maintain appropriate pesticide application equipment (refer 1.2.4 NIASA BMP). Train staff responsible for implementation of the pest management program (refer 1.2.4 NIASA BMP).	CCP	All plant stock shall be practically free from harmful diseases, insects, weeds or animals, or damage caused by them.	**Who**: Authorised Person **What**: Check stock for signs of pests, disease and weeds, or damage from animals. **When**: Weekly or more often as required. **Where**: Nursery production areas. **How**: Visual inspection and actions.	**Who**: Authorised Person **What**: Implement appropriate pest management actions. **When**: At time of non-compliance. **Where**: Nursery. **How**: Through pest management program.	Pesticide Application Record. IPM record sheets (refer Goodwin S et al (2002) Integrated Pest Management in Ornamentals: Information Guide, NSW Agriculture). Corrective Action Report.
	Edible parts of plants contaminated with pesticides above Maximum Residue Limit (MRL). *Note: This hazard only applies to stock that may be consumed as food by humans and animals.*	Use pesticides in accordance with label directions. Select and maintain appropriate pesticide application equipment Train staff responsible for implementation of the pest management program. Refer 1.2 NIASA BMP, CPAS [2002]) CD ROM.	CSP	Only registered or approved chemicals used. Chemicals applied according to manufacturer's guidelines. Manufacturer's recommended withholding periods adhered to. No excessive MRL's on tested product.	**Who**: Authorised Person **What**: Check spray records for correct chemicals and rates of concentration and application. Check withholding periods have been maintained. **When**: Before transport to despatch area. **How**: Visual inspection of records. **Where**: Nursery.	**Who**: Authorised Person **What**: Isolate and dispose or re-direct nonconforming product. **When**: If nonconforming product is detected. **How**: Dump or re-direct product. **Where**: Nursery.	Pesticide Application Record. Corrective Action Report.

HACCP TABLE (IN GROUND PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Growing	Poor or slow plant growth.	As necessary, construct wind breaks or other methods of wind/dust control to protect plants (refer 2.2 & in-ground prodn App NIASA BMP). Select and apply quantities and type of fertiliser to meet plant needs (refer 2.5 NIASA BMP). As necessary acclimatise plants to light level used by the customer (refer 2.3 NIASA BMP). As necessary and practicable establish and maintain a stable temperature environment for good plant growth (refer 2.4 NIASA BMP). Take measures to improve and maintain good soil structure. Avoid saline or sodic soils or soils with other conditions detrimental to plant growth that are difficult to remedy.	CCP	Correct environmental conditions with a suitable supply of light, moisture, heat and nutrients to ensure healthy growth. Soil conditions suitable for good plant growth	**Who**: Authorised Person. **What**: Check levels of light, heat and nutrients. Check plant growth. **When**: Daily or as required. **Where**: Nursery production area. **How**: Visual inspection.	**Who**: Authorised Person. **What**: Apply or reapply correct type and amount of nutrients. Adjust light and heat as required. **When**: At time of non-compliance. **Where**: Nursery production area. **How**: Crop husbandry practices.	Corrective Action Report.

HACCP TABLE (IN GROUND PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Growing (cont.)	Stock contaminated with pathogens as described above.	Regularly maintain drains. Restrict vehicle and animal access to the growing area (refer 1.1.17 NIASA BMP) Bury, burn or remove all waste vegetation from production site. Ensure dump sites cannot contaminate production areas (refer in-ground App NIASA BMP).	CCP	All stock shall be practically free from pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds).	**Who**: Authorised Person **What**: (A) Check drains & drainage. (B) Check for dumped vegetation. **When**: Weekly or more often as required. **Where**: Nursery production areas. **How**: Visual inspection and actions.	**Who**: Authorised Person **What**: (A) Repair/improve drains & drainage. (B) Bury, burn or remove dumped vegetation **When**: At time of non-compliance. **Where**: Nursery. **How**: Through pest management program and site inspections.	Corrective Action Report.
Prepare Site for Harvest	Stock contaminated with pathogens as described above.	Staff regularly maintain and sanitise equipment and practice good hygiene (refer 1.1.4 – 1.1.8 1.1.14 & Appendix 8 NIASA BMP).	CCP	All stock shall be practically free from pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds).	**Who**: Authorised Person. **What**: Inspect equipment used for harvesting. Check staff hygiene. **When**: Before use. **Where**: Nursery. **How**: Visual inspection and document.	**Who**: Authorised Person. **What**: Identify non-complying equipment, clean and disinfest. Retrain staff. **When**: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.

HACCP TABLE (IN GROUND PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Prepare Site for Harvest (cont.)	Poor or slow plant growth.	Select suitable equipment and methods for harvesting. Train staff to avoid plant damage.	CCP	Suitable harvesting equipment and methods used.	**Who**: Authorised Person. **What**: Check harvesting equipment and methods. **When**: Before harvest. **Where**: Nursery. **How**: Visual inspection.	**Who**: Authorised Person. **What**: Change or modify harvesting equipment or methods. **When**: Before harvest. **Where**: Nursery. **How**: Document remedial and corrective action.	Corrective Action Report.
Harvest	Stock contaminated with pathogens as described above. Poor or slow plant growth	Staff regularly maintain and sanitise equipment and practice good hygiene (refer 1.1.4 – 1.1.8 1.1.14 & Appendix 8 NIASA BMP). Remove all unused crop material at harvest. (Refer in-ground prodn App NIASA BMP). Select suitable equipment and methods for harvesting. Use suitable harvesting procedures and train staff to avoid plant damage	CCP	All stock shall be practically free from pathogens and other pests (insects & weed seeds). Suitable harvesting equipment and methods used.	**Who**: Authorised Person. **What**: Conduct inspection of equipment, hygiene practices, harvest procedures and unused crop. When: Before, during and after harvest. **Where**: Nursery. **How**: Visual inspection and document.	**Who**: Authorised Person. **What**: Identify non-complying equipment or practices, clean equipment, retrain staff. Remove and dispose of all unused crop When: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.

HACCP TABLE (IN GROUND PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Transport to Despatch Area	Stock contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Regularly clean and disinfest transport equipment. Refer 1.1.7 NIASA BMP). Maintain good hygiene practices (refer 1.1.4 – 1.1.8 1.1.14 & Appendix 8 NIASA BMP). Cover pathways and roads with materials to reduce contamination of plants with soil (dust) and water (refer 1.1.10 NIASA BMP).	CCP	As above.	**Who**: Authorised Person. **What**: Conduct inspection of transport equipment an pathways/roads used to transport stock. **When:** Prior to use. **Where**: Nursery. **How**: Visual inspection and document.	**Who**: Authorised Person. **What**: Identify non-complying transport equipment, pathways/roads and reject and/or clean facilities. **When**: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.
Detail, Pack & Label (stacking, pruning balling etc)	Stock contaminated with pathogens and other pests as described above (refer Appendix 12 NIASA BMP).	Regularly clean and disinfest handling area, equipment and balling material storage area. Balling material storage area sealed and well-drained (Refer 1.1.4-1.1.6 & in-ground prodn App NIASA BMP) Staff maintain good hygiene practices. Check and treat (if required) water used for washing & preparing root balls (Refer in-ground prodn App NIASA BMP)	CCP	As above.	**Who**: Authorised Person. **What**: (A) Conduct inspection of equipment, handling and storage areas used in detailing, packing, balling & labelling (B) Check water used to wash & prepare root balls **When**: Before use. **Where**: Nursery. **How**: Visual inspection and document.	**Who**: Authorised Person. **What**: (A) Identify non-complying equipment, handling and storage areas & reject, fix or clean and sanitise. (B) Treat water **When**: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report. Water Disinfestation Record

HACCP TABLE (IN GROUND PRODUCTION SYSTEM)

Step	Hazard(s)	Control Measure(s)	CCP/CQP/ CSP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Despatch	Plant Health	Handling areas sealed and well drained. Regularly clean and disinfest handling areas and equipment. Staff regularly wash hands and maintain good hygiene practices. Refer 1.1.4 – 1.1.8, 1.14, and in-ground prodn App NIASA BMP.	CCP	All stock shall be practically free from pathogens and other pests (insects & weed seeds).	**Who**: Authorised Person. **What**: Conduct inspection of equipment & handling areas used for despatch **When**: Before use. **Where**: Nursery. **How**: Visual inspection and document.	**Who**: Authorised Person. **What**: Identify non-complying equipment and areas. Reject, fix and/or clean and disinfest. **When**: At time of non-compliance. **Where**: Nursery. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report
	Quarantine requirements of importing authority (Area/Region, State or Country) not met. i.e. product infested or contaminated with quarantine pest or disease. Incorrect or incomplete documentation (phytosanitary or plant health certificate).	Determine importing authorities quarantine requirements for product(s) to be despatched Inspect plants before despatch for signs of quarantine pests and diseases. Treat product for quarantine pests and diseases as required. Prepare required documentation as required. If required hold plants in quarantine area and monitor for signs of quarantine pests and diseases before despatch	CQP	All products shall be practically free from quarantine pests (such Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) and pathogens. All product shall be accompanied by correct and complete documentation.	**Who**: Authorised Person **What**: (A) Sample, inspect or test all out going product in accordance with the quarantine requirements of the importing authority. (B) Check all documentation is correct and complete. **When**: Before despatch. **Where**: Nursery. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Treat, reinspect and send or reject. (B) Amend &/or reissue incorrect or incomplete documentation. **When**: Before despatch. **Where**: Nursery. **How**: Inspection, testing and Documentation.	Materials Despatch Record or Invoice. Copies of relevant ICA or quarantine documents Corrective Action Report.

VERIFICATION AND VALIDATION SCHEDULE (IN GROUND PRODUCTION SYSTEM)

ACTIVITY	DESCRIPTION	FREQUENCY	RESPONSIBILITY	RECORDS
External audit of HACCP plan	Verify that activities comply with documented requirements. Identify areas of poor performance and opportunities for improvement.	At least annually	Authorised Person	Audit Report Corrective Action Report
Microbial testing of plants and soil	Test product and water for pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp.*	At least annually	Authorised Person	Analysis Report
Disinfestation system testing	Test water for effectiveness of disinfestation (eg chlorine, pH, filtration).	Monthly	Authorised Person	Water Disinfestation Report
Review hazards	HACCP team reviews hazards	Once/year or after changes	Authorised Person	Hazards Analysis Report & HACCP Tables
Validate critical limits	Check that critical limits are still appropriate.	Once/year	Authorised Person	The Nursery Papers Industry & NIASA Best Management Practice Guides
Calibrate testing equipment	Ensure equipment is accurate.	As required	Authorised Person	Calibration Schedule

APPENDIX 2

HAZARD ANALYSIS AND CRITICAL CONTROL POINT (HACCP) PLAN

GROWING MEDIA PRODUCTION SYSTEM

Contents **No.**

DEFINITIONS

Critical Control Point (CCP)	A point of control in the process where a potential plant health hazard identified in *Hazard Analysis Report* is of **High or Extreme** significance. Control measures must be taken to reduce, eliminate or control the hazard.
Critical Quarantine Point (CQP)	A point of control in the process where a potential quarantine hazard identified in *Hazard Analysis Report* is of **High or Extreme** significance. Control measures must be taken to reduce, eliminate or control the hazard.
Hazard Analysis Report	A tabulated record of all *Potential Hazards* that affect or have the potential to affect the product(s) under analysis. The significance of each hazard is rated as a low risk, moderate risk, high risk or extreme risk and control measures for each *Potential Hazard* are stated.
HACCP Table	A tabulated report on the *Potential Hazards* identified in the Hazard Analysis Report. Critical limits for each *Potential Hazard* of high or extreme significance are transferred from the *Hazard Analysis Report* and stated. *Monitoring* activities are stated to ensure *Critical Limits* are not exceeded. *Corrective Action* is identified if deviation of limits occur. Records identified for the maintenance of the system.
Consequence (Con)	What are the consequences if the risk occurs? This is rated as either one, two, three, four or five.
Likelihood (Like)	What is the likelihood of the risk occurring? This is rated as either almost certain, likely, possible, unlikely or rare (refer page 7).
Significance (Sig)	What is the significance to the health status of the plant(s)/growing media, ability to meet quarantine and plant health requirements of the product given the *consequence* and *likelihood* of the hazard? This is rated as either low, moderate, high or extreme (refer page 7).

Corrective Action	Any action to be taken when the results of monitoring indicate a loss of control.
Critical limit	The boundaries of acceptability for control measures.
Control Measure	Any actions or activity that can be used to prevent or eliminate a hazard or reduce it to an acceptable level.
Potential Hazards	A plant health or quarantine agent or occurrence, or condition with the potential to cause an adverse effect on plant health or quarantine access to domestic and international markets to the final product at the point of sale or despatch.
Monitor	The act of conducting a planned sequence of observations or measurements to assess whether a *CCP* is under control.
Validation	Obtaining evidence the elements of the HACCP plan are effective.
Verification	The application of methods, procedures, tests and other evaluations, in addition to monitoring, to determine compliance with the HACCP plan.
Flow Chart	A systematic representation of the sequence of processes (steps or operations) used in a growing media production system.
HACCP (Hazard Analysis and Critical Control Point)	A system that identifies, evaluates, and controls hazards which are significant for product quality.
HACCP Plan	A logical and systematic method of establishing the context, identifying, analysing, evaluating, treating, monitoring and communicating risks associated within a process that will enable organisations to minimise losses and maximise opportunities.
Risk	The level of a potential plant health, food safety or quarantine hazard occurring to the final product(s). It is measured in terms of *Low, Medium, High or Extreme*.

PURPOSE AND SCOPE

This HACCP Plan provides an overview of the processes involved in a growing media production system. This HACCP Plan has been prepared in accordance with the CODEX Alimentarius Guidelines for HACCP.

Scope of this HACCP plan

Hazards associated with the production of growing media within a growing media production system from the receival of raw materials through to processing and despatch. Hazards under analysis are plant health and plant quarantine.

HACCP TEAM

NAME	POSITION	ORGANISATION
J Bagshaw	Team Leader	Dept of Primary Industries & Fisheries, Queensland
M Rogers	Hazard analysis, risk management and HACCP expert	Dept of Primary Industries & Fisheries, Queensland
J McDonald	Nursery Industry Development Officer	Nursery and Garden Industry Queensland

DETERMINING POINTS OF CONTROL

The method used to establish critical control points (CCP's) and critical quarantine points (CQP's) within this HACCP plan has been based on the significance of each hazard as determined by the hazard analysis process.

All hazards defined as highly (H) or extremely (E) significant within the Hazard Analysis Table have been carried over to the HACCP Table as either a CCP, CQP or CSP. These hazards are all monitored and a record of that activity maintained.

Hazards defined as low (L) or moderate (M) significance within the Hazard Analysis Table have not been carried over to the HACCP Table because these hazards are considered to be an acceptable level of risk.

HAZARD ANALYSIS PROCESS

The method used to separate minor acceptable hazards from major non-acceptable hazards is shown in the Tables below. The establishment of risk has been based on the significance of each hazard as determined by a Hazard Analysis Report. To establish a level of significance two factors are considered these being consequences (Cons) and likelihood (Like).

RECORDS

The records listed in the HACCP plans for growing media production systems are explained more fully in Appendix 3.

Measure of Consequences or (**Cons**)

Level	Descriptor	Description
1	Insignificant	Plant Health – No detectable damage or injury to the plant. Quarantine – No detectable quarantine risk, direct movement following relevant checks.
2	Minor	Plant Health – Minor impact on plant which may cause customer complaint. Quarantine – Minor quarantine risk detected and product may be held for further inspection, treatment or documentation check then released.
3	Moderate	Plant Health – Moderate impact on plant, may be easily treated and limited scope for customer complaint Quarantine – Moderate quarantine risk detected and product maybe held for further inspection, treatment or documentation check then released.
4	Major	Plant Health – Serious impact on plant, may not be easily treated and scope for major customer complaints. Quarantine – Serious quarantine risk detected, product rejected, destroyed or returned.
5	Catastrophic	Plant Health – Critical and widespread impact on plants, uncontrollable and widespread customer complaints. Quarantine – Critical quarantine risk detected, product rejected, destroyed or returned and suspension of trade.

Measure of Likelihood or (**Like**)

Level	Descriptor	Description
A	Almost certain	Is expected to occur in most circumstances.
B	Likely	Will probably occur in most circumstances.
C	Possible	Might occur at some time.
D	Unlikely	Could occur at some time.
E	Rare	May occur only in exceptional circumstances.

Level of Significance or (**Sig**)

Likelihood	Consequences				
	1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
A (almost certain)	**H**	**H**	**E**	**E**	**E**
B (likely)	**M**	**H**	**H**	**E**	**E**
C (Possible)	**L**	**M**	**H**	**E**	**E**
D (unlikely)	**L**	**L**	**M**	**H**	**E**
E (rare)	**L**	**L**	**M**	**H**	**H**

E = Extreme risk; immediate action required.

H = High risk; senior management attention needed.

M = Moderate risk; management responsibility must be specified.

L = Low risk; managed by routine procedures.

FLOW DIAGRAM

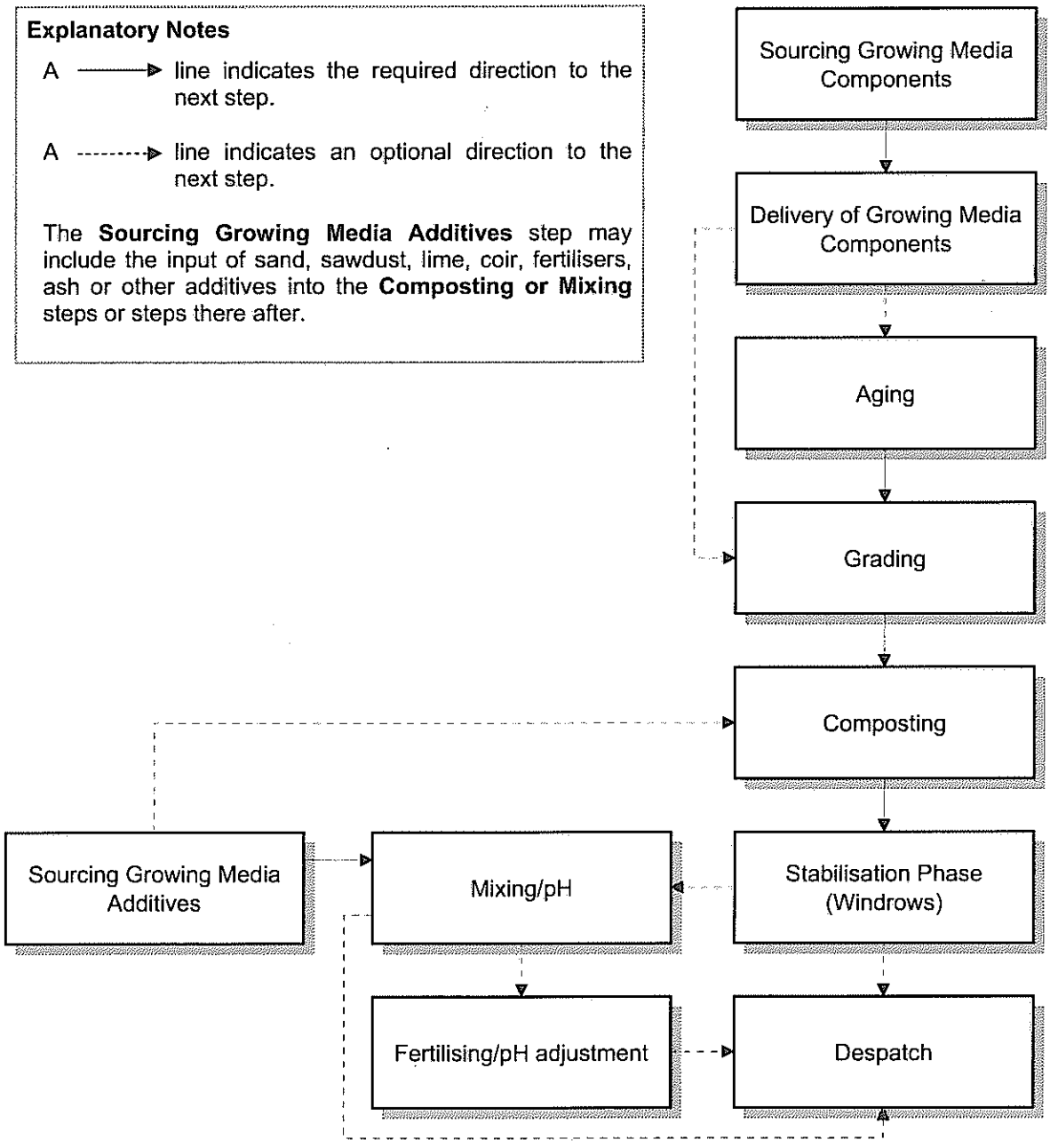
The following flow diagram represents the general process steps carried out by a growing media production business.

Explanatory Notes

A ——▶ line indicates the required direction to the next step.

A ·····▶ line indicates an optional direction to the next step.

The **Sourcing Growing Media Additives** step may include the input of sand, sawdust, lime, coir, fertilisers, ash or other additives into the **Composting or Mixing** steps or steps there after.



HAZARD ANALYSIS REPORT

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Sourcing Growing Media Components	Plant Health	Material contaminated with plant pathogens i.e. *Phytophthora spp.*, *Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds) (refer 1.1 & 1.1.2 NIASA BMP).	Growing media components and tools, containers, preparation surfaces, transportation etc contaminated with plant pathogens, insects & weed seeds.	4	D	H	Could cause major loss of product and market(s).	Source growing media components from approved suppliers that have the ability to supply and transport materials free from plant pathogens (refer Appendix 1 NIASA BMP). Sample and test all growing media components at delivery or before use (refer Appendix 2 section A2).
	Quarantine	Material contaminated with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens.	Source materials contaminated with known quarantine pests or pathogens.	4	C	E	Serious quarantine risk detected that could occur some time.	Source growing media components from approved suppliers that have the ability to supply and transport materials free from quarantine pests or pathogens

HAZARD ANALYSIS REPORT

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Delivery of Growing Media Components	Plant Health	Growing media components contaminated with plant pathogens i.e. *Phytophthora spp.*, *Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp*, *Botrytis spp* and other pests (insects & weed seeds) (refer 1.1 & 1.1.2 NIASA BMP).	Equipment, vehicles and machinery used for transporting growing media contaminated with plant pathogens or other pests (insects & weed seeds).	3	C	H	Could cause major loss of product and market(s).	Source growing media and growing media components from approved suppliers that have the ability to supply and transport materials that are free from plant pathogens (refer Appendix 1 NIASA BMP). Regularly clean and disinfest equipment, vehicles and machinery used for transporting growing media components (refer Appendix 1 NIASA BMP).
	Quarantine	Growing media components contaminated with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens.	Equipment, vehicles and machinery used for transporting growing media contaminated with known quarantine pests or pathogens.	4	C	E	Serious quarantine risk detected that could occur some time.	Source growing media and growing media components from approved suppliers that have the ability to supply and transport materials that are free from quarantine pests or pathogens. Regularly clean and disinfest equipment, vehicles and machinery used for transporting growing media and components (refer Appendix 1 NIASA BMP).

HAZARD ANALYSIS REPORT

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Aging	Plant Health	Cross contamination with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Aging facilities and equipment contaminated with plant pathogens or other pests (insects & weed seeds).	3	C	H	Could cause major loss of product and market(s).	Regularly clean and sanitise equipment and facilities used in aging of growing media (refer 1.1.4, 1.1.5, 1.1.12 & 1.2.1 NIASA BMP). Exclude runoff water, contaminated, untreated soil and other materials or items that may cause contamination of aging areas (refer Appendix 3 NIASA BMP).
	Quarantine	Cross contamination with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens.	Aging facilities, equipment and surrounds contaminated with known quarantine pests or pathogens.	4	C	E	Serious quarantine risk detected that could occur some time.	Regularly clean and sanitise equipment and facilities used in aging of growing media. Exclude runoff water, contaminated, untreated soil and other materials or items that may cause contamination of aging areas (refer Appendix 3 NIASA BMP).

HAZARD ANALYSIS REPORT

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Grading	Plant Health	Cross contamination with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Grading facilities and equipment contaminated with plant pathogens or other pests (insects & weed seeds).	3	C	H	Could cause major loss of product and market(s).	Regularly clean and sanitise equipment and facilities used to grade growing media (refer 1.1.4, 1.1.5, 1.1.12 & 1.2.1 NIASA BMP). Exclude runoff water, contaminated, untreated soil and other materials or items that may cause contamination of grading areas (refer Appendix 3 NIASA BMP).
		Poor quality growing media	Incorrect particle size, porosity and drainage	3	C	M	Leads to poor plant health	Grade components into correct size.
	Quarantine	Cross contamination with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens.	Grading facilities, equipment and surrounds contaminated with known quarantine pests or pathogens.	3	E	M	Moderate quarantine risk detected that could occur some time.	Regularly clean and treat equipment and facilities used to grade growing media
Composting	Plant Health	Growing media contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Composting process ineffective in disinfesting growing media contaminated with plant pathogens or other pests (insects& weed seeds).	3	C	H	Could cause major loss of product and market(s).	Ensure composting process is done correctly If necessary treat growing media and growing media components using an approved method. Treat water used in composting or source from underground or mains (refer Appendix 1 NIASA BMP).

HAZARD ANALYSIS REPORT

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Composting (cont.)	Plant Health	Incorrect levels of pH, EC, temperature and nitrogen (refer Appendix 1 NIASA BMP).	Inappropriate or ineffective composting processes.	3	C	H	Could cause major loss of product and market(s).	Regularly monitor composting process for levels of pH, EC, temperature and nitrogen (refer Appendix 1 NIASA BMP).
	Quarantine	Cross contamination with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens.	Composting facilities, equipment and surrounds contaminated with known quarantine pests or pathogens.	4	C	E	Serious quarantine risk detected that could occur some time.	Regularly clean and treat equipment and facilities used to compost growing media Exclude runoff water, contaminated, untreated soil and other materials or items that may cause contamination of composting areas (refer Appendix 3 NIASA BMP).
Source Growing Media Additives (For example wetting agents, polymer gels or other materials designed to improve growing media characteristics)	Plant Health	Cross contamination from additives to growing media with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Additives contaminated with pathogens and other pests before delivery or during storage.	3	C	H	Moderate impact on plants, may be easily treated. Might occur sometimes.	Source growing media additives from approved suppliers that have the ability to supply and transport additives free from plant pathogens and pests (refer Appendix 1 NIASA BMP). Regularly clean and disinfest storage facilities and equipment (refer 1.1.4, 1.1.5 & 1.2.1 NIASA BMP).

HAZARD ANALYSIS REPORT

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Source Growing Media Additives (cont.)	Quarantine	Growing media additives contaminated with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens.	Growing media additives contaminated with plant pathogens contaminated with known quarantine pests or pathogens.	4	C	E	Serious quarantine risk detected that could occur some time.	Source growing media additives from approved suppliers that have the ability to supply and transport additives free from quarantine pests & pathogens. Regularly clean and treat equipment, vehicles and machinery used for transporting and handling growing media additives (refer Appendix 1 NIASA BMP).
Mixing/pH	Plant Health	Cross contamination with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Mixing facilities and equipment contaminated with plant pathogens or other pests (insects & weed seeds).	3	C	H	Could cause major loss of product and market(s).	Regularly clean and disinfest equipment and facilities used to mix growing media (refer 1.1.4, 1.1.5, 1.1.12 & 1.2.1 NIASA BMP). Exclude contaminated, untreated materials or items that may cause contamination of mixing areas (refer Appendix A.1.16 NIASA BMP).
		Incorrect pH levels (refer Appendix 1 NIASA BMP).	Inappropriate or ineffective mixing processes.	3	C	H	Could cause major loss of product and market(s).	Regularly monitor the mixing process for pH levels (refer Appendix 1 NIASA BMP).

HAZARD ANALYSIS REPORT

Step	Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Mixing/pH (cont)	Quarantine	Cross contamination with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens.	Mixing facilities, equipment and surrounds contaminated with known quarantine pests or pathogens.	3	D	M	Moderate quarantine risk detected that might occur some time.	Regularly clean equipment and facilities used to mix growing media.
Stabilisation Phase (Windrows)	Plant Health	Cross contamination with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Facilities and equipment contaminated with plant pathogens or other pests (insects & weed seeds).	3	C	H	Could cause major loss of product and market(s).	Regularly clean equipment and facilities used in stabilisation phase Exclude runoff water, contaminated, untreated soil and other materials or items that may cause contamination (refer Appendix 3 NIASA BMP).
	Quarantine	Cross contamination with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens	Facilities, equipment and surrounds contaminated with known quarantine pests or pathogens.	3	C	H	Moderate quarantine risk detected that could occur some time.	Regularly clean and treat equipment and facilities used to stabilise growing media.

HAZARD ANALYSIS REPORT

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Fertilising/pH adjustment	Plant Health	Cross contamination with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Facilities and equipment contaminated with plant pathogens or other pests (insects & weed seeds).	3	C	H	Could cause major loss of product and market(s).	Regularly clean and treat equipment and facilities used for fertilising and adjusting pH. Exclude runoff water, contaminated, untreated soil and other materials or items that may cause contamination of fertiliser storage and handling areas (refer Appendix 3 NIASA BMP).
	Plant Health	Incorrect levels of pH, or nutrients (refer Appendix 1 NIASA BMP).	Inappropriate or ineffective fertilising processes.	3	C	H	Could cause major loss of product and market(s).	Supply suitable types and amounts of nutrients and adjust pH levels.
	Quarantine	Cross contamination with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens.	Facilities, equipment and surrounds contaminated with known quarantine pests or pathogens.	3	D	M	Moderate quarantine risk detected that might occur some time.	Regularly clean and treat equipment and facilities.

HAZARD ANALYSIS REPORT

Step	The Type of Potential Hazard	The Potential Hazard	The Cause of the Potential Hazard	Cons rating	Like rating	Level of Sig	Reason for Significance	Control Measure
Despatch	Plant Health	Nil						
	Quarantine	Quarantine requirements of importing authority (Area/Region, State or Country) not met. i.e. product infested or contaminated with quarantine pest or disease. Incorrect or incomplete documentation (phytosanitary or plant health certificate).	Stock contaminated with quarantine pests.	4	C	E	Serious quarantine risk detected that could occur some time.	Determine importing authorities quarantine requirements for product(s) to be despatched Inspect plants before despatch for signs of quarantine pests and diseases. Treat product for quarantine pests and diseases as required. Prepare required documentation as required. If required hold plants in quarantine area and monitor for signs of pests and disease before despatch (refer 1.1.11 NIASA BMP).

HACCP TABLE

Step	Hazard(s)	Control Measure(s)	CCP/CQP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Sourcing Growing Media Components or Prepared Growing Media	Source material contaminated with pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds) (refer 1.1 & 1.1.2 NIASA BMP).	Source growing media components from approved suppliers that have the ability to supply and transport components that are practically free from pathogens (refer Appendix 1 NIASA BMP). Sample and test all growing media components at delivery or before use (refer Appendix 2 section A2).	CCP	All growing media components shall be practically free from pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds)	**Who**: Authorised Person **What**: (A) Check approved supplier status for all growing media supplied. (B) Sample, inspect or test incoming growing media. **When**: (A) At receival or before use of any growing media. (B) At receival or before use. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Review/cancel &/or suspend approved supplier's status or seek growing media from another approved source. (B) Treat, reinspect and use or reject. **When**: (A) At delivery or before use. (B) Before use. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Record (or supplier invoice).

HACCP TABLE

Step	Hazard(s)	Control Measure(s)	CCP/CQP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Sourcing Growing Media Components or Prepared Growing Media (cont.)	Source material contaminated with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens	Source growing media components from approved suppliers that have the ability to supply and transport materials that are free from known quarantine pests or pathogens.	CQP	Only approved suppliers used All growing media components shall be practically free from known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens	Who: Authorised Person **What**: (A) Check approved supplier status for all growing media supplied. (C) ICA or quarantine documents accompany delivery where relevant. **When**: (A) Before ordering any growing media or components. (B) At delivery or before use. (C) At delivery. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Review/cancel &/or suspend approved supplier's status or seek growing media from another approved source. (B) Treat, reinspect and use or reject. **When**: (A) At delivery or before use. (B) Before use. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Record (or supplier invoice). ICA or quarantine documentation.

HACCP TABLE

Step	Hazard(s)	Control Measure(s)	CCP/CQP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Delivery of Growing Media Components	Vehicles, containers or media components contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Sample and test all growing media components at delivery or before use (refer Appendix 2 section A2). Regularly clean and disinfest equipment, vehicles and machinery used for transporting growing media components (refer Appendix 1 NIASA BMP).	CCP	All equipment, vehicles and machinery used for transporting growing media shall be clean and practically free from pathogens. All equipment, vehicles and machinery used for transporting growing media shall be inspected for cleanliness before use. Media or media components shall be free of pathogens & other pests	**Who**: Authorised Person **What**:: (A) Sample, inspect or test incoming growing media components. (B) Inspect vehicle and/or container cleanliness. **When**: (A) At receival or before using growing media components. (B) At recieval. (C) At recieval. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Review &/or suspend approved supplier's status or seek growing media components from another approved source. (B) Clean or reject vehicles, media &/or containers. **When**: (A) At receival or before use. (B) At receival. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Record (or supplier invoice). Corrective Action Report

HACCP TABLE

Step	Hazard(s)	Control Measure(s)	CCP/CQP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Delivery of Growing Media Components (cont.)	Growing media, vehicles and/or containers contaminated with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens	Regularly clean and disinfest equipment, vehicles and machinery used for transporting materials (refer Appendix 1 NIASA BMP).	CQP	All equipment, vehicles and machinery used for transporting growing media shall be clean and practically free from known quarantine pests or pathogens. All equipment, vehicles and machinery used for transporting growing media shall be inspected for signs of infestation before use. Media or media components shall be free of quarantine pathogens & other pests	**Who**: Authorised Person **What**:: (A) Sample, inspect or test incoming growing media components. (B) Inspect vehicle and/or container cleanliness. (C) ICA or quarantine documents accompany delivery where relevant. **When**: (A) At receival or before using growing media components. (B) At recieval. (C) At recieval. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Review &/or suspend approved supplier's status or seek growing media components from another approved source. (B) Clean or reject vehicles &/or containers. Reject media. **When**: At delivery or before use. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Record (or supplier invoice). ICA or quarantine documentation.

HACCP TABLE

Step	Hazard(s)	Control Measure(s)	CCP/CQP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Aging	Cross contamination with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Regularly clean and disinfest equipment and facilities used in aging growing media (refer 1.1.4, 1.1.5, 1.1.12 & 1.2.1 NIASA BMP). Exclude runoff water, contaminated, untreated soil and other materials or items that may cause contamination of aging areas (refer Appendix 3 NIASA BMP).	CCP	(A) Full compliance with Appendix 3 Section A.3.6 NIASA BMP. (B) Full compliance with relevant section of Appendix 1 section A.1.16 NIASA BMP.	**Who**: Authorised Person. **What**: Conduct inspection of growing media aging facilities. **When**: Weekly or as required. **Where**: Growing media aging facilities. **How**: Documentation, inspection and testing	**Who**: Authorised Person. **What**: Identify non-complying facilities and treat, reinspect facilities. **When**: At time of non-compliance. **Where**: Growing media production facility. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.
	Cross contamination with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens	Regularly clean and treat equipment and facilities used in aging growing media Exclude runoff water, contaminated, untreated soil and other materials or items that may cause contamination of aging areas (refer Appendix 3 NIASA BMP).	CQP	(A) Full compliance with Appendix 3 Section A.3.6 NIASA BMP. (B) Full compliance with relevant section of Appendix 1 section A.1.16 NIASA BMP.	**Who**: Authorised Person. **What**: Conduct inspection of growing media aging facilities. **When**: Weekly or as required. **Where**: Growing media aging facilities. **How**: Documentation, inspection and testing	**Who**: Authorised Person. **What**: Identify non-complying facilities and treat, reinspect facilities. **When**: At time of non-compliance. **Where** Growing media production facility. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report. Refer Appendix 1 section A.1.13 NIASA BMP for appropriate records.

HACCP TABLE

Step	Hazard(s)	Control Measure(s)	CCP/CQP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Grading	Cross contamination with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Regularly clean and disinfest equipment and facilities used to grade growing media (refer 1.1.4, 1.1.5, 1.1.12 & 1.2.1 NIASA BMP). Exclude runoff water, contaminated, untreated soil and other materials or items that may cause contamination of grading areas (refer Appendix 3 NIASA BMP).	CCP	(A) Full compliance with Appendix 3 Section A.3.6 NIASA BMP. (B) Full compliance with relevant section of Appendix 1 section A.1.16 NIASA BMP.	**Who**: Authorised Person. **What**: Conduct inspection of growing media grading facilities. **When**: Daily or as required. **Where**: Growing media grading facilities. **How**: Documentation, inspection and testing	**Who**: Authorised Person. **What**: Identify non-complying facilities and treat, reinspect facilities. **When**: At time of non-compliance. **Where**: Growing media production facility. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report. Growing Media Finished Product Specification.
Composting	Growing media contaminated with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	If necessary treat growing media and growing media components using an approved method. Treat water used in composting or source from underground or mains (refer Appendix 1 NIASA BMP).	CCP	All growing media components shall be practically free from pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed propagules)	**Who**: Authorised Person **What**: Sample, inspect or test growing media & water. **When**: During composting **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: Treat, reinspect and use or reject media. Disinfest water. **When**: Before use. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	Growing Media Quality Record. Growing Media Finished Product Specification. Water Disinfestation Record. Cleaning and Sanitation Procedure.

HACCP TABLE

Step	Hazard(s)	Control Measure(s)	CCP/CQP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Composting (cont.)	Incorrect temperature (refer Appendix 1 NIASA BMP).	Regularly monitor composting process for temperature (refer Appendix 1 NIASA BMP).	CCP	Temperature must be greater than 55°C in all parts of compost for at least one day.	**Who**: Authorised Person. **What**: Monitor/Test composting growing media. **When**: Weekly or as required. **Where**: Growing media production facility. **How**: Monitoring/Testing procedure and document results.	**Who**: Authorised Person. **What**: Identify non-complying growing media and retest. Treat or reject as required. **When**: At time of non-compliance. **Where**: Growing media production facility. **How**: Document remedial and corrective action.	Growing Media Quality Record. Corrective Action Report.
	Cross contamination with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens	Regularly clean and treat equipment and facilities used to compost growing media. Exclude runoff water, contaminated, untreated soil and other materials or items that may cause contamination of composting areas (refer Appendix 3 NIASA BMP).	CQP	All Equipment, and facilities used shall be clean and practically free from known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens	**Who**: Authorised Person **What**: Conduct inspection of growing media composting facilities. **When**: As required. **Where**: Growing media production facility. **How**: Inspection and testing.	**Who**: Authorised Person. **What**: Identify non-complying facilities and treat, reinspect facilities. **When**: At time of non-compliance. **Where**: Growing media production facility. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.

HACCP TABLE

Step	Hazard(s)	Control Measure(s)	CCP/CQP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Source Growing Media Additives (For example wetting agents, polymer gels or other materials designed to improve growing media characteristics)	Cross contamination from additives to growing media with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Source growing media additives from approved suppliers that have the ability to supply and transport additives that are free from pathogens and pests (refer Appendix 1 NIASA BMP). Regularly clean and disinfest storage facilities, equipment and transport (refer 1.1.4, 1.1.5, 1.12, 1.17 & 1.2.1 NIASA BMP).	CCP	Only approved suppliers used. All growing media additives shall be free from pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp* and other pests (insects & weed seeds)	**Who**: Authorised Person **What**: (A) Check approved supplier status for all growing media supplied. (B) Sample, inspect or test incoming growing media additives. **When**: (A) At receival or before use of any growing media additives. (B) At delivery or before use. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Review/cancel &/or suspend approved supplier's status or seek growing media from another approved source. (B) Treat, reinspect and use or reject. **When**: (A) At delivery or before use. (B) Before use. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Record (or supplier invoice). Cleaning and Sanitation Procedure.

HACCP TABLE

Step	Hazard(s)	Control Measure(s)	CCP/CQP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Source Growing Media Additives (cont.)	Growing media additives contaminated with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens	Source growing media additives from approved suppliers that have the ability to supply and transport additives that are free from known quarantine pests and pathogens. Regularly clean and disinfest equipment, vehicles and machinery used for transporting growing media additives (refer Appendix 1 NIASA BMP).	CQP	All growing media additives shall be practically free from known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens	**Who**: Authorised Person **What**: (A) Check approved supplier status for all growing media supplied. (B) Inspect all growing media additives. **When**: (A) At receival or before use of any growing media additives. (B) At delivery or prior to use. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Review/cancel &/or suspend approved supplier's status or seek growing media additives from another approved source. (B) Treat, reinspect and use or reject. **When**: (A) At delivery or before use. (B) Before use. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	Approved Supplier Register. Materials Delivery Record (or supplier invoice).

HACCP TABLE

Step	Hazard(s)	Control Measure(s)	CCP/CQP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Mixing/pH	Cross contamination with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Regularly clean and disinfest equipment and facilities used to mix growing media (refer 1.1.4, 1.1.5, 1.1.12, 1.17 & 1.2.1 NIASA BMP). Exclude contaminated, untreated materials or items that may cause contamination of grading areas (refer Appendix 1.16 NIASA BMP).	CCP	Full compliance with sections 1.1.4, 1.1.5, 1.1.12, 1.17 & 1.2.1 and Appendix 1.16 NIASA BMP.	**Who**: Authorised Person. **What**: Conduct inspection of mixing facilities. **When**: Daily when used. **Where**: Mixing facilities. **How**: Documentation, inspection and testing	**Who**: Authorised Person. **What**: Identify non-complying mixing facilities treat, reinspect or reject growing media, containers and facilities. **When**: At time of non-compliance. **Where**: Growing media production facility. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.
	Incorrect levels of EC, pH and other additives. Toxin levels too high (refer Appendix 1 NIASA BMP).	Regularly monitor the mixing process for levels of EC, pH and toxins, (refer Appendix 1 NIASA BMP).	CCP	EC, pH, additives and toxin levels meet customer requirements.	**Who**: Authorised Person. **What**: Monitor/Test growing media. **When**: As mixed or as required. **Where**: Growing media production facility. **How**: Monitoring/Testing procedure and document results.	**Who**: Authorised Person. **What**: Identify non-complying growing media and retest. Treat or reject as required. **When**: At time of non-compliance. **Where**: Growing media production facility. **How**: Document remedial and corrective action.	Growing Media Quality Record. Growing Media Finished Product Specification. Corrective Action Report.

HACCP TABLE

Step	Hazard(s)	Control Measure(s)	CCP/CQP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Stabilisation Phase (Windrows)	Cross contamination with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Regularly clean and treat equipment and facilities used to stabilise growing media. Exclude runoff water, contaminated, untreated soil and other materials or items that may cause contamination (refer Appendix 3 NIASA BMP).	CCP	(A) Full compliance with Appendix 3 Section A.3.6 NIASA BMP. (B) Full compliance with relevant section of Appendix 1 section A.1.16 NIASA BMP.	**Who**: Authorised Person. **What**: Conduct inspection of growing media grading facilities. **When**: Daily or as required. **Where**: Growing media grading facilities. **How**: Documentation, inspection and testing	**Who**: Authorised Person. **What**: Identify non-complying facilities and treat, reinspect facilities. **When**: At time of non-compliance. **Where**: Growing media production facility. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.
	Cross contamination with known quarantine pests (such as Red Imported Fire Ant, Silver Leaf White Fly or Western Flower Thrips) or pathogens	Regularly clean and treat equipment and facilities used to stabilise growing media.	CQP	All equipment, and facilities used shall be clean and practically free from known quarantine pests and pathogens	**Who**: Authorised Person **What**: Conduct inspection of growing media windrows, facilities & surrounds. **When**: As required. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	**Who**: Authorised Person. **What**: Identify non-complying facilities and treat, reinspect facilities. **When**: At time of non-compliance. **Where**: Growing media production facility. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.

HACCP TABLE

Step	Hazard(s)	Control Measure(s)	CCP/CQP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Fertilising/pH adjustment	Cross contamination with pathogens and other pests as described above (refer 1.1 & 1.1.2 NIASA BMP).	Regularly clean and treat equipment and facilities used for fertilising and pH adjustment. Exclude runoff water, contaminated, untreated soil and other materials or items that may cause contamination (refer Appendix 3 NIASA BMP).	CCP	(A) Full compliance with Appendix 3 Section A.3.6 NIASA BMP. (B) Full compliance with relevant section of Appendix 1 section A.1.16 NIASA BMP.	**Who**: Authorised Person. **What**: Conduct inspection of facilities. **When**: Daily or as required. **Where**: Fertilising/pH facilities. **How**: Documentation, inspection and testing	**Who**: Authorised Person. **What**: Identify non-complying facilities and treat, reinspect facilities. **When**: At time of non-compliance. **Where**: Growing media production facility. **How**: Document remedial and corrective action.	Cleaning and Sanitation Procedure. Corrective Action Report.
	Incorrect levels of pH & nutrients (refer Appendix 1 NIASA BMP).	Supply suitable nutrients and adjust pH levels.	CCP	Growing media pH and nutrient status meet customer requirements.	**Who**: Authorised Person. **What**: Monitor/Test growing media. **When**: As added or as required. **Where**: Growing media production facility. **How**: Monitoring/Testing procedure and document results.	**Who**: Authorised Person. **What**: Identify non-complying growing media and retest. Treat or reject as required. **When**: At time of non-compliance. **Where**: Growing media production facility. **How**: Document remedial and corrective action.	Growing Media Quality Record. Growing Media Finished Product Specification. Corrective Action Report.

HACCP TABLE

Step	Hazard(s)	Control Measure(s)	CCP/CQP	Critical Limits(s)	Monitoring Procedure(s)	Corrective Action(s)	Record(s)
Despatch	Quarantine requirements of importing authority (Area/Region, State or Country) not met. i.e. product infested or contaminated with quarantine pest or disease. Incorrect or incomplete documentation.	Determine importing authorities quarantine requirements for product(s) to be despatched Inspect growing media before despatch for signs of quarantine pests and diseases. Treat product for quarantine pests and diseases as required. Prepare documentation as required. If required hold plants in out-going quarantine area and monitor for signs of pests and disease before despatch (refer 1.1.11 NIASA BMP).	CQP	All growing media shall be practically free from quarantine pests and pathogens All products shall be accompanied by correct and complete documentation.	**Who**: Authorised Person **What**: (A) Sample, inspect or test all out going product in accordance with the quarantine requirements of the importing authority. (B) Check all documentation is correct and complete. **When**: Before despatch. **Where**: Growing media production facility. **How**: Documentation, inspection and testing.	**Who**: Authorised Person **What**: (A) Treat, reinspect and use or reject. (B) Amend &/or reissue incorrect or incomplete documentation. **When**: Before despatch. **Where**: Growing media production facility. **How**: Inspection, testing and Documentation.	Materials Despatch Record (or copy of delivery docket/invoice). Relevant ICA or quarantine documentation. Corrective Action Report.

VERIFICATION AND VALIDATION SCHEDULE

ACTIVITY	DESCRIPTION	FREQUENCY	RESPONSIBILITY	RECORDS
External Audit of HACCP Plan	Verify that activities comply with documented requirements. Identify areas of poor performance and opportunities for improvement.	At least annually	Authorised Person	Audit report Corrective Action Report
Pathogen testing of growing media, site and water	Test growing media, site and water for pathogens i.e. *Phytophthora spp., Chalara spp, Pythium spp, Rhizoctonia solani, Fusarium spp, Cylindrocladium spp, Botrytis spp.*	Six monthly	Authorised Person	Analysis Report
Review hazards	HACCP team reviews hazards	Once/year or after changes	Authorised Person	Hazards Analysis Report & HACCP Tables
Validate critical limits	Check that critical limits are still appropriate.	Once/year	Authorised Person	The Nursery papers, NIASA Best Management Practices
Calibrate testing equipment	Ensure equipment is accurate.	Monthly	Authorised Person	Calibration Schedule

Appendix 3

Records and Procedures

This appendix lists the records documented in the HACCP Tables in Appendices 1 and 2, and provides information about the type of information to be collected. Templates for records are provided where we think they are unlikely to currently exist in a nursery business.

The records documented in the HACCP Tables are a guide to the type of information that needs to be recorded, rather than the specific title of a record that must be kept.

Each business will have its own recording system, with document titles and information recorded unique to that business. Businesses are encouraged to use their existing documents or records where possible rather than create a new record.

Records

Approved Supplier Register

This register is to maintain a list of approved suppliers of all incoming materials, including growing media, propagating material such as seeds, seedlings, plugs and tube stock, containers, fertilisers, chemicals, and so on. The register also is to record any problems with materials supplied and date of next review to determine a supplier's status as an approved supplier. The register facilitates staff ordering materials to only use approved suppliers. Below is an example template of the register.

Product	Approved Suppliers	Contact Details	Comments (eg: Not meeting specification)	Status Review Date

Materials Delivery Record

This record lists receival of incoming materials. It may be in the form of a record or supplier invoices or transport dockets.

Information to be included:

- Date received
- Suppliers name
- Invoice number, batch number or other identification
- Material type
- Amount
- Test or Inspection results (if relevant).
- Signature of person receiving

Growing Media Disinfestation Record

A record of sterilisation or pasteurisation of growing media done at the nursery.

Information to be included:

- Date of treatment
- Treatment type
- Description of material treated
- Signature of operator.

Growing Media Specification

This documents the 'recipe' for the types of growing media used. Production nurseries may develop and use the Growing Media Specification when ordering growing media from suppliers or as a guide for staff if preparing their own media from delivered media components. The specification would list all the different media types used by a production nursery and the specification for each one.

Growing media suppliers use this record to document their 'recipes' for different customers. The production nursery customers may supply it or it may be developed by the growing media supplier in consultation with customers.

Information that may be included:

- Media identification (title/code)
- How it is to be used (for example seedling mix, for particular plant types and so on)
- Media ingredients and their quality and quantities or percentages in the mix.
- Quality characteristics (for example air-filled porosity, pH, EC).
- Requirements or treatments to ensure freedom from plant pathogens.

Growing Media Quality Record

A record showing results of growing media quality testing by production nurseries when received and for in-field growing media testing for EC and pH. Also used by growing media suppliers to check growing media against the finished product specification during the production process.

Information that may be included:

- Date of testing
- Batch identification
- Amount (M^3)
- Temperature during composting
- EC, pH and other quality measurement results
- Signature of tester

Corrective Action Report

This report is to be used to document key non-conformances and what actions were taken to correct the problem and to prevent recurrence. For example if storage and production areas are inspected and they need improved hygiene or design to prevent infection from plant pathogens, the problems and steps taken to fix them are documented in the Corrective Action Report.

A possible template is as follows:

Date	Non-conformance	Actions to correct and prevent recurrence	Signature

Pesticide Application Record

A number of templates currently exist in the nursery industry for recording pesticide application. Refer to NIASA Best Management Practice Guidelines (2003) Appendix 4, and Pesticide Management Diary CD Rom (available from NGIA).

Water Disinfestation Record

This record documents the treatment of water to remove plant and human pathogens. An example template of this record is in the NIASA Best Management Practice Guidelines (2003) Appendix 4 "Water Disinfestation – Recording Sheet".

Information to be included:

- Date of treatment
- Treatment details
- PH, free chlorine before and after treatment, contact time or other measurements of water depending on treatment type.
- Comments
- Signature of tester.

Irrigation Water Quality Record

This record documents results of water quality testing, particularly for pH and electrical conductivity (EC), but may also include particular quality issues such as iron content. An example template of this record is in the NIASA Best Management Practice Guidelines (2003) Appendix 4 "Irrigation Water Quality – Recording Sheet".

Information to be included:

- Water source
- Testing date
- Test results
- Comments
- Signature of tester.

The information in the "Water Disinfestation Record" and "Irrigation Water Quality Record" may more conveniently be combined into one record.

IPM Crop Monitoring Records

These records document the results of plant monitoring for pest insects, diseases, weeds or other pests, and pest management measures. Example templates are the Handy Guide 3 Record Sheets in Goodwin S et al (2002) Integrated Pest Management in Ornamentals: Information Guide, NSW Agriculture.

Information that may be included:

- Greenhouse/plot identification
- Crop being monitored
- Presence or absence, or number of pest and beneficial insects
- Presence or absence of diseases
- Environmental conditions such as temperature and humidity
- Number and type of insects in traps
- Pest management measures (may be able to combine Pesticide Application Record information with IPM record information)
- Comments.

Calibration Schedule

This documents calibration of equipment used to measure and/or control the hazards outlined in the HACCP plan. The most likely equipment requiring calibration in nurseries is pesticide application equipment, equipment used to measure water quality and disinfestation treatments for water and growing media.

A possible template is as follows:

Date of calibration	Item calibrated	Comments	Signature

Site Pathogen Testing Record

This applies to growing media suppliers. NIASA requires growing media suppliers to regularly test their production site, and growing media component extraction sites for pathogens.

Information that may be included:

- Date of sampling
- Source of the sample tested
- Testing process details (who, and how tested)
- Test results.

Soil Pathogen Testing and Disinfestation Record

This applies to in-ground nursery production. The record documents testing of the soil for presence of pathogens and disinfestation details (if applicable).

Information that may be included:

- Date of testing
- Test result
- Date of soil disinfestation
- Soil disinfestation method, or other action taken to protect nursery plants from pathogen infection.

Procedures

Procedures are written instructions on how to conduct activities that are important to control significant hazards identified in the HACCP plan. They document fundamental practices that staff regularly perform but don't necessarily require a formal record of activity. These written procedures will need regular review and updating.

The main objective of developing written procedures is to ensure all staff in the business know exactly what they have to do to achieve the outcomes documented in the HACCP plans. The act of writing procedures facilitates managers to review and plan these key activities. Procedures may be documented in a manual, or written down at the place of work activity either on protected sheets of paper, in folders or even on the pieces of equipment to which the procedures apply. There is no set way to format a written procedure, except to follow the principle of keeping them simple and practical and useable by staff.

The following procedures have been identified in the HACCP plan:

Sterilisation/Pasteurisation procedure

This includes sterilisation/pasteurisation of growing media and recycled plant containers where applicable. Information would include effective process guidelines, how to correctly operate machinery, safety precautions and how to test or inspect where applicable. A record is also suggested for this activity when treating growing media (see Growing Media Disinfestation Record above) due to it's critical nature.

Fertiliser Application Procedure

This includes the fertiliser application program for the full growth cycle of the crop. Information may include amount and type of fertiliser to be mixed in growing media, determining crop nutrient needs, what, when and how to apply top dressings, fertigation and so on.

Cleaning and sanitation procedure

This would outline the monitoring and sanitation program, what needs to be cleaned and sanitised, how, when and by whom it is to be done. The HACCP plan identified many sites and

pieces of equipment that need regular checking, cleaning and sanitising. The procedure would include all of these and may actually be several sub-procedures, one for each site or process or set of responsibilities.

This procedure would also include site pathogen testing activities for growing media suppliers, and would then reference the Site Pathogen Testing Record listed above.

.

Interstate Certification Assurance (ICA) and quarantine documents

The HACCP plan identifies these documents particularly near the despatch step of nursery production.

There are a number of interstate and intrastate quarantine issues in Australia that government authorities are addressing using ICA arrangements. Under the ICA arrangements businesses affected must conform to operational procedures and keep certain records depending on the particular ICA arrangement. For more information about these arrangements contact your State Department of Agriculture/Primary Industries.

In most of the ICA arrangements an affected business will be required to complete a Plant Health Assurance certificate, a property plan, treatment records and a freedom inspection record before sending products interstate or intrastate (depending on the particular ICA arrangement).

For international movement of plants, many importing countries have particular requirements for documentation and treatments. For more information about these quarantine requirements contact the Australian Quarantine and Inspection Service (AQIS).