



TECHNICAL ISSUES PAPER

Import Risk Analysis for the Importation of Fresh Longan and Lychee Fruit from The People's Republic of China



March 2003



Foreword

© Commonwealth of Australia 2003

This work is copyright. You may download, display, print and reproduce this material in unaltered form only (retaining this notice) for your personal, non-commercial use or use within your organisation. Apart from any use as permitted under the *Copyright Act 1968*, all other rights are reserved.

Requests for further authorisation should be directed to the Commonwealth Copyright Administration, Intellectual Property Branch, Department of Communications, Information Technology and the Arts, GPO Box 2154, Canberra ACT 2601 or by email to commonwealth.copyright@dcita.gov.au.

Cover design: <http://www.brevardrarefruit.org/photos/longans.html>
<http://www.ars.usda.gov/is/graphics/photos/jan98/k2296-2.jpg>

CONTENTS

CONTENTS	5
GLOSSARY OF TERMS AND ABBREVIATIONS.....	9
SUMMARY	13
BIOSECURITY FRAMEWORK.....	15
AUSTRALIA'S BIOSECURITY POLICY	15
Legislative framework	15
Quarantine risk.....	15
Quarantine Proclamation	16
Environment	16
Policy framework.....	17
WTO AND IMPORT RISK ANALYSIS.....	17
Notification obligations	19
Use of international standards	20
International Plant Protection Convention.....	20
Equivalence.....	21
Risk assessment	21
Appropriate level of protection	23
METHOD FOR PEST RISK ANALYSIS	27
ELEMENTS OF PEST CATEGORISATION	27
Identity of the pest.....	27
Presence or absence in the PRA area.....	28
Regulatory status	28
Potential for establishment and spread in the PRA area.....	28
Potential for economic consequences in the PRA area.....	28
PROPOSAL TO IMPORT LONGAN AND LYCHEE FRUIT FROM CHINA	29
BACKGROUND	29
ADMINISTRATION	30
Timetable	30

Importation of Fresh Longan and Lychee Fruit from China

Scope	30
AUSTRALIA'S CURRENT QUARANTINE POLICY FOR IMPORTS OF FRESH LONGAN AND LYCHEE FRUIT	30
International arrangements	30
Domestic arrangements	31
THE LONGAN AND LYCHEE INDUSTRIES.....	32
Production of longans and lychees in Australia	32
Production of longans in Australia	33
Production of lychees in Australia.....	34
Export of Australian longans and lychees.....	35
Longan and lychee production in China.....	35
Longan industry in China	35
Lychee industry in China.....	35
Chinese exports of longans and lychees	36
Chinese imports of longans and lychees	36
PRELIMINARY RESULTS OF PEST CATEGORISATION	37
PRESENCE OR ABSENCE, REGULATORY STATUS AND ASSOCIATION OF PESTS WITH THE PATHWAY.....	37
Mites.....	38
Insects	38
Nematodes	38
Fungi	38
Diseases of unknown aetiology	39
FURTHER STEPS IN THE IMPORT RISK ANALYSIS PROCESS	41
REFERENCES	43
APPENDIX 1. PEST CATEGORISATION FOR LONGAN (OCCURRENCE IN AUSTRALIA).....	45
APPENDIX 2. PEST CATEGORISATION FOR LONGAN (PATHWAY ASSOCIATION – FRESH LONGAN FRUIT).....	67
APPENDIX 3. PEST CATEGORISATION FOR LONGAN (PATHWAY ASSOCIATION – FRESH LONGAN FRUIT AND PANICLES – IE. BRANCH, STEM, TWIG, BUT NOT NEW GROWTH)	85
APPENDIX 4. PEST CATEGORISATION FOR LYCHEE (OCCURRENCE IN AUSTRALIA).....	103

APPENDIX 5. PEST CATEGORISATION FOR LYCHEE (PATHWAY ASSOCIATION – FRESH LYCHEE FRUIT)	131
APPENDIX 6. PESTS THAT WILL REQUIRE FURTHER EVALUATION IN THE IRA...	151
APPENDIX 8. REFERENCES FOR APPENDICES	155

GLOSSARY OF TERMS AND ABBREVIATIONS

AFFA	Commonwealth Department of Agriculture, Fisheries and Forestry – Australia
ALGA	Australian Lychee Growers Association
ALOP	appropriate level of protection
AQIS	Australian Quarantine and Inspection Service
AQSIQ	State General Administration for Quality Supervision and Inspection and Quarantine of the People's Republic of China
Area	an officially defined country, part of a country or all or parts of several countries
Biosecurity Australia (BA)	an agency within the Commonwealth Department of Agriculture, Fisheries and Forestry - Australia. Biosecurity Australia protects consumers and animal and plant health, and facilitates trade, by providing sound scientifically based and cost effective quarantine policy
China	the People's Republic of China
Control (of a pest)	suppression, containment or eradication of a pest population
CIQ	China Inspection and Quarantine
DPIE	Department of Primary Industries and Energy (former name of AFFA)
Endangered area	an area where ecological factors favour the establishment of a pest whose presence in the area will result in economically important loss
Entry (of a pest)	movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled
Entry potential	likelihood of the entry of a pest
Establishment	the perpetuation, for the foreseeable future, of a pest within an area after entry
Establishment potential	likelihood of the establishment of a pest
FAO	Food and Agriculture Organization of the United Nations
FDACS	China State Department of Agriculture and Consumer Services
Fresh	not dried, deep-frozen or otherwise conserved
ICA	Interstate Certification Assurance
ICON	AQIS Import Conditions database

Importation of Fresh Longan and Lychee Fruit from China

Introduction	entry of a pest resulting in its establishment
Introduction potential	likelihood of the introduction of a pest
IPPC	International Plant Protection Convention, as deposited in 1951 with FAO in Rome and as subsequently amended
IRA	import risk analysis
ISPM	International Standard on Phytosanitary Measures
LAA	Longan Association of Australia
National Plant Protection	
Organisation	official service established by a government to discharge the functions specified by the IPPC
Non-quarantine pest	pest that is not a quarantine pest for an area
NPPO	National Plant Protection Organisation
Official	established, authorised or performed by a National Plant Protection Organisation
Official control	
(of a regulated pest)	the active enforcement of mandatory phytosanitary regulations and the application of mandatory phytosanitary procedures with the objective of eradication or containment of quarantine pests or for the management of regulated non-quarantine pests
Pathway	the ordered sequence of steps leading to an outcome, or event
PBPM	Plant Biosecurity Policy Memorandum
Pest	any species, strain or biotype of plant, animal, or pathogenic agent, injurious to plants or plant products
Pest categorisation	the process for determining whether a pest has or has not the characteristics of a quarantine pest or those of a regulated non-quarantine pest
Pest free area	an area in which a specific pest does not occur as demonstrated by scientific evidence and in which, where appropriate, this condition is being officially maintained
Pest risk analysis	the process of evaluating biological or other scientific evidence to determine whether a pest should be regulated and the strength of any phytosanitary measures to be taken against it
Pest risk assessment	determination of whether a pest is a quarantine pest and evaluation of its introduction potential
Pest risk assessment	

Importation of Fresh Longan and Lychee Fruit from China

(for quarantine pests)	evaluation of the probability of the introduction and spread of a pest and of the associated potential economic consequences
Pest risk management	the decision-making process of reducing the risk of introduction of a quarantine pest
Pest risk management	
(for quarantine pests)	evaluation and selection of options to reduce the risk of introduction and spread of a pest
Phytosanitary measure	any legislation, regulation or official procedure having the purpose to prevent the introduction and/or spread of quarantine pests
Phytosanitary regulation	official rule to prevent the introduction and/or spread of quarantine pests, by regulating the production, movement or existence of commodities or other articles, or the normal activity of persons, and by establishing schemes for phytosanitary certification
PQPM	Plant Quarantine Policy Memorandum
PRA	pest risk analysis
PRA area	area in relation to which a pest risk analysis is conducted
QDPI	Queensland Department of Primary Industries
QP	Quarantine Proclamation
Quarantine pest	a pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled
Regulated non-	
quarantine pest	a non-quarantine pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing contracting party
SAIQ	State Administration for Entry and Exit Inspection and Quarantine of the People's Republic of China
Spread	expansion of the geographical distribution of a pest within an area
Spread potential	likelihood of the spread of a pest
SPS	Sanitary and Phytosanitary
SPS Agreement	WTO Agreement on the Application of Sanitary and Phytosanitary Measures
WTO	World Trade Organization

SUMMARY

The Commonwealth Department of Agriculture, Fisheries and Forestry – Australia (AFFA) is undertaking an import risk analysis (IRA) on fresh longan (*Dimocarpus longan* Lour.) fruit (detached and on panicles), and lychee (*Litchi chinensis* Sonn.) fruit from the People’s Republic of China (hereafter referred to as China).

This *Technical Issues Paper* contains the following sections:

- Biosecurity Australia’s framework for quarantine policy and for import risk analysis (IRA) and the international framework for trade in animal- and plant-derived products;
- pest risk analysis (PRA) methodology;
- background to this IRA;
- current quarantine policy for importation of fresh longans and lychees;
- results of pest categorisation; and
- an outline of further steps in the IRA process.

The introductory sections of this paper provide information that is fundamental to understanding the national and international framework for considering import applications from other countries. Information specific to the longan and lychee industry is covered in a section entitled “Proposal to Import Longan and Lychee Fruit from China”.

Biosecurity Australia will consult with stakeholders and relevant experts as necessary throughout the IRA process. Stakeholders are strongly encouraged to contribute to the IRA by providing relevant technical information and raising issues as early as possible, preferably while commenting on the *Technical Issues Paper* or during meetings with Biosecurity Australia.

To date, Biosecurity Australia has identified a total of 230 pests associated with longan and lychee crops from China. These pests include mites, insects, nematodes, fungi and diseases of unknown aetiology. Of these pests, 69 are present in Australia and do not need to be considered further in the IRA. Of the remaining 161 pests that are not present in Australia (or present but not widely distributed and being officially controlled), 77 are common to both longan and lychee, 26 occur only on longan and 58 occur only on lychee (Table 4).

The three potential import pathways considered are:

- fresh detached longan fruit;
- fresh longan fruit on panicles; and
- fresh detached lychee fruit.

Of the 161 pests of longan and lychee that are not present in Australia, 49 are found on the longan and lychee import pathways (Table 5). Of these, 18 pests are common to both the longan and lychee pathways. In addition, two pests are associated with longan fruit only (including fruit on the panicles), 13 pests are associated with lychee fruit only and a further 16 pests are associated with longan panicles only.

These pests will need to be considered further in the IRA.

Importation of Fresh Longan and Lychee Fruit from China

The next stage in the IRA will involve determining the likelihood of these pests to enter, establish and spread in Australia and the potential economic consequences of their entry. This part of the risk assessment will be covered in the draft IRA paper. The draft IRA paper will also consider risk management measures to achieve Australia's appropriate level of protection (ALOP) and a preliminary position on the importation of fresh longan and lychee fruit from China.

After considering all technical issues, including stakeholder comments on the draft IRA report, Biosecurity Australia will finalise the IRA recommendations consistent with Australia's ALOP and international rights and obligations under the *SPS Agreement*.

BIOSECURITY FRAMEWORK

AUSTRALIA'S BIOSECURITY POLICY

Legislative framework

AFFA's objective is to adopt biosecurity policies that provide the health safeguards required by government policy in the least trade-restrictive way and that are, where appropriate, based on international standards. In developing and reviewing quarantine (or biosecurity) policies, pest risks associated with importations may be analysed using import risk analysis — a structured, transparent and science-based process.

The *Quarantine Act 1908* (Quarantine Act) and its subordinate legislation, including the *Quarantine Proclamation 1998* (Quarantine Proclamation), are the legislative basis of human, animal and plant biosecurity in Australia.

Section 4 of the Quarantine Act defines the scope of quarantine as follows:

In this Act, quarantine includes, but is not limited to, measures:

- *for, or in relation to, the examination, exclusion, detention, observation, segregation, isolation, protection, treatment and regulation of vessels, installations, human beings, animals, plants or other goods or things*
- *having as their object the prevention or control of the introduction, establishment or spread of diseases or pests that will or could cause significant damage to human beings, animals, plants, other aspects of the environment or economic activities.*

Quarantine risk

The concept of level of quarantine (or biosecurity) risk has been introduced as the basis of quarantine decision-making. When making decisions under the Quarantine Act, decision-makers must consider the level of quarantine risk and must take prescribed actions to manage the risk if it is unacceptably high. Section 5D of the Quarantine Act includes harm to the environment as a component of the level of quarantine risk.

Section 5D: level of quarantine risk

A reference in this Act to a level of quarantine risk is a reference to:

- (a) *the probability of:*
 - (i) *a disease or pest being introduced, established or spread in Australia or the Cocos Islands; and*
 - (ii) *the disease or pest causing harm to human beings, animals, plants, other aspects of the environment, or economic activities; and*
- (b) *the probable extent of the harm.*

Quarantine Proclamation

Subsection 13 (1) of the Quarantine Act provides that the Governor-General in Executive Council may, by proclamation, prohibit the importation into Australia of any articles or things likely to introduce, establish or spread any disease or pest affecting people, animals or plants. The Governor-General may apply this power of prohibition generally or subject to any specified conditions or restrictions.

The Quarantine Proclamation is the principal legal instrument used to control the importation into Australia of goods of quarantine (or biosecurity) interest. A wide range of goods are specified in the Quarantine Proclamation including animals, plants, animal and plant products, micro-organisms, and certain other goods which carry a high risk if uncontrolled importation is allowed — e.g. soil, water, vaccines, feeds.

For articles or things prohibited by proclamation, the Director of Animal and Plant Quarantine may permit entry of products on an unrestricted basis or subject to compliance with conditions, which are normally specified on a permit. An import risk analysis provides the scientific and technical basis for biosecurity policies that determine whether an import may be permitted and, if so, the conditions to be applied.

The matters to be considered when deciding whether to issue a permit are set out in Section 70 of the Quarantine Proclamation as follows:

- 70 *Things a Director of Quarantine must take into account when deciding whether to grant a permit for importation into Australia*
- (1) *In deciding whether to grant a permit to import a thing into Australia or the Cocos Islands, or for the removal of a thing from the Protected Zone or the Torres Strait Special Quarantine Zone to the rest of Australia, a Director of Quarantine:*
- (a) *must consider the level of quarantine risk if the permit were granted; and*
 - (b) *must consider whether, if the permit were granted, the imposition of conditions on it would be necessary to limit the level of quarantine risk to one that is acceptably low; and*
 - (c) *may take into account anything else that he or she knows that is relevant.*

The matters include the level of quarantine risk (see above), whether the imposition of conditions would be necessary to limit the quarantine risk to a level that would be acceptably low, and anything else known to the decision maker to be relevant.

Environment

While protection of the natural and built environment has always been an objective of Australian quarantine policy and practice, recent amendments to the Quarantine Act make explicit the responsibility of quarantine officers to consider impact on the environment when making decisions. In particular, the scope of quarantine (as described in Section 4 of the Quarantine Act), and the level of quarantine risk (as described in Section 5D of the Quarantine Act), includes explicit reference to the environment.

Environment is defined in Section 5 of the Quarantine Act as:

... all aspects of the surroundings of human beings, whether natural surroundings or surroundings created by human beings themselves, and whether affecting them as individuals or in social groupings.

When undertaking an import risk analysis, Biosecurity Australia takes into account the risk of harm to the environment to ensure that the biosecurity policies developed reflect the Australian Government's approach to risk management. Environment Australia is involved in decisions on the import risk analysis work program and, for particular import risk analyses, discussions on the scope, the likely risks, and the expertise that may be required to address those risks. Environment Australia can also identify additional technical issues that it believes should be considered during an import risk analysis, and can nominate officers with relevant expertise to contribute to the import risk analysis.

Policy framework

The primary purpose of biosecurity is to protect Australia from the entry, establishment and spread of unwanted pests and diseases that may cause social, economic or environmental damage, while minimising the restrictions on the entry of agricultural commodities.

Successive Australian Governments have maintained an appropriate level of protection (ALOP) that reflects the value placed on Australia's unique and diverse flora and fauna and the value of its Agricultural industries. However, at the same time they recognise that a zero-risk approach to the management of biosecurity risks is not tenable. This approach is evident in the strictness of all biosecurity-related activities, including policies on imported commodities, procedures at the border and operations against incursions of pests and diseases.

Recent inquiries into Australia's biosecurity regime have recognised that it is impossible in practice to operate a zero-risk biosecurity regime. In 1979, the Senate Standing Committee on Natural Resources stressed that there is no such thing as a zero-risk quarantine policy, and it believed that Australia's approach should be better described as '*scientific evaluation of acceptable risk*'. In 1988, the Lindsay review of Australian quarantine concluded that '*a no risk policy is untenable and undesirable and should be formally rejected*'. In 1996, the Senate Rural and Regional Affairs and Transport Committee was of the view that a zero-risk approach was unrealistic and untenable, and that its currency only demonstrated that the concepts of risk assessment and risk management were widely misunderstood. These themes were repeated in the AQRC report (AQRC, 1996). In its 1997 response to that report, the Government confirmed a managed risk approach.

Import risk analysis provides the basis for considering import applications for the importation of animals and animal-derived products, and plants and plant-derived products. In keeping with the scope of the Quarantine Act and Australia's international obligations, only factors relevant to the evaluation of quarantine risk (i.e. the risk associated with the entry, establishment and spread of unwanted pests and diseases) are considered in the import risk analysis. The potential competitive economic impact of prospective imports is not within the scope of the import risk analysis process, and any discussion on industry support mechanisms would need to remain quite separate from the import risk analysis.

WTO AND IMPORT RISK ANALYSIS

One of the principal objectives in developing the administrative framework for import risk analysis was to ensure that it complied with Australia's international rights and obligations.

These derive principally from the WTO *Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement)*, although other WTO Agreements (including the *Agreement on Technical Barriers to Trade* - the TBT Agreement) may be relevant in certain circumstances. Specific international guidelines on risk analysis developed under the International Plant Protection Convention (IPPC) and by International Office of Epizootics (OIE) are also relevant.

The *SPS Agreement* applies to measures designed to protect human, animal and plant life and health from pests and diseases, or a country from pests, and which may directly or indirectly affect international trade. It also recognises the right of WTO Member countries to determine the level of protection they deem appropriate and to take the necessary measures to achieve that protection. Sanitary (human and animal health) and phytosanitary (plant health) measures apply to trade in or movement of animal and plant based products within or between countries.

In the *SPS Agreement*, SPS measures are defined as any measures applied:

- *to protect animal or plant life or health within the territory of the Member from risks arising from the entry, establishment or spread of pests, diseases, disease-carrying organisms or disease-causing organisms;*
- *to protect human or animal life or health within the territory of the Member from risks arising from additives, contaminants, toxins or disease-causing organisms in foods, beverages or feedstuffs;*
- *to protect human life or health within the territory of the Member from risks arising from diseases carried by animals, plants or products thereof, or from the entry, establishment or spread of pests; or*
- *to prevent or limit other damage within the territory of the Member from the entry, establishment or spread of pests.*

The key provisions of the *SPS Agreement* are as follows:

- An importing country has the sovereign right to adopt measures to achieve the level of protection it deems appropriate (its appropriate level of protection) to protect human, animal or plant life or health within its territory, but such a level of protection must be consistently applied in different situations.
- An SPS measure must be based on scientific principles and not be maintained without sufficient evidence.
- In applying SPS measures, an importing country must avoid arbitrary or unjustifiable distinctions in levels of protection, if such distinctions result in discrimination or a disguised restriction on international trade.
- An SPS measure must not be more trade restrictive than necessary to achieve an importing country's ALOP, taking into account technical and economic feasibility.
- An SPS measure should be based on an international standard, guideline or recommendation, where these exist, except to the extent that there is scientific justification for a more stringent measure which is necessary to achieve an importing country's ALOP.
- An SPS measure conforming to an international standard, guideline or recommendation is presumed to be necessary to protect human, animal or plant life or health, and to be consistent with the SPS Agreement.

- Where an international standard, guideline or recommendation does not exist or where, in order to meet an importing country's ALOP, a measure needs to provide a higher level of protection than accorded by the relevant international standard, such a measure must be based on a risk assessment; the risk assessment must take into account available scientific evidence and relevant economic factors.
- When there is insufficient scientific evidence to complete a risk assessment, an importing country may adopt a provisional measure(s) by taking into account available pertinent information; additional information must be sought to allow a more objective assessment and the measure(s) reviewed within a reasonable period.
- An importing country must recognise the measures of other countries as equivalent, if it is objectively demonstrated that the measures meet the importing country's ALOP.

The rights and obligations in the *SPS Agreement* must be read as a whole. The articles must be interpreted in relation to each other. That is, the articles do not stand alone.

In many instances, the biosecurity policies Biosecurity Australia develops are based on the relevant international standards, guidelines and recommendations. In certain instances and in conformity with rights under the *SPS Agreement*, Australia has not adopted such international norms because to do so would result in an unacceptably high level of risk of disease or pest entry and establishment. Instead, the policies are based on a risk analysis.

The text of the *SPS Agreement* can be found at the WTO Internet site.¹

The following issues are discussed in greater detail:

- notification obligations;
- use of international standards;
- equivalence;
- risk assessment;
- appropriate level of protection; and
- consistency in risk management.

Notification obligations

The WTO SPS Committee has been established to oversee the implementation of the *SPS Agreement*, and to provide a forum for the discussion of any trade issues related to biosecurity policies. Like other WTO committees, all WTO Members have the right to participate in the work and decision making of the SPS Committee; decisions are taken by consensus. The SPS Committee has accepted, as observers, the Codex Alimentarius Commission (Codex), OIE and IPPC, as well as other international and regional intergovernmental organisations with activities in food safety, animal health and plant protection to maximise knowledge of and participation in its work.

The SPS Committee normally meets three times a year at the WTO headquarters in Geneva, Switzerland.

¹ Available at http://www.wto.org/english/docs_e/docs_e.htm

In addition to considering any specific trade concerns raised by governments, the *SPS Agreement* has set specific tasks for the Committee. One of these is to monitor the extent to which governments are using internationally developed standards as the basis for their requirements for imported products. Countries identify cases where the non-use, or non-existence, of an appropriate international standard is causing difficulties for international trade. After consideration by the SPS Committee, these concerns may be brought to the attention of the relevant standard-setting organisations.

Under the *SPS Agreement*, Members are required to notify WTO of new sanitary or phytosanitary regulations or modifications to existing regulations that are not substantially the same as the content of an international standard and that may have a significant effect on international trade. Australia notifies new measures and comments on draft policies proposed by other countries through the SPS Notification Point in AFFA.

Use of international standards

The *SPS Agreement* has conferred new responsibilities on three international organisations by requiring WTO Members to harmonise their sanitary and phytosanitary measures on the standards, guidelines and recommendations produced by those organisations unless there is scientific justification for a more stringent measure.

The three international organisations are referenced in Annex A of the *SPS Agreement* as follows:

- *for food safety, the standards, guidelines and recommendations established by the Codex Alimentarius Commission relating to food additives, veterinary drug and pesticide residues, contaminants, methods of analysis and sampling, and codes and guidelines of hygienic practice;*
- *for animal health and zoonoses, the standards, guidelines and recommendations developed under the auspices of the International Office of Epizootics;*
- *for plant health, the international standards, guidelines and recommendations developed under the auspices of the Secretariat of the International Plant Protection Convention in cooperation with regional organizations operating within the framework of the International Plant Protection Convention.*

International Plant Protection Convention

IPPC is a multilateral treaty deposited with the Director-General of the Food and Agriculture Organization of the United Nations. IPPC provides a framework and forum for international cooperation, standards harmonisation and information exchange on plant health in collaboration with regional and national plant protection organisations (RPPOs and NPPOs). Its prime purpose is to secure common and effective action to prevent the spread and introduction of pests of plants and plant products and to promote measures for their control.

Currently, 117 governments are contracting parties to IPPC.

The New Revised Text of the IPPC enabled the establishment of an Interim Commission on Phytosanitary Measures to serve as the IPPC's new governing body. Membership in the Interim Commission is open to all contracting parties of the IPPC. The Interim Commission meets annually to establish priorities for standard setting and harmonisation of phytosanitary measures in co-ordination with the IPPC Secretariat.

The functions of the Interim Commission are to provide direction to the work program of the IPPC Secretariat and promote the full implementation of the objectives of the Convention and, in particular, to:

- review the state of plant protection in the world and the need for action to control the international spread of pests and control their introduction into endangered areas;
- establish and keep under review the necessary institutional arrangements and procedures for the development and adoption of international standards, and to adopt international standards;
- establish rules and procedures for the resolution of disputes; and
- co-operate with other relevant international organisations.

The new IPPC and ISPM Pub. No.11 *Pest Risk Analysis for Quarantine Pests* adopt a similar approach to that of OIE and note the importance of documenting all steps in the process.

Equivalence

Article 4 of the *SPS Agreement* states that:

Members shall accept the sanitary or phytosanitary measures of other Members as equivalent, even if these measures differ from their own or from those used by other Members trading in the same product, if the exporting Member objectively demonstrates to the importing Member that its measures achieve the importing Member's appropriate level of sanitary or phytosanitary protection.

Members must accept the SPS measures of other Members, as equivalent to their own if the latter can demonstrate objectively that their measures provide the level of protection required by the importing country.

Article 5.6 of the *SPS Agreement* states that:

Often there are several alternative measures that may either singly or in combination achieve ALOP. In choosing among such alternatives, a Member should apply measures that are no more trade-restrictive than necessary to achieve its ALOP, taking into account technical and economic feasibility.

Risk assessment

Articles 5.1 to 5.3 of the *SPS Agreement* outline the requirements that Members should follow when carrying out risk assessment.

Article 5.1 provides a basic statement of the obligation:

Members shall ensure that their sanitary or phytosanitary measures are based on an assessment, as appropriate to the circumstances, of the risks to human, animal or plant life or health, taking into account risk assessment techniques developed by the relevant international organizations

Annex A of the *SPS Agreement* contains two definitions of risk assessment; the following is the definition applicable to biosecurity assessments:

The evaluation of the likelihood of entry, establishment or spread of a pest or disease within the territory of an importing Member according to the sanitary or phytosanitary

measures which might be applied, and of the associated potential biological and economic consequences

On the basis of this definition, the Appellate Body examining Australia's appeal against the dispute settlement panel's finding on Australia's prohibition of imports of Canadian salmon considered that a risk assessment within the meaning of Article 5.1 must:

- identify the hazards whose entry, establishment or spread within its territory a Member wants to prevent, as well as the associated potential biological and economic consequences;
- evaluate the likelihood of entry, establishment or spread of these hazards, as well as the associated potential biological and economic consequences; and
- evaluate the likelihood of entry, establishment or spread of these hazards according to the SPS measures that might be applied; measures which might be applied are those which reduce the risks to the appropriate level, with the aim of being least trade restrictive.

The Appellate Body believed that, for a risk assessment to fall within the meaning of Article 5.1 and the first definition in paragraph 4 of Annex A of the Agreement, it is not sufficient that it conclude that there is a 'possibility' of entry, establishment or spread of diseases and their associated biological and economic consequences. That is, an assessment must evaluate the 'likelihood' (the 'probability') of entry, establishment or spread of diseases and their associated biological and economic consequences. Furthermore, likelihood should be evaluated without and then with any SPS measures that might be required.

Article 5.2 outlines factors that should be considered when assessing the risks associated with a proposed importation. Specifically, it states that:

In the assessment of risks Members shall take into account available scientific evidence; relevant processes and production methods; relevant inspection, sampling and testing methods; prevalence of specific diseases or pests; existence of pest- or disease-free areas; relevant ecological or environmental conditions; and quarantine or other treatment.

This paragraph emphasises the need to consider a wide range of factors in both the importing and exporting country.

Article 5.3 describes the need to include a consequence assessment in a risk assessment, and lists dimensions that should be considered when assessing 'potential damage' arising from a disease or pest incursion. Specifically, it states that:

Members shall take into account as relevant economic factors; the potential damage in terms of loss of production or sales in the event of the entry, establishment or spread of a pest or disease; the cost of control or eradication in the territory of the importing Member

This list of 'relevant economic factors' may be viewed as the bare minimum that must be considered if an analysis is to comply with the terms of the *SPS Agreement*. In addition, both the *OIE Code* and *IPPC* standards for risk analysis have outlined factors that should be considered when assessing consequences. These two standards also stress the need to consider the 'likely magnitude' of consequences — that is, to base an assessment of consequences on the likelihood of various levels of damage in the importing country. Finally, Article 5.3 states that Members should consider '... the relative cost-effectiveness of alternative approaches to limiting risks...' This is an

issue that should be explored during risk management. Among factors that may not be taken into account are those relating to import competition.

The environmental and ecological consequences of pest or disease introduction are legitimate considerations in a risk assessment. The *SPS Agreement* provides a basic right to take measures to protect animal or plant life or health (Article 2). In Annex A, ‘animal’ is defined to include fish and wild fauna; and ‘plant’ to include forests and wild flora.

Additional to the economic factors identified in Article 5.3, the definition of risk assessment in Annex A, paragraph 4 (‘... *evaluation of the likelihood of entry, establishment or spread of a pest or disease ... and of the associated potential biological and economic consequences...*’) provides for general consideration of the biological consequences, including those for the environment. The environment is included in paragraph 1(d), which states that an SPS measure is one that is applied to ‘... *prevent or limit other damage to a country from the entry, establishment or spread of pests...*’.

Appropriate level of protection

The *SPS Agreement* defines ‘*appropriate level of sanitary or phytosanitary protection*’ as the level of protection deemed appropriate by the Member establishing a sanitary or phytosanitary measure to protect human, animal or plant life or health within its territory. The *SPS Agreement* notes that many Members also refer to this concept as the ‘*acceptable level of risk*’. In setting their ALOP, Members are to take into account the objective of minimising negative trade effects (Article 5.4).

Determination of Australia’s ALOP is an issue for government in consultation with the community. ALOP reflects government policy that is affected by community expectations; it is a societal value judgement to which AFFA contributes by providing technical information and advice. The *SPS Agreement* does not require a Member to have a scientific basis for its ALOP determination.

ALOP can be illustrated using a *risk estimation matrix* (Table 1). The cells of this matrix describe the product of likelihood and consequences — termed ‘risk’.

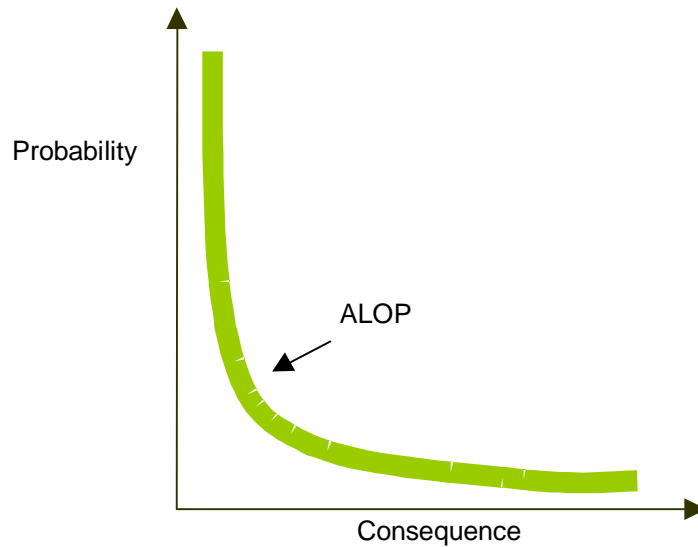
When interpreting the risk estimation matrix it should be remembered that although the descriptors for each axis are similar (‘low’, ‘moderate’, ‘high’, etc.), the vertical axis refers to *likelihood* and the horizontal axis refers to *consequences*.

One implication of this is that a ‘negligible’ probability combined with ‘extreme’ consequences, is not the same as an ‘extreme’ probability combined with ‘negligible’ consequences — that is, that the matrix is *not symmetrical*. Another implication is that ‘risk’ is expressed in the same units as are used to estimate consequences — that is, risk is *not* a likelihood.

Table 1. Risk estimation matrix

Likelihood of entry, establishment and spread	<i>High likelihood</i>	Negligible risk	Very low risk	Low risk	Moderate risk	High risk	Extreme risk
	<i>Moderate</i>	Negligible risk	Very low risk	Low risk	Moderate risk	High risk	Extreme risk
	<i>Low</i>	Negligible risk	Negligible risk	Very low risk	Low risk	Moderate risk	High risk
	<i>Very low</i>	Negligible risk	Negligible risk	Negligible risk	Very low risk	Low risk	Moderate risk
	<i>Extremely low</i>	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Very low risk	Low risk
	<i>Negligible likelihood</i>	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Very low risk
		<i>Negligible impact</i>	<i>Very low</i>	<i>Low</i>	<i>Moderate</i>	<i>High</i>	<i>Extreme impact</i>
Consequences of entry, establishment and spread							

The band of cells in Table 1 marked ‘very low risk’ represents Australia's ALOP, or tolerance of loss. This band of cells represents an approximation of a continuous ‘iso-risk curve’ — a curve that will be asymptotic at the minimum level of consequences considered to be ‘acceptable’ (which, in Australia's case, is ‘very low’) and at a likelihood that tends toward zero. The principle of an iso-risk curve is illustrated in Figure 1.


Figure 1. Theoretical iso-risk curve

Consistency in risk management

Article 5.5 states:

With the objective of achieving consistency in the application of the concept of appropriate level of sanitary or phytosanitary protection against risks to human life or health, or to animal and plant life or health, each Member shall avoid arbitrary or unjustifiable distinctions in the levels it considers to be appropriate in different situations, if such distinctions result in discrimination or a disguised restriction on international trade

Members are obliged to avoid arbitrary or unjustifiable distinctions in the levels of protection applied in different situations, if such distinctions result in discrimination or a disguised restriction on international trade. This obligation reflects the objective of consistency in applying the concept of ALOP against risks to human, animal and plant life or health — that is, consistency in risk management. In other words, it is not open to a Member to arbitrarily vary its attitude to the acceptance of risk from one situation to another, where the situations are comparable.

Consistency is achieved in Biosecurity Australia's IRA process by using the risk estimation matrix (Table 1).

METHOD FOR PEST RISK ANALYSIS

The technical component of an IRA for plants or plant products is termed a ‘pest risk analysis’, or PRA. In accordance with ISPM Pub. No. 11 *Pest Risk Analysis for Quarantine Pests*², a PRA comprises three discrete stages:

- Stage 1: initiation of the PRA
- Stage 2: risk assessment
- Stage 3: risk management

The *initiation* of a risk analysis involves the identification of the pest(s) and pathways of concern that should be considered for analysis. *Risk assessment* comprises pest categorisation, assessment of the probability of introduction and spread, and assessment of the potential economic consequences (including environmental impacts). *Risk management* describes the evaluation and selection of options to reduce the risk of introduction and spread of a pest. Because the key objective of this *Technical Issues Paper* is to document the approach to and preliminary results of pest categorisation, this component of the PRA is discussed in further detail.

Under ISPM Pub. No. 11 *Pest Risk Analysis for Quarantine Pests*, pest categorisation describes the process for determining whether a pest has or has not the characteristics of a quarantine pest, or those of a regulated non-quarantine pest. The objective of pest categorisation is thus to screen an exhaustive pest list to identify those that require an in-depth examination of the likelihood and consequences of introduction and spread.

ELEMENTS OF PEST CATEGORISATION

In accordance with ISPM Pub. No. 11 pest categorisation is based on the following elements or steps:

- identity of the pest;
- presence or absence in the PRA area;
- regulatory status;
- potential for establishment and spread in the PRA area; and
- potential for economic consequences (including environmental consequences) in the PRA area.

A description of these elements of pest categorisation from ISPM Pub. No. 11 is given below.

Identity of the pest

The identity of the pest should be clearly defined to ensure that the assessment is being performed on a distinct organism, and that biological and other information used in the assessment is relevant to the organism in question. If this is not possible because the causal agent of particular symptoms

² PRA is used throughout this document as an abbreviation of Pest Risk Analysis. AFFA uses the term PRA to describe the technical component of an import risk analysis.

has not yet been fully identified, then it should have been shown to produce consistent symptoms and to be transmissible.

The taxonomic unit for the pest is generally species level. The use of a higher or lower taxonomic level should be supported by scientifically sound rationale. In the case of levels below the species, this should include evidence demonstrating that factors such as differences in virulence, host range or vector relationships are significant enough to affect phytosanitary status.

In cases where a vector is involved, the vector may also be considered a pest to the extent that it is associated with the causal organism and is required for transmission of the pest.

Presence or absence in the PRA area

The pest should be absent from all or a defined part of the PRA area.

Regulatory status

If the pest is present but not widely distributed in the PRA area, it should be under official control or expected to be under official control in the near future.

Potential for establishment and spread in the PRA area

Evidence should be available to support the conclusion that the pest could become established or spread in the PRA area. The PRA area should have ecological/climatic conditions including those in protected conditions suitable for the establishment and spread of the pest and where relevant, host species (or near relatives), alternate hosts and vectors should be present in the PRA area.

Potential for economic consequences in the PRA area

There should be clear indication that the pest is likely to have an unacceptable economic impact (including environmental impact) in the PRA area.

PROPOSAL TO IMPORT LONGAN AND LYCHEE FRUIT FROM CHINA

BACKGROUND

In 1988, the Australian Quarantine and Inspection Service (AQIS) received a request from the Australian Growers' Corporation for market access of Chinese lychees to Australia. AQIS was requested during a quarantine mission to China in April 1991 to carry out a pest risk analysis (PRA). Information supplied on pests of lychee in China was insufficient to conduct a PRA.

In 1998, at a bilateral meeting in Beijing, China inquired about market access for longans as their next priority after the completion of the PRA on Ya pears from China.

On 13 March 2000, AQIS informed registered stakeholders through Plant Quarantine Policy Memorandum (PQPM) 2000/01 that it had received an application from the State Administration for Entry and Exit Inspection and Quarantine (SAIQ) of the People's Republic of China dated 30 April 1999, seeking technical market access to Australia for fresh longan and lychee fruit. This was the first step in the IRA process as outlined in *The AQIS Import Risk Analysis Process Handbook* (AQIS, 1998). Accompanying the application was a short list of the major arthropod pests and diseases associated with longan and lychee fruits in China. On 12 April 2000, China Inspection and Quarantine (CIQ), formerly SAIQ and presently State General Administration for Quality Supervision and Inspection and Quarantine of the People's Republic of China (AQSIQ), provided further information relating to disinfestation treatment for Oriental fruit fly (*Bactrocera dorsalis*) on longan and lychee fruit.

On 28 April 2000, AQIS informed stakeholders through PQPM 2000/05 of its proposal to undertake the IRA on fresh longan and lychee fruit as a single IRA using the routine process. The routine process was chosen because China's request met the following criteria from the Handbook in that the 'analysis is technically less complex or the proposal appears *prima facie* not to require assessment of significantly greater or different risks than those previously examined'. The routine process includes the same technically rigorous risk analysis as the non-routine process, is conducted in full consultation with stakeholders, and draws upon the advice of external scientists as appropriate. The decision to consider both longans and lychees under a single IRA was based on the fact that longans and lychees are closely related plant species within the Sapindaceae family and share a number of pests and diseases.

Changes to the internal structure of AFFA resulted in the formation of Biosecurity Australia (BA) on 6 October 2000. BA is responsible for the IRA function that was formerly the responsibility of AQIS. Plant Biosecurity (PB), a business unit within BA is conducting the longan and lychee IRA.

On 12 October 2000, BA confirmed to stakeholders through PQPM 00/19 that the IRA would be conducted using the routine process and that both longans and lychees would be considered in the one IRA. BA discussed the rationale for conducting the IRA with the individual stakeholders who had provided written comments.

On 20 December 2000, BA notified stakeholders through Plant Biosecurity Policy Memorandum (PBPM) 2000/26 of its intention to hold meetings in Brisbane on 29 January and in Mareeba on 31 January 2001. At these meetings, the longan and lychee IRA was discussed and the draft preliminary pest lists for longans and lychees were presented for comment. The stakeholder meetings were attended by representatives of the longan and lychee peak industry bodies (Longan

Association of Australia (LAA) and the Australian Lychee Growers Association (ALGA)), Queensland Department of Primary Industries (QDPI) scientists and longan and lychee growers.

Minutes of the stakeholder meetings were circulated to all stakeholders in April 2001 through PBPM 2001/07. BA also addressed a meeting of ALGA at Mooloolaba in March 2001 and discussed the IRA.

In April and August 2000, AQIS/BA requested additional information from SAIQ/CIQ to assist in the assessment of the IRA. BA received the requested information on 29 January 2001, along with confirmation of comprehensive pest lists for longan and lychee and information on the production systems used in China. Further clarification of some pests was requested by BA in March 2001 during the China – Australia technical bilateral discussions. BA is awaiting China's response.

ADMINISTRATION

Timetable

Further steps in the IRA process are outlined in the last section of this paper. Given the nature of the task, it would not be prudent to give definitive time frames for these steps at this stage. Stakeholders will be advised of forthcoming key events throughout the IRA process through PBPM. These PBPM will be sent to stakeholders when appropriate.

Scope

This IRA considers quarantine risks that may be associated with the importation of fresh longan and lychee fruit from China into Australia for human consumption. In the IRA, fresh longan fruit is defined as mature detached fruit or mature fruit on the panicle of *Dimocarpus longan* Lour. and fresh lychee fruit as mature detached fruit of *Litchi chinensis* Sonn., produced in China. The IRA will also consider and evaluate measures and procedures to manage these risks to an acceptably low level that is consistent with Australia's ALOP. The Technical Issues Paper and the draft IRA report will present a means of seeking feedback from stakeholders on the analysis and its outcomes. Feedback from stakeholders will be analysed and incorporated into the final IRA report before a final determination by the Director of Animal and Plant Quarantine on the policy for the importation of fresh detached longan and lychee fruit and longan fruit on panicles.

AUSTRALIA'S CURRENT QUARANTINE POLICY FOR IMPORTS OF FRESH LONGAN AND LYCHEE FRUIT

International arrangements

Currently, Australia only allows the importation of fresh lychee fruit from South Africa. All imported consignments of South African lychees are subject to '*General requirements for all fruits and vegetables*' as outlined in the AQIS Import Condition database (ICON).

The specific import conditions for South African lychees are that the fruit must have been cold treated with the flesh temperature of the fruit at $-0.5^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$ for not less than 24 consecutive days.

A Phytosanitary Certificate containing the following statement must accompany each consignment:

"The fruit has been cold treated at -0.5°C for 24 days".

If an infestation of live quarantine pests or contaminants are found, the imported consignment must be treated, reexported or destroyed using an AQIS-approved method.

The importation of fresh longan fruit from any country into Australia is prohibited.

Domestic arrangements

While the Commonwealth Government is responsible for regulating the movement of plants and their products into and out of Australia, the State/Territory Governments have primary responsibility for plant health controls within Australia. Legislation relating to resource management or plant health may be used by State/Territory Government agencies to control interstate movement of plants and their products.

To help facilitate interstate trade and ensure produce is pest free, the Interstate Certification Assurance (ICA) system was developed. The ICA scheme is a national scheme of Plant Health Certification that is accepted by all Australian states and the Northern Territory. ICA is based on documented Operational Procedures developed by Queensland Department of Primary Industries (QDPI) in conjunction with industry and interstate quarantine authorities. It provides a harmonised approach to the audit and accreditation of businesses throughout Australia and the mutual recognition of Plant Health Assurance Certificates accompanying consignments of produce moving within Queensland or interstate. Interstate quarantine authorities maintain the right to inspect the certified produce at any time and to refuse to accept a certificate where produce is found not to conform to specific requirements.

There are a number of ICAs with specific conditions or restrictions currently in place regarding the movement of fresh longan and lychee fruits produced in Queensland and New South Wales and other States and Territories within Australia. The main pest of interstate quarantine concern is the Queensland fruit fly (*Bactrocera tryoni*). However, Western Australia (WA) is also concerned about European red mite (*Panonychus ulmi*), melon thrips (*Thrips palmi* Karny) and spiralling whitefly (*Aleuroides dispersus*).

Interstate requirements are based on the following ICAs:

- **ICA-01 and 02**
Post-harvest treatments through ICA or DPI inspection
Postharvest Dimethoate or Fenthion Dip (ICA-01) or flood spray (ICA-02)
- **ICA-04**
Postharvest methyl bromide fumigation
- **ICA-13**
Packed in an unbroken skin. Meaning the skin has no pre-harvest crack, puncture, pulled stem or other break that penetrates through to the flesh and has not healed with callus tissue
[note: fruit with unbroken skin are not considered to host fruit flies]
- **ICA-14**
Pre-harvest treatment (bait spray) and inspection (free of broken skin, see ICA-13)

For WA, the additional pests of quarantine concern can be controlled through the following:

- European red mite - DPI inspection and certification free from pest.
- melon thrips - Property freedom
- spiralling whitefly - Postharvest methyl bromide fumigation (ICA-04)

Plant Biosecurity is concerned only with phytosanitary issues but the Food Standards Australia New Zealand (FSANZ) (formerly Australia New Zealand Food Authority (ANZFA)) is responsible for food safety issues. FSANZ has produced Food Standards for local fruit (Standard N1) including guidelines for sulphur dioxide (SO₂) treatment of longans. SO₂ is used to prevent surface rots on longan fruit (Biggs, 2001). The standards state that longans may be treated with SO₂ but the edible aril of longans must not contain more than 10 mg/kg (10 ppm) of SO₂ at the time of retail sale. SO₂-treated longans for retail sale, must be accompanied by a statement indicating the possible presence of SO₂ on the longans. This is required possibly due to the fact that SO₂ can induce allergic reactions in some sensitive individuals (NFI, 2001).

THE LONGAN AND LYCHEE INDUSTRIES

Production of longans and lychees in Australia

Longan and lychee plants were probably introduced into Australia by Chinese migrants, visitors or plant collectors in the 19th century (Biggs, 2001). In Australia, commercial longans and lychees are grown in orchards in New South Wales and Queensland. They are also grown non-commercially on a smaller scale in the Northern Territory and Western Australia.

Within NSW and Queensland, longan and lychee crops are produced in proximal areas as shown below and in Figure 2.

- About 50% of production areas are in far north Queensland (Cairns, Mareeba, Ingham and the Atherton Tablelands),
- 40% are in central and southern Queensland (Rockhampton, Bundaberg, Gympie, Nambour and Caboolture), and
- 10% are in the north coast of New South Wales (Lismore, Coffs Harbour)

(Menzel and McConchie, 1998).

A number of varieties of longan and lychee trees are grown in Australia. Different varieties are grown in different regions and climatic zones.

In terms of yield per hectare, Queensland is the leading state for longan and lychee production and accounts for almost 90% of the total Australian longan and lychee crop (Australian Horticultural Corporation, 1999). Fresh longan and lychee fruit are distributed from Queensland to central wholesale markets in each capital city, primarily to Sydney, Melbourne and Brisbane.

In 2000, annual longan and lychee production in Australia was estimated to be 7000 tonnes (2000 tonnes of longan and 5000 tonnes of lychee). Some growers are investigating the possibilities of processing lower grade fruit by drying. Dried longan and lychee fruit are very popular in south-east Asia.

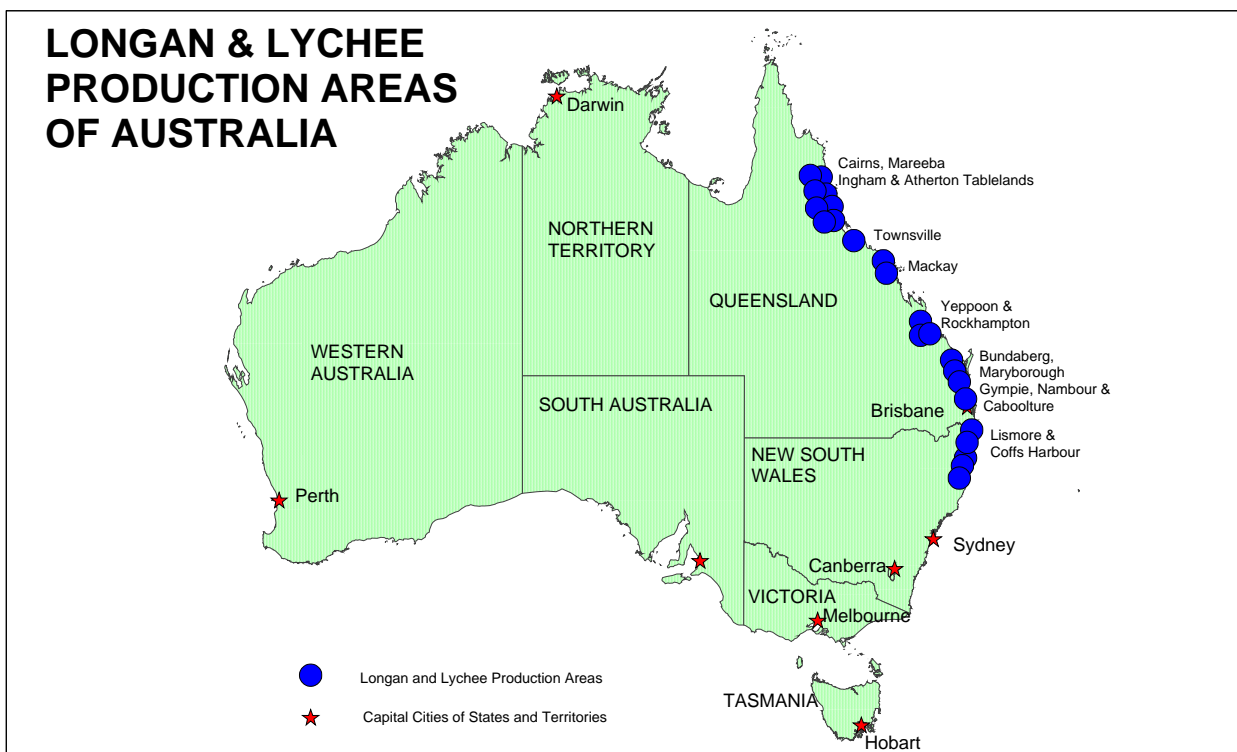


Figure 2. Longan and lychee production areas of Australia

Production of longans in Australia

Longans were introduced into Australia in the mid-1850s and shortly after that date there were seedling trees on many parts of the eastern coast, especially in the northern tropics (Biggs, 2001). They were first grown commercially in 1913, but significant commercial plantings began only in the 1970s when additional commercial varieties were introduced from Thailand, China, Hong Kong, Taiwan and the United States (Florida) (Menzel *et al.*, 1989). Additional commercial plantings of longan began in the early 1980s as farmers diversified from tobacco and other crops in Queensland.

There are approximately 80 commercial longan growers in Australia. Longan orchards are mainly found in elevated regions on the Atherton Tablelands of far north Queensland and a smaller number spread along the eastern coast of Queensland and northern New South Wales (Menzel and McConchie, 1998; Stakeholders, 2001). In 1998, the total production area for longan was 130 hectares, with an annual production of about 450 tonnes, worth \$2 million (Menzel and McConchie, 1998). Currently, longan fruit production is rising, especially as new plantations in northern Queensland begin to bear fruit. Production was predicted to increase from 200 tonnes in 1994 to 2,000 tonnes in the year 2001 (Partridge, 1997; Stakeholders, 2001) (Table 2). Common commercial orchard cultivars are 'Kohala', 'Homestead No.1', 'Chompoo', 'Haew' and 'Biew Kiew'.

Table 2. Australian production (tonnes) of longans for 1997-2001

Season	Total
1997	148
1998	289
1999	100
2000	1500
2001	2000

Source: Longan Association of Australian (2000)

Longan fruit are available in Australia from early January (in north Queensland) to May/early June (in northern NSW). Longan fruit mature about two months later than lychee.

Production of lychees in Australia

Chinese migrants introduced lychees into Australia in the early 1800s but major commercial plantings of lychees did not begin until the early 1970s.

In 1997/98, there were about 450 growers of lychee fruit (Menzel and McConchie, 1998) with an annual production of 1342 tonnes (Table 3), worth \$12-15 million (Australian Horticultural Corporation, 1999). Production has increased steadily over the past ten years, although the number of commercial growers has decreased. The industry predicts that plantings will double by 2003 and quadruple by 2005 (ALGA, 2002). There are now approximately 300 growers, who produced 6000 tonnes of lychee fruit in the 2001/2002 season (ALGA, 2002).

Table 3. Australian production (tonnes) of lychees by state for 1992-2000

Season	NSW	QLD	Total
1992/93	150	1850	2000
1993/94	200	1600	1800
1994/95	400	3100	3500
1995/96	500	2600	3100
1996/97	400	3100	3500
1997/98	162	1180	1342
1998/99	245	1115	1360
1999/2000	125	703	828
2000/01	NA	NA	5000
2001/02*	NA	NA	6000

Source: Australian Bureau of Statistics 2000-2001 *Australian Lychee Growers Association, 2002

NA=Not available

Current lychee cultivars include 'Kwai May Pink' (Bosworth 3), 'Tai So', 'Fei Zi Xiao', 'Souey Tung' and 'Kwai May Pink (Bosworth 3)'.

In Australia, lychee fruit are available from early November to mid-March.

Export of Australian longans and lychees

Australia has an advantage in the international market because it produces longan and lychee fruit during the Northern Hemisphere winter or 'off season'. This includes the Christmas (December) and Chinese New Year (January, February) periods (Menzel and McConchie, 1998).

In 1997/98, exports of longan fruit were about 40 tonnes (Menzel and McConchie, 1998). There have been trial consignments of longan fruit exported from northern Queensland to Hong Kong, but outturns have sometimes been disappointing. The main export markets for Australian longans are Hong Kong, Canada, Singapore, French Polynesia (Tahiti) and the European Union (United Kingdom and France).

The bulk of Australia's lychee production is sold on the domestic market with about 30% of the yield exported (Menzel and McConchie, 1998). No exports were recorded in 1997/98 (Australia Horticultural Corporation, 1999) but in 1998/99, lychee exports totalled 246 tonnes, of which 167 tonnes were exported to Hong Kong (Cirillo, 2001). Lychees were also exported in 2000. Most of the fruit is exported to Asia where the demand is for small-seeded fruit with good colour, taste and size. The main export markets are Hong Kong, Singapore, Philippines, French Polynesia, the European Union (United Kingdom, Netherlands, France and Germany), the United Arab Emirates, Brunei, Qatar and USA (Menzel and McConchie, 1998; Stakeholders, 2001; Cirillo, 2001).

Longan and lychee production in China

Longan and lychee plants originated in southern China over 2000 years ago. The production areas of Chinese lychee and longan are now distributed between latitudes 18° and 31° N (CIQ, 1999). The main Chinese production areas for both lychee and longan fruit are in the provinces of Guangdong, Hainan, Fujian and Guangxi Zhuang Autonomous Region (Figure 3).

Longan industry in China

In 1994, the production area for longan was more than 130,000 hectares (CIQ, 1999) producing about 400,000 tonnes of fruit (Waite and Hwang, 1999). In 1999, the estimate of longan production was 500,000 tonnes valued at 9,000,000,000 yuan (Lu M.Y., pers. comm. 2000).

In China, longan trees flower two to three weeks later than lychee trees and the fruit matures four to eight weeks later (Waite and Hwang, 1999). The harvest period for longan extends from late July to early September. Many varieties of longan are grown in China enabling productivity at a range of altitudes (600-1400 m).

Lychee industry in China

In 1994, the production area for lychee was about 151,000 hectares and produced about 190,000 tonnes of fruit (CIQ, 1999). In 1999, the cultivated area under lychee exceeded 580,000 ha with a record production of 1.26 million tonnes (FAO, 2001). The production of lychee is expected to further increase as more recently established orchards start to produce fruit.



Figure 3. Longan and lychee production areas in China

Major production regions within China are Guangdong, Guangxi, Fujian and Hainan with minor production in Sichuan, Yunnan and Guizhou. Twenty cultivars out of more than 200 recorded are commercially cultivated at a range of elevations and usually on sloping lands. Important early-season cultivars include 'Sanyuehong', 'Baila', 'Shuidong', 'Dazao', 'Heiye' and 'Feizixiao'. Mid-to late-season cultivars include 'Guiwei', 'Nuomici', 'Huazhi', 'Chenzhi', 'Lanzhu' and 'Yuanhong' (FAO, 2001).

In China, the harvest period for lychee extends from early May to late August but is mostly concentrated from late May to late July.

Chinese exports of longans and lychees

The main export markets for both Chinese longan and lychee fruit are Hong Kong, Japan, Singapore, Malaysia, Philippines, France and the USA (Stakeholders, 2001).

Chinese imports of longans and lychees

China presently imports longan and lychee fruit from Thailand and the Philippines (Stakeholders, 2001).

PRELIMINARY RESULTS OF PEST CATEGORISATION

PRESENCE OR ABSENCE, REGULATORY STATUS AND ASSOCIATION OF PESTS WITH THE PATHWAY

Pest categorisation involves the following elements: identity of the pest; presence or absence in the PRA area; regulatory status; potential for establishment or spread in the PRA area; and potential for economic consequences (including environmental consequences) in the PRA area. These are discussed in the section entitled “Elements of Pest Categorisation”. The first three elements of pest categorisation are reported in this Technical Issues Paper. Appendix 1 lists the occurrence of pests and diseases of longans in China and their presence or absence in Australia (including if they are present but not widely distributed and being officially controlled). Appendices 2 and 3 indicate whether the potential pest or disease occurs on longan fruit, or, longan fruit on panicles respectively, the pathways under consideration in this IRA. Appendix 4 lists the occurrence of pests and diseases of lychees in China and their presence or absence in Australia. Appendix 5 indicates whether these pests and diseases occur on lychee fruit, the pathway under consideration in this IRA. Appendix 6 summarises the species that are to be considered in the second stage of the IRA.

Table 4 provides, for each pest type (mites, insects, nematodes, fungi and diseases of unknown aetiology), a summary of the number known to be associated with longan and lychee plants in China and the number present in Australia. Table 5 provides a summary of the number of pests associated with the import pathways (i.e. that occur on longan and lychee fruit). Many of the pests associated with longan and lychee plants in China also occur in Australia or are not present on the import pathway. These pests do not need to be considered further in the IRA.

Table 4. Summary of pests associated with longan and lychee in China and their occurrence in Australia

Pest type	TOTAL	Present in China			Present in Australia
		associated with both longan and lychee	associated with longan only	associated with lychee only	
Mites	10	0	4	4	2
Insects	150	74	10	28	38
Nematodes	50	0	5	21	24
Fungi	18	2	7	4	5
Diseases of unknown aetiology	2	1	0	1	0
Total	230	77	26	58	69

Table 5. Summary of pests of longan and lychee associated with the import pathways and to be considered further

Pest type	TOTAL	both detached longan and detached lychee fruit	detached longan fruit only	longan panicle only	detached lychee fruit only
Mites	4	0	1	1	2
Insects	39	15	0	15	9
Nematodes	0	0	0	0	0
Fungi	4	2	1	0	1
Diseases of unknown aetiology	2	1	0	0	1
TOTAL	49	18	2	16	13

Mites

Of the ten mite species found on longan and lychee plants in China, two are also present in Australia. Of the remaining eight mite species, four species may be associated with the longan and lychee import pathways. Of these, one is associated with detached longan fruit and one species is associated with longan fruit on panicles, two are associated with detached lychee fruit. These four species will be considered further.

Insects

Of the 150 insect pest species found on longan and lychee plants in China, 38 are also present in Australia. Of the remaining 112 species that do not occur in Australia, 39 species may be associated with the longan and lychee import pathways. These comprise eight species of Coleoptera (beetles); one species of Diptera (flies); ten species of Hemiptera (true bugs); and 20 species of Lepidoptera (moths). Of these, 15 are common to both detached longan and lychee fruit, nine others occur on detached lychee fruit only, none occur on detached longan fruit only, and 15 species are associated with longan panicles. These 39 species will be considered further.

Nematodes

Of the 50 nematode species known to be associated with longan and lychee plants in China, 24 also occur in Australia. Of the 26 species that do not occur in Australia, none are to be considered further in the analysis as they do not occur on the import pathways.

Fungi

Of 18 fungal species known to be associated with longan and lychee plants in China, five are also present in Australia. Of the remaining 13 species that do not occur in Australia, four are associated with the import pathways. Two of these pathogens occur on both detached longan and lychee fruit, one other occurs on detached longan fruit and one other on detached lychee fruit. These four species will be considered further in the risk analysis.

Diseases of unknown aetiology

Of the two mycoplasma-like (possibly filamentous virus) diseases reported on longan and lychee in China, neither occurs in Australia. Longan witches' broom disease and lychee witches' broom disease are associated with the fruit pathway and will be included for further analysis.

.

FURTHER STEPS IN THE IMPORT RISK ANALYSIS PROCESS

The IRA process requires that the following steps be undertaken for an IRA:

- release of the draft IRA paper for stakeholder comment
 - comments to be received within 60 days
- consideration of stakeholder comment on the draft IRA paper
- further stakeholder consultation as necessary
- preparation of the final IRA paper
- submission of IRA recommendations to the Director of Animal and Plant Quarantine
- consideration of the recommendations by the Director of Animal and Plant Quarantine and final determination
- release of the final IRA paper
 - appeals to be received within 30 days
- consideration of any appeals
- if there are no appeals, or if the appeals are rejected, adoption of appropriate quarantine policy.

Stakeholders will be advised of any significant variations to the process.

Biosecurity Australia is committed to a thorough risk analysis of the proposed importation of fresh longan and lychee fruit from China. This analysis requires that technical information from a wide range of sources. If you have information relevant to this IRA for fresh longan and lychee fruit from China, please provide it as quickly as possible.³

³ Contact details for stakeholder contributions are provided in the accompanying Plant Biosecurity Policy Memorandum (PBPB)

REFERENCES

- Australian Lychee Growers Association (ALGA) (2001). Market access of lychee into China. *The Living Lychee*. No 3: p 3.
- Australian Lychee Growers Association (2002). Market Access of Lychees – Lychee Industry Information. Provided by Australian Lychee Growers Association (ALGA) May 2002.
- AQIS (1998). *The AQIS Import Risk Analysis Process Handbook*. AQIS: Canberra.
- AQRC (1996). Report of the Australian Quarantine Review Committee.
- Australian Horticultural Corporation (1999). Production Statistics Handbook 1999-2000. Australian Horticultural Corporation, Sydney, 172 pp.
- Biggs, T. (2001). Challenges for the exotic fruit industry. *Good Fruit & Vegetables* 12(1).
- China Inspection and Quarantine (CIQ) (1999). Information provided by China Inspection and Quarantine, 1999.
- China Inspection and Quarantine (CIQ) (2000). The Questions and Answers – Chinese Lychee and Longan Export to Australia. Information provided by China Inspection and Quarantine (CIQ), 25 December 2000.
- Cirillo, L. (2001). The Australian Horticultural Statistics Handbook 2000/2001 edition. Horticulture Australia Limited, 2001.
- FAO (2001). Report of the Expert Consultation on Lychee Production in the Asia-Pacific Region. 15-17 May 2001, Bangkok, Thailand. RAP Publication: 2001/09 24 pp.
- Longan Association of Australia (2000). Submission of New Priority for Consideration by Horticultural Market Access Committee (HMAC).
- Lu, M.Y. (2000). Personal communication. GLW, China.
- Menzel, C. and McConchie, C. (1998). Lychee and Longan. p 288-295 In: *The New Rural Industries: A handbook for Farmers and Investors*, (ed. K. Hyde) Rural Industries Research & Development Corporation: Canberra.
- Menzel, C.M., Watson, B.J. and Simpson, D.R. (1989). 'Longans – a place in Queensland's horticulture?' *Queensland Agricultural Journal* Sept-Oct, 251-265.
- NFI (2001) Longan. National Food Industry web site, Thailand, http://www.nfi.or.th/food_industry/product/longan/longan_link1.html
- Partridge, I. (1997). Tropical fruit becomes a major industry. *Rural Research* 174: 9-12.
- Stakeholders (2001). Comments provided by stakeholders 29 January at Brisbane and 31 January at Mareeba stakeholder meetings for the IRA on Longans & Lychees from China.
- Waite, G.K. and Hwang, J.S. (1999). Pests of litchi and longan. (Mimeograph).

APPENDIX 1. PEST CATEGORISATION FOR LONGAN (OCCURRENCE IN AUSTRALIA)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
INVERTEBRATA						
ACARI (mites)						
<i>Aceria dimocarp</i> Kuang, 1997= <i>Eriophyes dimocarp</i> Kuang [Acari: Eriophyidae]	Longan gall mite	Yes	He (2001)	No	Halliday (1998) Possible vector of longan witches' broom	Yes
<i>Aceria litchii</i> (Keiffer) [Acari: Eriophyidae]	Litchi erinose mite, litchi hairy mite, dog ear mite, hairy spider, litchi gall mite, leaf curl mite, litchi rust mite	Yes	Hong & Zhang (1996)	Yes	CABI (1999); Menzel & McConchie (1997); Menzel <i>et al.</i> (1988); Pinese (1981); Waite (1999); Waite & Elder (1999b); Waite & Hwang (1999)	No
<i>Epitrimerus dimocarp</i> Kuang & Hong 1989 [Acari: Eriophyidae]	Longan gall mite	Yes	Hong & Zhang (1996)	No	Halliday (1998)	Yes
<i>Neoeptimerus (Neoleipothrix)</i> <i>alocasiae</i> Wei & Kuang, 1993 [Acari: Eriophyidae]	Gall mite	Yes	He <i>et al.</i> (1996) (associated with longan witches' broom disease)	No	Halliday (1998)	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Echinopsis fukiensis</i> Fan & Chen [Acari: Raphignathidae]	Mite	Yes	Fan & Chen (1996)	No	Halliday (1998)	Yes
INSECTA (insects)						
Coleoptera (beetles)						
<i>Adoretus hirsutus</i> Ohaus [Coleoptera: Scarabaeidae]	White root grub	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Houston (1992)	Yes
<i>Adoretus sinicus</i> Burmeister [Coleoptera: Scarabaeidae]	Chinese rose beetle, root grub	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Houston (1992)	Yes
<i>Anomala antiqua</i> (Gyllenhal) [Coleoptera: Scarabaeidae]	Groundnut chafer	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	Yes	CABI (1999); Houston (1992)	No
<i>Anomala cupripes</i> Hope [Coleoptera: Scarabaeidae]	Large green chafer beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Houston (1992)	Yes
<i>Anoplophora almora</i> Maulik [Coleoptera: Cerambycidae]	Beetle	Yes	CIQ (2000)	No	CABI (1999)	Yes
<i>Anoplophora chinensis</i> (Forster) [Coleoptera: Cerambycidae]	Black and white citrus longhorned, longicorn beetle	Yes	CIQ (2000); FSCA (1999); Tan <i>et al.</i> (1997, 1998)	No	CABI (1999)	Yes
<i>Apogonia cribricollis</i> Burmeister [Coleoptera: Scarabaeidae]	Chafer beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Houston (1992)	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Aristobia testudo</i> (Voet) [Coleoptera: Cerambycidae]	Litchi longicorn beetle, turtleback beetle	Yes	Ho <i>et al.</i> (1990); Waite & Hwang (1999); Zhang (1997)	No	No records found	Yes
<i>Aulacophora almora</i> Maulik [Coleoptera: Chrysomelidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Aulacophora cattigarensis</i> Weise [Coleoptera: Chrysomelidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes
<i>Aulacophora femoralis</i> (Motschulsky) [Coleoptera: Chrysomelidae]	Cucurbit leaf beetle, orange broom galerucid	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes
<i>Chrysochus chinensis</i> Baly [Coleoptera: Chrysomelidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Colaphellus bowringi</i> Baly [Coleoptera: Chrysomelidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes
<i>Henosepilachna vigintioctopunctata</i> (Fabricius) = <i>Epilachna</i> <i>vigintioctopunctata</i> (Fabricius) [Coleoptera: Coccinellidae]	Hadda beetle, leaf- eating ladybird, 26- spotted ladybird	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	Yes	AICN (2001); Gupta & Kumar (1983); Li (1993)	No
<i>Holotrichia ovata</i> Chang [Coleoptera: Scarabaeidae]	White grub beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Houston (1992)	Yes
<i>Holotrichia sauteri</i> Moser [Coleoptera: Scarabaeidae]	Southern black chafer	Yes	Huang & Lin (1987)	No	Houston (1992)	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Hypomeces squamosus</i> Fabricius [Coleoptera: Curculionidae]	Green weevil, gold-dust beetle, gold-dust weevil	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	CABI (1999)	Yes
<i>Lepidiota stigma</i> Fabricius [Coleoptera: Scarabaeidae]	Sugarcane white grub	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Houston (1992)	Yes
<i>Maladera castanea</i> (Arrow) [Coleoptera: Scarabaeidae]	Asiatic garden beetle, castaneus garden beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Houston (1992)	Yes
<i>Maladera</i> spp. [Coleoptera: Scarabaeidae]	Chafer beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Houston (1992)	Yes
<i>Microtrichia cephalotes</i> Burmeister [Coleoptera: Scarabaeidae]	Sugarcane chafer	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Houston (1992)	Yes
<i>Monolepta hieroglyphica</i> Motschulsky [Coleoptera: Chrysomelidae]	Leaf feeding beetle, leaf beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes
<i>Neomylloderus hedini</i> (Marshall) [Coleoptera: Curculionidae]	Weevil	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes
<i>Nodina punctostriolata</i> Fairmaire [Coleoptera: Chrysomelidae]	Leaf beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes
<i>Oxycetonia jucunda</i> Faldermann [Coleoptera: Scarabaeidae]	Flower chafer, citrus flower chafer	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Houston (1992)	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Phaedon brassicae</i> Baly [Coleoptera: Chrysomelidae]	Daikon leaf beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes
<i>Phyllotreta striolata</i> Fabricius [Coleoptera: Chrysomelidae]	Cabbage flea beetle, striped flea beetle, turnip flea beetle, yellow striped flea beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes
<i>Platymycteropsis mandarinus</i> Fairmaire [Coleoptera: Curculionidae]	Weevil	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes
<i>Popillia mutans</i> Newman [Coleoptera: Scarabaeidae]	Scarab beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Houston (1992)	Yes
<i>Popillia quadriguttata</i> Fabricius [Coleoptera: Scarabaeidae]	Scarab beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Houston (1992)	Yes
<i>Protaetia fusca</i> (Herbst) [Coleoptera: Scarabaeidae]	Mottled flower scarab beetle, mango flower beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997)	Yes	Houston (1992)	No
<i>Protaetia nitididorsis</i> (Fairmaire) = <i>Cetonia esquirolii</i> Pouillaude [Coleoptera: Scarabaeidae]	Scarab beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Houston (1992)	Yes
<i>Sympiezomias citri</i> Chao [Coleoptera: Curculionidae]	Grey citrus weevil	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Taiwania obtusata</i> Boheman [Coleoptera: Chrysomelidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes
<i>Xylotrupes gideon</i> Linnaeus [Coleoptera: Scarabaeidae]	Elephant beetle, rhinoceros beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	Yes	CABI (1999); Houston (1992); Menzel <i>et al.</i> (1988); Waite & Elder (2000a); Waite & Hwang (1999)	No
Diptera (flies)						
<i>Bactrocera dorsalis</i> (Hendel) [Diptera: Tephritidae]	Oriental fruit fly, Asian fruit fly, mango fruit fly	Yes	CABI (1999); Liang <i>et al.</i> (1999)	No	CABI (1999)	Yes
Hemiptera [aphids, leafhoppers; mealybugs; psyllids; scales; true bugs; whiteflies]						
<i>Aulacaspis longanae</i> Chen [Hemiptera: Diaspididae]	Longan diaspidid scale	Yes	Chen <i>et al.</i> (1980)	No	Chen <i>et al.</i> (1980)	Yes
<i>Cantao ocellatus</i> (Thunberg) [Hemiptera: Pentatomidae]	Shield bug	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes
<i>Ceroplastes ceriferus</i> (Fabricus) [Hemiptera: Coccidae]	Indian wax scale, Indian white wax scale, Japanese wax scale	Yes	CABI (1999); Takahashi (1942)	Yes	AICN (2000); Beardsley (1986); CABI (1999); Danzig & Konstantinova (1990); De Lotto (1971); Qin & Gullan (1994)	No

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Ceroplastes rubens</i> Maskell [Hemiptera: Coccidae]	Pink wax scale, red wax scale, ruby wax scale	Yes	CIE (1960); CIQ (2000); Tan <i>et al.</i> (1997)	Yes	AICN (2000); CABI (1999); Danzig & Konstantinova (1990); Qin & Gullan (1994); Smith <i>et al.</i> (1997); Waite & Elder (1999d); Waite & Hwang (1999)	No
<i>Cletus trigonus</i> Thunberg [Hemiptera: Coreidae]	Rice slender bug	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes
<i>Coccus viridis</i> Green [Hemiptera: Coccidae]	Green coffee scale, green scale, green shield scale, soft green scale	Yes	Ballou (1926)	Yes	AICN (2000); CABI (1999); Smith <i>et al.</i> (1997); Waite & Elder (2000c)	No
<i>Cornegenapsylla sinica</i> Yang & Li [Hemiptera: Psyllidae]	Longan psylla/psyllid	Yes	Chen <i>et al.</i> (1992); CIQ (2000); Tan <i>et al.</i> (1997); Yang & Li (1982); Zhan <i>et al.</i> (1999)	No	Yang & Li (1982) Possible vector of longan witches' broom	Yes (as vector – low risk)
<i>Dalpada oculata</i> (Fabricius) [Hemiptera: Pentatomidae]	Shield bug	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Empoasca vitis</i> (Goethe, 1875) = <i>E. flavescens</i> (Fabricius) = <i>E. pirusuga</i> (Mura) [Hemiptera: Cicadellidae]	Smaller green leaf-hopper, green frogfly	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998); Sohi (1983) noted that all records of <i>E. flavescens</i> in the Oriental region need taxonomic verification.	No	CABI (1999)	Yes
<i>Erythroneura melia</i> Kuoh [Hemiptera: Cicadellidae]		Yes	CIQ (2000); Tan <i>et al.</i> (1997)	No	Day & Fletcher (1994)	Yes
<i>Eutettix apicus</i> Melichur [Hemiptera: Cicadellidae]		Yes	CIQ (2000); Tan <i>et al.</i> (1997)	No	Day & Fletcher (1994)	Yes
<i>Hyperoncus lateritius</i> (Westwood) [Hemiptera: Pentatomidae]	Shield bug	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes
<i>Iassus indicus</i> Lethierry [Hemiptera: Cicadellidae]		Yes	CIQ (2000); Tan <i>et al.</i> (1997)	No	Day & Fletcher (1994)	Yes
<i>Idioscopus clypealis</i> (Lethierry) [Hemiptera: Cicadellidae]	Mango leafhopper, blossom leafhopper	Yes		Yes	NSW Agriculture (1999)	No
<i>Kerria greeni</i> (Chamberlin) [Hemiptera: Kerridae]	Green's lac insect	Yes	Li <i>et al.</i> (1997)	No	ScaleNet (2001)	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Kerria lacca</i> Kerr (Laccifer) [Hemiptera: Kerridae]	Lac insect	Yes	Hu et al. (1992); Subbarayudu & Ram (1997). CIQ (2000) claim not on longan in China. In Taiwan (Li et al., 1997)	No	No records found	Yes
<i>Lawana imitata</i> Melichar [Hemiptera: Flattidae]	Flattid scale	Yes	CIQ (2000); Tan et al. (1997)	No	No records found	Yes
<i>Leptocentrus albolineatus</i> Funkhouser [Hemiptera: Membracidae]	Leaf hopper	Yes	CIQ (2000); Tan et al. (1997, 1998)	No	Day & Fletcher (1994)	Yes
<i>Leptocoris acuta</i> Thunberg = <i>Leptocoris</i> ? [Hemiptera: Coreidae]	Rice seed bug, Asian rice bug, paddy bug, rice sapper, paddy fly	Yes	CIQ (2000); Tan et al. (1997, 1998)	Yes	AICN (2000); CABI (1999); Kay et al. (1993)	No
<i>Mictis tenebrosa</i> Fabricius [Hemiptera: Coreidae]	Squash bug, leaf-footed bug	Yes	CIQ (2000); Tan et al. (1997, 1998)	No	No records found	Yes
<i>Nezara antennata</i> Scott [Hemiptera: Pentatomidae]	Green stink bug	Yes	CIQ (2000); Tan et al. (1997, 1998)	No	No records found	Yes
<i>Nipaecoccus viridis</i> (Newstead) = <i>Nipaecoccus vastator</i> (Maskell) [Hemiptera: Pseudococcidae]	Spherical mealybug, globular mealybug, cotton mealybug, coffee mealybug	Yes	CIQ (2000); Tan et al. (1997, 1998)	Yes	AICN (2000); Ben-Dov (1994); CABI (1999)	No
<i>Ochrochira camelina</i> Kiritshenko [Hemiptera: Coreidae]	Squash bug, leaf-footed bug	Yes	CIQ (2000); Tan et al. (1997, 1998)	No	No records found	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Pulvinaria psidii</i> (Maskell) [Hemiptera: Coccidae]	Green shield scale, guava mealy scale, guava pulvinaria, guava scale mango scale	Yes	Waite & Hwang (1999)	Yes	AICN (2000); CABI (1999); Menzel <i>et al.</i> (1988); Waite & Elder (1999a); Waite & Hwang (1999)	No
<i>Pyrops candalaria</i> Linnaeus = <i>Fulgora condalaria</i> Linnaeus; <i>Laternaria candalaria</i> (Linnaeus) [Hemiptera: Fulgoridae]	Lantern bug, longan leafhopper, longan plant hopper	Yes	CIQ (2000); Li <i>et al.</i> (1997); Tan <i>et al.</i> (1997, 1998)	No	No records found	Yes
<i>Ricania speculum</i> (Walker) [Hemiptera: Ricaniidae]	Black leafhopper	Yes	CIQ (2000); Tan <i>et al.</i> (1997)	No	No records found	Yes
<i>Riptortus linearis</i> Fabricius [Hemiptera: Alydidae]	Legume pod beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	Yes	Cassis & Gross (in press)	No
<i>Saissetia oleae</i> (Olivier) [Hemiptera: Coccidae]	Black scale, black shield scale, brown olive scale, citrus black scale, Mediterranean black scale, olive scale, olive soft scale	Yes	Ali (1971); Mamet (1943)	Yes	AICN (2000); CABI (1999); De Lotto (1971); Mamet (1943); Smith <i>et al.</i> (1997)	No
<i>Solenostethium chinense</i> Stål [Hemiptera: Scutelleridae]	Yellow-belly arctiid, shield backed bug	Yes	Tan <i>et al.</i> (1997)	No	No records found	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Tessaratoma papillosa</i> (Drury) [Hemiptera: Pentatomidae]	Lychee/litchi stinkbug, litchi bug, leaf & twig sucking bug	Yes	Anon. (1978); CABI (1999); Chen <i>et al.</i> (1999); CIQ (2000); SAIQ (1999); Tan <i>et al.</i> (1997, 1998); Waite & Hwang (1999); Xin & Li (1989); Zhan <i>et al.</i> (1999); Zhou & Xian (1994)	No	CABI (1999) Possible vector of longan witches' broom disease	Yes (as vector – low risk)
Hymenoptera (ants; bees, wasps)						
<i>Anastatus japonicus</i> Ashmead [Hymenoptera: Eupelmidae]	Egg parasite	Yes	Xin & Li (1989)	No	No records found	Yes
<i>Ooencyrtus</i> spp. [Hymenoptera: Encyrtidae]	Egg parasite	Yes	Zhou & Xian (1994)	No	CABI (2000)	Yes
Isoptera (termites)						
<i>Coptotermes formosanus</i> Shiraki [Isoptera: Rhinotermitidae]	Formosan subterranean termite	Yes	Li <i>et al.</i> (1997)	No	CABI (1999)	Yes
Lepidoptera (butterflies; moths)						
<i>Acanthopsyche subteralbatus</i> Hampson [Lepidoptera: Psychidae]		Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Nielsen <i>et al.</i> (1996)	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Adoxophyes cyrtosema</i> Meyrick [Lepidoptera: Tortricidae]	Citrus brown-banded tortrix, citrus leaf-roller	Yes	Anon. (1978); CIQ (2000); Tan <i>et al.</i> (1998); Waite & Hwang (1999)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Adoxophyes orana</i> Fisher von Roeslerstamm = <i>Adoxophyes fasciata</i> Walsh [Lepidoptera: Tortricidae]	Apple peel tortricid, smaller tea tortrix, summer fruit tortrix	Yes	Huang <i>et al.</i> (1997)	No	CABI (1999); Nielsen <i>et al.</i> (1996)	Yes
<i>Archips asiatica</i> Walsingham [Lepidoptera: Tortricidae]	Fruit borer	Yes	Huang <i>et al.</i> (1997)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Cerace stipatana</i> Walker [Lepidoptera: Tortricidae]	Borer, tortrix	Yes	Han & Shen (1993); Huang <i>et al.</i> (1997)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Chalioides kondonis</i> Matsumura [Lepidoptera: Psychidae]	Kondo white psychid	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Conogethes punctaferalis</i> Guenée = <i>Dichocrocis punctaferalis</i> [Lepidoptera: Pyralidae]	Yellow peach moth	Yes	Huang <i>et al.</i> (1997)	Yes	Nielsen <i>et al.</i> (1996)	No
<i>Conopomorpha litchiella</i> Bradley [Lepidoptera: Gracillariidae]	Litchi leafminer	Yes	Huang <i>et al.</i> (1997); Waite & Hwang (1999); Yao & Liu (1990); Zhan <i>et al.</i> (1999)	No	Nielsen <i>et al.</i> (1996)	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Conopomorpha sinensis</i> Bradley [Lepidoptera: Gracillariidae]	Litchi fruit borer, litchi stem-end borer	Yes	CABI (1999); CIQ (2000); Huang <i>et al.</i> (1997); SAIQ (1999); Tan <i>et al.</i> (1997, 1998); Waite & Hwang (1999); Zhan <i>et al.</i> (1999)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Cryptophlebia ombrodelta</i> (Lower) [Lepidoptera: Tortricidae]	Litchi fruit moth, macadamia nut borer	Yes	CIE (1976); Huang <i>et al.</i> (1997); Waite & Hwang (1999)	Yes	AICN (2000); CABI (1999); Menzel & McConchie (1997); Menzel <i>et al.</i> (1988); Waite & Elder (1999c); Waite & Hwang (1999)	No
<i>Cryptothelea variegata</i> Snellen [Lepidoptera: Psychidae]	Bagworm	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Deudorix epijarbas</i> Moore [Lepidoptera: Lycaenidae]	Cornelian butterfly, fruit borer, grey lychee butterfly	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	Yes	Liu (1964); Nielsen <i>et al.</i> (1996); Waite & Hwang (1999) as <i>D. epijarbas diovis</i>	No
<i>Dudua aprobola</i> (Meyrick) = <i>Argyroplote aprobola</i> (Meyrick, 1886); <i>Platypeplus aprobola</i> (Meyrick) [Lepidoptera: Tortricidae]	Brown tortrix, leaf roller, leaf-webber	Yes	CIQ (2000); Tan <i>et al.</i> (1998); Waite & Hwang (1999); Zhang (1994)	Yes	Menzel <i>et al.</i> (1988); Nielsen <i>et al.</i> (1996); Waite (1992); Waite & Hwang (1999)	No

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Eboda cellerigera</i> Meyrick [Lepidoptera: Tortricidae]	Tortrix	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Eudocima fullonia</i> (Clerck) = <i>Othreis fullonia</i> [Lepidoptera: Noctuidae]	Fruit piercing moth, fruit sucking moth	Yes	CABI (1999); Waite & Hwang (1999)	Yes	AICN (2000); CABI (1999); Menzel & McConchie (1997); Menzel <i>et al.</i> (1988); Waite & Elder (2000b); Waite & Hwang (1999)	No
<i>Eumeta japonica</i> Heylaerts [Lepidoptera: Pyschidae]	Japanese bagworm	Yes	Li <i>et al.</i> (1997)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Euproctis scintillans</i> (Walker) = <i>Porthesia scintillans</i> [Lepidoptera: Lymantriidae]	Hairy tussock caterpillar	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Euproctis taiwana</i> Shiraki [Lepidoptera: Lymantriidae]	Tussock moth, yellow tailed moth	Yes	Li <i>et al.</i> (1997)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Euproctis varians</i> (Walker) [Lepidoptera: Lymantriidae]	Moth/caterpillar	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Homona coffearia</i> (Nietner) [Lepidoptera: Tortricidae]	Coffee tortrix, tea flushworm, tea tortrix, leafroller	Yes	Anon. (1978); Huang <i>et al.</i> (1997); Waite & Hwang (1999)	No	CABI (1999); Nielsen <i>et al.</i> (1996)	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Hypatima longanae</i> Tan <i>et al.</i> [Lepidoptera: Gelechiidae]	Twig borer	Yes	CIQ (2000); Huang <i>et al.</i> (1997); Tan <i>et al.</i> (1997, 1998); Zhan <i>et al.</i> (1999)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Olethreutes leucaspis</i> (Meyrick, 1906) = <i>Eupselias</i> [Lepidoptera: Tortricidae]	Leafroller, moth	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Orgyia postica</i> (Walker) = <i>Notolophus australis posticus</i> Walker [Lepidoptera: Lymantriidae]	Cocoa tussock moth, small tussock moth	Yes	CABI (1999); CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	CABI (1999); Nielsen <i>et al.</i> (1996)	Yes
<i>Orgyia turbata</i> Butler [Lepidoptera: Lymantriidae]	Tussock moth	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Oxyodes scrobiculata</i> (Fabricius, 1775) [Lepidoptera: Noctuidae]	Leaf-eating looper	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998); Waite & Hwang (1999)	Yes	Nielsen <i>et al.</i> (1996)	No
<i>Pingasa pseudoterpnaria gracilis</i> Prout [Lepidoptera: Geometridae]	Moth	Yes	CIQ (2000); Tan <i>et al.</i> (1997)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Selepa celtis</i> Moore, 1858 [Lepidoptera: Noctuidae]	Hairy caterpillar	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	Yes	Nielsen <i>et al.</i> (1996)	No

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Squamura dea</i> Swinhoe = <i>Arbela dea</i> Swinhoe; <i>Indarbela dea</i> Swinhoe [Lepidoptera: Metarbelidae]	Bark borer, litchi bark caterpillar, metarbelid borer	Yes	CABI (1999); CIQ (2000); Tan <i>et al.</i> (1998); Waite & Hwang (1999); Xu & Yang (1992)	No	CABI (1999); Nielsen <i>et al.</i> (1996)	Yes
<i>Squamura swinhoediscipuncta</i> (Wileman) = <i>Arbela baibarana</i> Matsumura; <i>Indarbela baibarana</i> [Lepidoptera: Metarbelidae]	Bark borer, litchi stem borer, stem borer, metarbelid borer	Yes	Li <i>et al.</i> (1997); Waite & Hwang (1999)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Stauropus alternus</i> (Walker) [Lepidoptera: Notodontidae]	Lobster caterpillar	Yes	Li <i>et al.</i> (1997)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Sympis rufibasis</i> Guenée [Lepidoptera: Noctuidae]	Moth/caterpillar	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	Yes	Nielsen <i>et al.</i> (1996)	No
<i>Thalassodes quadraria</i> Guenée [Lepidoptera: Geometridae]	Caterpillar	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	Yes	Balciunas <i>et al.</i> (1993)	No
<i>Zeuzera coffeae</i> Nietner [Lepidoptera: Cossidae]	Coffee leopard moth, coffee moth borer, red branch borer red coffee borer	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998); Waite & Hwang (1999)	No	Nielsen <i>et al.</i> (1996)	Yes
Orthoptera (crickets; grasshoppers; katydids)						
<i>Chondracris rosea</i> (De Geer) [Orthoptera: Acrididae]	Citrus locust, cotton locust	Yes	CIQ (2000); Tan <i>et al.</i> (1997)	No	CABI (1999)	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Choroedocus violaceipes</i> Miller [Orthoptera: Acrididae]	Grasshopper	Yes	CIQ (2000); Tan <i>et al.</i> (1997)	No	No records found	Yes
<i>Holochlora nawae</i> Matsumura & Shiraki [Orthoptera: Tettigoniidae]	Katydid	Yes	CIQ (2000); Tan <i>et al.</i> (1997)	No	No records found	Yes
<i>Locusta migratoria manilensis</i> (Meyton) [Orthoptera: Acrididae]	Oriental migratory locust, migratory locust	Yes	CIQ (2000); Tan <i>et al.</i> (1997, 1998)	Yes	AICN (2000); CABI (1999)	No
<i>Tarbinskiellus portentosus</i> (Litchenstein) = <i>Brachytupes</i> ? [Orthoptera: Gryllidae]	Large brown cricket	Yes	Li <i>et al.</i> (1997)	No	Orthoptera species online	Yes
Thysanoptera (thrips)						
<i>Scirtothrips dorsalis</i> Hood [Thysanoptera: Thripidae]	Castor thrips, chilli thrips, strawberry thrips, tea yellow thrips	Yes	Waite & Hwang (1999); Zhang (1997)	Yes	AICN (2000); CABI (1999)	No
NEMATODA (nematodes)						
<i>Helicotylenchus crenacauda</i> Sher [Tylenchida: Hoplolaimidae]	Spiral nematode	Yes	Liu & Zhang (1999)	No	No records found	Yes
<i>Helicotylenchus dihystra</i> (Cobb) Sher [Tylenchida: Hoplolaimidae]	Common spiral nematode	Yes	Liu & Zhang (1999)	Yes	CABI (1999); McLeod <i>et al.</i> (1994); Siddiqi (1972a)	No
<i>Hemicriconemoides mangiferae</i> Siddiqi [Tylenchida: Criconematidae]	Ring nematode	Yes	Liu & Zhang (1999); Zhang (1995)	Yes	McLeod <i>et al.</i> (1994); Siddiqi, (1977)	No

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Paratrichodorus porosus</i> (Allen) Siddiqi [Triplonchida: Trichodoridae]	Stubby-root nematode	Yes	Liu & Zhang (1999)	Yes	CABI (1999)	No
<i>Paratylenchus veruculatus</i> Wu [Tylenchida: Paratylenchidae]	Pin nematode	Yes	Liu & Zhang (1999)	No	No records found	Yes
<i>Pratylenchus coffeae</i> (Zimmerman) Filipjev & Steckh [Tylenchida: Pratylenchidae]	Banana root nematode, root lesion nematode	Yes	Liu & Zhang (1999)	Yes	CABI (1999); Siddiqi (1972b)	No
<i>Pratylenchus pratensis</i> (de Man) Filipjev [Tylenchida: Pratylenchidae]	Root lesion nematode	Yes	Liu & Zhang (1999)	Yes	Loof (1974)	No
<i>Trichodorus pakistanensis</i> Siddiqi [Triplonchida: Trichodoridae]	Stubby root nematode	Yes	Liu & Zhang (1999)	No	No records found	Yes
<i>Tylenchorhynchus annulatus</i> (Cassidy) Golden [Tylenchida: Belonolamidae]	Stunt nematode, pin nematode	Yes	Liu & Zhang (1999)	Yes	CABI (1999); McLeod <i>et al.</i> (1994); Siddiqi (1976)	No
<i>Tylenchorhynchus leviterminalis</i> Siddiqi, Mukherjee & Dasgupta [Tylenchida: Belonolamidae]	Stunt nematode	Yes	Liu & Zhang (1999)	No	No records found	Yes
<i>Xiphinema insigne</i> Loos [Dorylaimida: Longidoridae]	Dagger nematode	Yes	Liu & Zhang (1999)	No	No records found	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
PATHOGENS						
FUNGI						
<i>Ascochyta longan</i> C.F. Zhang & P.K. Chi [Mitosporic fungi]	Leaf spot	Yes	Zhang & Qi (1996)	No	No records found	Yes
<i>Botryodiplodia</i> spp. [Mitosporic fungi: Coelomycetes]	Collar rot	Yes	Jiang (1997)	Yes	Tongdee <i>et al.</i> (1982)	No
<i>Colletotrichum gloeosporioides</i> = <i>Glomerella cingulata</i> (Penz.) Penz. & Sacc. [Phyllachorales: Phyllachoraceae]	Leaf blight, blossom blight, anthracnose, brown blight, fruit rot, tear stain	Yes	CIQ (2000)	Yes	CABI (1999); Drew (1999); Johnson (1989); NCOF (2000); Priest (1989)	No
<i>Cylindrocladiella peruviana</i> (Bat., Bez., & Herrera) [Mitosporic fungi: Hyphomycetes]		Yes	CIQ (2000)	No	No records found	Yes
<i>Leptosphaeria guayuan</i> C.F. Zhang & P.K. Chi [Dothideales: Leptosphaericaceae]	Leaf spot	Yes	Zhang & Qi (1996)	No	No records found	Yes
<i>Leptosphaeria longan</i> C.F. Zhang & P.K. Chi [Dothideales: Leptosphaericaceae]	Leaf spot	Yes	Zhang & Qi (1996)	No	No records found	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Marssonia euphoriae</i> C.F. Zhang & P.K. Chi [Mitosporic fung: Hyphomycetes]	Brown leaf spot	Yes	Zhang & Qi (1996)	No	No records found	Yes
<i>Meliola capensis</i> (K. & C.) Thiess var. <i>euphoriae</i> Hangsf. [Meliolales: Meliolaceae]		Yes	Hu <i>et al.</i> (1986)	No	No records found	Yes
<i>Pestalotiopsis pauciseta</i> (Sacc.) Y.X. Chen [Mitosporic fungi: Coelomycetes]	Leaf blight	Yes	Zhang & Qi (1996)	No	No records found	Yes
<i>Phomopsis guiyuan</i> C.F. Zhang & P.K. Chi [Diaporthales: Valsaceae]	Grey leaf blight	Yes	Zhang & Qi (1996)	No	No records found	Yes
<i>Phomopsis longanae</i> Chi & Jiang [Diaporthales: Valsaceae]	Fruit blotch, branch canker	Yes	Lin & Chi (1992)	No	No records found	Yes
DISEASES OF UNKNOWN AETIOLOGY						
LWBD Mycoplasma-like/Filamentous virus? Organism	Longan witches' broom disease	Yes	Batten (1986); Chen <i>et al.</i> (1992, 1996); CIQ (2000); Coates <i>et al.</i> (2000); He <i>et al.</i> (1996); Koizumi (1995); Menzel <i>et al.</i> (1989); Zhang (1999)	No	No records found	Yes

Appendix 1. Pest Categorisation for Longan (Occurrence in Australia)

Question marks (No? Yes?) denote that further information is required to categorise the species. In these cases of doubt, the species is always included in the next step of categorisation.

= denotes both previous combinations and synonomies.

Shaded pests are found on both longan and lychee.

APPENDIX 2. PEST CATEGORISATION FOR LONGAN (PATHWAY ASSOCIATION – FRESH LONGAN FRUIT)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
INVERTEBRATA					
ACARI (mites)					
<i>Aceria dimocarp</i> i Kuang 1997 = <i>Eriophyes dimocarp</i> i Kuang [Acari: Eriophyidae]	Longan gall mite	Yes	Leaves, new growth, fruit, terminal flower. Possible vector of longan witches' broom	He (2001)	Yes
<i>Echinopsis fukiensis</i> Fan & Chen [Acari: Raphignathidae]	Mite	No	Under bark	Fan & Chen (1996)	No
<i>Epitrimerus dimocarp</i> i Kuang & Hong 1989 [Acari: Eriophyidae]	Longan gall mite	No	Leaves, new growth	Hong & Zhang (1996)	No
<i>Neopitrimerus (Neoleipothrix) alocasiae</i> Wei & Kuang 1993 [Acari: Eriophyidae]	Gall mite	No	Buds, flowers; leaflet	He <i>et al.</i> (1996) (associated with longan witches' broom disease)	No

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
INSECTA (insects)					
Coleoptera (beetles)					
<i>Adoretus hirsutus</i> Ohaus [Coleoptera: Scarabaeidae]	White root grub	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Adoretus sinicus</i> Burmeister [Coleoptera: Scarabaeidae]	Chinese rose beetle, root grub	No	Roots, leaves, new leaf growth	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Anomala cupripes</i> Hope [Coleoptera: Scarabaeidae]	Large green chafer beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Anoplophora almora</i> Maulik [Coleoptera: Cerambycidae]	Beetle	No	New stems	CIQ (2000)	No
<i>Anoplophora chinensis</i> (Forster) [Coleoptera: Cerambycidae]	Black and white citrus longhorned/ longicorn beetle	No	Roots, stem, trunk, branches	CIQ (2000); FSCA (1999); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Apogonia cribricollis</i> Burmeister [Coleoptera: Scarabaeidae]	Chafer beetle	No	New stems, new leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Aristobia testudo</i> (Voet) [Coleoptera: Cerambycidae]	Litchi longicorn beetle, turtleback beetle	No	Bark, stem	Ho <i>et al.</i> (1990); Waite & Hwang (1999); Zhang (1997)	No
<i>Aulacophora almora</i> Maulik [Coleoptera: Chrysomelidae]	Beetle	No	New stem, new leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Aulacophora cattigarensis</i> Weise [Coleoptera: Chrysomelidae]	Leaf beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Aulacophora femoralis</i> (Motschulsky) [Coleoptera: Chrysomelidae]	Orange broom galerucid, cucurbit leaf beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Chrysochus chinensis</i> Baly [Coleoptera: Chrysomelidae]	Leaf beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Colaphellus bowringi</i> Baly [Coleoptera: Chrysomelidae]	Beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Holotrichia ovata</i> Chang [Coleoptera: Scarabaeidae]	White grub beetle	No	Roots	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Holotrichia sauteri</i> Moser [Coleoptera: Scarabaeidae]	Southern black chafer	No	Flowers	Huang & Lin (1987)	No
<i>Hypomeces squamosus</i> Fabricius [Coleoptera: Curculionidae]	Green weevil, gold-dust beetle, gold-dust weevil	No	Leaves, roots, growing points	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Lepidiota stigma</i> Fabricius [Coleoptera: Scarabaeidae]	Sugarcane white grub	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Maladera castanea</i> (Arrow) [Coleoptera: Scarabaeidae]	Asiatic garden beetle, castaneus garden beetle	No	New stems, twigs, new leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Maladera</i> spp. [Coleoptera: Scarabaeidae]	Chafer beetle	No	New stems, young leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Microtrichia cephalotes</i> Burmeister [Coleoptera: Scarabaeidae]	Sugarcane chafer	No	New leaves, new stems	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Monolepta hieroglyphica</i> Motschulsky [Coleoptera: Chrysomelidae]	Leaf feeding beetle, leaf beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Neomyllocerus hedinii</i> (Marshall) [Coleoptera: Curculionidae]	Weevil	No	Leaves, new stem	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Nodina punctostriolata</i> Fairmaire [Coleoptera: Chrysomelidae]	Leaf beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Oxycetonia jucunda</i> Faldermann [Coleoptera: Scarabaeidae]	Flower chafer, citrus flower chafer	Yes	Fruit, flowers	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Phaedon brassicae</i> Baly [Coleoptera: Chrysomelidae]	Daikon leaf beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Phyllotreta striolata</i> Fabricius [Coleoptera: Chrysomelidae]	Cabbage flea beetle, yellow striped flea beetle, striped flea beetle, turnip flea beetle	No	Leaves, roots, flowers	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Platymycteropsis mandarinus</i> Faimaire [Coleoptera: Curculionidae]	Weevil	No	Leaves, new stems	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Popillia mutans</i> Newman [Coleoptera: Scarabaeidae]	Scarab beetle	Yes	Fruit	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Popillia quadriguttata</i> Fabricius [Coleoptera: Scarabaeidae]	Scarab beetle	Yes	Fruit	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Protaetia nitididorsis</i> (Fairmaire) = <i>Cetonia esquirola</i> Pouillaude [Coleoptera: Scarabaeidae]	Scarab beetle	Yes	Fruit	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Sympiezomias citri</i> Chao [Coleoptera: Curculionidae]	Grey citrus weevil	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Taiwania obtusata</i> Boheman [Coleoptera: Chrysomelidae]	Beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
Diptera (true flies; mosquitoes)					
<i>Bactrocera dorsalis</i> (Hendel) [Diptera: Tephritidae]	Oriental fruit fly, Asian fruit fly	Yes	Fruit with damaged skin	CABI (1999); Liang <i>et al.</i> (1999)	Yes

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
Hemiptera (aphids; leafhoppers; mealybugs; phyllids; scales; true bugs; whiteflies)					
Aulacaspis longanae Chen [Hemiptera: Diaspididae]	Longan diaspidid scale	Yes	Twig, fruit	Chen et al. (1980)	Yes
Cantao ocellatus (Thunberg) [Hemiptera: Pentatomidae]	Shield bug	No	Leaves	CIQ (2000); Tan et al. (1997); Tan et al. (1998)	No
Cletus trigonus Thunberg [Hemiptera: Coreidae]	Rice slender bug	No	Leaves	CIQ (2000); Tan et al. (1997); Tan et al. (1998)	No
Cornegenapsylla sinica Yang & Li [Hemiptera: Psyllidae]	Longan psylla/psyllid	No	Leaves. Possible vector of longan witches’ broom	CIQ (2000); Chen et al. (1992); Tan et al. (1997); Yang & Li (1982); Zhan et al. (1999)	No (as vector – low risk)
Dalpada oculata (Fabricius) [Hemiptera: Pentatomidae]	Shield bug	No	Leaves	CIQ (2000); Tan et al. (1997); Tan et al. (1998)	No
Empoasca vitis (Goethe 1875) = E. flavescens (Fabricius); E. pirusuga (Mura) [Hemiptera: Cicadellidae]	Smaller green leaf-hopper, green frogfly	No	Leaves, stem, trunk	CIQ (2000); Tan et al. (1997); Tan et al. (1998); (Sohi (1983) noted that all records of E. flavescens in the Oriental region need taxonomic verification.)	No

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Erythroneura melia</i> Kuoh [Hemiptera: Cicadellidae]	Leaf hopper	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Eutettix apicus</i> Melichur [Hemiptera: Cicadellidae]	Leaf hopper	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Hyperoncus lateritius</i> (Westwood) [Hemiptera: Pentatomidae]	Shield bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Iassus indicus</i> Lethierry [Hemiptera: Cicadellidae]	Leaf hopper	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Kerria greeni</i> (Chamberlin) [Hemiptera: Kerridae]	Green's lac insect	No	Stem, branches Refer to www.efruit.com.cn/lzw/lzzzql	Anon (2002); Li <i>et al.</i> (1997)	No
<i>Kerria lacca</i> Kerr (Laccifer) [Hemiptera: Kerridae]	Lac insect	No	Stem, branches, twigs, sap Refer to http://creatures.ifas.ufl.edu/orn/scales/lobate_lac.htm	CIQ (2000) not on lychee; Anon (2002); Hsieh & Hwang (1981); Waite & Hwang (1999)	No
<i>Lawana imitata</i> Melichar [Hemiptera: Flattidae]	Flattid scale	No	Branch, stem, trunk	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Leptocentrus albolineatus</i> Funkhouser [Hemiptera: Membracidae]	Leaf hopper	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Mictis tenebrosa</i> Fabricius [Hemiptera: Coreidae]	Squash bug, leaf-footed bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Nezara antennata</i> Scott [Hemiptera: Pentatomidae]	Green stink bug	Yes	Fruit, new leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Ochrochira camelina</i> Kiritshenko [Hemiptera: Coreidae]	Squash bug, leaf-footed bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Pyrops candalaria</i> Linnaeus = <i>Laternaria candalaria</i> (Linnaeus); <i>Fulgora condalaria</i> Linnaeus [Hemiptera: Fulgoridae]	Lantern bug, longan leafhopper, longan plant hopper	No	Stem	CIQ (2000); Li <i>et al.</i> (1997); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Ricania speculum</i> (Walker) [Hemiptera: Ricaniidae]	Black leafhopper	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Solenostethium chinense</i> Stål [Hemiptera: Scutelleridae]	Yellow-belly arctiid, shield backed bug	No	Leaves	Tan <i>et al.</i> (1997)	No

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Tessaratoma papillosa</i> (Drury) [Hemiptera: Pentatomidae]	Lychee/litchi stinkbug, litchi bug, leaf & twig sucking bug	Yes	New stems flower panicles; fruitlets; leaves, young petiole. Possible vector of longan witches' broom disease	Anon. (1978); CABI (1999); Chen <i>et al.</i> (1999); CIQ (2000); SAIQ (1999); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998); Waite & Hwang (1999); Xin & Li (1989); Zhan <i>et al.</i> (1999); Zhou & Xian (1994)	Yes (as vector – low risk)
Hymenoptera (ants; bees; wasps)					
<i>Anastatus japonicus</i> Ashmead [Hymenoptera: Eupelmidae]	Egg parasite	No	Eggs of <i>Tessaratoma papillosa</i> , laid on lower surface of leaves	Xin & Li (1989)	No
<i>Ooencyrtus</i> spp. [Hymenoptera: Encyrtidae]	Egg parasite	No	Eggs of <i>Tessaratoma papillosa</i> , laid on lower surface of leaves	Zhou & Xian (1994)	No
Isoptera (termites)					
<i>Coptotermes formosanus</i> Shiraki [Isoptera: Rhinotermitidae]	Formosan subterranean termite	No	Stems, roots	Li <i>et al.</i> (1997)	No
Lepidoptera (butterflies; moths)					
<i>Acanthopsyche subteralbatus</i> Hampson [Lepidoptera: Psychidae]	Moth	No	Branch, stem, trunk	CIQ (2000); Tan <i>et al.</i> (1998)	No

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Adoxophyes cyrtosema</i> Meyrick [Lepidoptera: Tortricidae]	Citrus brown-banded tortrix, citrus leaf-roller	No	New leaves, flowers	Anon. (1978); CIQ (2000); Tan <i>et al.</i> (1998); Waite & Hwang (1999)	No
<i>Adoxophyes orana</i> Fisher von Roeslerstamm = <i>Adoxophyes fasciata</i> Walsh [Lepidoptera: Tortricidae]	Smaller tea tortrix, summer fruit tortrix, apple peel tortricid	Yes	Leaves, new growth, fruit, flowers	Huang <i>et al.</i> (1997)	Yes
<i>Archips asiatica</i> Walsingham [Lepidoptera: Tortricidae]	Fruit borer	Yes	Fruit	Huang <i>et al.</i> (1997)	Yes
<i>Cerace stipatana</i> Walker [Lepidoptera: Tortricidae]	Tortrix, borer	Yes	Stem, fruit	Han & Shen (1993); Huang <i>et al.</i> (1997)	Yes
<i>Chalioides kondonis</i> Matsumura [Lepidoptera: Psychidae]	Kondo white psychid	No	Branch, stem, trunk	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Conopomorpha litchiella</i> Bradley [Lepidoptera: Gracillariidae]	Litchi leafminer	No	New leaves, new stems,	Yao & Liu (1990); Zhan <i>et al.</i> (1999); Huang <i>et al.</i> (1997); Waite & Hwang (1999);	No

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Conopomorpha sinensis</i> Bradley [Lepidoptera: Gracillariidae]	Litchi stem-end borer, litchi fruit borer	Yes	Young leaves, new shoot growth, fruit, young petiole	CABI (1999); CIQ (2000); Huang <i>et al.</i> (1997); SAIQ (1999); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998); Waite & Hwang (1999); Yao & Liu (1990); Zhan <i>et al.</i> (1999)	Yes
<i>Cryptothelea variegata</i> Snellen [Lepidoptera: Psychidae]	Bagworm	No	Branch, stem, trunk	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Eboda cellerigera</i> Meyrick [Lepidoptera: Tortricidae]	Tortrix	No	New stems, new leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Eumeta japonica</i> Heylaerts [Lepidoptera: Pyschidae]	Japanese tea bagworm	No	Stem, shoots, twigs	Li <i>et al.</i> (1997)	No
<i>Euproctis scintillans</i> (Walker) = <i>Porthesia scintillans</i> [Lepidoptera: Lymantriidae]	Hairy tussock caterpillar	Yes	Fruit, flower, leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Euproctis taiwana</i> Shiraki [Lepidoptera: Lymantriidae]	Yellow tailed moth, tussock moth	No	Leaves, stems, flowers, shoots Found to damage leaves of <i>Casuarina equisetifolia</i> (Huang & Tsay, 2002). Refer also to www.wetland.org.tw/	He (2002); Huang & Tsay (2002); Li <i>et al.</i> (1997);	No

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Euproctis varians</i> (Walker) [Lepidoptera: Lymantriidae]	Moth/caterpillar	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Homona coffearia</i> (Nietner) [Lepidoptera: Tortricidae]	Coffee tortrix, tea flushworm, tea tortrix, leafroller	Yes	Leaves, flowers, fruit	Anon. (1978); Huang <i>et al.</i> (1997); Waite & Hwang (1999);	Yes
<i>Hypatima longanae</i> Tan <i>et al.</i> [Lepidoptera: Gelechiidae]	Twig borer	Yes	Shoots, leaf, fruit, branch, stem, twigs, trunk	CIQ (2000); Huang <i>et al.</i> (1997); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998); Zhan <i>et al.</i> (1999)	Yes
<i>Olethreutes leucaspis</i> Meyrick (1906) [Lepidoptera: Tortricidae]	Moth, leafroller	No	New stem, new leaves,	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Orgyia postica</i> (Walker) = <i>Notolophus australis posticus</i> Walker [Lepidoptera: Lymantriidae]	Cocoa tussock moth, small tussock moth	No	Leaves	CABI (1999); CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Orgyia turbata</i> Butler [Lepidoptera: Lymantriidae]	Tussock moth	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Pingasa pseudoterpnaria gracilis</i> Prout [Lepidoptera: Geometridae]	Moth	No	New leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Squamura dea</i> (Swinhoe) = <i>Indarbela dea</i> Swinhoe = <i>Arbela dea</i> Swinhoe [Lepidoptera: Metarbelidae]	Bark borer, litchi bark caterpillar, metarbelid borer	No	Stem, bark, trunk	CABI (1999); CIQ (2000); Tan <i>et al.</i> (1998); Waite & Hwang (1999); Xu & Yang (1992)	No
<i>Squamura discipuncta</i> (Wileman) = ? <i>Indarbela baibarana</i> ; <i>Arbela baibarana</i> Matsumura [Lepidoptera: Metarbelidae]	Litchi stem borer bark borer, stem borer, metarbelid borer	No	Stem	Li <i>et al.</i> (1997); Waite & Hwang (1999)	No
<i>Stauropus alternus</i> (Walker) [Lepidoptera: Notodontidae]	Lobster caterpillar	No	Leaves, flowers	Li <i>et al.</i> (1997)	No
<i>Zeuzera coffeae</i> Nietner [Lepidoptera: Cossidae]	Coffee moth borer, coffee leopard moth, red coffee borer, red branch borer	No	Branch, stem, bark, trunk	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998); Waite & Hwang (1999)	No
Orthoptera [crickets; grasshoppers; katydids]					
<i>Chondracris rosea</i> (De Geer) [Orthoptera: Acrididae]	Citrus locust, cotton locust	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Choroedocus violaceipes</i> Miller [Orthoptera: Acrididae]	Grasshopper	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Holochlora nawae</i> Matsumura & Shiraki [Orthoptera: Tettigoniidae]	Katydid	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Tarbinskiellus portentosus</i> (Litchenstein) = <i>Brachytupes</i> spp.? [Orthoptera: Gryllidae]	Large brown cricket	No	Roots	Ali <i>et al.</i> (1996); Li <i>et al.</i> (1997)	No
NEMATODA (nematodes)					
<i>Helicotylenchus crenacauda</i> Sher [Tylenchida: Hoplolaimidae]	Spiral nematode	No	Roots	Liu & Zhang (1999)	No
<i>Paratylenchus veruculatus</i> Wu [Tylenchida: Paratylenchidae]	Nematode	No	Roots	Liu & Zhang (1999)	No
<i>Trichodorus pakistanensis</i> Siddiqi [Triplonchida: Trichodoridae]	Stubby root nematode	No	Roots	Liu & Zhang (1999)	No
<i>Tylenchorhynchus leviterminalis</i> Siddiqi, Mukherjee & Dasgupta [Tylenchida: Belonolaimidae]	Stunt nematode	No	Roots	Liu & Zhang (1999)	No
<i>Xiphinema insigne</i> Loos [Dorylaimida: Longidoridae]	Dagger nematode	No	Roots	Liu & Zhang (1999)	No

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
PATHOGENS					
FUNGI					
<i>Ascochyta longan</i> C.F. Zhang & P.K. Chi [Mitosporic fungi]	Leaf spot	No	Leaves	Zhang & Qi (1996)	No
<i>Cylindrocladiella peruviana</i> (Bat., Bez., & Herrera) [Mitosporic fungi: Hyphomycetes]		Yes	Fruit	CIQ (2000)	Yes
<i>Leptosphaeria guayuan</i> C.F. Zhang & P.K. Chi [Dothideales: Leptosphaericaceae]	Leaf spot	No	Leaves	Zhang & Qi (1996)	No
<i>Leptosphaeria longan</i> C.F. Zhang & P.K. Chi [Dothideales: Leptosphaericaceae]	Leaf spot	No	Leaves	Zhang & Qi (1996)	No
<i>Marssonia euphoriae</i> C.F. Zhang & P.K. Chi [Mitosporic fungi: Hyphomycetes]	Brown leaf spot	No	Leaves	Zhang & Qi (1996)	No

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Meliola capensis</i> (K. & C.) Thiess var. <i>euphoriae</i> Hangsf [Meliales: Meliaceae]	Black mildew	No	Leaves <i>Meliola</i> spp. reported on leaves of bamboo and other plant species in China. Unlikely to attack fruit (Zhang & Zhang 2000).	Hu <i>et al.</i> (1986); Hu & Lu (1989); Jiang (1989); Zhang & Zhang (2000).	No
<i>Pestalotiopsis pauciseta</i> (Sacc.) Y.X. Chen [Mitosporic fungi: Coelomycetes]	Leaf blight	Yes	Leaves, fruit	Zhang & Qi (1996)	Yes
<i>Phomopsis guiyuan</i> C.F. Zhang & P.K. Chi [Diaporthales: Valsaceae]	Grey leaf blight	No	Leaves	Zhang & Qi (1996)	No
<i>Phomopsis longanae</i> Chi & Jiang [Diaporthales: Valsaceae]	Fruit blotch/branch canker	Yes	Fruit, bark, stem, twig	Lin & Chi (1992)	Yes

Appendix 2. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
DISEASES OF UNKNOWN AETIOLOGY					
LWBD Mycoplasma-like/filamentous virus? Organism	Longan witches' broom disease Can be transmitted by dodder weeds (<i>Cuscuta campestris</i>) and arthropods <i>Tessoratoma papillosa</i> , <i>Cornegenopsylla sinica</i> , <i>Epitrimerus dimocarp</i>	Yes	Flowers, leaves, seeds, budwood, shoots	Batten (1986); Coates <i>et al.</i> (2000); Chen <i>et al.</i> (1992); Chen <i>et al.</i> (1999); CIQ (2000); He <i>et al.</i> (1996); Koizumi (1995); Menzel <i>et al.</i> (1989); Zhang (1999)	Yes

Associations of some pest species with the fruit or other parts of the plant are uncertain and are denoted with a question mark.

= denotes both previous combinations and synonymies.

Shaded pests are found on both longan and lychee.

APPENDIX 3. PEST CATEGORISATION FOR LONGAN (PATHWAY ASSOCIATION – FRESH LONGAN FRUIT AND PANICLES – IE. BRANCH, STEM, TWIG, BUT NOT NEW GROWTH)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
INVERTEBRATA					
ACARI (mites)					
<i>Aceria dimocarp</i> i Kuang 1997 = <i>Eriophyes dimocarp</i> i Kuang [Acari: Eriophyidae]	Longan gall mite	Yes	Leaves, new growth, fruit, terminal flowers. Possible vector of longan witches' broom	He (2001)	Yes
<i>Echinopsis fukiensis</i> Fan & Chen [Acari: Raphignathidae]	Mite	Yes	Under bark. May be a hitch-hiker on stems	Fan & Chen (1996)	Yes
<i>Epitrimerus dimocarp</i> i Kuang & Hong 1989 [Acari:Eriophyidae]	Longan gall mite	No	Leaves, new growth	Hong & Zhang (1996)	No
<i>Neoepitrimerus (Neoleipothrix) alocasiae</i> Wei & Kuang 1993 [Acari: Eriophyidae]	Gall mite	No	Buds, flowers; leaflet	He <i>et al.</i> 1996 (associated with longan witches' broom disease)	No

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
INSECTA (insects)					
Coleoptera (beetles)					
<i>Adoretus hirsutus</i> Ohaus [Coleoptera: Scarabaeidae]	White root grub	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Adoretus sinicus</i> Burmeister [Coleoptera: Scarabaeidae]	Chinese rose beetle, root grub	No	Roots, leaves, new leaf growth	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Anomala cupripes</i> Hope [Coleoptera: Scarabaeidae]	Large green chafer beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Anoplophora almora</i> Maulik [Coleoptera: Cerambycidae]	Beetle	No	New stems	CIQ (2000)	No
<i>Anoplophora chinensis</i> (Forster) [Coleoptera: Cerambycidae]	Black and white citrus longhorned/ longicorn beetle	Yes	Roots, stem, trunk, branches	CIQ (2000); FSCA (1999); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Apogonia cribricollis</i> Burmeister [Coleoptera: Scarabaeidae]	Chafer beetle	No	New stems, new leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Aristobia testudo</i> (Voet) [Coleoptera: Cerambycidae]	Litchi longicorn beetle, turtleback beetle	Yes	Bark, stem	Ho <i>et al.</i> (1990); Waite & Hwang (1999); Zhang (1997)	Yes
<i>Aulacophora almora</i> Maulik [Coleoptera: Chrysomelidae]	Beetle	No	New stem, new leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
<i>Aulacophora cattigarensis</i> Weise [Coleoptera: Chrysomelidae]	Beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Aulacophora femoralis</i> (Motschulsky) [Coleoptera: Chrysomelidae]	Orange broom galerucid, cucurbit leaf beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Chrysochus chinensis</i> Baly [Coleoptera: Chrysomelidae]	Beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Colaphellus bowringi</i> Baly [Coleoptera: Chrysomelidae]	Beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Holotrichia ovata</i> Chang [Coleoptera: Scarabaeidae]	White grub beetle	No	Roots	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Holotrichia sauteri</i> Moser [Coleoptera: Scarabaeidae]	Southern black chafer	No	Flowers	Huang & Lin (1987)	No
<i>Hypomeces squamosus</i> Fabricius [Coleoptera: Curculionidae]	Green weevil, gold-dust beetle, gold-dust weevil	No	Leaves, roots, growing points	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Lepidiota stigma</i> Fabricius [Coleoptera: Scarabaeidae]	Sugarcane white grub	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
<i>Maladera castanea</i> (Arrow) [Coleoptera: Scarabaeidae]	Asiatic garden beetle, castaneus garden beetle	Yes	New stems, twigs, new leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Maladera</i> spp. [Coleoptera: Scarabaeidae]	Chafer beetle	No	New stems, young leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Microtrichia cephalotes</i> Burmeister [Coleoptera: Scarabaeidae]	Sugarcane chafer	No	New leaves, new stems	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Monolepta hieroglyphica</i> Motschulsky [Coleoptera: Chrysomelidae]	Leaf feeding beetle, leaf beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Neomyllocerus hedini</i> (Marshall) [Coleoptera: Curculionidae]	Weevil	No	Leaves, new stem	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Nodina punctostriolata</i> Fairmaire [Coleoptera: Chrysomelidae]	Beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Oxycetonia jucunda</i> Faldermann [Coleoptera: Scarabaeidae]	Flower chafer, citrus flower chafer	Yes	Fruit, flowers	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Phaedon brassicae</i> Baly [Coleoptera: Chrysomelidae]	Daikon leaf beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
<i>Phyllotreta striolata</i> Fabricius [Coleoptera: Chrysomelidae]	Cabbage flea beetle, yellow striped flea beetle, striped flea beetle, turnip flea beetle	No	Leaves, roots, flowers	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Platymycteropsis mandarinus</i> Fairmaire [Coleoptera: Curculionidae]	Weevil	No	Leaves, new stems	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Popillia mutans</i> Newman [Coleoptera: Scarabaeidae]	Beetle	Yes	Fruit	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Popillia quadriguttata</i> Fabricius [Coleoptera: Scarabaeidae]	Beetle	Yes	Fruit	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Protaetia nitididorsis</i> (Fairmaire) = <i>Cetonia esquirola</i> Pouillaude [Coleoptera: Scarabaeidae]	Beetle	Yes	Fruit	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Sympiezomias citri</i> Chao [Coleoptera: Curculionidae]	Grey citrus weevil	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Taiwania obtusata</i> Boheman [Coleoptera: Chrysomelidae]	Beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
Diptera (true flies; mosquitoes)					
Bactrocera dorsalis (Hendel) [Diptera: Tephritidae]	Oriental fruit fly, Asian fruit fly	Yes	Fruit with damaged skin	CABI (1999); Liang <i>et al.</i> (1999)	Yes
Hemiptera (aphids; leafhoppers; mealybugs; phyllids; scales; true bugs; whiteflies)					
Aulacaspis longanae Chen [Hemiptera: Diaspididae]	Longan diaspidid scale	Yes	Twig, fruit	Chen <i>et al.</i> (1980)	Yes
Cantao ocellatus (Thunberg) [Hemiptera: Pentatomidae]	Shield bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
Cletus trigonus Thunberg [Hemiptera: Coreidae]	Rice slender bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
Cornegenapsylla sinica Yang & Li [Hemiptera: Psyllidae]	Longan psylla/psyllid	No	Leaves. Possible vector of longan witches' broom	Chen <i>et al.</i> (1992); CIQ (2000); Tan <i>et al.</i> (1997); Yang & Li (1982); Zhan <i>et al.</i> (1999)	No (as vector – low risk)
Dalpada oculata (Fabricius) [Hemiptera: Pentatomidae]	Shield bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
<i>Empoasca vitis</i> (Goethe 1875) = <i>E. flavescens</i> (Fabricius) = <i>E. pirisuga</i> (Mura) [Hemiptera: Cicadellidae]	Smaller green leaf-hopper, green frogfly	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998) (Sohi (1983) noted that all records of <i>E. flavescens</i> in the Oriental region need taxonomic verification)	No
<i>Erythroneura melia</i> Kuoh [Hemiptera: Cicadellidae]		No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Eutettix apicus</i> Melichur [Hemiptera: Cicadellidae]		No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Hyperoncus lateritius</i> (Westwood) [Hemiptera: Pentatomidae]	Shield bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Iassus indicus</i> Lethierry [Hemiptera: Cicadellidae]		No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Kerria greeni</i> (Chamberlin) [Hemiptera: Kerridae]	Green's lac insect	Yes	Stem, branches Refer to www.efruit.com.cn/lzw/lzzzgl/	Anon (2002); Li <i>et al.</i> (1997)	Yes

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
<i>Kerria lacca</i> Kerr (Laccifer) [Hemiptera: Kerridae]	Lac insect	Yes	Stem, branches, twigs, sap Refer to http://creatures.ifas.ufl.edu/orn/scales/lobate_lac.htm	CIQ (2000) not on lychee; Anon (2002); Hsieh & Hwang (1981); Waite & Hwang (1999)	Yes
<i>Lawana imitata</i> Melichar [Hemiptera: Flattidae]	Flattid scale	Yes	Branch, stem, trunk	CIQ (2000); Tan <i>et al.</i> (1997)	Yes
<i>Leptocentrus albolineatus</i> Funkhouser [Hemiptera: Membracidae]	Leaf hopper	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Mictis tenebrosa</i> Fabricius [Hemiptera: Coreidae]	Squash bug, leaf-footed bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Nezara antennata</i> Scott [Hemiptera: Pentatomidae]	Green stink bug	Yes	Fruit, new leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Ochrochira camelina</i> Kiritshenko [Hemiptera: Coreidae]	Squash bug, leaf-footed bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Pyrops candalaria</i> Linnaeus = <i>Laternaria candalaria</i> (Linnaeus) = <i>Fulgora condalaria</i> Linnaeus [Hemiptera: Fulgoridae]	Lantern bug, longan leafhopper, longan plant hopper	Yes	Stem	CIQ (2000); Li <i>et al.</i> (1997); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998);	Yes

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
<i>Ricania speculum</i> (Walker) [Hemiptera: Ricaniidae]	Black leafhopper	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Solenostethium chinense</i> Stål [Hemiptera: Scutelleridae]	Yellow-belly arctiid, shield backed bug	No	Leaves	Tan <i>et al.</i> (1997)	No
<i>Tessaratoma papillosa</i> (Drury) [Hemiptera: Pentatomidae]	Lychee/litchi stinkbug, litchi bug, leaf & twig sucking bug	Yes	New stems flower panicles; fruitlets; leaves, young petiole. Possible vector of longan witches' broom disease	Anon. (1978); CABI (1999); CIQ (2000); Chen <i>et al.</i> (1999); SAIQ (1999); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998); Waite & Hwang (1999); Xin & Li (1989); Zhan <i>et al.</i> (1999); Zhou & Xian (1994)	Yes (as vector – low risk)
Hymenoptera (ants; bees; wasps)					
<i>Anastatus japonicus</i> Ashmead [Hymenoptera: Eupelmidae]	Egg parasite	No	Eggs of <i>Tessaratoma papillosa</i> , laid on lower surface of leaves	Xin & Li (1989)	No
<i>Ooencyrtus</i> spp. [Hymenoptera: Encyrtidae]	Egg parasite	No	Eggs of <i>Tessaratoma papillosa</i> , laid on lower surface of leaves	Zhou & Xian (1994)	No

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
Isoptera (termites)					
<i>Coptotermes formosanus</i> Shiraki [Isoptera: Rhinotermitidae]	Formosan subterranean termite	No	Stems, roots	Li <i>et al.</i> (1997)	No
Lepidoptera (butterflies; moths)					
<i>Acanthopsyche subteralbatus</i> Hampson [Lepidoptera: Psychidae]	Moth	Yes	Branch, stem, trunk	CIQ (2000); Tan <i>et al.</i> (1998)	Yes
<i>Adoxophyes cyrtosema</i> Meyrick [Lepidoptera: Tortricidae]	Citrus brown-banded tortrix, citrus leaf-roller	No	New leaves, flowers	Anon. (1978); CIQ (2000); Tan <i>et al.</i> (1998); Waite & Hwang (1999)	No
<i>Adoxophyes orana</i> Fisher von Roeslerstamm = <i>Adoxophyes fasciata</i> Walsh [Lepidoptera: Tortricidae]	Smaller tea tortrix, summer fruit tortrix, apple peel tortricid	Yes	Leaves, new growth, fruit, flowers	Huang <i>et al.</i> (1997)	Yes
<i>Archips asiatica</i> Walsingham [Lepidoptera: Tortricidae]	Fruit borer	Yes	Fruit	Huang <i>et al.</i> (1997)	Yes
<i>Cerace stipatana</i> Walker [Lepidoptera: Tortricidae]	Tortrix, borer	Yes	Stem, fruit	Han & Shen (1993); Huang <i>et al.</i> (1997)	Yes

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
<i>Chalioides kondonis</i> Matsumura [Lepidoptera: Psychidae]	Kondo white psychid	Yes	Branch, stem, trunk	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Conopomorpha litchiella</i> Bradley [Lepidoptera: Gracillariidae]	Litchi leafminer	No	New leaves, new stems,	Huang <i>et al.</i> (1997); Waite & Hwang (1999); Yao & Liu (1990); Zhan <i>et al.</i> (1999)	No
<i>Conopomorpha sinensis</i> Bradley [Lepidoptera: Gracillariidae]	Litchi stem-end borer, litchi fruit borer	Yes	Young leaves, new shoot growth, fruit, young petiole	CABI (1999); CIQ (2000); Huang <i>et al.</i> (1997); SAIQ (1999); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998); Waite & Hwang (1999); Yao & Liu (1990); Zhan <i>et al.</i> (1999)	Yes
<i>Cryptothelea variegata</i> Snellen [Lepidoptera: Psychidae]	Bagworm	Yes	Branch, stem, trunk	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Eboda cellerigera</i> Meyrick [Lepidoptera: Tortricidae]	Tortrix	No	New stems, new leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Eumeta japonica</i> Heylaerts [Lepidoptera: Psychidae]	Japanese bagworm	Yes	Stem, shoots, twigs	Li <i>et al.</i> (1997)	Yes

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
<i>Euproctis scintillans</i> (Walker) = <i>Porthesia scintillans</i> [Lepidoptera: Lymantriidae]	Hairy tussock caterpillar	Yes	Fruit, flower, leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Euproctis taiwana</i> Shiraki [Lepidoptera: Lymantriidae]	Yellow tailed moth, tussock moth	Yes	Leaves, stem, flowers, shoots Found to damage leaves of <i>Casuarina equisetifolia</i> (Huang & Tsay, 2002). Refer also to www.wetland.org.tw/	He (2002); Huang & Tsay (2002); Li <i>et al.</i> (1997);	Yes
<i>Euproctis varians</i> (Walker) [Lepidoptera: Lymantriidae]	Moth/caterpillar	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Homona coffearia</i> (Nietner) [Lepidoptera: Tortricidae]	Coffee tortrix, tea flush worm, tea tortrix, leafroller	Yes	Leaves, flowers, fruit	Anon. (1978); Huang <i>et al.</i> (1997); Waite & Hwang (1999);	Yes
<i>Hypatima longanae</i> Tan <i>et al.</i> [Lepidoptera: Gelechiidae]	Twig borer	Yes	Shoots, leaf, fruit, branch, stem, twigs, trunk	CIQ (2000); Huang <i>et al.</i> (1997); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998); Zhan <i>et al.</i> (1999)	Yes
<i>Olethreutes leucaspis</i> (Meyrick) 1906 [Lepidoptera: Tortricidae]	Moth, leafroller	No	New stem, new leaves,	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
<i>Orgyia postica</i> (Walker) = <i>Notolophus australis posticus</i> Walker [Lepidoptera: Lymantriidae]	Cocoa tussock moth, small tussock moth	No	Leaves	CABI (1999); CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Orgyia turbata</i> Butler [Lepidoptera: Lymantriidae]	Tussock moth	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No
<i>Pingasa pseudoterpnaria gracilis</i> Prout [Lepidoptera: Geometridae]	Moth	No	New leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Squamura dea</i> Swinhoe = <i>Indarbela dea</i> Swinhoe = <i>Arbela dea</i> Swinhoe [Lepidoptera: Metarbelidae]	Bark borer, litchi bark caterpillar, metarbelid borer	Yes	Stem, bark, trunk	CABI (1999); CIQ (2000); Tan <i>et al.</i> (1998); Waite & Hwang (1999); Xu & Yang (1992)	Yes
<i>Squamura swinhoediscipuncta</i> (Wileman) = ? <i>Indarbela baibarana</i> = <i>Arbela baibarana</i> Matsumura [Lepidoptera: Metarbelidae]	Litchi stem borer, bark borer, stem borer, metarbelid borer	Yes	Stem	Li <i>et al.</i> (1997); Waite & Hwang (1999)	Yes
<i>Stauropus alternus</i> (Walker) [Lepidoptera: Notodontidae]	Lobster caterpillar	No	Leaves, flowers	Li <i>et al.</i> (1997)	No

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
<i>Zeuzera coffeae</i> Nietner [Lepidoptera: Cossidae]	Coffee moth borer, coffee leopard moth, red coffee borer, red branch borer	Yes	Branch, stem, bark, trunk	CIQ (2000); Tan <i>et al.</i> (1997); Tan <i>et al.</i> (1998); Waite & Hwang (1999)	Yes
Orthoptera [crickets; grasshoppers; katydids]					
<i>Chondracris rosea</i> (De Geer) [Orthoptera: Acrididae]	Citrus locust, cotton locust	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Choroedocus violaceipes</i> Miller [Orthoptera: Acrididae]	Grasshopper	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Holochlora nawae</i> Matsumura & Shiraki [Orthoptera: Tettigoniidae]	Katydid	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1997)	No
<i>Tarbinskiellus portentosus</i> (Litchenstein) [Orthoptera: Gryllidae]	Large brown cricket	No	Roots	Ali <i>et al.</i> (1996); Li <i>et al.</i> (1997)	No
NEMATODA (nematodes)					
<i>Helicotylenchus crenacauda</i> Sher [Tylenchida: Hoplolaimidae]	Spiral nematode	No	Roots	Liu & Zhang (1999)	No

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
<i>Paratylenchus veruculatus</i> Wu [Tylenchida: Paratylenchidae]	Nematode	No	Roots	Liu & Zhang (1999)	No
<i>Trichodorus pakistanensis</i> Siddiqi [Triplonchida: Trichodoridae]	Stubby root nematode	No	Roots	Liu & Zhang (1999)	No
<i>Tylenchorhynchus leviterminalis</i> Siddiqi, Mukherjee & Dasgupta [Tylenchida: Belonolamidae]	Stunt nematode	No	Roots	Liu & Zhang (1999)	No
<i>Xiphinema insigne</i> Loos [Dorylaimida: Longidoridae]	Dagger nematode	No	Roots	Liu & Zhang (1999)	No
PATHOGENS					
FUNGI					
<i>Ascochyta longan</i> C.F. Zhang & P.K. Chi [Mitosporic fungi]	Leaf spot	No	Leaves	Zhang & Qi (1996)	No
<i>Cylindrocladiella peruviana</i> (Bat., Bez., & Herrera) [Mitosporic fungi: Hyphomycetes]		Yes	Fruit	CIQ (2000)	Yes

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
<i>Leptosphaeria guayuan</i> C.F. Zhang & P.K. Chi [Dothideales: Leptosphaericaceae]	Leaf spot	No	Leaves	Zhang & Qi (1996)	No
<i>Leptosphaeria longan</i> C.F. Zhang & P.K. Chi [Dothideales: Leptosphaericaceae]	Leaf spot	No	Leaves	Zhang & Qi (1996)	No
<i>Marssonina euphoriae</i> C.F. Zhang & P.K. Chi [Mitosporic fungi: Hyphomycetes]	Brown leaf spot	No	Leaves	Zhang & Qi (1996)	No
<i>Meliola capensis</i> (K. & C.) Thiess var. <i>euphoriae</i> Hangsf [Meliolales: Meliolaceae]	Black mildew	No	Leaves <i>Meliola</i> spp. reported on leaves of bamboo and other plant species in China. Unlikely to attack fruit (Zhang & Zhang 2000).	Hu <i>et al.</i> (1986); Hu & Lu (1989); Jiang (1989); Zhang & Zhang (2000)	No
<i>Pestalotiopsis pauciseta</i> (Sacc.) Y.X. Chen [Mitosporic fungi: Coelomycetes]	Leaf blight	Yes	Leaves, fruit	Zhang & Qi (1996)	Yes
<i>Phomopsis guiyuan</i> C.F. Zhang & P.K. Chi [Diaporthales: Valsaceae]	Grey leaf blight	No	Leaves	Zhang & Qi (1996)	No

Appendix 3. Pest Categorisation for Longan (Pathway Association – Fresh Longan Fruit and Panicles – ie. Branch, Stem, Twig but not New Growth)

Taxonomic name	Common name/s	Pathway association			Consider further
		fruit on panicles	comment	Reference	
Phomopsis longanae Chi & Jiang [Diaporthales: Valsaceae]	Fruit blotch/branch canker	Yes	Fruit, bark, stem, twig	Lin & Chi (1992)	Yes
DISEASES OF UNKNOWN AETIOLOGY					
LWBD Mycoplasma-like/filamentous virus? Organism	Longan witches' broom disease Can be transmitted by dodder weeds (<i>Cuscuta campestris</i>) and arthropods <i>Tessoratoma papillosa</i> , <i>Cornegenopsylla sinica</i> , <i>Epitrimerus dimocarp</i>	Yes	Flowers, leaves, seeds, budwood, shoots	Batten (1986); Coates <i>et al.</i> (2000); Chen <i>et al.</i> (1992); Chen <i>et al.</i> (1999); CIQ (2000); He <i>et al.</i> (1996); Koizumi (1995); Menzel <i>et al.</i> (1989); Zhang (1999)	Yes

Associations of some pest species with the fruit or other parts of the plant are uncertain and are denoted with a question mark.

Synonyms are given in Appendix 1

= denotes both previous combinations and synonymies.

Shaded pests are found on both longan and lychee.

APPENDIX 4. PEST CATEGORISATION FOR LYCHEE (OCCURRENCE IN AUSTRALIA)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
INVERTEBRATA						
ACARI (mites)						
<i>Acaspinia litchii</i> Huang, Huang & Hong [Acari: Phytoseiidae]	Mite	Yes	CIQ (2000) claims not in China; Hong & Zhang (1996); Huang <i>et al.</i> (1989) in Taiwan	No	No records found	Yes
<i>Aceria litchii</i> (Keifer) [Acari: Eriophyidae]	Litchi erinose mite, litchi hairy mite, dog ear mite, hairy spider, litchi gall mite, litchi rust mite, leaf curl mite	Yes	Anon. (1978); CABI (1999); CIQ (2000); He (2001); Hong & Zhang (1996); Tan <i>et al.</i> (1999); Waite & Hwang (1999)	Yes	AICN (2000); Menzel & McConchie (1997); Menzel <i>et al.</i> (1988); PDI (2000); Pinese (1981); Saucó & Menini (1989); Waite (1986, 1999); Waite & Elder (1999b); Waite & Hwang (1999)	No
<i>Agistemus exsertus</i> Gonzalez-Rodriguez [Acari: Stigmaeidae]	Stigmaeid mite	Yes	CIQ (2000) claims not in China; PDI (2000); Wang (1981)	No	Halliday (1998)	Yes
<i>Amblyseius similiovalis</i> Liang & Ke [Acari: Phytoseiidae]	Phytoseiid mite	Yes	Liang & Ke (1983)	No	Halliday (1998)	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Disella litchii</i> Kuang & Feng [Acari: Nothopodinae]	Mite	Yes	CIQ (2000) claims not in China; Kuang & Feng (1990)	No	No records found	Yes
<i>Panonychus citri</i> (McGregor) [Acari: Tetranychidae]	Citrus red mite, citrus red spider mite, red spider mite, purple mite	Yes	He (2001)	Yes (NSW, SA)	Halliday (1998)	No
INSECTA (insects)						
Coleoptera (beetles)						
<i>Adoretus complexus</i> Burmeister [Coleoptera: Scarabaeidae]	Root grub	Yes	Sauco & Menini (1989)	Yes	Houston (1992)	No
<i>Adoretus hirsutus</i> Ohaus [Coleoptera: Scarabaeidae]	White root grub	Yes	CIQ (2000); Tan <i>et al.</i> (1998, 1999)	No	Houston (1992)	Yes
<i>Adoretus sinicus</i> Burmeister [Coleoptera: Scarabaeidae]	Chinese rose beetle, root grub	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Houston (1992)	Yes
<i>Anomala antiqua</i> (Gyllenhal) [Coleoptera: Scarabaeidae]	Groundnut chafer	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	Yes	CABI (1999); Houston (1992)	No
<i>Anomala corpulenta</i> Motschulsky [Coleoptera: Scarabaeidae]	Beetle	Yes	Waite (pers. comm., 2001)	No	Houston (1992)	Yes
<i>Anomala cuprea</i> (Hope) [Coleoptera: Scarabaeidae]	Cupreous chafer	Yes	Waite (pers. comm., 2001)	No	Houston (1992)	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Anomala cupripes</i> Hope [Coleoptera: Scarabaeidae]	Large green chafer beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Houston (1992)	Yes
<i>Anomala varicolor</i> Gyllenhal [Coleoptera: Scarabaeidae]	Beetle	Yes	Sauco & Menini (1989)	No	Houston (1992)	Yes
<i>Anoplophora chinensis</i> (Forster) [Coleoptera: Cerambycidae]	Black and white citrus longicorn, longhorned beetle	Yes	CIQ (2000); He (2001); Tan <i>et al.</i> (1998, 1999)	No	CABI (1999)	Yes
<i>Apogonia cribricollis</i> Burmeister [Coleoptera: Scarabaeidae]	Chafer beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998, 1999)	No	Houston (1992)	Yes
<i>Aristobia testudo</i> (Voet) [Coleoptera: Cerambycidae]	Litchi longicorn beetle, turtleback beetle	Yes	He (2001); Ho <i>et al.</i> (1990); PDI (2000); Waite & Hwang (1999); Zhang (1997)	No	No records found	Yes
<i>Aulacaphora almora</i> (Maulik) [Coleoptera: Chrysomelidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Aulacaphora cattigarensis</i> Weise [Coleoptera: Chrysomelidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Aulacaphora femoralis</i> (Motschulsky) [Coleoptera: Chrysomelidae]	Cucurbit leaf beetle, orange broom galerucid	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Auloseryca migrorubra</i> Busk. [Coleoptera: Scarabaeidae]	Beetle	Yes	Sauco & Menini (1989)	No	Houston (1992)	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Ceresium</i> spp. [Coleoptera: Cerambycidae]	Longhorn beetle	Yes	Cavey (1998)	No (1 record of <i>Ceresium</i> spp. in QLD)	Pollock (unpublished)	Yes
<i>Chrysochus chinensis</i> Baly [Coleoptera: Chrysomelidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Clitea fulva</i> Chen [Coleoptera: Chrysomelidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Colaphellus bowringi</i> Baly [Coleoptera: Chrysomelidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Euwallacea fornicatus</i> Eichhoff = <i>Xyleborus fornicatus</i> [Coleoptera: Scolytidae]	Tea shot-hole borer, shot-hole borer of tea	Yes	He (2001)	Yes	CABI (1999); AICN (2000)	No
<i>Henosepilachna vigintioctopunctata</i> (Fabricius) = <i>Epilachna vigintioctopunctata</i> (Fabricius) [Coleoptera: Coccinellidae]	Hadda beetle, leaf-eating ladybird, 26-spotted ladybird	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	Yes	AICN (2001); Gupta & Kumar (1983); Li (1993)	No
<i>Holotricha ovata</i> Chang [Coleoptera: Scarabaeidae]	White grub beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Houston (1992)	Yes
<i>Holotrichia plumbea planicollis</i> Burmeister [Coleoptera: Scarabaeidae]	Beetle	Yes	Sauco & Menini (1989)	No	Houston (1992)	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Holotrichia sauteri</i> Moser [Coleoptera: Scarabaeidae]	Southern black chafer	Yes	Huang & Lin (1987); PDI (2000)	No	Houston (1992)	Yes
<i>Hoplostomus chinensis</i> Guer. [Coleoptera: Scarabaeidae]	Beetle	Yes	Sauco & Menini (1989)	No	Houston (1992)	Yes
<i>Hypomeces squamosus</i> Fabricius [Coleoptera: Curculionidae]	Green weevil, gold-dust beetle, gold-dust weevil	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	CABI (1999)	Yes
<i>Lepidiota stigma</i> Fabricius [Coleoptera: Scarabaeidae]	Sugar cane white grub	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Houston (1992)	Yes
<i>Maladera castanea</i> (Arrow) [Coleoptera: Scarabaeidae]	Asiatic garden beetle, castaneus garden beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998, 1999)	No	Houston (1992)	Yes
<i>Maladera</i> spp. [Coleoptera: Scarabaeidae]	Chafer beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Houston (1992)	Yes
<i>Metritona circumdala</i> Herbst [Coleoptera: Chrysomelidae]	Green tortoise beetle	Yes	Waite (pers. comm., 2001)	No	No records found	Yes
<i>Microtrichia cephalotes</i> Burmeister [Coleoptera: Scarabaeidae]	Sugarcane chafer	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Houston (1992)	Yes
<i>Monolepta hierglyphica</i> Motschulsky [Coleoptera: Chrysomelidae]	Leaf feeding beetle, leaf beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Neomyllocerus hedini</i> (Marshall) [Coleoptera: Curculionidae]	Weevil	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Nodina punctostriolata</i> Fairmaire [Coleoptera: Chrysomelidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Oxycetonia jucunda</i> Faldermann [Coleoptera: Scarabaeidae]	Flower chafer, citrus flower chafer	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Houston (1992)	Yes
<i>Phaedon brassicae</i> Baly [Coleoptera: Chrysomelidae]	Daikon leaf beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Phyllotreta striolata</i> Fabricius [Coleoptera: Chrysomelidae]	Cabbage flea beetle, striped flea beetle, turnip flea beetle, yellow striped flea beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Platymycteropsis mandarinus</i> Fairmaire [Coleoptera: Curculionidae]	Weevil	Yes	CIQ (2000); Tan <i>et al.</i> (1998, 1999)	No	No records found	Yes
<i>Popillia mutans</i> Newman [Coleoptera: Scarabaeidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Houston (1992)	Yes
<i>Popillia quadriguttata</i> Fabricius [Coleoptera: Scarabaeidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Houston (1992)	Yes
<i>Potosia brevitarsis</i> Lewis [Coleoptera: Scarabaeidae]	Beetle	Yes	He (2001)	No	Houston (1992)	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Protaetia fusca</i> (Herbst) [Coleoptera: Scarabaeidae]	Mango flower beetle, mottled flower scarab beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	Yes	Houston (1992)	No
<i>Protaetia nitididorsis</i> (Fairmaire) = <i>Cetonia esquirola</i> Pouillaude [Coleoptera: Scarabaeidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Houston (1992)	Yes
<i>Sympiezomias citri</i> Chao [Coleoptera: Curculionidae]	Grey citrus weevil	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Taiwania obtusata</i> Boheman [Coleoptera: Chrysomelidae]	Beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Xylotrupes gideon</i> Linnaeus [Coleoptera: Scarabaeidae]	Elephant beetle, rhinoceros beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998, 1999)	Yes	CABI (1999); Houston (1992); Menzel <i>et al.</i> (1988); PDI (2000); Waite & Elder (2000a)	No
Diptera (flies)						
<i>Bactrocera dorsalis</i> (Hendel) [Diptera: Tephritidae]	Oriental fruit fly, Asian fruit fly, mango fruit fly	Yes	CABI (1999); SAIQ (1999); Yang <i>et al.</i> (1996)	No	CABI (1999)	Yes
<i>Litchiomyia chinensis</i> Yang & Luo = <i>Dasyneura</i> spp. [Diptera: Cecidomyiidae]	Litchi gall midge, litchi leaf midge	Yes	He (2001); Waite & Hwang (1999); Yang & Luo (1999); Zhang (1997)	Yes	Naumann (1993)	No

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Mayetiola</i> spp. [Diptera: Cecidomyiidae]	Gall midge	Yes	CIQ (2000); Tan <i>et al.</i> (1999); Yang & Luo (1999)	No	Martin (1982) – Only <i>Mayetiola destructor</i> (Hessian Fly) (Say) in Australia	Yes
Hemiptera [aphids, leafhoppers; mealybugs; psyllids; scales; true bugs; whiteflies]						
<i>Aleurocanthus woglumi</i> Ashby [Hemiptera: Aleyrodidae]	Citrus black fly, spiny citrus whitefly	Yes	COSAVE (1999); Waite (pers. comm., 2001)	No	Martin (1999)?	Yes
<i>Aonidiella orientalis</i> (Newstead) [Hemiptera: Diaspididae]	Oriental red scale, Oriental scale, Oriental yellow scale, red scale	Yes	CABI (1999)	Yes	AICN (2000); CABI (1999)	No
<i>Aphis gossypii</i> Glover [Hemiptera: Aphididae]	Melon aphid, cotton aphid	Yes	Waite (pers. comm., 2001)	Yes	AICN (2001)	No
<i>Aulacaspis longanae</i> Chen [Hemiptera: Diaspididae]	Longan diaspidid scale	Yes	Chen <i>et al.</i> (1980); CIQ (2000) not on lychee	No	No records found	Yes
<i>Cantao ocellatus</i> (Thunberg) [Hemiptera: Pentatomidae]	Shield bug	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Ceroplastes pseudoceriferus</i> Green [Hemiptera: Coccidae]	Horned wax scale	Yes	CABI (1999); Wen & Lee (1986)	No	No records found	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Ceroplastes rubens</i> Maskell [Hemiptera: Coccidae]	Pink wax scale, red wax scale, ruby wax scale	Yes	CABI (1999); CIE (1960); Waite & Hwang (1999) – but in Taiwan	Yes	AICN (2000); CABI (1999); Danzig & Konstantinova (1990); PDI (2000); Qin & Gullan (1994); Smith <i>et al.</i> (1997); Waite & Elder (1999d); Waite & Hwang (1999)	No
<i>Chloropulvineria psidii</i> Maskell [Hemiptera: Coccidae]	Green shield scale	Yes	Waite & Hwang (1999)	Yes	Waite & Hwang (1999)	No
<i>Cletus trigonus</i> Thunberg [Hemiptera: Alydidae]	Rice slender bug	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Coccus hesperidum</i> Linnaeus [Hemiptera: Coccidae]	Brown soft scale, common shield scale, soft brown scale, soft scale	Yes	CIQ (2000) not on lychee; Hu <i>et al.</i> (1992)	Yes	AICN (2000); CABI (1999); Waite (1986); Waite & Elder (1999e); Waite & Hwang (1999)	No
<i>Coccus longulus</i> (Douglas) [Hemiptera: Coccidae]	Long brown scale, long shell scale, long shield scale, long soft scale	Yes	Tan <i>et al.</i> (1998); Tao <i>et al.</i> (1983) Taiwan only?	Yes	AICN (2000); Smith <i>et al.</i> (1997)	No
<i>Coccus viridis</i> Green [Hemiptera: Coccidae]	Green coffee scale, green scale, green shield scale, soft green scale	Yes	CIQ (2000) not on lychee; Hu <i>et al.</i> (1992)	Yes	AICN (2000); CABI (1999); Waite & Elder (2000c)	No

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Dalpada oculata</i> (Fabricius) [Hemiptera: Pentatomidae]	Shield bug	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Empoasca vitis</i> (Goethe, 1875) = <i>E. flavescens</i> (Fabricius); <i>E. pirusuga</i> (Mura) [Hemiptera: Cicadellidae]	Smaller green leaf-hopper, green frogfly	Yes	CIQ (2000); Tan <i>et al.</i> (1998); Sohi (1983) noted that all records of <i>E. flavescens</i> in the Oriental region need taxonomic verification.	No	CABI (1999)	Yes
<i>Erythroneura melia</i> Kuoh [Hemiptera: Cicadeltidae]		Yes	CIQ (2000)	No	No records found	Yes
<i>Eutettix apicus</i> Melichur [Hemiptera: Cicadeltidae]		Yes	CIQ (2000)	No	No records found	Yes
<i>Ferrisia virgata</i> (Cockerell) [Hemiptera: Pseudococcidae]	Striped mealybug, spotted mealybug, tailed mealybug, white tailed mealybug, guava mealybug, tailed coffee mealybug	Yes	CABI (1999)	Yes	AICN (2000); Ben-Dov (1994); CABI (1999); Williams (1985)	No
<i>Hyperoncus lateritius</i> (Westwood) [Hemiptera: Pentatomidae]	Shield bug	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Iassus indicus</i> Lethierry [Hemiptera: Cicadeltidae]		Yes	CIQ (2000)	No	No records found	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Kerria lacca</i> Kerr (Laccifer) [Hemiptera: Kerridae]	Lac insect	Yes	Hu <i>et al.</i> (1992); Subbarayudu & Ram (1997). CIQ (2000) claim not on lychee in China. In Taiwan (Li <i>et al.</i> , 1997)	No	No records found	Yes
<i>Kilifia acuminata</i> (Signoret) [Hemiptera: Coccidae]	Mango shield scale	Yes	Ali (1971); Ferris (1950); Nakahara (1981)	No	No records found	Yes
<i>Lawana imitata</i> Melichar [Hemiptera: Flattidae]	Flattid scale	Yes	CIQ (2000)	No	No records found	Yes
<i>Leptocentrus albolineatus</i> Funkhouser [Hemiptera: Membracidae]	Leaf hopper	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Day & Fletcher (1994)	Yes
<i>Leptocoris acuta</i> Thunberg = <i>Leptocoris</i> ? [Hemiptera: Coreidae]	Asian rice bug, paddy bug, rice sappers, rice seed bug, paddy fly	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	Yes	AICN (2000); CABI (1999); Kay <i>et al.</i> (1993)	No
<i>Metatachardia fukiensis</i> Zhang [Hemiptera: Kerridae]	Lac insect	Yes	CIQ (2000) not on lychee; Zhang (1993)	No	No records found	Yes
<i>Mictis tenebrosa</i> Fabricius [Hemiptera: Coreidae]	Squash bugs, leaf footed bug	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Nezara antennata</i> Scott [Hemiptera: Pentatomidae]	Green stink bug	Yes	CIQ (2000); Tan <i>et al.</i> (1998, 1999)	No	No records found	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Nipaecoccus viridis</i> (Newstead) = <i>Nipaecoccus vastator</i> (Maskell) [Hemiptera: Pseudococcidae]	Spherical mealybug, globular mealybug, cotton mealybug, coffee mealybug	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	Yes	ScaleNet (2001)	No
<i>Ochrochira camelina</i> Kiritshenko [Hemiptera: Coreidae]	Squash bugs, leaf footed bug	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Parasaissetia nigra</i> (Nietner) [Hemiptera: Coccidae]	Black coffee scale	Yes	Mamet (1943)	Yes	AICN (2000); Mamet (1943); PDI (2000)	No
<i>Pseudococcus comstocki</i> (Kuwana) [Hemiptera: Pseudococcidae]	Comstock's mealybug	Yes	CIE (1975) says lychee; ScaleNet (2001) in China confirmed but no record on longan or lychee anywhere	No	Ben-Dov (1994); ScaleNet (2001)	Yes
<i>Pseudococcus jackbeardsleyi</i> Gimpel & Miller [Hemiptera: Pseudococcidae]	Jack Beardsley mealybug	Yes	Gimpel & Miller (1996)	No	CABI (1999); ScaleNet (2001)	Yes
<i>Pulvinaria psidii</i> (Maskell) [Hemiptera: Coccidae]	Green shield scale, guava mealy scale, guava pulvinaria, guava scale, mango scale	Yes	CABI (1999); He (2001); Waite & Hwang (1999)	Yes	AICN (2000); CABI (1999); Menzel <i>et al.</i> (1988); Waite & Elder (1999a); Waite & Hwang (1999)	No

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Pyrops candelaria</i> Linnaeus = <i>Fulgora candelaria</i> Linnaeus; <i>Laternaria candalaria</i> (Linnaeus) [Hemiptera: Fulgoridae]	Lantern bug, longan leafhopper	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Ricania speculum</i> (Walker) [Hemiptera: Ricanidae]	Black leafhopper	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Riptortus linearis</i> Fabricius [Hemiptera: Alydidae]	Legume pod beetle	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	Yes	Cassis & Gross (in press)	No
<i>Saissetia coffeae</i> Walker [Hemiptera: Coccidae]	Hemispherical scale, brown coffee scale, coffee helmet scale, helmet scale	Yes	CABI (1999); Hu <i>et al.</i> (1992); Nakahara (1981)	Yes	CABI (1999); Mamet (1943)	No
<i>Solenostethium chinense</i> Stål [Hemiptera: Diaspididae]	Yellow-belly arctiid, shield backed bug	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Tessaratoma papillosa</i> (Drury) [Hemiptera: Pentatomidae]	Lychee stinkbug, leaf and twig sucking bug, longan stink bug	Yes	Anon. (1978); Chen <i>et al.</i> (1999); CIQ (2000); He (2001); PDI (2000); SAIQ (1999); Tan <i>et al.</i> (1998, 1999); Waite & Hwang (1999); Xin & Li (1989); Zhou & Xian (1994). Possible vector of longan witches' broom disease.	No	CABI (1999)	Yes (as vector – low risk)
Hymenoptera (ants; bees, wasps)						
<i>Anastatus japonicus</i> Ashmead [Hymenoptera: Eupelmidae]	Egg parasite	Yes	Xin & Li (1989)	No	No records found	Yes
Isoptera (termites)						
<i>Coptotermes</i> spp. [Isoptera: Rhinotermitidae]	Subterranean termites	Yes	CABI (1999)	Yes	AICN (2000)	No
<i>Odontotermes formosanus</i> Shiraki [Isoptera: Termitidae]	Subterranean termite	Yes	Waite (pers. comm., 2001)	No	No records found	Yes
Lepidoptera (butterflies; moths)						
<i>Acanthopsyche subteralbatus</i> Hampson [Lepidoptera: Psychidae]		Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Nielsen <i>et al.</i> (1996)	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Adoxophyes cyrtosema</i> Meyrick [Lepidoptera: Tortricidae]	Citrus brown-banded tortrix, citrus leaf-roller	Yes	Anon. (1978); CIQ (2000); Liu (1964); Tan <i>et al.</i> (1998); Waite & Hwang (1999)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Adoxophyes orana</i> Fisher von Roeslerstamm = <i>Adoxophyes fasciata</i> Walsh [Lepidoptera: Tortricidae]	Apple peel tortricid, smaller tea tortrix, summer fruit tortrix	Yes	CIQ (2000) not on lychee; Huang <i>et al.</i> (1997); <i>A. fasciata</i> (Liu 1964) on lychee	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Amata lutesfascia</i> Hamps [Lepidoptera: Amatidae]	Moth	Yes	Waite (pers. comm., 2001)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Archips asiatica</i> Walsingham = <i>Cacoecia asiatica</i> ? [Lepidoptera: Tortricidae]	Fruit borer	Yes	Huang <i>et al.</i> (1997); Liu (1964)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Archips tabescens</i> Meyrick = <i>Cacoecia tabescens</i> ? Meyrick [Lepidoptera: Tortricidae]	Fruit borer	Yes	CIQ (2000) not on lychee; Liu (1964)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Buzura suppressaria</i> (Guenée) [Lepidoptera: Geometridae]	Tea looper	Yes	CABI (1999); CIQ (2000) not on lychee, may be on longan; He (2001)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Cerace stipatana</i> Walker [Lepidoptera: Tortricidae]	Borer, tortrix	Yes	Han & Shen (1993)	No	Nielsen <i>et al.</i> (1996)	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Chalioides kondonis</i> Matsumura [Lepidoptera: Psychidae]	Kondo white psychid	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Comocritis albicapilla</i> Moriuti [Lepidoptera: Oecophonidae]	Moth	Yes	Liu & Xu (1997); Luo <i>et al.</i> (1998)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Conopomorpha litchiella</i> Bradley [Lepidoptera: Gracillariidae]	Litchi leafminer	Yes	He (2001); Huang <i>et al.</i> (1997); Liu (1964); Waite & Hwang (1999); Yao & Liu (1990)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Conopomorpha sinensis</i> Bradley [Lepidoptera: Gracillariidae]	Litchi fruit borer, litchi stem-end borer	Yes	CABI (1999); CIQ (2000); Huang <i>et al.</i> (1997); Liu (1964); SAIQ (1999); Tan <i>et al.</i> (1998, 1999); Waite & Hwang (1999)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Cryptophlebia illepida</i> (Butler) = <i>Argyroplote illepida</i> [Lepidoptera: Tortricidae]	Koa seedworm, klu tortricid, koa seed moth, lichi moth, macadamia nut borer, macadamia nut moth	Yes	Liu (1964)	No	Nielsen <i>et al.</i> (1996)	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Cryptophlebia ombrodelta</i> (Lower) [Lepidoptera: Tortricidae]	Litchi fruit moth, macadamia nut borer	Yes	CIE (1976); Liu (1964); Waite & Hwang (1999)	Yes	AICN (2000); CABI (1999); Menzel & McConchie (1997); Menzel <i>et al.</i> (1988); Waite & Elder (1999c); Waite & Hwang (1999)	No
<i>Cryptothelea variegata</i> Snellen [Lepidoptera: Psychidae]	Bagworm	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Deudorix epijarbas</i> Moore [Lepidoptera: Lycaenidae]	Cornelian butterfly, fruit borer, grey lychee butterfly	Yes	CIQ (2000); He (2001); Tan <i>et al.</i> (1998, 1999); Waite & Hwang (1999)	Yes	Liu (1964); Nielsen <i>et al.</i> (1996); Waite & Hwang (1999) as <i>D. epijarbas diovis</i>	No
<i>Deudorix epijarbas</i> subspecies <i>amatius</i> ? [Lepidoptera: Lycaenidae]	Fruit borer	Yes	Waite & Hwang (1999)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Dudua aprobola</i> (Meyrick) = <i>Argyroplote aprobola</i> (Meyrick, 1886); <i>Platyplus aprobola</i> (Meyrick) [Lepidoptera: Tortricidae]	Brown tortrix, leaf roller, leaf-webber	Yes	Anon. (1978); PDI (2000); Tan <i>et al.</i> (1998); Waite & Hwang (1999); Zhang (1994)	Yes	Menzel <i>et al.</i> (1988); Nielsen <i>et al.</i> (1996); PDI (2000); Waite (1992); Waite & Hwang (1999)	No
<i>Eboda cellerigera</i> Meyrick [Lepidoptera: Tortricidae]	Tortrix	Yes	CIQ (2000); He (2001); Liu (1964); Tan <i>et al.</i> (1998)	No	Nielsen <i>et al.</i> (1996)	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Euproctis scintillans</i> (Walker) = <i>Porthesia scintillans</i> (Walker) [Lepidoptera: Lymantriidae]	Hairy tussock caterpillar	Yes	CIQ (2000); He (2001); Tan <i>et al.</i> (1998, 1999)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Euproctis varians</i> (Walker) [Lepidoptera: Lymantriidae]	Moth/caterpillar	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Homona coffearia</i> (Nietner) [Lepidoptera: Tortricidae]	Coffee tortrix, tea flushworm, tea tortrix, leaf roller	Yes	Anon. (1978); CABI (1999); Liu (1964); PDI (2000); Waite & Hwang (1999)	No	CABI (1999); Nielsen <i>et al.</i> (1996)	Yes
<i>Hypatima longanae</i> Tan <i>et al.</i> [Lepidoptera: Gelechiidae]	Twig borer	Yes	Huang <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Lymantria xyliana</i> Swindoe [Lepidoptera: Lymantriidae]	Moth	Yes	He (2001)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Miresa fulgida</i> Wilemam [Lepidoptera: Euoleidae?]	Slug caterpillar	Yes	He (2001); Heppner & Inoue (1992) in Taiwan	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Olethreutes leucaspis</i> (Meyrick) [Lepidoptera: Tortricidae]	Leaf roller, moth	Yes	Liu (1964); Tan <i>et al.</i> (1998, 1999)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Orgyia postica</i> (Walker) = <i>Notolophus australis posticus</i> Walker [Lepidoptera: Lymantriidae]	Cocoa tussock moth, small tussock moth	Yes	CABI (1999); CIQ (2000); He (2001); Tan <i>et al.</i> (1998, 1999)	No	CABI (1999); Nielsen <i>et al.</i> (1996)	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Orgyia turbata</i> Butler [Lepidoptera: Lymantriidae]	Tussock moth	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Oxyodes scrobiculata</i> Fabricius [Lepidoptera: Noctuidae]	Leaf-eating looper	Yes	CIQ (2000); He (2001); Tan <i>et al.</i> (1998, 1999)	Yes	Nielsen <i>et al.</i> (1996)	No
<i>Parasa lepida</i> (Cramer) [Lepidoptera: Limacodidae]	Blue striped nettlegrub, nettle caterpillar	Yes	CABI (1999)	No	CABI (1999); Nielsen <i>et al.</i> (1996)	Yes
<i>Pingasa pseudoterpnaria gracilis</i> Prout [Lepidoptera: Geometridae]	Moth	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	Nielsen <i>et al.</i> (1996)	Yes
<i>Prodenia litura</i> (Fabricius) [Lepidoptera: Noctuidae]	Moth	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	Yes	Nielsen <i>et al.</i> (1996)	No
<i>Selepa celtis</i> Moore [Lepidoptera: Noctuidae]	Hairy caterpillar	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	Yes	Nielsen <i>et al.</i> (1996)	No
<i>Squamura dea</i> Swinhoe = <i>Arbela dea</i> Swinhoe; <i>Indarbela dea</i> Swinhoe [Lepidoptera: Metarbelidae]	Bark borer, litchi bark caterpillar, metarbelid borer	Yes	CABI (1999); CIQ (2000); Tan <i>et al.</i> (1998); Waite & Hwang (1999); Xu & Yang (1992)	No	CABI (1999); Nielsen <i>et al.</i> (1996)	Yes
<i>Statherotis discana</i> (Felder & Rogenhofer) [Lepidoptera: Tortricidae]	Litchi leaf roller	Yes	CIQ (2000) not on lychee; Meyrick (1911)	No	Nielsen <i>et al.</i> (1996)	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Sympis rufibasis</i> Guenée [Lepidoptera: Noctuidae]	Caterpillar	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	Yes	Nielsen <i>et al.</i> (1996)	No
<i>Thalassodes quadraria</i> Guenée Lepidoptera: Geometridae]	Caterpillar	Yes	CIQ (2000); Tan <i>et al.</i> (1998, 1999)	Yes	AICN (2000); Balciunas <i>et al.</i> (1993)	No
<i>Zeuzera coffeae</i> Niethner [Lepidoptera: Cossidae]	Coffee leopard moth, coffee moth borer, red branch borer, red coffee borer	Yes	CIQ (2000); He (2001); Tan <i>et al.</i> (1998); Waite & Hwang (1999)	No	Nielsen <i>et al.</i> (1996)	Yes
Orthoptera (crickets; grasshoppers; katydids)						
<i>Chondracris rosea</i> (De Geer) [Orthoptera: Acrididae]	Citrus locust, cotton locust	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	CABI (1999)	Yes
<i>Choroedocus violaceipes</i> Miller [Orthoptera: Acrididae]	Grasshopper	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Holochlora nawae</i> Matsumura & Shiraki [Orthoptera: Tettigoniidae]	Katydid	Yes	CIQ (2000); Tan <i>et al.</i> (1998)	No	No records found	Yes
<i>Locusta migratoria manilensis</i> (Meyton) [Orthoptera: Saltatoria]	Oriental migratory locust, migratory locust	Yes	CIQ (2000)	Yes	AICN (2000); CABI (1999)	No
Thysanoptera (thrips)						
<i>Scirtothrips dorsalis</i> Hood [Thysanoptera: Thripidae]	Castor thrips, chilli thrips, strawberry thrips, tea yellow thrips	Yes	He (2001); Waite & Hwang (1999)	Yes	AICN (2000); CABI (1999)	No

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Selenothrips rubrocinctus</i> (Giard) [Thysanoptera: Thripidae]	Red-banded thrips, cacao thrips, cocoa thrips	Yes	He (2001)	Yes	AICN (2000); CABI (1999)	No
NEMATODA (nematodes)						
<i>Aphelenchoides bicaudatus</i> Imamura [Tylenchida, Aphelenchoididae]	Nematode	Yes	Yin <i>et al.</i> (1994a)	Yes	Siddiqui (1976)	No
<i>Aorolaimus helicus</i> Sher [Tylenchida: Hoplolaiminae]	Nematode	Yes	Yin <i>et al.</i> (1994a, b)	No	No records found	Yes
<i>Aphelenchus avenae</i> Bastian [Apelendiida: Aphelenchidae]	Nematode	Yes	Yin <i>et al.</i> (1994a)	Yes	Hooper (1974); McLeod <i>et al.</i> (1994)	No
<i>Aphelenchus maximus</i> Das [Apelendiida: Aphelenchidae]	Nematode	Yes	Yin <i>et al.</i> (1994a)	No	No records found	Yes
<i>Aphelenchus sparsus</i> Thorne & Malek [Apelendiida: Aphelenchidae]	Nematode	Yes	Yin <i>et al.</i> (1994a)	No	No records found	Yes
<i>Clavilenchus similis</i> Thorne & Malek [Tylenchida: Criconematidae]	Nematode	Yes	Yin <i>et al.</i> (1994a)	No	No records found	Yes
<i>Criconemella</i> De Grisse & Loof [Tylenchida: Criconematidae]	Ring nematode	Yes		Yes	CABI (1999); McLeod <i>et al.</i> (1994)	No
<i>Criconemoides complexus</i> Jairajpuri [Tylenchida: Criconematidae]	Ring nematode	Yes	Liu & Feng (1995); Yang <i>et al.</i> (1992)	No	No records found	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Discocriconemella limitanea</i> (Luc) De Grisse & Loof [Tylenchida: Criconematidae]	Nematode	Yes	Yin <i>et al.</i> (1994a, b)	Yes	McLeod <i>et al.</i> (1994)	No
<i>Helicotylenchus californicus</i> Sher Tylenchida: Hoploaimidae]	Spiral nematode	Yes	Yin <i>et al.</i> (1994a)	Yes	McLeod <i>et al.</i> (1994)	No
<i>Helicotylenchus concavus</i> Roman [Tylenchida: Hoploaimidae]	Spiral nematode	Yes	Yin <i>et al.</i> (1994a)	No	No records found	Yes
<i>Helicotylenchus digonicus</i> Perry in Perry, Darling & Thorne [Tylenchida: Hoploaimidae]	Spiral nematode	Yes	Yin <i>et al.</i> (1994a)	Yes	McLeod <i>et al.</i> (1994)	No
<i>Helicotylenchus dihystra</i> (Cobb) Sher. [Tylenchida: Hoploaimidae]	Common spiral nematode	Yes	Yin <i>et al.</i> (1994a)	Yes	CABI (1999); McLeod <i>et al.</i> (1994); Siddiqi (1972a)	No
<i>Helicotylenchus exallus</i> Sher [Tylenchida: Hoploaimidae]	Spiral nematode	Yes	Yin <i>et al.</i> (1994a)	Yes	McLeod <i>et al.</i> (1994)	No
<i>Helicotylenchus</i> spp. [Tylenchida: Hoploaimidae]	Spiral nematode	Yes	Yin <i>et al.</i> (1994a)	Yes	Menzel <i>et al.</i> (1988)	No
<i>Hemicriconemoides birchfieldi</i> [Tylenchida: Criconematidae]	Ring nematode	Yes	Zhang (1998)	No	No records found	Yes
<i>Hemicriconemoides fujianensis</i> [Tylenchida: Criconematidae]	Ring nematode	Yes	Zhang (1998)	No	No records found	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Hemicriconemoides litchi</i> Edward & Misra [Tylenchida: Criconematidae]	Ring nematode	Yes	Liu & Feng (1995); Zhang (1998)	No	No records found	Yes
<i>Hemicriconemoides mangiferae</i> Siddiqi [Tylenchida: Criconematidae]	Ring nematode	Yes	CABI (1999); CIQ (2000) claims not in China; Zhang (1995, 1998)	Yes	McLeod <i>et al.</i> (1994); Siddiqi (1977)	No
<i>Lelenchus</i> spp. [Tylenchida: Tylenchidae]	Nematode	Yes	Yin <i>et al.</i> (1994a)	No	McLeod <i>et al.</i> (1994) (only <i>L. leptosoma</i>)	Yes
<i>Longidorus litchii</i> Xu [Dorylaimida: Longidoridae]	Needle nematode	Yes	PDI (2000); Xu & Cheng (1992)	No	No records found	Yes
<i>Macroposthonia xenoplax</i> (Raski) De Grise & Loof [Tylenchida: Criconematidae]	Ring nematode	Yes	Yin <i>et al.</i> (1994a)	Yes	McLeod <i>et al.</i> (1994); Orton-Williams (1972)	No
<i>Meloidogyne</i> spp. [Tylenchida: Meloidogynidae]	Root knot nematode	Yes	Yang <i>et al.</i> (1992); Yin & Feng (1981); Yin <i>et al.</i> (1994a)	Yes	McLeod <i>et al.</i> (1994)	No
<i>Meloidogyne incognita</i> (Kofoed & White) [Tylenchida: Meloidogynidae]	Root knot nematode	Yes	Huang (pers. comm., 2000)	Yes	McLeod <i>et al.</i> (1994); Orton-Williams (1973)	No
<i>Paratrichodorus nanus</i> (Allen) Siddiqi [Triplonchida: Trichodoridae]	Stubby root nematode	Yes	Yin <i>et al.</i> (1994a)	No	No records found	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Paratylenchus elachistus</i> Steiner [Tylenchida: Paratylenchidae]	Nematode	Yes	Yin <i>et al.</i> (1994a)	Yes	McLeod <i>et al.</i> (1994) (genus only – not species)	No
<i>Pratylenchus brachyurus</i> (Godfrey) Filipjev & Schuurmans Stekhoven [Tylenchida: Pratylenchidae]	Root lesion nematode, meadow nematode, smooth headed nematode	Yes	Yin <i>et al.</i> (1994a)	Yes	CABI (1999); Corbett, 1976; McLeod <i>et al.</i> (1994)	No
<i>Pratylenchus coffeae</i> (Zimmerman) Filipjev & Stekh. [Tylenchida: Pratylenchidae]	Banana root nematode, root lesion nematode	Yes	Yin <i>et al.</i> (1994a)	Yes	CABI (1999); McLeod <i>et al.</i> (1994); Siddiqi (1972b)	No
<i>Pratylenchus</i> spp. [Tylenchida: Pratylenchidae]	Root lesion nematode	Yes		Yes	McLeod <i>et al.</i> (1994)	No
<i>Rotylenchulus reniformis</i> (Linford & Oliveira) [Tylenchida: Rotylenchulidae]	Reniform nematode	Yes	CABI (1999); Yin <i>et al.</i> (1994a)	No	CABI (1999); McLeod <i>et al.</i> (1994); Siddiqi (1972c)	Yes
<i>Scutylenchus quadrifer</i> Andr�ssy Siddiqi [Tylenchida: Merliniinae]	Nematode	Yes	Yin <i>et al.</i> (1994a, b)	No	CABI IP (1985)	Yes
<i>Trichodorus monhystera</i> Allen [Triplonchida: Trichodoridae]	Stubby root nematode	Yes	Yin <i>et al.</i> (1994a)	No	No records found	Yes
<i>Tylenchorhynchus claytoni</i> Steiner [Tylenchida: Belonolaimidae]	Stunt nematode, tobacco stunt nematode	Yes	Yin <i>et al.</i> (1994a)	Yes	CABI IP (1973); McLeod <i>et al.</i> (1994)	No

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Tylenchorhynchus nudus</i> Allen [Tylenchida: Belonolaimidae]	Stunt nematode	Yes	Yin <i>et al.</i> (1994a)	No	No records found	Yes
<i>Tylenchulus semipenetrans</i> Cobb [Tylenchida: Tylenchulidae]	Citrus root nematode, root nematode, citrus nematode	Yes	Yin <i>et al.</i> (1994a)	Yes	CABI (1999); McLeod <i>et al.</i> (1994); Siddiqi (1974)	No
<i>Tylenchus butteus</i> Thorne & Malek [Tylenchida: Tylenchulidae]	Citrus root nematode	Yes	Yin <i>et al.</i> (1994a)	No	No records found	Yes
<i>Tylenchus cylindricollis</i> Thorne & Malek [Tylenchida: Tylenchulidae]	Citrus root nematode	Yes	Yin <i>et al.</i> (1994a)	No	No records found	Yes
<i>Tylenchus exiguus</i> de Man [Tylenchida: Tylenchulidae]	Citrus root nematode	Yes	Yin <i>et al.</i> (1994a)	No	No records found	Yes
<i>Tylenchus fusiformis</i> Thorne & Malek (Siddiqi) [Tylenchida: Tylenchulidae]	Citrus root nematode	Yes	Yin <i>et al.</i> (1994a)	No	No records found	Yes
<i>Tylenchus parvissimus</i> Thorne & Malek [Tylenchida: Tylenchulidae]	Citrus root nematode	Yes	Yin <i>et al.</i> (1994a)	No	No records found	Yes
<i>Xiphinema americanum</i> Cobb [Dorylaimida: Longidoridae]	Dagger nematode, tobacco ringspot nematode	Yes	CABI (1999); CIQ (2000) not on lychee; Yin <i>et al.</i> (1994a)	Yes	CABI (1999); McLeod <i>et al.</i> (1994); Siddiqi (1973)	No

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
PATHOGENS						
FUNGI						
<i>Aspergillus niger</i> Van Tiegh [Mitosporic fungi: Hyphomycetes]	Aspergillus ear rot, fruit rot, collar rot	Yes	CABI (1999); Huang & Scott (1985)	Yes	CABI (1999); Farr <i>et al.</i> (1989)	No
<i>Aspergillus restrictus</i> G. Sm. [Mitosporic fungi: Hyphomycetes]	Fruit rot	Yes	Huang & Scott (1985)	Yes	Farr <i>et al.</i> (1989)	No
<i>Colletotrichum gloesporioides</i> = <i>Glomerella cingulata</i> (Penz.) Penz. & Sacc. In Penz [Phyllachorales: Phyllachoraceae]	Anthraxnose	Yes	CIQ (2000)	Yes	NCOF (2000)	No
<i>Cylindrocladiella peruviana</i> (Bat., Bez., & Herrera) [Mitosporic fungi: Hyphomycetes]		Yes	CIQ (2000) reported inconsistently in two places	No	No records found	Yes
<i>Dimeriella dendrocalami</i> Sawada & Yamam [Ascomycota]		Yes	Sawada (1959); Tai (1979)	No	No records found	Yes
<i>Peronophythora litchii</i> Chen ex Ko <i>et al.</i> [Pythiales: Pythiaceae]	Lychee brown blight	Yes	CABI (1999); Chi <i>et al.</i> (1984); CIQ (2000); Coates <i>et al.</i> (2000); Ou <i>et al.</i> (1999); PDI (2000); SAIQ (1999); Zee <i>et al.</i> (1998)	No	CABI (1999)	Yes

Appendix 4. Pest Categorisation for Lychee (Occurrence in Australia)

Taxonomic name	Common Name/s	Present in China	Reference	Present in Australia	Reference	Consider further
<i>Phaeosaccardinula javanica</i> (Zimm.) Yamamoto [Ascomycota]		Yes	Tai (1979)	No	No records found	Yes
Phomopsis longanae Chi & Jiang [Diaporthales: Valsaceae]	Fruit blotch, branch canker	Yes	Lin & Chi (1992)	No	No records found	Yes
<i>Rhizopus arrhizus</i> A. Fischer (R. oryzae) [Mucorales: Mucoraceae]	Fruit rot	Yes	Huang & Scott (1985)	Yes	Farr <i>et al.</i> (1989)	No
<i>Uredo nephelii</i> [Basidiomycota: Uredinales]	Rust	Yes	Hiratsuka & Chen (1991); Hirasuka <i>et al.</i> (1992); Tai (1979)	No	No records found	Yes
DISEASES OF UNKNOWN AETIOLOGY						
LyWBD Mycoplasma-like/Filamentous virus? Organism	Lychee witches' broom disease	Yes	Chen <i>et al.</i> (1992, 1996); Zee <i>et al.</i> (1998)	No	No records found	Yes
LWBD Mycoplasma-like/Filamentous virus? Organism	Longan witches' broom disease	Yes	Chen <i>et al.</i> (1992, 1996); CIQ (2000)	No	No records found	Yes

Question marks (No? Yes?) denote that further information is required to categorise the species. In these cases of doubt, the species is always included in the next step of categorisation.

= denotes both previous combinations and synonymies.

Shaded pests are found on both longan and lychee.

APPENDIX 5. PEST CATEGORISATION FOR LYCHEE (PATHWAY ASSOCIATION – FRESH LYCHEE FRUIT)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
INVERTEBRATA					
ACARI (mites)					
<i>Acaspina litchii</i> Huang, Huang & Hong [Acari: Phytoseiidae]	Phytoseiid mite	No	Leaves (Huang <i>et al.</i> , 1989) in Taiwan	CIQ (2000) claims not in China; Hong & Zhang (1996); Huang <i>et al.</i> (1989) in Taiwan	No
<i>Agistemus exsertus</i> Gonzalez-Rodriguez [Acari: Stigmaeidae]	Stigmaeid mite (predatory)	Yes	Feed on other mites	CIQ (2000) claims not in China; PDI (2000); Wang (1981)	Yes
<i>Amblyseius similiovalis</i> Liang & Ke [Acari: Phytoseiidae]	Phytoseiid mite (predatory)	Yes	Feed on other mites	Liang & Ke (1983)	Yes
<i>Disella litchii</i> Kuang & Feng [Acari: Eriophyidae: Nothopodinae]	Mite	No	Leaves as spp. of this genus, eg. <i>D. tectona</i> feeds on leaves (Das & Chakrabati, 1982).	CIQ (2000) claims not in China; Kuang & Feng (1990)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
INSECTA (insects)					
Coleoptera (beetles)					
<i>Adoretus hirsutus</i> Ohaus [Coleoptera: Scarabaeidae]	White root grub	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998, 1999)	No
<i>Adoretus sinicus</i> Burmeister [Coleoptera: Scarabaeidae]	Chinese rose beetle, root grub	No	Roots, leaves, new leaf growth	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Anomala corpulenta</i> Motschulsky [Coleoptera: Scarabaeidae]	Beetle	No	Leaves, new growth	Waite (pers. comm., 2001)	No
<i>Anomala cuprea</i> (Hope) [Coleoptera: Scarabaeidae]	Cupreous chafer	No	Leaves, new growth	Waite (pers. comm., 2001)	No
<i>Anomala cupripes</i> Hope [Coleoptera: Scarabaeidae]	Large green chafer beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Anomala varicolor</i> Gyllenhal [Coleoptera: Scarabaeidae]	Beetle	No	Leaves, new growth	Sauco & Menini (1989)	No
<i>Anoplophora chinensis</i> (Forster) [Coleoptera: Cerambycidae]	Black and white citrus longicorn/ longhorned beetle	No	Stems, roots, trunks	CIQ (2000); He (2001); Tan <i>et al.</i> (1998, 1999)	No
<i>Apogonia cribricollis</i> Burmeister [Coleoptera: Scarabaeidae]	Chafer beetle	No	Young leaves, new stem	CIQ (2000); Tan <i>et al.</i> (1998, 1999)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Aristobia testudo</i> (Voet) [Coleoptera: Cerambycidae]	Litchi longicorn beetle, turtleback beetle	No	Bark, stem	He (2001); Ho <i>et al.</i> (1990); PDI (2000); Waite & Hwang (1999); Zhang (1997)	No
<i>Aulacaphora almora</i> (Maulik) [Coleoptera: Chrysomelidae]	Beetle	No	New stem, new leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Aulacaphora cattigarensis</i> Weise [Coleoptera: Chrysomelidae]	Leaf beetle	No	New stem, new leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Aulacaphora femoralis</i> (Motschulsky) [Coleoptera: Chrysomelidae]	Cucurbit leaf beetle, orange broom galerucid	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Auloseryca migrorubra</i> Busk. [Coleoptera: Scarabaeidae]	Beetle	No	Leaves, new growth	Sauco & Menini (1989)	No
<i>Ceresium</i> spp. [Coleoptera: Cerambycidae]	Longhorned/ longicorn beetle	No	Branch	Cavey (1998)	No
<i>Chrysochus chinensis</i> Baly [Coleoptera: Chrysomelidae]	Leaf beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Clitea fulva</i> Chen [Coleoptera: Chrysomelidae]	Beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Colaphellus bowringi</i> Baly [Coleoptera: Chrysomelidae]	Beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Holotricha ovata</i> Chang [Coleoptera: Scarabaeidae]	White grub beetle	No	Roots	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Holotrichia plumbea planicollis</i> Burmeister [Coleoptera: Scarabaeidae]	Beetle	No	Leaves, roots	Sauco & Menini (1989)	No
<i>Holotrichia sauteri</i> Moser [Coleoptera: Scarabaeidae]	Southern black chafer	No	Leaves, roots, flowers	Huang & Lin (1987); PDI (2000)	No
<i>Hoplostomus chinensis</i> Guer. [Coleoptera: Scarabaeidae]	Beetle	No	Flowers (pollen and honey). Refer to www.beekeeping.com/ (in French). Predator of a spp. of social hymenoptera (<i>Belonogaster petiolata</i>), which is not associated with fruit of <i>L. chinensis</i> .	Allan (1986); Keeping (1984); Sauco & Menini (1989)	No
<i>Hypomeces squamosus</i> Fabricius [Coleoptera: Curculionidae]	Green weevil, gold-dust beetle, gold-dust weevil	No	Leaves, roots, growing points	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Lepidiota stigma</i> Fabricius [Coleoptera: Scarabaeidae]	Sugarcane white grub	No	Roots	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Maladera castanea</i> (Arrow) [Coleoptera: Scarabaeidae]	Asiatic garden beetle, castaneus garden beetle	No	New leaves, new stem	CIQ (2000); Tan <i>et al.</i> (1998, 1999)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Maladera</i> spp. [Coleoptera: Scarabaeidae]	Chafer beetle	No	New leaves, new stem	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Metriona circumdala</i> Herbst [Coleoptera: Chrysomelidae]	Green tortoise beetle	No	Leaves	Waite (pers. comm., 2001)	No
<i>Microtrichia cephalotes</i> Burmeister [Coleoptera: Scarabaeidae]	Sugarcane chafer	No	Leaves, new stems	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Monolepta hierglyphica</i> Motschulsky [Coleoptera: Chrysomelidae]	Leaf feeding beetle, leaf beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Neomylloceris hedinii</i> (Marshall) [Coleoptera: Curculionidae]	Weevil	No	Leaves, new stem	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Nodina punctostriolata</i> Fairmaire [Coleoptera: Chrysomelidae]	Leaf beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Oxycetonia jucunda</i> Faldermann [Coleoptera: Scarabaeidae]	Flower chafer, citrus flower chafer	Yes	Fruit, flowers	CIQ (2000); Tan <i>et al.</i> (1998)	Yes
<i>Phaedon brassicae</i> Baly [Coleoptera: Chrysomelidae]	Daikon leaf beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Phyllotreta striolata</i> Fabricius [Coleoptera: Chrysomelidae]	Cabbage flea beetle, striped flea beetle, turnip flea beetle, yellow striped flea beetle	No	Leaves, roots, flowers	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Platymycteropsis mandarinus</i> Fairmaire [Coleoptera: Curculionidae]	Weevil	No	Leaves, new stems	CIQ (2000); Tan <i>et al.</i> (1998, 1999)	No
<i>Popillia mutans</i> Newman [Coleoptera: Scarabaeidae]	Scarab beetle	Yes	Fruit	CIQ (2000); Tan <i>et al.</i> (1998)	Yes
<i>Popillia quadriguttata</i> Fabricius [Coleoptera: Scarabaeidae]	Scarab beetle	Yes	Fruit	CIQ (2000); Tan <i>et al.</i> (1998)	Yes
<i>Potosia brevitarsis</i> Lewis [Coleoptera: Scarabaeidae]	Scarab beetle	Yes	Fruit, flower	He (2001)	Yes
<i>Protaetia nitididorsis</i> (Fairmaire) [Coleoptera: Scarabaeidae]	Scarab beetle	Yes	Fruit	CIQ (2000); Tan <i>et al.</i> (1998)	Yes
<i>Sympiezomias citri</i> Chao [Coleoptera: Curculionidae]	Grey citrus weevil	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Taiwania obtusata</i> Boheman [Coleoptera: Chrysomelidae]	Beetle	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
Diptera (true flies; mosquitoes)					
Bactrocera dorsalis (Hendel) [Diptera: Tephritidae]	Oriental fruit fly, Asian fruit fly, mango fruit fly	Yes	Fruit with damaged skin or rotting fruit	CABI (1999); SAIQ (1999); Yang <i>et al.</i> (1996)	Yes
Mayetiola spp. [Diptera: Cecidomyiidae]	Gall midge	No	New leaves	CIQ (2000); Tan <i>et al.</i> (1999); Yang & Luo (1999)	No
Hemiptera (aphids; leafhoppers; mealybugs; phyllids; scales; true bugs; whiteflies)					
Aleurocanthus woglumi Ashby [Hemiptera: Aleyrodidae]	Citrus blackfly, spiny citrus whitefly	Yes	Leaves, fruit	COSAVE (1999); Waite (pers. comm., 2001)	Yes
Aulacaspis longanae Chen [Hemiptera: Diaspididae]	Longan diaspidid scale	Yes	Twig, fruit?	Chen <i>et al.</i> (1980); CIQ (2000) not on lychee	Yes
Cantao ocellatus (Thunberg) [Hemiptera: Pentatomidae]	Shield bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
Ceroplastes pseudoceriferus Green [Hemiptera: Coccidae]	Horned wax scale	No	Leaves, new growth, stem	CABI (1999); Wen & Lee (1986)	No
Cletus trigonus Thunberg [Hemiptera: Alydidae]	Rice slender bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
Dalpada oculata (Fabricius) [Hemiptera: Pentatomidae]	Shield bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Empoasca vitis</i> (Goethe, 1875) = <i>E. flavescens</i> (Fabricius); <i>E. pirusuga</i> (Mura) [Hemiptera: Cicadellidae]	Smaller green leaf-hopper, green frogfly	No	Leaves, stem, trunk	CIQ (2000); Tan <i>et al.</i> (1998) Sohi (1983) noted that all records of <i>E. flavescens</i> in the Oriental region need taxonomic verification.	No
<i>Erythroneura melia</i> Kuoh [Hemiptera: Cicadellidae]	Leaf hopper	No	Leaves	CIQ (2000)	No
<i>Eutettix apicus</i> Melichur [Hemiptera: Cicadellidae]	Leaf hopper	No	Leaves	CIQ (2000)	No
<i>Hyperoncus lateritius</i> (Westwood) [Hemiptera: Pentatomidae]	Shield bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Iassus indicus</i> Lethierry [Hemiptera: Cicadellidae]	Leaf hopper	No	Leaves	CIQ (2000)	No
<i>Kerria lacca</i> Kerr (Laccifer) [Hemiptera: Kerridae]	Lac insect	No	Stem, branches, twigs, sap Refer to http://creatures.ifas.ufl.edu/orn/scales/lobate_lac.htm	CIQ (2000) not on lychee; Anon (2002); Hsieh & Hwang (1981); Waite & Hwang (1999)	No
<i>Kilifia acuminata</i> (Signoret) [Hemiptera: Coccidae]	Mango shield scale	No	Stem	Ali (1971); Ferris (1950); Nakahara (1981)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Lawana imitata</i> Melichar [Hemiptera: Flattidae]	Flattid scale	No	Branch stem bole?	CIQ (2000)	No
<i>Leptocentrus albolineatus</i> Funkhouser [Hemiptera: Membracidae]	Leaf hopper	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Metatachardia fukiensis</i> Zhang [Hemiptera: Kerridae]	Lac insect	No	Stem, branches	CIQ (2000) not on lychee; Tang (1974); Zhang (1993);	No
<i>Mictis tenebrosa</i> Fabricius [Hemiptera: Coreidae]	Squash bug, leaf footed bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Nezara antennata</i> Scott [Hemiptera: Pentatomidae]	Green stink bug	Yes	Fruit, new leaves	CIQ (2000); Tan <i>et al.</i> (1998, 1999)	Yes
<i>Ochrochira camelina</i> Kiritshenko [Hemiptera: Coreidae]	Squash bug, leaf footed bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Pseudococcus comstocki</i> (Kuwana) [Hemiptera: Pseudococcidae]	Comstock's mealybug	Yes	Leaves, stems, fruits (as hitchhiker possibly)	CIE (1975) says lychee; ScaleNet (2001) in China confirmed but no record on longan or lychee anywhere	Yes

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Pseudococcus jackbeardsleyi</i> Gimpel & Miller [Hemiptera: Pseudococcidae]	Jack Beardsley mealybug	Yes	Leaves, fruit, stem	Gimpel & Miller (1996)	Yes
<i>Pyrops candalaria</i> Linnaeus = <i>Fulgora candalaria</i> Linnaeus; <i>Laternaria candalaria</i> (Linnaeus) [Hemiptera: Fulgoridae]	Lantern bug, longan leafhopper, longan plant hopper	No	Stem	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Ricania speculum</i> (Walker) [Hemiptera: Ricanidae]	Black leafhopper	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Solenostethium chinense</i> Stål [Hemiptera: Scutelleridae]	Yellow-belly arctiid, shield-backed bug	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Tessarotoma papillosa</i> (Drury) [Hemiptera: Pentatomidae]	Lychee stinkbug, leaf and twig sucking bug, longan stink bug	Yes	New stems, flowers, fruit, new leaves, terminals. Possible vector of longan witches' broom disease	Anon. (1978); Chen <i>et al.</i> (1999); CIQ (2000); He (2001); PDI (2000); SAIQ (1999); Tan <i>et al.</i> (1998, 1999); Waite & Hwang (1999); Xin & Li (1989); Zhou & Xian (1994)	Yes (as vector – low risk)

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
Hymenoptera (ants; bees; wasps)					
<i>Anastatus japonicus</i> Ashmead [Hymenoptera: Eupelmidae]	Egg parasite	No	Eggs of <i>Tessaratomya papillosa</i> , laid on lower surface of leaves	Xin & Li (1989)	No
Isoptera (termites)					
<i>Odontotermes formosanus</i> Shiraki [Isoptera: Termitidae]	Subterranean termite	No	Roots	Waite (pers. comm., 2001)	No
Lepidoptera (butterflies; moths)					
<i>Acanthopsyche subteralbatus</i> Hampson [Lepidoptera: Psychidae]	Moth	No	Branch, stem, trunk	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Adoxophyes cyrtosema</i> Meyrick [Lepidoptera: Tortricidae]	Citrus brown-banded tortrix, citrus leaf-roller	No	New leaves, flowers	Anon. (1978); CIQ (2000); Liu (1964); Tan <i>et al.</i> (1998); Waite & Hwang (1999)	No
<i>Adoxophyes orana</i> Fisher von Roeslerstamm = <i>Adoxophyes fasciata</i> Walsh [Lepidoptera: Tortricidae]	Apple peel tortricid: smaller tea tortrix, summer fruit tortrix	Yes	Leaves, new growth, fruit, flowers	CIQ (2000) not on lychee; Huang <i>et al.</i> (1997); <i>A. fasciata</i> (Liu 1964) on lychee	Yes

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Amata lutesfascia</i> Hamps [Lepidoptera: Amatidae]	Moth	Yes	Fruit, seed	Waite (pers. comm., 2001) (Check Holloway 1988 - not in Moths of Borneo)	Yes
<i>Archips asiatica</i> Walsingham = <i>Cacoecia asiatica</i> ? [Lepidoptera: Tortricidae]	Fruit borer	Yes	Fruit	Huang <i>et al.</i> (1997); Liu (1964)	Yes
<i>Archips tabescens</i> Meyrick = <i>Cacoecia tabescens</i> ? Meyrick [Lepidoptera: Tortricidae]	Fruit borer	Yes	Fruit	CIQ (2000) not on lychee; Liu (1964)	Yes
<i>Buzura suppressaria</i> (Guenée) [Lepidoptera: Geometridae]	Tea looper	No	Leaves Reported on leaves of <i>Eucalyptus</i> spp. (Liang, 1990).	CABI (1999); CIQ (2000) not on lychee, may be on longan; He (2001)	No
<i>Cerace stipatana</i> Walker [Lepidoptera: Tortricidae]	Borer, tortrix	Yes	Stem, fruit	Han & Shen (1993)	Yes
<i>Chalioides kondonis</i> Matsumura [Lepidoptera: Psychidae]	Kondo white psychid	No	Branch, stem, trunk	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Comocritis albicapilla</i> Moriuti [Lepidoptera: Oecophoridae]	Moth	No	Bark	Liu & Xu (1997); Luo <i>et al.</i> (1998)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Conopomorpha litchiella</i> Bradley [Lepidoptera: Gracillariidae]	Litchi leafminer	No	Leaves, new growth	He (2001); Liu (1964); Huang <i>et al.</i> (1997); Waite & Hwang (1999); Yao & Liu (1990)	No
<i>Conopomorpha sinensis</i> Bradley [Lepidoptera: Gracillariidae]	Litchi fruit borer, litchi stem-end borer	Yes	New leaves, new stem, fruit	CABI (1999); CIQ (2000); Huang <i>et al.</i> (1997); Liu (1964); SAIQ (1999); Tan <i>et al.</i> (1998, 1999); Waite & Hwang (1999)	Yes
<i>Cryptophlebia illepida</i> (Butler) = <i>Argyroplote illepida</i> [Lepidoptera: Tortricidae]	Koa seedworm, klu tortricid, koa seed moth, lichi borer, lichi moth, macadamia nut borer, macadamia nut moth	Yes	Fruit	Liu (1964)	Yes
<i>Cryptothelea variegata</i> Snellen [Lepidoptera: Psychidae]	Bagworm	No	Stem, trunk	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Deudorix epijarbas</i> spp. <i>amatius</i> ? [Lepidoptera: Lycaenidae]	Fruit borer	Yes	Fruit	Waite & Hwang (1999)	Yes
<i>Eboda cellerigera</i> Meyrick [Lepidoptera: Tortricidae]	Tortrix	No	New stem, new leaves	CIQ (2000); Liu (1964); He (2001); Tan <i>et al.</i> (1998)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Euproctis scintillans</i> (Walker) = <i>Porthesia scintillans</i> (Walker) [Lepidoptera: Lymantriidae]	Hairy tussock caterpillar	Yes	Leaves, fruit, flower	CIQ (2000); He (2001); Tan <i>et al.</i> (1998, 1999)	Yes
<i>Euproctis varians</i> (Walker) [Lepidoptera: Lymantriidae]	Moth/caterpillar	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Homona coffearia</i> (Nietner) [Lepidoptera: Tortricidae]	Coffee tortrix, tea flushworm, tea tortrix, leaf roller	Yes	Leaves, flowers, fruit	Anon. (1978); CABI (1999); Liu (1964); PDI (2000); Waite & Hwang (1999)	Yes
<i>Hypatima longanae</i> Tan <i>et al.</i> [Lepidoptera: Gelechiidae]	Twig borer	Yes	Shoots, flowers, fruit, stem, twig	Huang <i>et al.</i> (1997); Tan <i>et al.</i> (1998)	Yes
<i>Lymantria xylina</i> Swindoe [Lepidoptera: Lymantriidae]	Casuarina moth, casuarina tussock moth	No	Leaves Unlikely to attack fruit	He (2001)	No
<i>Miresa fulgida</i> Wilemam [Lepidoptera: Euoleidae?]	Slug caterpillar	No	Leaves	He (2001); Heppner & Inoue (1992) in Taiwan; Mesharam <i>et al.</i> (1991)	No
<i>Olethreutes leucaspis</i> (Meyrick) [Lepidoptera: Tortricidae]	Leaf roller, moth	No	New stem, new leaves	Liu (1964); Tan <i>et al.</i> (1998, 1999)	No
<i>Orgyia postica</i> (Walker) = <i>Notolophus australis posticus</i> Walker [Lepidoptera: Lymantriidae]	Cocoa tussock moth, small tussock moth	No	Leaves	CABI (1999); CIQ (2000); He (2001); Tan <i>et al.</i> (1998, 1999)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Orgyia turbata</i> Butler [Lepidoptera: Lymantriidae]	Tussock moth	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Parasa lepida</i> (Cramer) [Lepidoptera: Limacodidae]	Blue striped nettlegrub, nettle caterpillar	Yes	Leaves, fruit	CABI (1999)	Yes
<i>Pingasa pseudoterpnaria gracilis</i> Prout [Lepidoptera: Geometridae]	Moth	No	New leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Squamura dea</i> Swinhoe = <i>Arbela dea</i> Swinhoe; <i>Indarbela dea</i> Swinhoe [Lepidoptera: Metarbelidae]	Bark borer, litchi bark caterpillar, metarbelid borer	No	Stem, bark, trunk	CABI (1999); CIQ (2000); Tan <i>et al.</i> (1998); Waite & Hwang (1999); Xu & Yang (1992)	No
<i>Statherotis discana</i> (Felder & Rogenhofer) [Lepidoptera: Tortricidae]	Litchi leaf roller	No	Leaves	CIQ (2000) not on lychee; Meyrick (1911)	No
<i>Zeuzera coffeae</i> Niethner [Lepidoptera: Cossidae]	Coffee leopard moth, coffee moth borer, red branch borer, red coffee borer	No	Branch, bark, stem, trunk	CIQ (2000); He (2001); Tan <i>et al.</i> (1998); Waite & Hwang (1999)	No
Orthoptera [crickets; grasshoppers; katydids]					
<i>Chondracris rosea</i> (De Geer) [Orthoptera: Acrididae]	Citrus locust, cotton locust	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Choroedocus violaceipes</i> Miller [Orthoptera: Acrididae]	Grasshopper	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
<i>Holochlora nawae</i> Matsumura & Shiraki [Orthoptera: Tettigoniidae]	Katydid	No	Leaves	CIQ (2000); Tan <i>et al.</i> (1998)	No
NEMATODA (nematodes)					
<i>Aorolaimus helicus</i> Sher [Tylenchida: Hoplolaiminae]	Nematode	No	Roots	Yin <i>et al.</i> (1994a, b)	No
<i>Aphelenchus maximus</i> Das [Apelendiida: Aphelenchidae]	Nematode	No	Roots	Yin <i>et al.</i> (1994a)	No
<i>Aphelenchus sparsus</i> Thorne & Malek [Apelendiida: Aphelenchidae]	Nematode	No	Roots	Yin <i>et al.</i> (1994a)	No
<i>Clavilenchus similis</i> Thorne & Malek [Tylenchida: Criconematidae]	Nematode	No	Roots	Yin <i>et al.</i> (1994a)	No
<i>Criconemoides complexus</i> Jairajpuri [Tylenchida: Criconematidae]	Ring nematode	No	Roots	Liu & Feng (1995); Yang <i>et al.</i> (1992)	No
<i>Helicotylenchus concavus</i> Roman [Tylenchida: Hoploaimidae]	Spiral nematode	No	Roots	Yin <i>et al.</i> (1994a)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Hemicriconemoides birchfieldi</i> [Tylenchida: Criconematidae]	Ring nematode	No	Roots	Zhang (1998)	No
<i>Hemicriconemoides fujianensis</i> [Tylenchida: Criconematidae]	Ring nematode	No	Roots	Zhang (1998)	No
<i>Hemicriconemoides litchi</i> Edward & Misra [Tylenchida: Criconematidae]	Ring nematode	No	Roots	Liu & Feng (1995); Zhang (1998)	No
<i>Lelenchus</i> spp. [Tylenchida: Tylenchidae]	Nematode	No	Roots	Yin <i>et al.</i> (1994a)	No
<i>Longidorus litchii</i> Xu [Dorylaimida: Longidoridae]	Needle nematode	No	Roots	PDI (2000); Xu & Cheng (1992)	No
<i>Paratrichodorus nanus</i> (Allen) Siddiqi [Triplonchida: Trichodoridae]	Stubby root nematode	No	Roots	Yin <i>et al.</i> (1994a)	No
<i>Rotylenchulus reniformis</i> (Linford & Oliveira) [Tylenchida: Rotylenchulidae]	Reniform nematode	No	Roots	CABI (1999); Yin <i>et al.</i> (1994a)	No
<i>Scutylenchus quadrifer</i> Andrassy Siddiqi [Tylenchida: Merliniinae]	Nematode	No	Roots	Yin <i>et al.</i> (1994a, b)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Trichodorus monhystera</i> Allen [Triplonchida: Trichodoridae]	Stubby root nematode	No	Roots	Yin <i>et al.</i> (1994a)	No
<i>Tylenchorhynchus nudus</i> Allen [Tylenchida: Belonolaimidae]	Stunt nematode	No	Roots	Yin <i>et al.</i> (1994a)	No
<i>Tylenchus butteus</i> Thorne & Malek [Tylenchida: Tylenchulidae]	Citrus root nematode	No	Roots	Yin <i>et al.</i> (1994a)	No
<i>Tylenchus cylindricollis</i> Thorne & Malek [Tylenchida: Tylenchulidae]	Citrus root nematode	No	Roots	Yin <i>et al.</i> (1994a)	No
<i>Tylenchus exiguus</i> de Man [Tylenchida: Tylenchulidae]	Citrus root nematode	No	Roots	Yin <i>et al.</i> (1994a)	No
<i>Tylenchus fusiformis</i> Thorne & Malek (Siddiqi) [Tylenchida: Tylenchulidae]	Citrus root nematode	No	Roots	Yin <i>et al.</i> (1994a)	No
<i>Tylenchus parvissimus</i> Thorne & Malek [Tylenchida: Tylenchulidae]	Citrus root nematode	No	Roots	Yin <i>et al.</i> (1994a)	No

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
PATHOGENS					
FUNGI					
<i>Cylindrocladiella peruviana</i> (Bat., Bez., & Herrera) [Mitosporic fungi: Hyphomycetes]	Root rot	Yes	Fruit	CIQ (2000) reported inconsistently in two places	Yes
<i>Dimeriella dendrocalami</i> Sawada & Yamam [Ascomycota]	Leaf spot	No	Leaves	Sawada (1959); Tai (1979)	No
<i>Peronophythora litchii</i> Chen ex Ko <i>et al.</i> [Pythiales: Pythiaceae]	Lychee brown blight	Yes	Foliage, flowers, fruit, peduncle	CABI (1999); Chi <i>et al.</i> (1984); CIQ (2000); Coates <i>et al.</i> (2000); Ou <i>et al.</i> (1999); PDI (2000); SAIQ (1999); Zee <i>et al.</i> (1998)	Yes
<i>Phaeosaccardinula javanica</i> (Zimm.) Yamamoto [Ascomycota]	Sooty mold	No	Leaves	Eriksson & Yue (1985); Tai (1979)	No
<i>Phomopsis longanae</i> Chi & Jiang [Diaporthales: Valsaceae]	Fruit blotch, branch canker	Yes	Fruit, bark, stem, twig	Lin & Chi (1992)	Yes

Appendix 5. Pest Categorisation for Lychee (Pathway Association – Fresh Lychee Fruit)

Taxonomic name	Common name/s	Pathway association			Consider further
		on fruit	comment	reference	
<i>Uredo nephelii</i> [Basidiomycota: Uredinales]	Rust	No	Leaves	Hiratsuka & Chen (1991); Hirasuka <i>et al.</i> (1992); Tai (1979)	No
DISEASES OF UNKNOWN AETIOLOGY					
LyWBD Filamentous virus/Mycoplasma-like organism	Lychee witches' broom disease	Yes	Flowers, leaves, seeds, budwood, shoots	Chen <i>et al.</i> (1992, 1996); Zee <i>et al.</i> (1998)	Yes
LWBD Filamentous virus/Mycoplasma-like organism	Longan witches' broom disease	Yes	Flowers, leaves, seeds, budwood, shoots Can be transmitted by <i>Tessoratoma papillosa</i> from longans	Chen <i>et al.</i> (1992); CIQ (2000)	Yes

Associations of some pest species with the fruit or other parts of the plant are uncertain and are denoted with a question mark.

Synonyms are given in Appendix 1

= denotes both previous combinations and synonomomies.

Shaded pests are found on both longan and lychee.

APPENDIX 6. PESTS THAT WILL REQUIRE FURTHER EVALUATION IN THE IRA

Pest	Common name(s)	Pathway(s)
INVERTEBRATA		
ACARI (mites)		
<i>Aceria dimocarp</i> Kuang 1997 (Eriophyes dimocarp Kuang) [Eriophyidae] mites	Longan gall mite (Possible vector of longan witches' broom)	Longan fruit
<i>Agistemus exsertus</i> Gonzalez- Rodriguez [Acari: Stigmaeidae]	Stigmaeid mite (predatory)	Lychee fruit
<i>Amblyseius similiovalis</i> Liang & Ke [Acari: Phytoseiidae]	Phytoseiid mite (predatory)	Lychee fruit
<i>Echinopsis fukiensis</i> Fan & Chen [Acari: Raphignathidae]	Mite	Longan panicles
INSECTA (insects)		
Coleoptera (beetles)		
<i>Anoplophora chinensis</i> (Forster) [Coleoptera: Cerambycidae]	Black and white citrus longhorned/ longicorn beetle	Longan panicles
<i>Aristobia testudo</i> (Voet) [Coleoptera: Cerambycidae]	Litchi longicorn beetle, turtleback beetle	Longan panicles
<i>Maladera castanea</i> (Arrow) [Coleoptera: Scarabaeidae]	Asiatic garden beetle, castaneus garden beetle	Longan panicles
<i>Oxycetonia jucunda</i> Faldermann [Coleoptera: Scarabaeidae]	Flower chafer, citrus flower chafer	Longan fruit, lychee fruit
<i>Popillia mutans</i> Newman [Coleoptera: Scarabaeidae]	Scarab beetle	Longan fruit, lychee fruit
<i>Popillia quadriguttata</i> Fabricius [Coleoptera: Scarabaeidae]	Scarab beetle	Longan fruit, lychee fruit
<i>Potosia brevitarsis</i> Lewis [Coleoptera: Scarabaeidae]	Scarab beetle	Lychee fruit
<i>Protaetia nitididorsis</i> (Fairmaire) [Coleoptera: Scarabaeidae]	Scarab beetle	Longan fruit, lychee fruit
Diptera (true flies, mosquitoes)		
<i>Bactrocera dorsalis</i> (Hendel) [Diptera: Tephritidae]	Oriental fruit fly, Asian fruit fly, mango fruit fly	Longan fruit, lychee fruit
Hemiptera (aphids; leafhoppers; mealybugs; phyllids; scales; true bugs; whiteflies)		

Appendix 6. Pests that will Require Further Evaluation in the IRA

Pest	Common name(s)	Pathway(s)
<i>Aleurocanthus woglumi</i> Ashby [Hemiptera: Aleyrodidae]	Citrus blackfly, spiny citrus whitefly	Lychee fruit
<i>Aulacaspis longanae</i> Chen [Hemiptera: Diaspididae]	Longan diaspidid scale	Longan fruit, lychee fruit, longan panicles
<i>Kerria greeni</i> (Chamberlin) [Hemiptera: Kerridae]	Green's lac insect	Longan panicles
<i>Kerria lacca</i> Kerr (Laccifer) [Hemiptera: Kerridae]	Lac insect	Longan panicles
<i>Lawana imitata</i> Melichar [Hemiptera: Flattidae]	Flattid scale	Longan panicles
<i>Nezara antennata</i> Scott [Hemiptera: Pentatomidae]	Green stink bug	Longan fruit, lychee fruit
<i>Pseudococcus comstocki</i> (Kuwana) [Hemiptera: Pseudococcidae]	Comstock's mealybug	Lychee fruit
<i>Pseudococcus jackbeardsleyi</i> Gimpel & Miller [Hemiptera: Pseudococcidae]	Jack Beardsley mealybug	Lychee fruit
<i>Pyrops candelaria</i> Linnaeus = <i>Laternaria candalaria</i> (Linnaeus) = <i>Fulgora candelaria</i> Linnaeus [Hemiptera: Fulgoridae]	Lantern bug; longan leafhopper, longan plant hopper	Longan panicles
<i>Tessarotoma papillosa</i> (Drury) [Hemiptera: Pentatomidae]	Lychee stinkbug, leaf and twig sucking bug, longan stink bug	Longan fruit, lychee fruit
Lepidoptera (butterflies; moths)		
<i>Acanthopsyche subteralbatus</i> Hampson [Lepidoptera: Psychidae]	Moth	Longan panicles
<i>Adoxophyes orana</i> Fisher von Roeslerstamm = <i>Adoxophyes fasciata</i> Walsh [Lepidoptera: Tortricidae]	Apple peel tortricid, smaller tea tortrix, summer fruit tortrix	Longan fruit, lychee fruit
<i>Amata lutesfascia</i> Hamps [Lepidoptera: Amatidae]	Moth	Lychee fruit
<i>Archips asiatica</i> Walsingham = <i>Cacoecia asiatica</i> ? [Lepidoptera: Tortricidae]	Fruit borer	Longan fruit, lychee fruit
<i>Archips tabescens</i> Meyrick = <i>Cacoecia tabescens</i> ? Meyrick	Fruit borer	Lychee fruit

Appendix 6. Pests that will Require Further Evaluation in the IRA

Pest	Common name(s)	Pathway(s)
[Lepidoptera: Tortricidae]		
<i>Cerace stipatana</i> Walker [Lepidoptera: Tortricidae]	Borer, tortrix	Longan fruit, lychee fruit, longan panicles
<i>Chalioides kondonis</i> Matsumura [Lepidoptera: Psychidae]	Kondo white psychid	Longan panicles
<i>Conopomorpha sinensis</i> Bradley [Lepidoptera: Gracillariidae]	Litchi fruit borer, litchi stem-end borer	Longan fruit, lychee fruit
<i>Cryptophlebia illepida</i> (Butler) = <i>Argyroplote illepida</i> [Lepidoptera: Tortricidae]	Koa seedworm, klu tortricid, koa seed moth, lichi borer, lichi moth, macadamia nut borer, macadamia nut moth	Lychee fruit
<i>Cryptothoelea variegata</i> Snellen [Lepidoptera: Psychidae]	Bagworm	Longan panicles
<i>Deudorix epijarbas</i> spp. <i>amatus</i> ? [Lepidoptera: Lycaenidae]	Fruit borer	Lychee fruit
<i>Eumeta japonica</i> Heylaerts [Lepidoptera: Psychidae]	Japanese bagworm	Longan panicles
<i>Euproctis scintillans</i> (Walker) = <i>Porthesia scintillans</i> [Lepidoptera: Lymantriidae]	Hairy tussock caterpillar	Longan fruit, lychee fruit
<i>Euproctis taiwana</i> Shiraki [Lepidoptera: Lymantriidae]	Yellow tailed moth, tussock moth	Longan panicles
<i>Homona coffearia</i> (Nietner) [Lepidoptera: Tortricidae]	Coffee tortrix, tea flushworm, tea tortrix, leaf roller	Longan fruit, lychee fruit
<i>Hypatima longanae</i> Tan <i>et al.</i> [Lepidoptera: Gelechiidae]	Twig borer	Longan fruit, lychee fruit, longan panicles
<i>Parasa lepida</i> (Cramer) [Lepidoptera: Limacodidae]	Blue striped nettlegrub, nettle caterpillar	Lychee fruit
<i>Squamura dea</i> Swinhoe = <i>Indarbela dea</i> Swinhoe = <i>Arbela</i> <i>dea</i> Swinhoe) [Lepidoptera: Metarbelidae]	Bark borer, litchi bark caterpillar, metarbelid borer	Longan panicles
<i>Squamura swinhoediscipuncta</i> (Wileman) = ? <i>Indarbela</i> <i>baibarana</i> = <i>Arbela baibarana</i> Matsumura [Lepidoptera: Metabelidae]	Litchi stem borer, bark borer, stem borer, metarbelid borer	Longan panicles
<i>Zeuzera coffeae</i> Nietner [Lepidoptera: Cossidae]	Coffee moth borer, coffee leopard moth, red coffee borer,	Longan panicles

Appendix 6. Pests that will Require Further Evaluation in the IRA

Pest	Common name(s)	Pathway(s)
	red branch borer	
PATHOGENS		
FUNGI		
<i>Cylindrocladiella peruviana</i> (Bat., Bez., & Herrera) [Mitosporic fungi: Hyphomycetes]	Root rot	Longan fruit, lychee fruit
<i>Pestalotiopsis pauciseta</i> (Sacc.) Y.X. Chen [Mitosporic fungi: Coelomycetes]	Leaf blight	Longan fruit
<i>Peronophythora litchii</i> Chen ex Ko <i>et al.</i> [Pythiales: Pythiaceae]	Lychee brown blight	Lychee fruit
<i>Phomopsis longanae</i> Chi & Jiang [Diaporthales: Valsaceae]	Fruit blotch, branch canker	Longan fruit, lychee fruit, longan panicles
DISEASES OF UNKNOWN AETIOLOGY		
LWBD Mycoplasma-like/Filamentous virus organism	Longan witches' broom disease	Longan fruit, lychee fruit, longan panicles
LyWBD Mycoplasma-like/Filamentous virus organism	Lychee witches' broom disease	Lychee fruit

= denotes both previous combinations and synonymies.

Shaded pests are common to both longan and lychee pathways.

APPENDIX 8. REFERENCES FOR APPENDICES

- AICN (2000). Australia Insect Common Names, Version 0.71. CSIRO Australia and Department of Agriculture, Fisheries and Forestry – Australia <http://www.ento.csiro.au/aicn/index/html>, 20 January 2000.
- AICN (2001). Australia Insect Common Names, Version 0.71. CSIRO Australia and Department of Agriculture, Fisheries and Forestry – Australia <http://www.ento.csiro.au/aicn/index/html>, 19 September 2001.
- Ali, M.S. (1971). A catalogue of the Oriental Coccoidea (Part V) (Insecta: Homoptera: Coccoidea). *Indian Museum Bulletin* 6: 7-82.
- Ali, M.S., Chaturvedi, O.P., Nair, K.S.S., Sharma, J.K. and Varma, R.V. (1996). Major insect pests of forest trees in north Bihar. In: Sharma, J.K. (ed). *Impact of diseases and insect pests in tropical rainforests. Proceedings of the IUFRO Symposium, Peechi, India, 23-26 November 1993*. pp. 464-467.
- Allan, D. (1986). Honey buzzards at Lydenburg, RSA. *GABAR* 1(1): 30-31.
- Anonymous (1978). Lychee pest and disease control. In: Academy of Guangdong Agricultural Science (ed.) *Monograph of Guangdong Lychee*. Guangdong Science and Technology Press. (In Chinese).
- Anonymous (2002). Apiculture – Revue des revues. <http://www.beekeeping.com/> 2 December 2002.
- Anonymous (2002). *Kerria greeni*. <http://www.efruit.com.cn/lzw/lzzzgl/> 2 December 2002.
- Balciunas, J.K., Burrows, D.W. and Edwards, E.D. (1993). Herbivorous insects associated with the paperbark tree *Melaleuca quinquenervia* and its allies. II. Geometridae (Lepidoptera). *Australian Entomologist* 20(3): 91-98.
- Ballou, C.H. (1926). Los cóccidos de Cuba y sus plantas hospederas. *Boletin Estacion Experimental Agronomica, Santiago de Las Vegas, Cuba* 51: 1-47. (In Spanish).
- Batten, D. (1986). The Longan. *Australian Horticulture* 84(3): 14-22.
- Beardsley, J.W. (1986). Notes and exhibitions. New insect records for Guam. *Proceedings of the Hawaiian Entomological Society* 26: 9-10.
- Ben-Dov, Y. (1994). *A Systematic Catalogue of the Mealybugs of the World (Insects: Homoptera: Coccoidea: Coccidae) with Data on Geographical Distribution, Host Plants, Biology and Economic Importance*. Andover, UK: Intercept Limited, 686 pp.
- CABI (CAB INTERNATIONAL) (1999). *Crop Protection Compendium – Global Module*. Wallingford, UK: CAB International.
- CABI (CAB INTERNATIONAL) (2000). *Crop Protection Compendium – Global Module 2*. Wallingford, UK: CAB International.
- CABI IP (CAB INTERNATIONAL Institute of Parasitology) (1973). *Tylenchorhynchus claytoni*. *C.I.H. Descriptions of Plant-Parasitic Nematodes Set 3, No. 39*. Farnham Royal, UK: Commonwealth Agricultural Bureaux.

- CABI IP (CAB INTERNATIONAL Institute of Parasitology) (1985). *Scutylenchus quadrifer*. C.I.H. Descriptions of Plant-Parasitic Nematodes Set 8, No. 108. Farnham Royal, UK: Commonwealth Agricultural Bureaux.
- Cassis, G. and Gross, G.F. (in press). (ed.) *Zoological Catalogue of Australia. Volume 27 (3b). Heteroptera: Pentatomomorpha*. Canberra, Australia: CSIRO Publishing.
- Cavey, J.F. (1998). *Solid wood packing material from China*. Riverdale, MD: Animal and Plant Health Inspection Service, U.S. Department of Agriculture.
- Chen, F.G., Wu, Z.Q. and Su, D.K. (1980). New coccids of the genus *Aulacaspsis* in China. *Acta Zootaxonomica Sinica* 5(3): 289-296. (In Chinese).
- Chen, J.Y., Li, K.B., Chen, J.Y. and Fan, G.C. (1996). A preliminary study on litchi witches' broom and its relations to longan witches' broom. *Acta Phytopathologica Sinica* 26(4): 331-335. (In Chinese).
- Chen, J.Y., Xu, C.F., Li, K.B. and Xia, Y.H. (1992). On transmission of longan witches' broom disease by insect vectors. *Acta Phytopathologica Sinica* 22(3): 245-249. (In Chinese).
- Chen, Q.Y., Chen, J.Y. and Fan, G. (1999). The integrated control of longan witches' broom disease. *South China Fruits* 28(3): 29. (In Chinese).
- Chi, P.K., Pang, S.P. and Liu, R. (1984). On downy mildew of *Litchi chinensis* Sonn. I. The pathogen and its infection process. *Acta Phytopathologica Sinica* 14(2): 113-119. (In Chinese).
- CIE (Commonwealth Institute of Entomology) (1960). *Ceroplastes rubens* Mask. *Distribution Maps of Pests, Series A (Agricultural), Map No. 118*. London, UK: Commonwealth Agricultural Bureaux, 2 pp.
- CIE (Commonwealth Institute of Entomology) (1975). *Pseudococcus comstocki* (Kuw.). *Distribution Maps of Pests, Series A (Agricultural), Map No. 338*. London, UK: Commonwealth Agricultural Bureaux, 2 pp.
- CIE (Commonwealth Institute of Entomology) (1976). *Cryptophlebia ombrodelta* (Lower). *Distribution Maps of Pests, Series A (Agricultural), Map No. 353*. London, UK: Commonwealth Agricultural Bureaux, 2 pp.
- CIQ (2000). The Questions and Answers – Chinese Lychee and Longan Export to Australia. Information provided by China Inspection and Quarantine (CIQ), 25 December 2000. CIQ: Beijing, People's Republic of China. 25 pp +Appendices 1-5.
- Coates, L.M., Sangchote, S. and Johnson, G.I. (2002). Diseases of Lychee, Longan and Rambutan. In: Ploetz, R. (ed). *Compendium of Diseases of Tropical Fruit Crops* (in press).
- Corbett, D.C.M. (1976). *Pratylenchus brachyurus*. C.I.H. Descriptions of Plant-Parasitic Nematodes Set 6, No. 89. Farnham Royal, UK: Commonwealth Agricultural Bureaux, 4 pp.
- COSAVE (1999). Hojas de Datos Sobre Organismos Cuarentenarios Para Los Paises Miembros del COSAVE Ficha Cuarentenaria. *Aleurocanthus woglumi* Ashby. <http://www.cosave.org.py/lpcaleurocanthuswoglumi.htm>, 8 May 2001.
- Danzig, E.M. and Konstantinova, G.M. (1990). On coccid (Homoptera, Coccinea) fauna of Vietnam. *Trudy Zoologicheskogo Instituta Akademiyi Nauk SSSR. Leningrad* 209: 38-52. (In Russian).

- Das, A.K. and Chakrabarti, S. (1982). Studies on the eriophyid mites (Acarina: Eriophyoidea) of India. XII. Description of three new species from Bihar. *Entomon.* 7(3): 297-302.
- Day, M. F. and Fletcher, M. J. (1994). An annotated catalogue of the Australasian Cicadelloidea (Hemiptera: Auchenorrhyncha). *Invertebrate Taxonomy* 8(5): 1117-1288.
- De Lotto, G. (1971). On some genera and species of wax scales (Homoptera: Coccidae). *Journal of Natural History* 5: 133-153.
- Drew, H. (1999). Pepper spot – a new disease affecting lychee. *Proceedings of the Fifth National Lychee Conference 13-15 September 1999, Sunshine Coast, Queensland.* pp. 21-23.
- Eriksson, O. and Yue, J.Z. (1985). Studies on Chinese ascomycetes 1 *Phaeosaccardinula dictyospora*. *Mycotaxon.* 22(2): 269-280.
- Fan, Q.H. and Chen, Y. (1996). A new genus of the family Xenocaligonelhidiae (Acari: Raphigrathcidae). *Systematic and Applied Acarology* 1: 123-126.
- Farr, D.F., Bills, G.F., Chamuris, G.P. and Rossman, A.Y. (1989). *Fungi on Plants and Plant Products in the United States*. St Paul, Minnesota, USA: American Phytopathological Society (APS) Press, 1252 pp.
- Ferris, G.F. (1950). Report upon scale insects collected in China (Homoptera: Coccoidea). Part II. (Contribution No. 68). *Microentomology* 15: 69-124.
- FSCA (Florida State Collection of Arthropods) (1999). Pest Alert: *Anoplophora chinensis* (Forster), a second Asian Longhorned Beetle in the U.S. Citrus Longhorned Beetle (CLB). <http://doacs.state.fl.us/~pi/enpp/ento/clbalert.htm>, 18 June 1999.
- Gimpel, W.F. and Miller, D.R. (1996). Systematic analysis of the mealybugs in the *Pseudococcus maritimus* complex (Homoptera: Pseudococcidae). *Contributions on Entomology, International* 2: 1-163.
- Gupta, J.K. and Kumar, A. (1983). Biometrical studies on different developmental stages of *Henosepilachna vigintioctopunctata* (Coleoptera). *Acta Entomologica Bohemoslovaca* 80(6): 419-422.
- Halliday, R.B. (1998). Mites of Australia: A Checklist and Bibliography. *Monographs on Invertebrate Taxonomy. Volume 5*. Collingwood, Australia: CSIRO Publishing, 317 pp.
- Han, J. and Shen, J.L. (1993). A study of the developmental zero and effective accumulated temperature of *Cerace Stipatana* Walker. *Entomological Knowledge* 30(3): 153-156. (In Chinese).
- He, D.P. (2001). An overview of integrated management of insect pests in litchi orchards of Guangdong. In: Huang, H. and Menzel, C. (eds). *Proceedings of the First International Symposium on Litchi and Logan*. Guangzhou, China June 2000. ISHS Acta Horticulturae 558. pp. 401-405
- He, D., Zeng, M., Zhuo, B. and Lin, S. (1996). The preliminary study on the occurrence and control method of a new longan tree insect pest *Neoleipothrix alocasiae*. *Natural Enemies of Insects* 18: 44.
- He, J.R. (2002). <http://www.wetland.org.tw/> 2 December 2002.
- Heppner, J.B. and Inoue, H. (1992). *Lepidoptera of Taiwan Volume 1 Part 2. Checklist*. Gainesville, Florida, USA: Association for Tropical Lepidoptera.

- Hiratsuka, N. and Chen, Z.C. (1991). A list of Uredinales collected from Taiwan. *Transactions of the Mycological Society of Japan* 32: 3-22.
- Hiratsuka, N., Sato, S., Katsuya, K., Kakishima, M., Hiratsuka, Y., Kaneko, S., Ono, Y., Sato, T., Harada, Y., Hiratsuka, T. and Nakayama, K. (1992). *The rust flora of Japan*. Takezono, Ibaraki: Tsukuba Shuppanakai, 1205 pp.
- Ho, D.P., Liang, H.W., Feng, Z.W. and Zhao, X.D. (1990). A study of the biology and control methods of the longhorn beetle, *Aristobia testudo* (Voet). *Natural Enemies of Insects* 12: 123-128. (In Chinese).
- Holloway, J.D. (1988). The moths of Borneo: Family Arctiidae, Subfamilies Syntominiæ, Euchromiinae, Arctiinae; Noctuidae misplaced in Arctiidae (*Camptoloma*, *Aganainae*). Southdene, Kuala Lumpur, 101 pp.
- Hong, X. and Zhang, Z.Q. (1996). *The Eriophyoid mites of China: An illustrated catalogue and identification keys (Acari: Prostigmata: Eriophyoidea)*. Florida, USA: Associated Publishers.
- Hooper, D.J. (1974). *Aphelenchus avenae*. *C.I.H. Descriptions of Plant-Parasitic Nematodes Set 4, No. 50*. Farnham Royal, UK: Commonwealth Agricultural Bureaux, 4 pp.
- Houston, W.W.K. (ed.) (1992). *Zoological Catalogue of Australia. Volume 9. Coleoptera: Scarabaeoidea*. Canberra, Australia: Australian Government Publishing Service (AGPS), 544 pp.
- Hsieh, F.K. and Hwang, J.S. (1981). The Indian lac insect in Taiwan, once a beneficial insect, now a nuisance. *Chinese Journal of Entomology* 1: 119-120.
- Hu, X., He, J. and Wang, X. (1992). Homoptera: Coccoidea. pp. 176-203. In: Peng, J., Liu, Y., Zhao, J. et al. *Iconography of Forest Insects in Hunan China*. Hunan, China: Academia Sinica & Hunan Forestry Institute, 1473 pp.
- Hu, Y.X. and Lu, D.J. (1989). The Meliolaceae of Hainan province. *Acta Mycologica Sinica* 8(3): 180-190.
- Hu, Y., Lu, D.J. and Jiang, G.Z. (1986). The Meliolaceae of Ding Hu Shan Biosphere Reserve. *Acta Mycologica Sinica Suppl.* pp. 77-81.
- Huang, C.C and Tsay, J.G. (2002). Insect pests and their damage to *Casuarina equisetifolia*. Published online.
- Huang, C.Q., Wu, H.Q., Lin, Y.W., Xie, Y.D., Huang, J. and Huang, B.K. (1997). A review of shoot and fruit borers and two species of gracillariid moths attacking litchi and longan. *Wuyi Science Journal* 13: 125-130. (In Chinese).
- Huang, C.Y. and Lin, B.X. (1987). A preliminary study on *Holotrichia sauteri* Moser. *Insect Knowledge* 24(1): 33-34. (In Chinese).
- Huang, H.B. (2000). Personal communication. List of pests and diseases on longan and lychee in China. Wushan, Guangzhou: South China Agricultural University (email to Biosecurity Australia dated 21 December 2000).
- Huang, K.W. (2002). Species of gall family mites. <http://www.nmns.edu.tw/> 2 December 2002.
- Huang, P.Y. and Scott, K.J. (1985). Control of rotting and browning of litchi fruit after harvest at ambient temperatures in China. *Tropical Agriculture* 62(1): 2-4.

- Huang, T., Huang, K.W. and Horng, I.J. (1989). Two species of eriophyid mites injurious to litchi trees in Taiwan. *Chinese Journal of Entomology, Special Publication* 3: 57-64.
- Hwang, J.S. and Hsieh, F.K. (1981). Bionomics of the lac insect in Taiwan. *Plant Protection Bulletin* 23(2): 103-115.
- Jiang, G.Z. (1989). The Meliolaceae of China III. *Acta Mycologica Sinica* 8(3): 169-179.
- Jiang, Y.M. (1997). The use of microbial metabolites against post-harvest diseases of longan fruit. *International Journal of Food Science and Technology* 32(6): 535-538.
- Johnson, G.I. (1989). Lychee disease control. *Proceedings of the Second National Lychee Seminar, Cairns, Australia. September 21-23 1989*. pp. 90-93.
- Kay, I.R., Brown, J.D. and Mayer, R.J. (1993). Insecticidal control of *Eysarcoris trimaculatus* (Distant) (Heteroptera: Pentatomidae) and *Leptocoris acuta* (Thunberg) (Heteroptera: Alydidae) on rice in north Queensland, Australia. *Crop Protection* 12(4): 310-314.
- Keeping, M.G. (1984). A beetle predacious on the brood of a social wasp. *Journal of the Entomological Society of Southern Africa* 47(2): 355-356.
- Koizumi, M. (1995). Problems of Insect-borne Virus Diseases of Fruit Trees in Asia. Food & Fertilizer Technology Center Extension Bulletin, Volume 417, pp. 6-11.
<http://www.agnet.org/library/article/eb417b.html>
- Kuang, H.-Y. (1997). Four new species of Eriophyidae (Acari: Eriophyoidea) from China. *Entomotaxonomia* 19: 74-78.
- Kuang, H.Y. and Feng, Y.B. (1990). Three new species of Nothopodinae from China (Acari: Eriophyidae). *Acta Zootaxonomica Sinica* 15(2): 169-173.
- Lamberti, F. and Bleve-Zacheo, T. (1979). Studies on *Xiphinema americanum sensu lato* with descriptions of fifteen new species (Nematoda: Longidoridae). *Nematologia Mediterranea* 7: 51-106
- Li, C.S. (1993). Review of the Australian Epilachninae (Coleoptera: Coccinellidae). *Journal of the Australian Entomological Society* 32(3): 209-224.
- Li, L.Y., Wang, R. and Waterhouse, D.F. (1997). *The Distribution and Importance of Arthropod Pests and Weeds of Agricultural and Forestry Plantations in Southern China*. Canberra, Australia: Australian Centre for Agricultural Research (ACIAR), 185 pp.
- Liang, G.Q., Liang, F., Yang, G.H., Wu, J.J., Situ, B. and Zhang, Z.H. (1999). The study of cold storage quarantine treatment controlling Oriental fruit fly (Diptera: Tephritidae) in longan. *Acta Agriculturae Universitatis Jiangxiensis* 21(1): 33-35.
- Liang, G.X. (1990). Eucalypts, new hosts of *Buzura suppressaria*. *Forest Pest and Disease* No. 2(7).
- Liang, L.R. and Ke, L.S. (1983). Notes on the finlandicus group of *Amblyseius* Berlese of China (Acari: Phytoseiidae). *Acta Zootaxonomica Sinica* 8(2): 162-172. (In Chinese).
- Lin, S.M. and Chi, P.K. (1992). Some new species and records of genus *Phomopsis* in China. *Journal of South China Agricultural University* 13: 93-97.
- Liu, G.K. and Zhang, S.S. (1999). Identification of parasitic nematodes on longan in Fujian, China. *Journal of Fujian Agricultural University* 28(1): 59-65. (In Chinese).

- Liu, X.Q. (1964). Report on nine litchi flower and fruit borers in Kwongtung Province (Tortricidae, Olethreutidae). *ACTA Entomologica Sinica* 13(2): 207-213.
- Liu, Y.Q. and Xu, J.L. (1997). *Comoritis* [*Comocritus*] *albicapilla* Moriuti, a new pest on litchi. *Entomological Knowledge* 34: 148-149.
- Liu, Z.M. and Feng, Z.X. (1995). Six new records of plant nematodes in China. *Journal of Guangxi Agricultural University* 14(2): 121-124.
- Loof, P.A.A. (1974). *Pratylenchus pratensis*. *C.I.H. Descriptions of Plant-Parasitic Nematodes Set 4, No. 52*. Farnham Royal, UK: Commonwealth Agricultural Bureaux, 2 pp.
- Luo, Q.H., Wu, Y.T., Ou, M.L., Chen, Y.F. and Xu, F. (1998). Study on *Comocritus albicapilla* of litchi tree. *Journal of South China Agricultural University* 19(3): 31-35. (In Chinese).
- Mamet, J.R. (1943). A revised list of the Coccoidea of the islands of the western Indian Ocean, south of the equator. *Mauritius Institute Bulletin, Port Louis* 2: 137-170.
- Martin, J.H. (1999). The whitefly fauna of Australia (Sternorrhyncha: Aleyrodidae). A taxonomic account and identification guide. *CSIRO Entomology Technical Paper No. 38*, 197 pp.
- Martin, R.H. (1982). Report on visit to Purdue University, West Lafayette, Indiana, USA. *Study tour: Purdue University, USA; Wageningen, the Netherlands; Plant Breeding Institute, Cambridge, England; CIMMYT, El Batan, Mexico - June-July, 1982*. Sydney, NSW, Australia: Department of Agriculture, pp. 8-13.
- McLeod, R., Reay, F. and Smyth, J. (1994). *Plant Nematodes of Australia Listed by Plant and Genus*. Orange, Australia: NSW Agriculture, 201 pp.
- Menzel, C.M. and McConchie, C. (1997). Lychee and Logan. Pp. 288-295. In: *The New Rural Industries Rural Industries*. Canberra, Australia: Research and Development Corporation (RIRDC).
- Menzel, C.M., Watson, B.J. and Simpson, D.R. (1988). The lychee in Australia. *Queensland Agricultural Journal* 114(1): 19-26.
- Menzel, C.M., Watson, B.J. and Simpson, D.R. (1989). Longans – A place in Queensland's Horticulture? *Queensland Agricultural Journal Sep-Oct 1989*: 251-265.
- Meshram, P.B., Jamaluddin and Pathak, S.C. (1991). A new report of slug caterpillar, *Miresa albipuncta* Herr-Schaff (Lepidoptera: Limacodidae) as a pest of Mahua, *Madhuca latifolia*. *Indian Journal of Applied and Pure Biology* 6 (1): 79.
- Meyrick, E. (1911). Revision of Australian Tortricina. *Proceedings of the Linnaean Society of New South Wales* 36: 223-303.
- Nakahara, S. (1981). List of the Hawaiian Coccoidea (Homoptera: Sternorrhyncha). *Proceedings of the Hawaiian Entomological Society* 23: 387-424.
- Naumann, I. (1993). *CSIRO Handbook of Australian Insect Names. Common and Scientific Names for Insects and Allied Organisms of Economic and Environmental Importance* (6th edition). East Melbourne, Victoria, Australia: CSIRO, 193 pp.
- NCOF Database (2000). *National Collection of Fungi Database*. Queensland Department of Primary Industries.

- Nielsen, E.S., Edwards, E.D. and Rangsi, T.V. (eds). (1996). Checklist of the Lepidoptera of Australia. *Monographs on Australian Lepidoptera. Volume 4*. Melbourne, Australia: CSIRO Australia, 529 pp.
- NSW Agriculture (1999). *Idioscopus clypealis* ([Lethierry 1889](#)).
<http://www.agric.nsw.gov.au/Hort/ascu/cicadell/ecoky23b.htm>
- Orthoptera Species File online <http://viceroy.eeb.uconn.edu/Orthoptera>, 9 October 1999.
- Orton-Williams, K.J. (1972). *Macroposthonia xenoplax*. *C.I.H. Descriptions of Plant-Parasitic Nematodes Set 1, No. 12*. Farnham Royal, UK: Commonwealth Agricultural Bureaux, 2 pp.
- Orton-Williams, K.J. (1973). *Meloidogyne incognita*. *C.I.H. Descriptions of Plant-Parasitic Nematodes Set 2, No. 18*. Farnham Royal, UK: Commonwealth Agricultural Bureaux, 4 pp.
- Ou, Z.J., Deng, W.S. and Wu, C.T. (1999). Experiment of control of litchi downy mildew disease using 80% mancozeb wetted powder. *China Fruits* 3: 32. (In Chinese).
- PDI (2000). Pests and Diseases for *Litchi chinensis*, *Nephilium longana*, *Dimocarpus longan* and *Euphoria longana*. Biosecurity Australia PDI Database.
- Pinese, B. (1981). Erinose mite – a serious litchi pest. *Queensland Agricultural Journal* 107(2): 79-81.
- Pollock, D.A. (unpublished). Cerambycidae list. Darren Pollock's Wonderful World of Beetles.
<http://home.cc.umanitoba.ca/~pollockd/ceram.html>, 22 January 2001.
- Priest, M. (1989). *Diseases of Lychee in NSW* (Mimeograph).
- Qin, T.K. and Gullan, P.J. (1994). Taxonomy of the wax scales (Hemiptera: Coccidae: Ceroplastinae) in Australia. *Invertebrate Taxonomy* 8: 923-959.
- SAIQ (1999). Letter to General Manager, Plant Biosecurity, Biosecurity Australia, concerning Chinese longan and lychee exports to Australia from Xia Hong Min, Director General State Administration for Entry-Exit Inspection and Quarantine of The People's Republic of China, (SAIQ) (dated 30 April 1999).
- Sauco, V.G. and Menini, U.G. (1989). Litchi Cultivation. *FAO Plant Production and Protection Paper* 83. Rome: Food and Agriculture Organisation of the United Nations.
- Sawada, K. (1959). *Dimeriella dendrocalami* Sawada and Yamam. *Special Publication of College of Agriculture, National Taiwan University* 8: 37.
- ScaleNet (2001). Ben-Dov, Y., Miller, D.R. and Gibson, G.A.P. 2000.
<http://www.sel.barc.usda.gov/scalenet/scalenet.htm>. Individual databases have been developed by different authors as follows: Coccidae: Ben-Dov, Y., Pseudococcidae: Ben-Dov, Y. and German, V., References: Veilleux, K., Miller, D.R. and Ben-Dov, Y.
- Siddiqi, M.R. (1972a). *Helicotylenchus dihystra*. *C.I.H. Descriptions of Plant-Parasitic Nematodes Set 1, No. 9*. Farnham Royal, UK: Commonwealth Agricultural Bureaux, 3 pp.
- Siddiqi, M.R. (1972b). *Pratylenchus coffeae*. *C.I.H. Descriptions of Plant-Parasitic Nematodes Set 1, No. 6*. Farnham Royal, UK: Commonwealth Agricultural Bureaux, 3 pp.
- Siddiqi, M.R. (1972c). *Rotylenchulus reniformis*. *C.I.H. Descriptions of Plant-Parasitic Nematodes Set 1, No. 5*. Farnham Royal, UK: Commonwealth Agricultural Bureaux, 2 pp.

- Siddiqi, M.R. (1973). *Xiphinema americanum*. C.I.H. Descriptions of Plant-Parasitic Nematodes Set 2, No. 29. Farnham Royal, UK: Commonwealth Agricultural Bureaux, 4 pp.
- Siddiqi, M.R. (1974). *Tylenchulus semipenetrans*. C.I.H. Descriptions of Plant-Parasitic Nematodes Set 3, No. 34. Farnham Royal, UK: Commonwealth Agricultural Bureaux, 4 pp.
- Siddiqi, M.R. (1976). *Tylenchorhynchus annulatus* (= *T. martini*). C.I.H. Descriptions of Plant-Parasitic Nematodes Set 6, No. 85. Farnham Royal, UK: Commonwealth Agricultural Bureaux, 4 pp.
- Siddiqi, M.R. (1977). *Hemicriconemoides mangiferae*. C.I.H. Descriptions of Plant-Parasitic Nematodes Set 7, No. 99. Farnham Royal, UK: Commonwealth Agricultural Bureaux, 4 pp.
- Siddiqui, I.A. (1976). *Aphelenchoides bicaudatus*. C.I.H. Descriptions of Plant-Parasitic Nematodes Set 6, No. 84. Farnham Royal, UK: Commonwealth Agricultural Bureaux, 3 pp.
- Smith, D., Beattie, G.A.C. and Broadley, R. (eds). (1997). *Citrus Pests and their Natural Enemies: Integrated Pest Management in Australia*. Information Series Q197030. (Brisbane, Australia: State of Queensland, Department of Primary Industries and Horticultural Research and Development Corporation), 263 pp.
- Sohi, A.S. (1983). The Oriental Typhlocybinae with special reference to the pests of cotton and rice: A review. Pp. 49-74. In: Knight, W.T, Pant, N.C., Robertson, T.S. and Wilson, M.R. (eds). *Proceedings of the 1st International Workshop on Biotaxonomy Classification of Leafhoppers and Plant hoppers (Auchenorrhyncha) of Economic Importance, London 4-7 October 1982*. London, UK: Commonwealth Institute of Entomology.
- Subbarayudu, B. and Ram, R.L. (1997). Distribution of host plants of the lac insect, *Kerria lacca* (Kerr.). *Journal of Entomological Research, New Delhi* 21: 187-192.
- Tai, F.L. (1979). *Sylloge fungorum Sinicorum*. Peking; China: Science Press, Academia Sinica, 1527 pp.
- Takahashi, R. (1942). Immature stages and metamorphosis of the lac insect, *Laccifer lacca* Kerr (Homoptera). *Transactions of the Formosa Natural History Society* 32: 69-75.
- Tan, S.D., Wei, J.D. and Lan, R.X. (1997). Structure and development of the pest community in longan orchards. *Chinese Journal of Tropical Crops* 18: 84-91. (In Chinese with translation).
- Tan, S.D., Wei, J.D. and Lan, R.X. (1998). Analysis on the similarity of the structure of the litchi and longan pest communities. *Guangxi Science and Technology of Tropical Crops* 69: 4-10. (In Chinese with translation).
- Tan, S.D., Wei, J.D., Lan, R.X. and Wei, J.X. (1999). Study of the structure and dynamics of pest community in lychee orchards. *Acta Phytophylacica Sinica* 26(3): 213-218. (In Chinese).
- Tang, F.T. (1974). A preliminary report on the lac-insect fauna with description of a new species. *Acta Entomologica Sinica* 17: 205-209.
- Tao, C.C., Wang, C. and Chang, Y. (1983). Coccidae of Taiwan. Monographs of Coccidae of Taiwan, Republic of China (Homoptera: Coccidae). *Journal of Taiwan Museum* 36(1): 57-107.
- Tongdee, S.C., Scott, K.J. and McGlasson, W.B. (1982). Packaging and cool storage of litchi fruit. *CSIRO Food Research Quarterly* 42(2): 25-28.

- University of Florida – Department of Entomology and Nematology (2002). Featured creatures – lobate lac scale *Paratachardina lobata lobata* (Chamberlin).
http://creatures.ifas.ufl.edu/orn/sclaes/lobate_lac.htm 4 December 2002.
- Waite, G.K. (1986). Pests of lychee in Australia. *Proceedings of the First National Lychee Seminar, 14-15 February 1986, Australia*, pp. 42-43.
- Waite, G.K. (1992). *Pest management in Lychees*. Final Report, DAQ 81A. Canberra, Australia: Australian Rural Industries Research and Development Corporation, 42 pp.
- Waite, G.K. (1999). New evidence further incriminates honey-bees as vectors of lychee erinose mite *Aceria litchii* (Acari: Eriophyidae). *Experimental and Applied Acarology* 23(2): 145-147.
- Waite, G.K. (2001). Personal communication.
- Waite, G.K. and Elder, R. (1999a). *Green Shield Scale in Lychees and Longans*. DPI Note, Department of Primary Industries Queensland.
- Waite, G.K. and Elder, R. (1999b). *Lychee Erinose Mite in Lychees*. DPI Note, Department of Primary Industries Queensland.
- Waite, G.K. and Elder, R. (1999c). *Macadamia Nut Borer in Lychees*. DPI Note, Department of Primary Industries Queensland.
- Waite, G.K. and Elder, R. (1999d). *Pink Wax Scale in Longans*. DPI Note, Department of Primary Industries Queensland.
- Waite, G.K. and Elder, R. (1999e). *Soft Brown Scales in Lychees and Longans*. DPI Note, Department of Primary Industries Queensland.
- Waite, G.K. and Elder, R. (2000a). *Elephant Beetles in Lychees and Longans*. DPI Note, Department of Primary Industries Queensland.
- Waite, G.K. and Elder, R. (2000b). *Fruitpiercing Moths in Lychees and Longans*. DPI Note, Department of Primary Industries Queensland. Lychee file ref 19
- Waite, G.K. and Elder, R. (2000c). *Green Coffee Scale in Longans*. DPI Note, Department of Primary Industries Queensland.
- Waite, G.K. and Hwang, J.S. (1999). *Pests of litchi and longan*. (Mimeograph).
- Wang, H.F. (1981). Some predatory species of Stigmaeidae from Chinese orchards. *Insect Knowledge Kunchong Zhishi* 18(2): 81-82. (In Chinese).
- Wen, H.C. and Lee, H.S. (1986). Seasonal abundance of the ceriferus wax scale (*Ceroplastes pseudoceriferus*) in southern Taiwan and its control. *Journal of Agricultural Research of China* 35: 216-221. (In Chinese).
- Williams, D.J. (1985). *Australian Mealybugs*. London, UK: British Museum (Natural History), 431 pp.
- Xin, J.C. and Li, L.Y. (1989). Observations on the oviposition behaviour of *Anastatus japonicus* (Ashmead) and the results of its continuous rearing in vitro. *Natural Enemies of Insects* 11: 12-16. (In Chinese).
- Xu, J.L. and Cheng, H. (1992). *Longidorus litchi* n. spp. and *L. henanus* n. spp. (Nemata: Longidoridae) from China. *Fundamental and Applied Nematology* 15(6): 517-523.

- Xu, J.L. and Yang, P. (1992). The application of the codling moth nematode against the litchi stemborer. *Acta Phytophylacica Sinica* 19(3): 217-222. (In Chinese).
- Yang, C.K. and Li, F.S. (1982). A new genus and species of Ciriacreminae (Homoptera: Psillidae) injuring the Longan tree. *Wuyi Science Journal* 2: 124-127.
- Yang, C.K. and Luo, Q.H. (1999). A new genus and species of gall midge (Diptera: Cecidomyiidae) infesting litchi from China. *Entomotaxonomia* 21(2): 129-132. (In Chinese).
- Yang, G.H., Liang, F., Liang, G.Q., Xu, W. and Lin, C.Q. (1996). Research on detection, identification and plant quarantine treatment of Dacini fruit flies (Diptera: Tephritidae) in China. *Natural Enemies of Insects* 18(4): 1-6. (In Chinese).
- Yang, Y.Z., Deng, X.M. and Liu, G.Z. (1992). Studies on species and genera of plant parasitic nematodes in cotton fields in Sichuan. *Journal of Southwest Agricultural University* 14(4): 292-295. (In Chinese).
- Yao, Z.W. and Liu, X.Q. (1990). Two gracillariid insect pests attacking litchi and longan. *Acta Entomologica Sinica* 33(2): 207-212. (In Chinese).
- Yin, K.C. and Feng, Z.X. (1981). The investigation of plant nematodes. *Acta Phytophylactica Sinica* 8(2): 11-126. (In Chinese).
- Yin, Y.Q., Gao, X.B. and Feng, Z.X. (1994a). Investigations of parasitic nematodes on lychee in Guangdong Province. *Journal of South China Agricultural University* 15(3): 22-27. (In Chinese).
- Yin, Y.Q., Gao, X.B. and Feng, Z.X. (1994b). Three new records of plant nematodes in China. *Journal of South China Agricultural University* 15(2): 23-25. (In Chinese).
- Zee, F.T.P., Chan, H.T. Jr. and Yen, C.R. (1998). Lychee, Longan, Rambutan and Pulasan. pp. 290-335. In: Shaw, P.E., Chan, H.T. Jr. and Nagy, S. (eds). (1998). *Tropical and Subtropical Fruits*. Florida, USA: Agscience Inc.
- Zhan, Z.X., Zhang, X.J., Chen, Y.H., Huang, Y.Q. and Hu, Q.Y. (1999). Studies on the niche of five longan pests. *Journal of Fujian Academy of Agricultural Sciences* 14(2): 25-28. (In Chinese).
- Zhang, B.-C. (1994). *Index of Economically Important Lepidoptera*. Wallingford, UK: CAB International, 599 pp.
- Zhang, C.F. and Qi, P.K. (1996). Identification of new mycopathogens on longan in Guangdong province. *Journal of South China Agriculture University* 17: 59-64.
- Zhang, L.Q. and Zhang, L.Q. (2000). Recent situation and control of bamboo diseases in China. *Indian Journal of Forestry* 23: 104-109.
- Zhang, O. (1999). Investigation of the occurrence of longan witch-broom disease and its control. *South China Fruits* 28(1): 24.
- Zhang, S.S. (1995). Notes on *Hemicriconemoides mangiferae* from fruit tress in Fujian, China. *Acta Phytopathologica Sinica* 25(1): 39-42. (In Chinese).
- Zhang, S.S. (1998). Two new species of *Hemicriconemoides* (Nemata: Criconematidae). *Acta Phytopathologica Sinica* 28(4): 367-373. (In Chinese).
- Zhang, Z. (ed.) (1997). *Litchi Pictorial Narration of Cultivation*. Pomology Research Institute, Guangdong Academy of Agricultural Science, 189 pp. (In Chinese).

- Zhang, Z.S. (1993). Four new species of lac insects of the genus *Metatachardia* and *Kerria* from China (Homoptera: Tachardiidae). *Oriental Insects* 27: 273-286. (In Chinese).
- Zhou, Z.H. and Xian, X.Y. (1994). Investigation on the morphology and parasitism of *Ooencyrtus* spp. *Plant Protection* 20(2): 41-42. (In Chinese).