

食品安全檢驗與動植物防疫檢疫措施協定叢書（十二）

有害生物風險分析的一般要件

國際植物防疫檢疫措施標準第二號，一九九六年

GENERAL REQUIREMENTS FOR PEST RISK ANALYSIS

**INTERNATIONAL STANDARDS FOR
PHYTOSANITARY MEASURES**

(ISPM Pub. No.2, 1996)

農委會動植物防疫檢疫局 印行

序

食品安全檢驗與動植物防疫檢疫(Sanitary and Phytosanitary, SPS)是國際間通行的重要措施，目的在避免或減少因農產品貿易流通而導致外來動植物疫病蟲害之入侵、立足或蔓延，及防範食品、飲料或飼料中之添加物、污染物等的潛在風險，以保護境內國民及動植物的生命或健康，及維護自然生態環境。

為避免 SPS 措施對國際農產品貿易造成限制性的影響，世界貿易組織(WTO)在商品貿易理事會下設有「食品安全檢驗與動植物防疫檢疫措施委員會」，依據「食品安全檢驗與動植物防疫檢疫措施協定」鼓勵會員採用包括國際食品標準委員會(Codex)、世界動物衛生組織(OIE)及國際植物保護公約(IPPC)等三個國際組織所制訂之國際標準、準則或建議，以達到調和措施減少非關稅貿易障礙之目標。

本局為使我國政府機關、相關機構、產學各界及全國的農友瞭解此一重要協定及相關國際規範，特規劃出版中文譯本之「食品安全檢驗與動植物防疫檢疫措施協定叢書」，繼九十年十二月出版「食品安全檢驗與動植物防疫檢疫措施協定」及「國際植物保護公約」二單行本後，接續出版國際植物保護公約秘書處編定

之「國際植物防疫檢疫措施標準」系列 (International Standards for Phytosanitary Measures , ISPM) , 期使相關人員充分認識植物防疫檢疫措施之國際標準, 俾運用有利之協定條文及國際標準, 維護國內之農業生產安全, 並在與貿易對手國家諮商中保障我國應有的權益。

出版本叢書系列由本局同仁策劃編譯工作, 並邀請國立台灣大學昆蟲系教授陳秋男及相關領域專家參與譯稿作業。舉凡名詞翻譯、文句潤飾、譯詞統一及語氣之流暢等, 均係參與人員字斟句酌、集思廣益的成果, 而叢書之設計與編印, 亦蒙相關人員之辛勤付出, 始得出版問世, 在此一併致謝。

本局施政目標之一為建立符合國際規範之動植物防疫檢疫及農產品衛生安全之檢驗體系, 本叢書之出版, 期能增進與提昇相關工作之效能及水準, 促進目標之達成。

農委會動植物防疫檢疫局 局長

江益男 謹誌

二 三年十月

CONTENTS

<i>Endorsement</i>	8
<i>Review and amendment</i>	10
<i>Distribution</i>	12

INTRODUCTION

SCOPE.....	14
REFERENCES.....	14
DEFINITIONS AND ABBREVIATIONS.....	16
OUTLINE OF REQUIREMENTS.....	24

GENERAL REQUIREMENTS FOR PEST RISK ANALYSIS (PRA)

1. STAGE 1: INITIATING THE PRA PROCESS.....	26
1.1 PRA Initiated by a Pathway.....	28
1.2 PRA Initiated by a Pest.....	32
1.3 Review of Earlier PRAs.....	38
1.4 Conclusion for Stage 1	38
2. STAGE 2: PEST RISK ASSESSMENT.....	40
2.1 Geographical and Regulatory Criteria.....	46
2.2 Economic Importance Criteria.....	48
2.2.1 Establishment potential.....	52
2.2.2 Spread potential after establishment.....	54
2.2.3 Potential economic importance.....	56

目錄

批准.....	9
審查及修訂.....	11
分發.....	13

序言

範圍.....	15
參考文獻.....	15
定義及縮寫.....	17
要件綱要.....	25

有害生物風險分析的一般要件

1 第一階段：開始進行有害生物風險分析作業.....	27
1.1 由傳播途徑啟動之有害生物風險分析.....	29
1.2 由有害生物啟動之有害生物風險分析.....	33
1.3 檢視以往的有害生物風險分析結果.....	39
1.4 第一階段結論.....	39
2 第二階段：有害生物風險評估.....	41
2.1 地理標準和管制標準.....	47
2.2 經濟重要性標準.....	51
2.2.1 立足的可能性.....	53
2.2.2 立足後傳播的可能性.....	55
2.2.3 潛在的經濟重要性.....	57

2.3	Introduction Potential.....	60
2.4	Conclusion for Stage 2	64
3.	STAGE 3: PEST RISK MANAGEMENT.....	68
3.1	Risk Management Options.....	68
3.2	Efficacy and Impact of the Options.....	72
3.3	Conclusion for Stage 3	76
4.	DOCUMENTING THE PRA PROCESS.....	76
	<i>Figure 1. PRA Stage 1: Initiation.....</i>	<i>30</i>
	<i>Figure 2. PRA Stage 2: Assessment.....</i>	<i>42</i>
	<i>Figure 3. PRA Stage 3: Management.....</i>	<i>66</i>

2.3	傳入的可能性.....	61
2.4	第二階段的結論.....	65
3	第三階段：有害生物風險管理.....	69
3.1	風險管理的備選方案.....	69
3.2	備選方案的效力和影響.....	73
3.3	第三階段的結論.....	77
4	有害生物風險分析過程的建檔.....	77
	圖一、有害生物風險分析第一階段：開始.....	31
	圖二、有害生物風險分析第二階段：評估.....	43
	圖三、有害生物風險分析第三階段：管理.....	67

Endorsement

International standards for phytosanitary measures are prepared by the Secretariat of the International Plant Protection Convention as part of the United Nations Food and Agriculture Organization's global programme of policy and technical assistance in plant quarantine. This programme makes available to FAO Members and other interested parties these standards, guidelines and recommendations to achieve international harmonization of phytosanitary measures, with the aim to facilitate trade and avoid the use of unjustifiable measures as barriers to trade.

The following standard was endorsed by the 28th Session of the FAO Conference in November 1995.

Jacques Diouf

Director-General

Food and Agriculture Organization of the United Nations

批准

國際植物防疫檢疫措施標準為國際植物保護公約秘書處所編定，作為聯合國糧農組織的全球性植物防疫檢疫政策及技術援助計畫之一部分。該計畫提供糧農組織會員及其它有關團體這些標準、準則及建議，以達到植物防疫檢疫措施的國際性調和，俾促進貿易及避免採用無理措施作為貿易障礙。

本標準已於 1995 年 11 月由糧農組織大會第二十八屆會議批准。

Jacques Diouf

秘書長

聯合國糧農組織

Review and amendment

International standards for phytosanitary measures are subject to periodic review and amendment. The next review date for this standard is 2001, or such other date as may be agreed upon by the Commission on Phytosanitary Measures.

Standards will be updated and republished as necessary. Standard holders should ensure that the current edition of this standard is being used.

審查及修訂

國際植物防疫檢疫措施標準接受定期審查和修訂。本標準下次審查日期為 2001 年，或經植物防疫檢疫措施委員會同意之其他日期。

本標準於必要時將再更新或再版。本標準之持有者應確定係使用標準的現行版本。

Distribution

International standards for phytosanitary measures are distributed by the Secretariat of the International Plant Protection Convention to all FAO Members, plus the Executive/Technical Secretariats of the Regional Plant Protection Organizations:

Asia and Pacific Plant Protection Commission

- Caribbean Plant Protection Commission
- Comité Regional de Sanidad Vegetal para el Cono Sur
- Comunidad Andina
- European and Mediterranean Plant Protection Organization
- Inter-African Phytosanitary Council
- North American Plant Protection Organization
- Organismo Internacional Regional de Sanidad Agropecuaria
- Pacific Plant Protection Organization.

分發

國際植物防疫檢疫措施標準由國際植物保護公約秘書處分發給糧農組織所有成員，及下列區域性植物保護組織的執行 / 技術秘書處：

- 亞洲及太平洋區域植物保護委員會
- 加勒比海區域植物保護委員會
- 南錐體區域植物保護委員會
- 安第斯共同體
- 歐洲及地中海區域植物保護組織
- 非洲植物檢疫理事會
- 北美洲植物保護組織
- 區域國際農業衛生組織
- 太平洋植物保護組織

INTRODUCTION

SCOPE

This standard describes the process of pest risk analysis for plant pests for the purpose of preparing phytosanitary regulations by National Plant Protection Organizations.

REFERENCES

Glossary of phytosanitary terms, 1997. ISPM Pub. No. 5, FAO, Rome.*

International Plant Protection Convention, 1992. FAO, Rome.

Principles of plant quarantine as related to international trade, 1995. ISPM Pub. No. 1, FAO, Rome.

序言

範圍

本標準說明植物有害生物的有害生物風險分析過程，俾供國家植物保護機關制訂植物檢疫法規之用。

參考文獻

植物防疫檢疫措施詞彙，1997年。國際植物防疫檢疫措施標準，第五號出版物，糧農組織，羅馬。

國際植物保護公約，1992年。糧農組織，羅馬。

國際貿易有關的植物檢疫原則，1995年。國際植物防疫檢疫措施標準，第一號出版物，糧農組織，羅馬。

DEFINITIONS AND ABBREVIATIONS

Area	An officially defined country, part of a country or all or parts of several countries.
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	Perpetuation, for the foreseeable future, of a pest within an area after entry.

定義及縮寫

地區	官方界定的一個國家的全部、一個國家的部分或數個國家之全部或部分。
受威脅區	生態因子有利於某一有害物生物立足，其存在會對該地造成重大經濟損失的地區。
進入 (有害生物的)	有害生物進入其尚未存在，或雖存在但未廣泛分布且正進行官方防治之地區。
進入的可能性	有害生物進入的可能性。
立足	一有害生物在進入某一地區後在可預見之未來能持續生存。

Establishment potential	Likelihood of the establishment of a pest.
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.
National Plant Protection Organization (NPPO)	Official service established by a government to discharge the functions specified by the IPPC.
Official	Established, authorized or performed by a National Plant Protection Organization.
Pest	Any species, strain or biotype of plant or animal or any pathogenic agent, injurious to plants or plant products.

立足的可能性	有害生物立足的可能性
傳入	導致有害生物立足之進入。
傳入的可能性	有害生物傳入的可能性。
IPPC	係指 1951 年存檔於羅馬的糧農組織及其後修正的國際植物保護公約。
國家植物保護機關 (NPPO)	政府為執行國際植物保護公約規定的職責所設立的官方機關。
官方的	由國家植物保護機關建立、授權或執行的。
有害生物	任何對植物或植物產品有害的任何植物、動物或病原體之種、品系或生物型。

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 (PRA)	Pest risk assessment and pest risk management.
Pest risk assessment	Determination of whether a pest is a quarantine pest and evaluation of its introduction potential.
Pest risk management	The decision-making process of reducing the risk of introduction of a quarantine 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.

非疫區	經科學證據證明無某一特定有害生物發生，且此種狀況適當的由官方維持的地區。
有害生物風險分析(PRA)	評價生物的或其他科學與經濟的證據，俾決定某一有害生物是否應予以管制及將為此採取的任何植物防疫檢疫措施之強度的過程。
有害生物風險評估	決定某一有害生物是否為檢疫有害生物及評價其傳入的可能性。
有害生物風險管理	降低某一檢疫有害生物傳入風險之決策過程。
植物防疫檢疫措施	為防範有害生物傳入及 / 或傳播為目的之任何法令、規定或官方程序。
植物檢疫規定	為防範有害生物之傳入及 / 或傳播而管制商品或其他物品之生產 移動或存在，或人員之正常活動，及制定植物檢疫發證程序之官方規定。

PRA area	Area in relation to which a pest risk analysis is conducted.
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.
Spread	Expansion of the geographical distribution of a pest within an area.
Spread potential	Likelihood of the spread of a pest.

有害生物風險分析地區	進行有害生物風險分析的有關地區。
檢疫有害生物	對某一受威脅區具有潛在經濟重要性，惟尚未在該地區發生，或雖發生但尚未廣泛分布且有官方防治的有害生物。
傳播	有害生物在一地區內之地理分布之擴展。
傳播的可能性	有害生物傳播的可能性。

OUTLINE OF REQUIREMENTS

Pest risk analysis (PRA) consists of three stages: initiating the process for analyzing risk, assessing pest risk, and managing pest risk (See Figures 1-3).

Initiating the process involves identification of pests or pathways for which the PRA is needed. Pest risk assessment determines whether each pest identified as such, or associated with a pathway, is a quarantine pest, characterized in terms of likelihood of entry, establishment, spread and economic importance. Pest risk management involves developing, evaluating, comparing and selecting options for reducing the risk.

PRA is only meaningful in relation to a defined "PRA area" considered to be at risk. This is usually a country, but can also be an area within a country, or an area covering all or parts of several countries [e.g. the area covered by a Regional Plant Protection Organization (RPPO)].

要件綱要

有害生物風險分析可分為三個階段：開始進行分析風險的程序、評估有害生物風險及管理有害生物風險。(見圖一至三)

開始階段的工作涉及到查明需要進行有害生物風險分析的有害生物或傳播途徑。有害生物風險評估確定各種經查明的或與某一傳播途徑有關的有害生物是否為檢疫有害生物，列出其進入、立足、傳播的可能性和經濟重要性的特點。有害生物風險管理涉及到擬定、評價、比較和選定降低這種風險的備選方案。

有害生物風險分析僅對據認為處於受危險中而被確定為“有害生物風險分析地區”才有意義。這一地區通常是一個國家，也可是一個國家內的一個地區，或是包括若干國家之全部或部分的一個地區(如區域性植物保護組織所涵蓋的地區)。

GENERAL REQUIREMENTS FOR PEST RISK ANALYSIS (PRA)

STAGE 1: INITIATING THE PRA PROCESS

There are generally two initiation points for a pest risk analysis (see Figure 1):

- the identification of a pathway, usually an imported commodity, that may allow the introduction and/or spread of quarantine pests
- the identification of a pest that may qualify as a quarantine pest.

Either can involve pests already present in the PRA area but not widely distributed and being officially controlled, as well as pests absent from the PRA area, since both are covered by the quarantine pest definition

有害生物風險分析一般要件

第一階段：開始進行有害生物風險分析

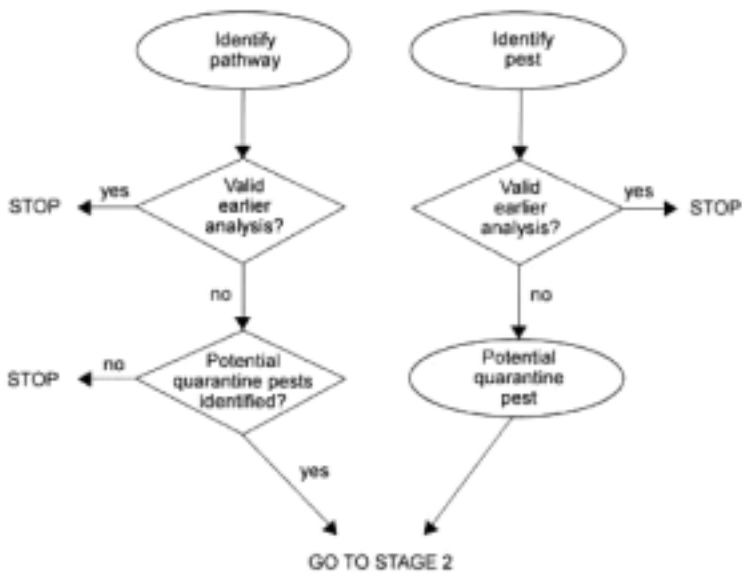
有害生物風險分析一般有兩個起始點(見圖一)：

- 查明可能使檢疫有害生物傳入及/或傳播的途徑，通常是一種輸入商品。
- 查明可能被視為檢疫有害生物的某一有害生物。

兩者均可以涉及已在有害生物風險分析區存在，但尚未廣泛分布且得到官方防治的有害生物，以及有害生物風險分析區尚不存在的有害生物，因檢疫有害生物定義包括這兩種。

FIGURE 1 PEST RISK ANALYSIS

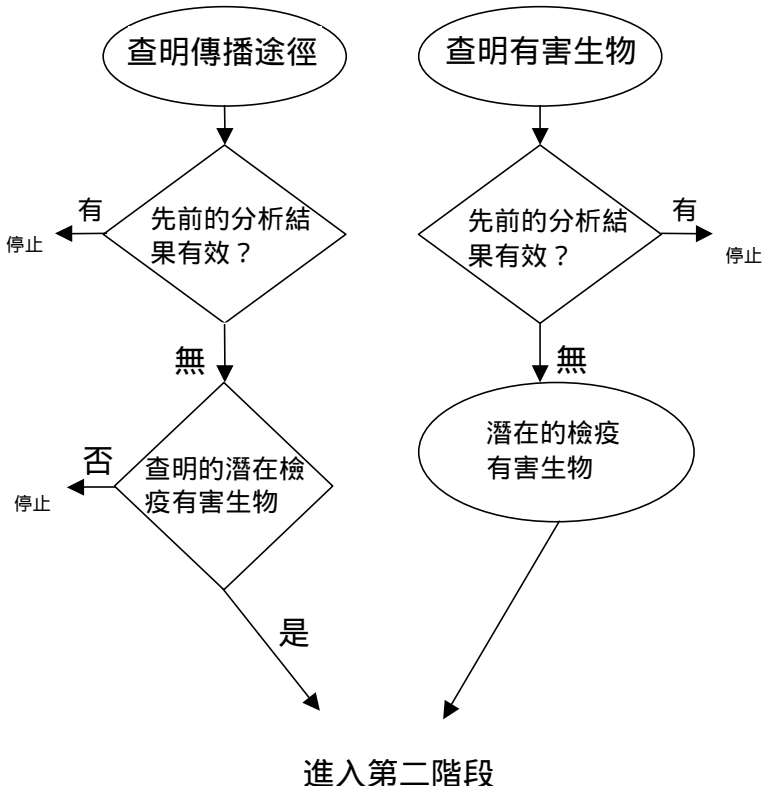
Stage 1: Initiation



圖一

有害生物風險分析

第一階段：開始



1.1 PRA Initiated by a Pathway

A requirement for a new or revised PRA originating from a specific pathway will most frequently arise in the following situations:

- International trade is initiated in a new commodity (usually a plant or plant product) or a commodity from a new origin. The PRA may be triggered by a request for import, or by the appearance in trade of consignments of a commodity. The pathway may concern a single area of origin or several.
- New plant species are imported for selection and scientific research purposes
- A pathway other than commodity import is identified (natural spread, mail, garbage, passenger's baggage etc.)
- A policy decision is taken to establish or revise phytosanitary regulations or requirements concerning specific commodities
- A new treatment, system or process, or new information impacts on an earlier decision.

1.1 從傳播途徑開始的有害生物風險分析

因特定傳播途徑而需進行新的或修改的有害生物風險分析經常在下列情況產生：

- 開始進行一種新商品(通常是植物或植物產品)或新產地的商品的國際貿易。有害生物風險分析可能由於輸入要求或貿易中出現某一商品之若干批貨品而產生。傳播途徑可能涉及到一個或若干原產地。
- 輸入新的植物種類供選種和科學研究用。
- 查明商品輸入以外的傳播途徑(自然傳播、郵件、垃圾、旅客行李等)。
- 政策決定針對某些特定商品制定或修正其植物防疫檢疫法規和要求。
- 新的處理系統或過程，或新資訊對先前決定之影響。

The pests which are likely to follow the pathway (e.g. be carried by the commodity) are then listed, and each is then subjected to Stage 2 in the PRA process¹. If no potential quarantine pests are identified as likely to follow the pathway, the PRA stops at this point.

¹ The list of pests may be generated by any combination of databases, literature sources, or expert consultation. Once the list of pests has been established, it is preferable to prioritize it by using expert judgement before the next step. According to the results obtained, it may or may not be necessary to conduct a risk assessment on all pests on the list.

接著列出可能隨該途徑傳播（如由商品攜帶）的有害生物，然後每一種有害生物須經有害生物風險分析過程的第二階段¹。如果查明並無任何潛在的檢疫有害生物有可能跟隨此一傳播途徑，則有害生物風險分析即到此為止。

¹ 有害生物名單可由資料庫、文獻資料和專家諮詢之任一組合而產生。一旦確定有害生物名單後，在進行下一步之前宜利用專家判斷對其列出優先順序。根據所獲得的結果，可能必須或不必要對名單上的所有有害生物進行風險評估。

1.2 PRA Initiated by a Pest

A requirement for a new or revised PRA originating from a specific pest will most frequently arise in the following situations:

- An emergency arises on discovery of an established infestation or an outbreak of a new pest within a PRA area
- An emergency arises on interception of a new pest on an imported commodity
- A new pest risk is identified by scientific research
- A pest is introduced into a new area other than the PRA area
- A pest is reported to be more damaging in a new area other than the PRA area itself, than in its area of origin
- Audits reveal that a particular pest is repeatedly intercepted

1.2 從有害生物開始的有害生物風險分析

因某一特定有害生物而需進行新的或經修改的有害生物風險分析經常在下列情況產生：

- 在有害生物風險分析地區發現新的有害生物已經立足為害或已爆發緊急情況時。
- 在輸入商品上截獲新的有害生物時所產生的緊急情況。
- 經科學研究查明的新的有害生物風險。
- 某一有害生物傳入有害生物風險分析地區以外的新地區。
- 據報告某一有害生物在有害生物風險分析地區外的新地區比其在原發生地區具更大破壞性。
- 檢查發現，某一特殊有害生物不斷被截獲。

- A request is made to import, as such, an organism, for example by researchers, educators, biological practitioners, businesses (pet store owners), the food industry (snails for consumption) or hobbyists (aquatic plants for aquaria)
- A policy decision is taken to revise phytosanitary regulations or requirements concerning specific pests
- A proposal is made by another country or by an international organization (RPPO, FAO)
- A new treatment system, process, or new information impacts on an earlier decision.

The specific pest identified is then subjected to Stage 2 in the PRA process.

- 提出輸入某種此類生物的要求，如研究人員、教學人員、生物從業人員、商業公司（寵物商店業主）、食品業（供食用蝸牛）或業餘愛好者（置於水族箱的水生植物）提出的要求。
- 作出政策決定來修改有關某些特定有害生物之植物防疫檢疫法規或要求。
- 其他國家或國際組織（區域植物保護組織、糧農組織）提出之建議。
- 新的處理系統、過程或新資訊對先前決定之影響。

然後對已查明的特定有害生物須進行有害生物風險分析過程的第二階段。

1.3 Review of Earlier PRAs

Prior to proceeding with a new PRA, a check should be made as to whether the pathway or pest has already been subjected to the PRA process, either nationally or internationally. If a PRA exists, its validity should be checked as circumstances may have changed. The possibility of using a PRA from a similar pathway or pest, that may partly or entirely replace the need for this PRA, should also be investigated.

1.4 Conclusion for Stage 1

At the end of Stage 1, pests have been identified as potential quarantine pests, individually or in association with a pathway.

1.3 檢討以往的有害生物風險分析

在進行新的有害生物風險分析前，應查核該傳播途徑或有害生物是否已經在國內或國際上進行過有害生物風險分析。倘已有相關分析，應當查核其有效性，因為相關環境條件可能已經改變。此外，亦應調查利用類似傳播途徑或有害生物進行的有害生物風險分析能否部分或完全替代此有害生物風險分析的可能性。

1.4 第一階段的結論

在第一階段結束時，已查明有害生物個別地或與某一傳播途徑有關聯而為潛在的檢疫有害生物。

STAGE 2: PEST RISK ASSESSMENT

Stage 1 has identified a pest, or list of pests (in the case of initiation by a pathway), to be subjected to risk assessment. Stage 2 considers these pests individually (see Figure 2). It examines, for each, whether the criteria for quarantine pest status are satisfied:

"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".

In this context, "area" should be understood to mean:

"an officially defined country, part of a country, or all or part of several countries",

and "endangered area" should be understood to mean:

"an area where ecological factors favour the establishment of a pest whose presence in the area will result in economically important loss".

2.第二階段：有害生物風險評估

第一階段已經查明了須進行風險評估的某一有害生物或有害生物名單(在從一種傳播途徑開始的情況下)。第二階段將個別地考慮這些有害生物(圖二)，審查其是否符合檢疫有害生物的標準：

“對受其危害地區具有潛在的經濟重要性，但尚未在該地區發生，或即使發生在但尚未廣泛分布且已有官方管制的有害生物”。

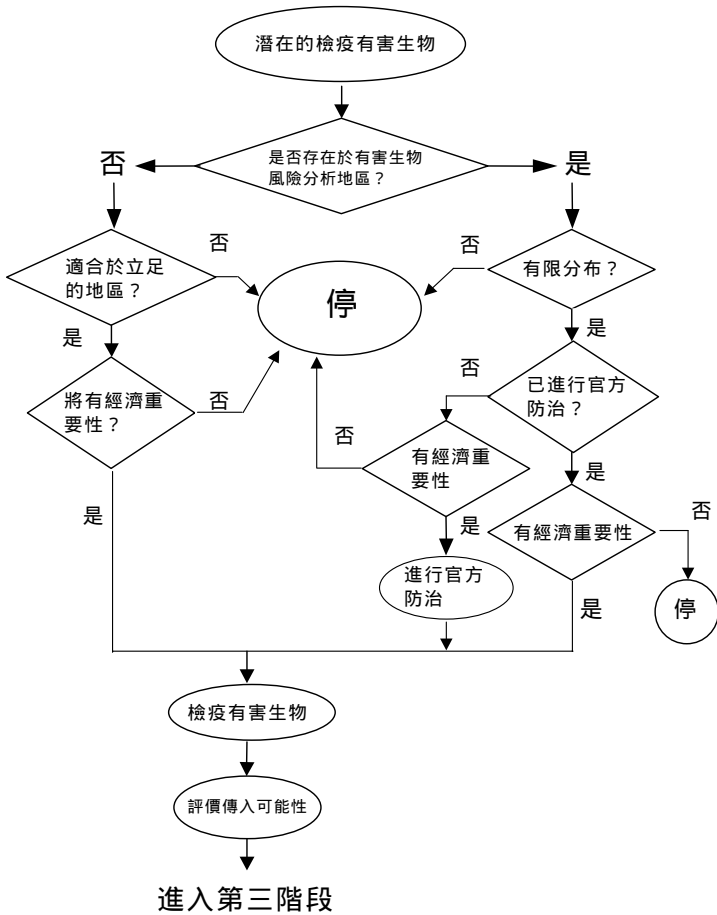
在此情況下，“地區”應理解為：

“一個官方界定的國家，一個國家的部分，或若干國家的全部或部分”，

“受威脅地區”應理解為：

“生態學因素有利於某一有害生物立足的地區，這種有害生物在該地區的發生將造成重大經濟損失”。

圖二
有害生物風險分析
第二階段：評估



In doing so, the PRA considers all aspects of each pest and in particular actual information about its geographical distribution, biology and economic importance. Expert judgement is then used to assess the establishment, spread and economic importance potential in the PRA area. Finally, the potential for introduction into the PRA area is characterized.

In characterizing the risk, the amount of information available will vary with each pest and the sophistication of the assessment will vary with available tools. For example, one country may have elaborate pest databases and geographical information systems, another may depend on books, printed soil maps, and climate maps. In some cases, virtually no information may be available, or research may be needed to obtain it. Assessments will be limited by the amount of information available on the biology of a particular pest. Countries where the pest is present may provide available information for the country conducting the PRA, on request.

在審查過程中，有害生物風險分析須多方考慮每一有害生物的特性，特別是有關其地理分布、生物和經濟重要性的實際資料。然後運用專家的判斷來評估在有害生物風險分析地區立足、傳播及具經濟重要性的潛在可能性。最後列出傳入有害生物風險分析地區的可能性的特點。

在確定這種風險的特點時，每一種有害生物的可用資料數量均不相同，評估的複雜程度亦因可用工具之不同而有所不同。例如，某一國家可能已有詳細的有害生物的數據庫和地理資訊系統，但另一國家卻可能依賴書籍、印刷的土壤圖和氣象圖。在一些情況下，實際上可能無任何資訊可用，或可能需要進行研究來獲得資訊。評估工作將受限於某種特定有害生物可以利用的生物學資料量。出現有害生物的國家應要求時得提供可用資料給進行有害生物風險分析的國家。

2.1 Geographical and Regulatory Criteria

For each pest subjected to the PRA process, the geographical and regulatory criteria in the quarantine pest definition should be considered:

- If the pest is present in the PRA area and has reached the limits of its ecological range (i.e. is widely distributed), then the pest does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point
- If the pest is present in the PRA area and has not reached the limits of its ecological range (i.e. not widely distributed), and the pest is subject to official control in the PRA area, then the pest satisfies this aspect of the definition of a quarantine pest

2.1 地理標準和管制標準

對於每一種須進行有害生物風險分析的有害生物，在考慮檢疫有害生物定義時應考量地理標準和管制標準：

- 如果有害生物出現在有害生物風險分析地區，並已達到其生態學範圍的極限（即廣泛分布），則此種有害生物不符合檢疫有害生物的定義，對這種有害生物的有害生物風險分析即到此為止。
- 如果有害生物出現在有害生物風險分析地區，但未達到其生態學範圍的極限（即未廣泛分布），且在該種有害生物在有害生物風險分析地區被實施官方防治，則此種有害生物符合檢疫有害生物在這個方面的定義。

- If the pest is not widely distributed but is under consideration of future official control in the PRA area, then the PRA will determine whether the pest should be placed under official control. If the conclusion is reached that the pest should be subject to official control, then the pest satisfies this aspect of the definition of the definition of a quarantine pest.
- If the pest is not widely distributed but is not subject to official control or consideration of future official control in the PRA area, then the pest does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point
- If the pest is absent from the PRA area, then it satisfies this aspect of the definition of a quarantine pest.

- 如果有害生物尚未廣泛分布，但正考慮未來在有害生物風險分析地區對其進行官方防治，則有害生物風險分析將決定是否應對該有害生物進行官方防治。如果結論為是，則該有害生物符合檢疫有害生物這個方面的定義。
- 如果有害生物尚未廣泛分布，但毋須進行官方防治或不考慮未來進行官方防治，則此種有害生物不符合檢疫有害生物的定義。對這種有害生物的有害生物風險分析即到此為止。
- 如果有害生物不存在於有害生物風險分析地區，則此種有害生物符合檢疫有害生物這個方面的定義。

2.2 Economic Importance Criteria

For potential economic importance to be expressed, a pest must become established and spread. Thus the risk of a pest, having entered, becoming established and spreading in the PRA area must be characterized. The factors to be considered are set out below².

² Fuller checklists of information which can usefully be considered in assessing the potential for establishment, spread and economic importance, are available from national and international sources.

2.2 經濟重要性標準

為能顯現其潛在的經濟重要性，一有害生物必須已經立足和傳播。因此必須列出已經進入有害生物風險分析地區，立足並傳播的有害生物風險的特點。以下說明須考慮的因子²。

²在評估立足、傳播及經濟重要性之潛在可能性時可考慮更充分的資料核對清單，這些資料可從國家和國際來源獲得。

2.2.1 Establishment potential

In order to estimate the establishment potential of a pest, reliable biological information (life cycle, host range, epidemiology, survival etc.) should be obtained from the areas where the pest currently occurs.

The situation in the PRA area can then be carefully compared with that in the areas where it currently occurs and expert judgement used to assess the establishment potential. Case histories concerning comparable pests can usefully be considered. Examples of the factors to consider are:

- availability, quantity and distribution of hosts in the PRA area
- environmental suitability in the PRA area
- potential for adaptation of the pest
- reproductive strategy of the pest
- method of pest survival.

2.2.1 立足的可能性

為能估計某種有害生物的立足可能性，應由目前已存在該有害生物之地區獲得可靠的生物學資料(生活史、寄主範圍、流行病學、存活性等)。

然後可以將有害生物風險分析地區的情況與已存在該有害生物地區的情況謹慎地比較，並以專家的判斷方式來評估其立足的可能性。而考慮可資比較的有害生物之案例是有所助益的。需考慮的因素例如：

- 有害生物風險分析地區是否有寄主、其數量及分布狀況。
- 在有害生物風險分析地區的環境適宜性。
- 該有害生物的適應潛力。
- 該有害生物的繁殖策略。
- 該有害生物的存活方式。

If a pest has no potential for establishment in the PRA area, then it does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point.

2.2.2 Spread potential after establishment

In order to estimate spread potential of the pest, reliable, biological information should be obtained from areas where the pest currently occurs.

The situation in the PRA area can then be carefully compared with that in the areas where the pest currently occurs and expert judgement used to assess the spread potential. Case histories concerning comparable pests can usefully be considered. Examples of the factors to consider are:

- suitability of the natural and/or managed environment for natural spread of the pest
- movement with commodities or conveyances
- intended use of the commodity
- potential vectors of the pest in the PRA area

如果某種有害生物在有害生物風險分析地區無立足的可能性，則其不符合檢疫有害生物的定義，對該有害生物之風險分析即到此為止。

2.2.2 立足後傳播的可能性

為了估計該有害生物傳播的可能性，應由目前已存在該有害生物的地區獲得可靠的生物學資料。

然後可以將有害生物風險分析地區的情況與已存在該有害生物的地區的情況謹慎地比較，並以專家的判斷來評估其傳播的可能性。而考慮可資比較的有害生物之案例是有所助益的。需考慮的因素例如：

- 有害生物自然傳播的自然和 / 或管理環境的適宜性。
- 隨商品或運輸工具的移動情況。
- 商品的預定用途。
- 有害生物在有害生物風險分析地區的潛在媒介。

- potential natural enemies of the pest in the PRA area..

The information on spread potential is used to estimate how rapidly a pest's potential economic importance may be expressed within the PRA area. This also has significance if the pest is liable to enter and establish in an area of low potential economic importance and then spread to an area of high potential economic importance. In addition it may be important in the risk management stage (see Figure 3) when considering the ease with which an introduced pest could be contained or eradicated.

2.2.3 Potential economic importance

The next step in the PRA process is to determine whether the pest is of potential economic importance in the PRA area.

- 有害生物在有害生物風險分析地區的
潛在天敵。

傳播之可能性的資料係用於估計有害生物之潛在經濟重要性多快可在有害生物風險分析地區表現出來。如果該有害生物易於進入並立足於潛在經濟重要性低的地區，然後傳播到潛在經濟重要性高的地區，則上述情況也很重要。此外，在風險管理階段時（圖三），當考慮一種傳入的有害生物是否易於圍堵或撲滅時，此種資訊也可能很重要。

2.2.3 潛在的經濟重要性

有害生物風險分析過程的下一步驟是確定該有害生物在有害生物風險分析地區是否具有潛在的經濟重要性。

In order to estimate the potential economic importance of the pest, information should be obtained from areas where the pest currently occurs. For each of these areas, note whether the pest causes major, minor or no damage. Note whether the pest causes damage frequently or infrequently. Relate this, if possible, to biotic and abiotic effects, particularly climate.

The situation in the PRA area can then be carefully compared with that in the areas where the pest currently occurs. Case histories concerning comparable pests can usefully be considered. Expert judgement is then used to assess the potential for economic importance. Examples of the factors to consider are:

- type of damage
- crop losses
- loss of export markets
- increases in control costs
- effects on ongoing integrated pest management (IPM) programmes

為估計有害生物的潛在經濟重要性，應由目前已存在該有害生物地區獲得資料。對每個這類地區都要注意有害生物是否造成重大危害、微小危害或不造成危害。注意有害生物係經常或不常造成危害。如有可能，將此情況與生物和非生物的影響，特別是氣候的影響關聯起來。

然後可以將有害生物風險分析地區的情況與已存在該有害生物地區的情況謹慎地比較，而考慮可資比較的有害生物之案例是有所助益的。然後利用專家判斷來評估經濟重要性的潛力。需考慮的因素例如：

- 危害類別。
- 作物損失。
- 外銷市場的喪失。
- 防治費用的增加。
- 對正在執行的有害生物綜合防治計畫的影響。

- environmental damage
- capacity to act as a vector for other pests
- perceived social costs such as unemployment.

If a pest has no potential economic importance in the PRA area, then it does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point.

2.3 Introduction Potential

The final stage of assessment concerns the introduction potential which depends on the pathways from the exporting country to the destination, and the frequency and quantity of pests associated with them. Documented pathways for the pest to enter new areas should be noted. Potential pathways which may not currently exist should be assessed if known.

The following is a partial checklist that may be used to estimate the introduction potential divided into those factors which may affect the likelihood of entry and those factors which may affect the likelihood of establishment.

- 環境危害。
- 作為其它有害生物媒介的能力。
- 已察覺諸如失業等之社會成本。

如果有害生物在有害生物風險分析地區沒有潛在的經濟重要性，則此有害生物不符合檢疫有害生物的定義，對該有害生物的風險分析即到此為止。

2.3 傳入的可能性

評估的最後階段為傳入的可能性，此取決於從輸出國到目的地的傳播途徑，及與其有關的有害生物的發生頻度和數量。應當注意該有害生物進入新地區的已有記載的傳播途徑。如果有知道目前可能尚不存在的潛在傳播途徑，則應加以評估。

以下是可以用來估計傳入可能性的部分查核清單，可分為影響進入可能性的因素和影響立足可能性的因素。

Entry:

- opportunity for contamination of commodities or conveyances by the pest
- survival of the pest under the environmental conditions of transport
- ease or difficulty of detecting the pest at entry inspection
- frequency and quantity of pest movement into the PRA area by natural means
- frequency and number of persons entering from another country at any given port of entry.

Establishment:

- number and frequency of consignments of the commodity
- number of individuals of a given pest associated with the means of conveyance
- intended use of the commodity
- environmental conditions and availability of hosts at the destination and during transport in the PRA area.

進 入：

- 有害生物污染商品和運輸工具的機會。
- 有害生物在運輸環境條件下的存活情形。
- 在入關檢查時偵察出有害生物的難易程度。
- 有害生物以自然手段進入有害生物風險分析地區的頻度及數量。
- 在任何特定的入境港站從另一國家進入的人員頻度和數量。

立 足：

- 托運商品之貨運數量和頻度。
- 運輸工具帶有某種有害生物的個數。
- 商品的預定用途。
- 有害生物風險分析地區的目的地和運輸途中寄主是否存在及其環境條件。

2.4 Conclusion for Stage 2

If the pest satisfies the definition of a quarantine pest, expert judgement should be used to review the information collected during Stage 2 to decide whether the pest has sufficient economic importance and introduction potential, i.e. sufficient risk, for phytosanitary measures to be justified. If so, proceed to Stage 3; if not, the PRA for the pest stops at this point³.

³ Decision-making schemes, or expert systems, may be useful at this stage to assist expert judgement.

2.4 第二階段結論

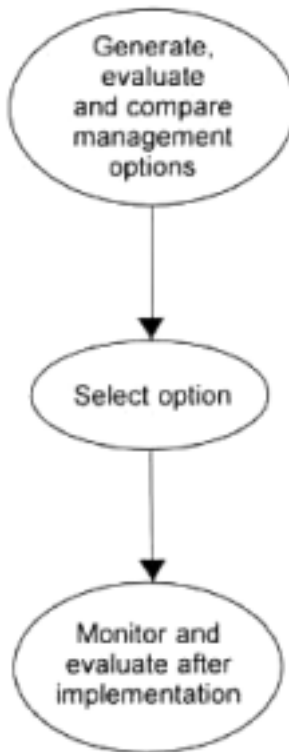
如果有害生物符合檢疫有害生物之定義，應利用專家判斷來審查第二階段所收集的資料，以決定有害生物是否具有足夠的經濟重要性及傳入的可能性，即是否具有足夠風險作為採取植物防疫檢疫措施的理由。如是，則進入第三階段；如否，則該有害生物的有害生物風險分析即到此為止³。

³ 在這一階段可採用決策計畫或專家系統來協助專家判斷。

FIGURE 2
PEST RISK ANALYSIS

Stage 3: Management

from Stage 2

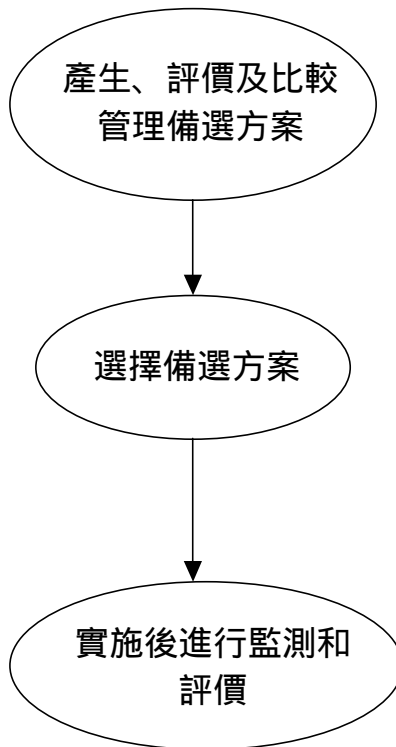


圖三

有害生物風險分析

第三階段：管 理

從第二階段



3. STAGE 3: PEST RISK MANAGEMENT

Pest risk management (see Figure 3) to protect the endangered areas should be proportional to the risk identified in the pest risk assessment. In most respects it can be based on the information gathered in the pest risk assessment. Phytosanitary measures should be applied to the minimum area necessary for the effective protection of the endangered area.

3.1 Risk Options Management

A list of options for reducing risks to an acceptable level should be assembled. These options will primarily concern pathways and in particular the conditions for permitting entry of commodities. Examples of the options to consider are:

- inclusion in list of prohibited pests
- phytosanitary inspection and certification prior to export
- definition of requirements to be satisfied before export
(e.g. treatment, origin from pest free area, growing season inspection, certification scheme)
- inspection at entry

3 第三階段：有害生物風險管理

為保護受威脅地區而採行的有害生物風險管理(圖三)應與有害生物風險評估中所查明的風險相稱。在多數方面可依據有害生物風險評估中所收集的資訊。要有效保護受威脅地區，則應對所須的最起碼地區實施植物防疫檢疫措施。

3.1 風險管理的備選方案

應彙整一份將風險降低至可接受水準的備選方案清單。這些備選方案主要涉及到傳播途徑及特別是允許商品輸入的條件。須考慮的備選方案如下：

- 列入禁止的有害生物名單。
- 於輸出前進行的植物檢疫檢查和證書。
- 規定輸出前須達到的要求（如處理、源自非疫區、生長季檢查、發證計畫）。
- 進入時的檢查。

- treatment at point of entry, inspection station or, if appropriate, at place of destination
- detention in post-entry quarantine
- post-entry measures (restrictions on use of commodity, control measures)
- prohibition of entry of specific commodities from specific origins.

They may also, however, concern ways of reducing the risk of damage, for example, introduction of a biological control agent, or ease of eradication or containment.

- 於輸入口岸、檢查站或適當時目的地的處理。
- 進入後進行隔離檢疫。
- 進入後的措施（商品使用的限制，防治措施）。
- 禁止由特定產地的特定商品進入。

然而，這些備選方案也可能可涉及降低危害風險的方法，例如引進生物防治物，或是否易於撲滅或圍堵。

3.2 Efficacy and Impact of the Options

The efficacy and impact of the various options in reducing risk to an acceptable level should be evaluated, in terms of the following factors:

- biological effectiveness
- cost/benefit of implementation
- impact on existing regulations
- commercial impact
- social impact
- phytosanitary policy considerations
- time to implement a new regulation
- efficacy of option against other quarantine pests
- environmental impact.

3.2 備選方案的效力和影響

應就以下因素評價各種備選方案的效力和影響，使風險降到可接受水準：

- 生物有效性。
- 實施的成本效益比。
- 對現有法規的影響。
- 商業面影響。
- 社會面影響。
- 植物防疫檢疫政策考量。
- 實施新法規的時機。
- 備選方案對付其它檢疫有害生物的效力。
- 環境影響。

The positive and negative aspects of the options should be specified. While it is recognized that countries according to the sovereignty principle may exercise their sovereign right to utilize phytosanitary measures, countries should also take particular note of the "**Minimal impact**" principle:

Phytosanitary measures shall be consistent with the pest risk involved, and shall represent the least restrictive measures available which result in the minimum impediment to the international movement of people, commodities and conveyances.

Article VI.2(f) of the International Plant Protection Convention makes a similar but less comprehensive provision. Phytosanitary measures recommended should be based on all of the above factors.

In order to determine which options are appropriate, it may be advisable to communicate with interested and affected groups within and outside the PRA area.

各種備選方案的正負面影響應具體說明。雖然認可各國根據主權原則得運用其主權施行植物防疫檢疫措施，但各國也應特別注意“**最低影響**”原則：

“植物防疫檢疫措施應與涉及的有害生物風險相符，並應是對人員、商品或運輸工具的國際移動造成最小妨礙的最少限制的措施。”

國際植物保護公約第 VI.2(f)條有類似但內容稍欠完整的規定。所建議的植物防疫檢疫措施應依據上述所有因子。

為了決定適當備選方案，宜與有害生物風險分析地區內外的利益攸關及受影響之團體進行溝通。

3.3 Conclusion for Stage 3

At the end of Stage 3, the appropriate phytosanitary measures concerning the pest or pathway have been decided. Completion of Stage 3 is essential; it is in particular not justified to complete only Stages 1 and 2 and then take phytosanitary measures without proper assessment of risk management options. After implementation of the phytosanitary measures, their effectiveness should be monitored and the risk management options should be reviewed, if necessary.

4. DOCUMENTING THE PRA PROCESS

A PRA should be sufficiently documented so that when a review or a dispute arises, the PRA will clearly state the sources of information and the rationales used in reaching a management decision regarding phytosanitary measures taken or to be taken.

3.3 第三階段結論

第三階段結束時，已決定了有關有害生物或其傳播途徑的適當植物防疫檢疫措施。第三階段的完成是必要的；特別是僅完成第一、二階段，然後不經適當評估風險管理備選方案就採取植物防疫檢疫措施是不合理的。在實施植物防疫檢疫措施後，應監測其有效性，如有必要應檢討風險管理備選方案。

4. 有害生物風險分析過程的建檔

有害生物風險分析應有充分之紀錄，以便在檢討或是爭議發生時，有害生物風險分析可明確說明資料來源，並說明對已採行或即將採行的植物防疫檢疫措施所作管理決策之理由。

For further information on international standards, guidelines and recommendations concerning phytosanitary measures, and the complete list of current publications, please contact the:

Secretariat of the International Plant Protection Convention

By mail: IPPC Secretariat

Plant Protection Service

Food and Agriculture Organization of the United Nations (FAO)

Viale delle Terme di Caracalla

00100 Rome, Italy

Fax: + (39) (06) 57056347

Email: ippc@fao.org

Or visit our WEB site at:

<http://www.fao.org/WAICENT/FaoInfo/Agricult/AGP/AGPP/PQ/Default.htm>

若需更多有關植物防疫檢疫措施之國際標準、準則及建議或現有刊物之全部目錄請洽下列單位：

國際植物保護公約秘書處

信件寄往下列住址：

IPPC Secretariat

Plant Protection Service

Food and Agriculture Organization of the United Nations
(FAO)

Viale delle Terme di Caracalla

00100 Rome, Italy

FAX: +(39)(06)57056347

Email: ippc@fao.org

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[http://www.fao.org/WAICENT/FaoInfo/Agricult/AGP/AGPP/
PQ/Default.htm](http://www.fao.org/WAICENT/FaoInfo/Agricult/AGP/AGPP/PQ/Default.htm)

有害生物風險分析的一般要件：國際植物防疫檢疫措施標準第二號，
一九九六年= General Requirements for Pest Risk Analysis: International
Standards for Phytosanitary Measures (ISPM Pub. No.2, 1996)

葉瑩、許昭元主編；陳秋男編譯

臺北市：農委會動植物防疫局，民 92

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