



**Australian Government**

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**Biosecurity Australia**

**Report of the assessment of northern China's  
fruit fly pest free areas:  
Hebei, Shandong and Xinjiang**

**March 2009**

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This assessment report has been issued to give all interested parties an opportunity to comment and draw attention to any scientific, technical, or other gaps in the data, misinterpretations and errors. Any comments should be submitted to Biosecurity Australia within the comment period stated in the related Biosecurity Australia Advice on the Biosecurity Australia website. The assessment report will then be revised as necessary to take account of the comments received.

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## Summary

Biosecurity Australia is assessing the fruit fly free status of the provinces of Hebei and Shandong and the autonomous region of Xinjiang in northern China.

China has sought Australia's recognition of northern China's pear and apple producing regions as pest free areas for economically significant fruit flies (*Bactrocera* spp.).

The scientific evidence and verification visits to China's National Fruit Fly Trapping Network in Hebei, Shandong and Xinjiang has provided a high level of confidence that the provinces and region are free of native and exotic fruit flies.

This report provides Biosecurity Australia's assessment of northern China's fruit fly free status.

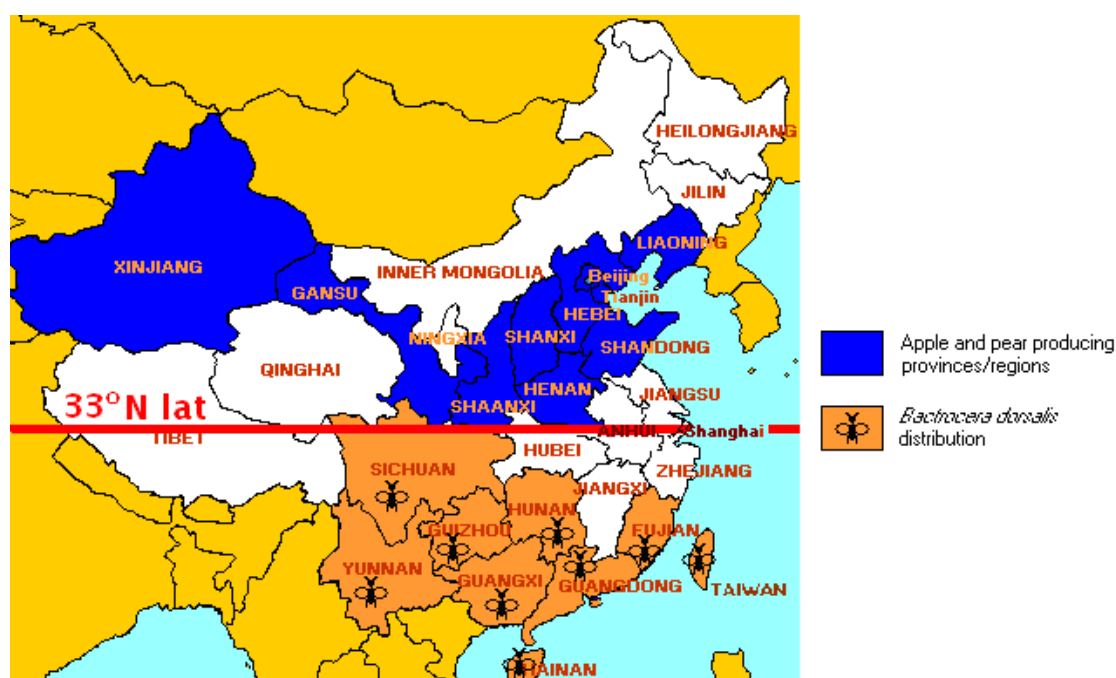
Biosecurity Australia recommends recognition of Hebei, Shandong and Xinjiang as pest free areas for economically significant fruit flies.

Recognition of these areas will mean that the requirement for mandatory fruit fly monitoring in the orchards that export Chinese pears to Australia will be replaced by China's national fruit fly monitoring systems.

## Background

The General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ) sent a letter, dated 9 July 2007, to Biosecurity Australia formally requesting recognition of northern China's pear and apple producing regions as pest free areas (PFAs) for economically significant fruit flies. AQSIQ provided technical information to support its claim (AQSIQ 2007).

China is seeking recognition of all apple and pear producing regions in northern China as fruit fly pest free areas (FF-PFAs) (see Figure 1).



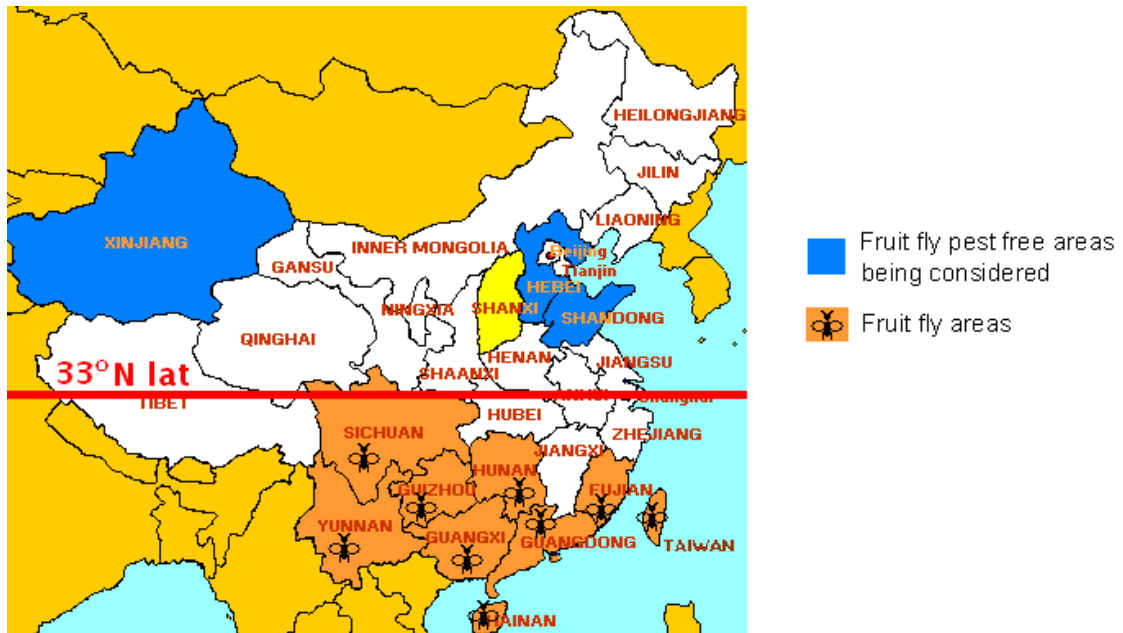
**Figure 1 Apple and pear production areas and fruit fly distribution in China**

In the first instance, AQSIQ has requested that Australia remove the current requirement for orchard monitoring of fruit flies in the export pear production areas in the provinces of Hebei and Shandong and the autonomous region of Xinjiang, which are currently exporting to Australia. Chinese pears can also be imported into Australia from Shaanxi, although to date no pears have been exported from this province (BA 2005). AQSIQ is seeking the removal of Australia's current requirement for fruit fly trapping in orchards and requests the recognition of China's National Fruit Fly Trapping Network (NFFTN) to verify the FF-PFA status.

## Scope

Biosecurity Australia is considering northern China's fruit fly pest free area status in three stages:

1. The first stage was to assess the production areas in the provinces of Hebei and Shandong and autonomous region of Xinjiang, which currently export pears to Australia.



**Figure 2 Fruit fly pest free areas being considered**

2. The second stage will be to consider the provinces of Beijing, Gansu, Henan, Jilin, Liaoning, Ningxia, Shaanxi and Shanxi.
3. The third stage will be to consider the remaining areas of northern China.

This document is limited to dealing with the first stage and considers fruit fly area freedom for Hebei, Shandong and Xinjiang for all commodities.

## Risk assessment

Biosecurity Australia has analysed the climatic and trapping data provided and reviewed the scientific literature.

### Potential distribution of Oriental fruit fly (*Bactrocera dorsalis* Hendel 1812) in China

– Oriental fruit fly is a tropical and subtropical species. It has been recorded from many Asian countries, some Pacific countries and Hawaii, USA.

In China, Oriental fruit fly is found in Fujian, Hong Kong, Hainan, Guangdong, Guangxi, Hunan, Guizhou, Yunnan, Sichuan, Macao (AQSIQ 2007; Carroll *et al.* 2005), which are all south of  $30 \pm 2$  degrees north ( $30 \pm 2^\circ\text{N}$ ) latitude in China (CAB International 2005; Drew and Hancock 1994; Wu 2005) (see Figures 1 and 3).

**Climatic modelling** – There have been several recent studies (Wu 2005) to predict the potential geographical distribution of Oriental fruit fly in China (Hou and Zhang 2005; Zhan *et al.* 2006) (see Figure 3). These studies have included CLIMEX modelling and reviews of 30 years of climatic data.

CLIMEX modelling predicted the following minimum and maximum temperatures for Oriental fruit fly survival:

- the lower or minimum temperature threshold:  $11.8^\circ\text{C}$
- the upper or maximum temperature threshold:  $35^\circ\text{C}$

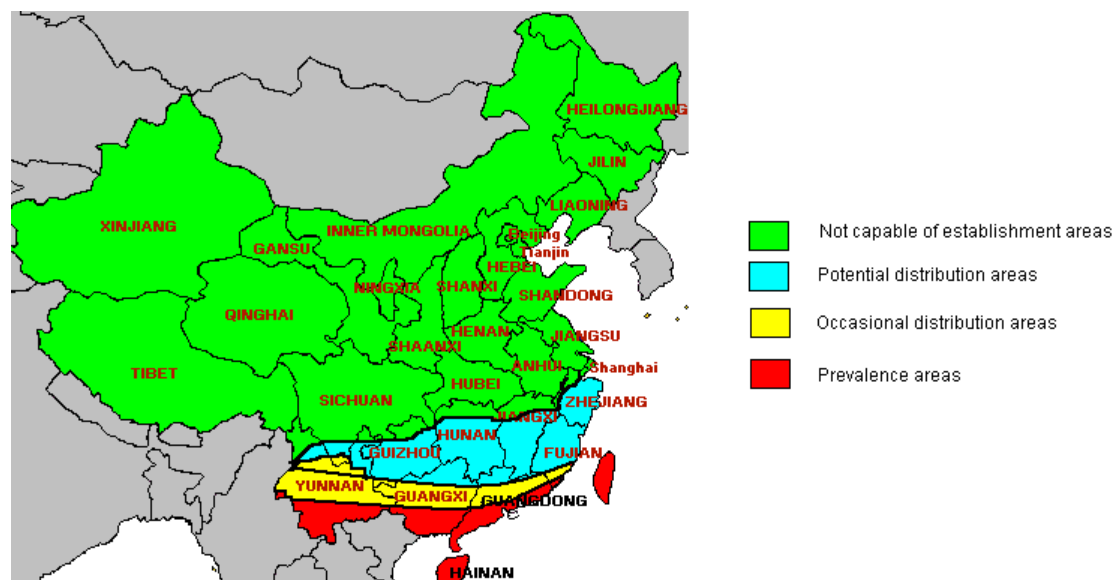


Figure 3 Distribution of Oriental fruit fly in China adapted from AQSIQ (2007)

**Climatic information** – The climatic information for China’s production areas in Hebei, Shandong and Xinjiang was provided by AQSIQ (2007).

The winter temperatures for both air and soil in Hebei, Shandong and Xinjiang (Table 1) are well below the minimum survival temperature for Oriental fruit fly. These fruit flies will not survive overwintering in production areas in these provinces and region.

**Table 1. Climatic information for the coldest month (January) in Hebei, Shandong and Xinjiang.**

Provinces or regions	Range of average air temperature (January)	Range for minimum average air temperature (January)	Range of maximum average air temperature (January)	Range of average soil temperature (January)
Hebei	-3.2°C to -2.8°C	-5.7°C to -1.1°C	-0.1°C to 7.8°C	-4.0°C to -5.2°C
Shandong	-1.0°C to 2.0°C	-4.3°C to -1.9°C	2.3°C to 6.8°C	0.9°C to 1.6°C
Xinjiang	-8.8°C to -5.2°C	-13.6°C to -10.2°C	-3.6°C to 0.7°C	-9.2°C to -6.9°C

Therefore, low winter temperatures are the main factor limiting the geographical distribution and survival of Oriental fruit fly. The northern limit for survival of Oriental fruit fly is  $30 \pm 2^\circ\text{N}$  latitude.

## The National Fruit Fly Trapping Network

The National Fruit Fly Trapping Network (NFFTN) was established in 2000 to monitor fruit flies throughout China. It conforms to international standards for fruit fly monitoring, for example International Standards for Phytosanitary Measures (ISPM) 26 *Establishment of pest free areas for fruit flies* (FAO 2006) and *Trapping Guidelines for Area-Wide Fruit Fly Programmes* (International Atomic Energy Agency 2003).

In China, there are three levels of responsibility for maintaining the NFFTN:

1. AQSIQ in Beijing is the administrative organisation that issues relevant gazettes. The Key Quarantine Fruit Fly Laboratory in Guangzhou is an executive department that is in charge of technical training and the confirmation of identifications of trapped specimens sent by China’s Entry and Exit Inspection and Quarantine (CIQ) monitoring and trapping offices in each province and/or region and supervision of these CIQs. AQSIQ and Key Quarantine Fruit Fly Laboratory make the rules and regulations and determine the number of traps to be sent to each province. This is done between April and May each year.
2. Provincial and regional CIQs monitoring and trapping offices in each province and/or region organise trapping activities in the relevant province/region. The CIQs determine where the traps are to be set up in each province/region, for example ports of entry, production areas, towns, tourist areas, areas where trash

from overseas is disposed of, and then distribute and monitor these traps. The CIQs are also in charge of provincial technical training, and confirmation of the identifications of trapped specimens forwarded by the local CIQs and supervision of the local CIQ branches.

3. The local CIQ branches implement local trapping activities (e.g. trap establishment, monitoring and servicing), undertake primary identification of any trapped specimens and summarise trap data. Trapped specimens and trap data is forwarded to the provincial/regional CIQ office for confirmation. These local CIQs consist of 5–10 staff members who are all graduates of agricultural colleges.

**Fruit fly trapping technical information** – Monitoring is based on ISPM 26 *Establishment of pest free areas for fruit flies* (FAO 2006). Cuelure (CUE), methyl eugenol (ME), trimedlure (TML) and protein baits are the lures used in the traps. McPhail traps are used for protein baits and Steiner traps for the other three lures. Each trap site has a maximum of these four lures. Generally, the monitoring sites are set at a density of one trap site per square kilometre (one trap site/km<sup>2</sup>) in the low risk areas or two trapping sites per square kilometre (two trap sites/km<sup>2</sup>) in the high risk areas (Key Quarantine Fruit Fly Laboratory 2000).

The Key Quarantine Fruit Fly Laboratory in Guangzhou audits the trapping network, but this is not done often due to staff shortages. Therefore, the provincial quarantine department, CIQ, audits its local quarantine branches.

**Quarantine fruit fly species being monitored** – These include economically significant native fruit flies (e.g. *Bactrocera dorsalis*, *B. cucurbitae*, *B. tau*, *B. correcta*, *B. minax*) and exotic fruit flies (e.g. *Anastrepha* spp., *Bactrocera* spp. *Ceratitis* spp., *Dacus* spp. and *Rhagoletis* spp).

**Monitoring and trapping seasons** – The NFFTN divides China into three specific fruit fly monitoring and trapping seasons based on the results of several recent studies (Hou and Zhang 2005; Wu 2005; Zhan *et al.* 2006) (see Table 2 and Figure 4).

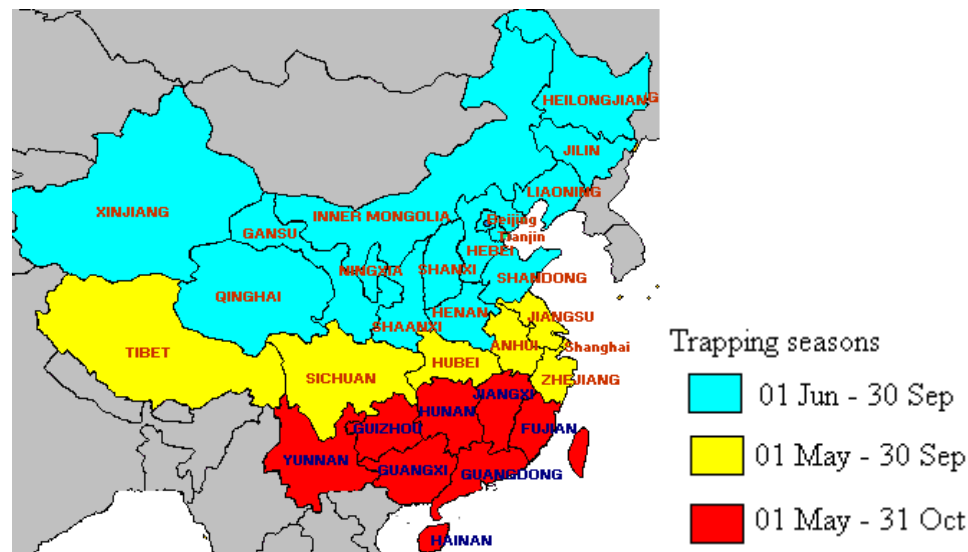
**Table 2 Fruit fly trapping seasons**

Trapping season	The provinces/regions include
TYPE 1 June 1~September 30	Liaoning, Heilongjiang, Jilin, Ningxia, Inner Mongolia, Qinghai, Beijing, Tianjin, <b>Hebei</b> , Henan, <b>Shandong</b> , Shaanxi, Shanxi, Gansu, and <b>Xinjiang</b>
TYPE 2 May 1~September 30	Jiangsu, Shanghai, Zhejiang, Ningbo, Anhui, Hubei, Sichuan, Chongqing, and Tibet
TYPE 3 May 1~October 31	Hainan, Guangxi, Guangdong, Shenzhen, Zhuhai, Fujian, Xiamen, Hunan, Jiangxi, Yunnan, and Guizhou

These monitoring and trapping seasons may be prolonged in individual provinces and regions dependent on the harvest period for fruit fly host commodities being grown in the pest free areas and the importing countries' requirements.

**Frequency of inspection** – Steiner traps with either CUE, ME or TML are inspected twice a month (15 day intervals). McPhail traps with protein baits are inspected once a week.

**Recharging of attractants** – CUE and ME are recharged monthly with 2–3 ml of lure. TML is recharged monthly with one new pellet. The protein bait is changed weekly with four new pellets and water added to the trap at every servicing.



**Figure 4 NFFTN fruit fly trapping seasons in China**

**Outbreak criteria** – If one or more suspect flies (male or female) are detected, they are sent to AQSIQ’s Key Quarantine Fruit Fly Laboratory at Guangdong Inspection and Quarantine Technology Centre in Guangzhou within 1–2 days for verification. The suspect fruit fly is identified within 1–2 days. If a quarantine fruit fly is confirmed, then a report is made to AQSIQ within one day. AQSIQ will inform the provincial CIQ that the suspect fruit fly is quarantineable and an outbreak is declared.

**Procedures in the event of fruit fly outbreaks in pest free areas** – National emergency action plans for outbreaks are put in place, including undertaking a delimiting survey by setting up additional traps. Additional traps will identify the extent of the fruit fly outbreak and will determine the site of the outbreak, the surrounding area, and the buffer area. Fruit sampling is also conducted. The measures are controlled by AQSIQ and the Ministry of Agriculture and have been developed for all types of quarantine incursions, not only fruit flies. Exports from the outbreak area are subsequently banned. In accordance with ISPM 26 *Establishment of pest free areas for fruit flies* (FAO 2006), AQSIQ is required to notify the relevant importing countries’ national plant protection agencies (e.g. Biosecurity Australia and the Australian Quarantine and Inspection Service).

**Fruit fly control measures** – Pest control measures are followed in accordance with the emergency action plan in AQSIQ’s *National Fruit Flies Trapping Guide* (NFFTN guidebook). For small scale outbreaks, fruit fly infested trees are removed if they are not economical. For large scale outbreaks, pesticides are used for eradication.

The following measures will also be used in FF-PFAs in northern China in the event of a fruit fly outbreak. In the southern provinces, these measures are used to control native fruit flies:

- pesticides are used to suppress fruit flies
- fallen fruit is removed
- the soil is treated with pesticides to control pupae
- sticky traps are set up
- bagging of fruit may be used in some areas for protection against fruit fly attack
- domestic quarantine restrictions for the movement of fruit fly host produce (see below for further details)
- cold disinfestation is also occasionally used to treat harvested fruit from outbreak areas if this fruit is to be moved from within the outbreak area. However, this fruit is usually sent for processing or consumed within the outbreak area.

**Reinstatement criteria** – freedom from fruit flies must be reconfirmed to Australian satisfaction prior to the reinstatement of fruit fly pest free area status.

## **Domestic quarantine restrictions for the movement of fruit fly host produce**

**Commercial fruit movement** – Domestic fruit movement in China is governed by a national standard (or regulation) titled ‘Plant quarantine rules transporting of agricultural plant’. The standard was approved in 1995 and is available in Chinese on the internet: <http://www.lzppq.com/uploadfile/20074217445396.pdf>. An English version is also available.

This regulation is administered by the Ministry of Agriculture of the People’s Republic of China (MoA), which is in charge of nationwide domestic plant quarantine affairs. Agricultural administrative departments in all the provinces, autonomous regions and municipalities are in charge of the regional agricultural plant quarantine affairs and supervise local plant quarantine departments to county level.

The regulation sets out the procedure for the transportation of plant seeds, nursery stock and reproductive materials as well as quarantine plants and plant products. The regulated articles include fruit fly host species, e.g. grapes, apples, pears, stonefruit and citrus, and other crop seeds and saplings. It also covers scions, rootstocks, tissue cultures, propagative material of other plants, vegetable seeds, seedlings and vegetable products of the above mentioned plants coming from the county-level administrative regions with epidemics/outbreaks.

Quarantine inspections are carried out at railway stations, cargo stations, airports, ports, warehouses and other relevant places. The inspections are performed based on the process set out in the regulations, which includes direct on the spot examination and laboratory examination.

If any plants or products are found to be carrying quarantine pests or diseases (in this case, Oriental fruit fly), the samples and specimens are kept and notification of the *Quarantine and Inspection Results for Transportation of Agricultural Plants* is issued. This notification informs the organisations or individuals to take immediate measures to treat the plants and products, such as sterilization, changing usage, limiting use, or direct destruction.

If the quarantine pests are found in the local areas, these are designated as quarantine outbreak areas, and measures including blockades and pest elimination are taken to prevent quarantine pests spreading into other areas. If the quarantine pest is already established in local areas, other areas are designated as protected areas, thus preventing the introduction of quarantine pests into the protected areas.

**Fruit movement with travellers** – The abovementioned regulation appears to cover only the commercial movement of plants and plant products. No rules can be found governing the movement of fresh fruit by travellers and there are no apparent national quarantine checks for passengers travelling domestically by air, rail, public or private road transport. People do take fruit from southern China to northern China when travelling. There is one main highway and one railway into Xinjiang and they pass through Hami in the east of Xinjiang. Xinjiang CIQ advised Australia that it undertakes quarantine checks at Hami.

However, the fact that there have been no fruit flies trapped to date in the orchard monitoring system since 1994, and in the NFFTN since 2000, provides some confidence that Oriental fruit fly has not been able to spread to and establish in these provinces through fruit movement with travellers.

## **Audit visits to the NFFTN**

In September and December 2007, Biosecurity Australia entomologists visited production areas in Hebei and Shandong provinces and the Xinjiang Uygur Autonomous Region to audit China's NFFTN. AQSIQ provided Biosecurity Australia with additional technical information during and after the visits to assist in Biosecurity Australia's assessment.

The NFFTN provides national consistency for the national fruit fly trapping and monitoring system in China. This was evident from the audit visits to Hebei, Shandong and Xinjiang in 2007, which showed that the NFFTN is maintained adequately. All NFFTN and orchard monitoring records examined showed no fruit fly detections in these three regions since trapping began in 1984 for Xinjiang, the late 1990s for Hebei and in 2000 for Shandong (see Table 3). The AQSIQ and provincial CIQ staff presenting and demonstrating the fruit fly monitoring and trapping systems in Hebei, Shandong and Xinjiang appeared to understand all the procedures for establishing, servicing, maintaining and inspecting traps based on the NFFTN guidebook.

**Table 3 Fruit fly trapping and detections**

Province/Region	2007		Total trapping results	
	Number of traps set up	Number of fruit flies detected	Trapping period	Total number of fruit flies detected
Hebei	989	0	1998–2007	0
Shandong	550	0	2000–2007	0
Xinjiang	344	0	1984–2007	0

## **Recognition of northern China’s fruit fly free areas by other countries**

AQSIQ advised Australia that Chile, the United States and the Republic of South Africa have accepted China’s pear producing northern regions as FF-PFAs (AQSIQ 2007; AQSIQ 2008). These countries accept the NFFTN and do not require additional monitoring measures in the orchards.

AQSIQ’s *National Fruit Flies Trapping Guide* is the guideline used for establishing the NFFTN in all the regions/provinces of China. It has been written in accordance with ISPM 26 *Establishment of pest free areas for fruit flies* (FAO 2006) and is consistent with *Trapping Guidelines for Area-Wide Fruit Fly Programmes* published by the International Atomic Energy Agency (2003).

Based on the assessment of data provided by AQSIQ, it can be concluded that the current exporting production areas of Xinjiang, Hebei and Shandong located in northern China are not suitable for fruit flies to survive and establish. The winter temperatures are too low for fruit flies to survive overwintering. This is supported by the fact that no fruit fly has ever been detected in any of these areas since trapping, in accordance with export protocols, was first established in horticultural areas (including pear orchards) in the 1980s for Xinjiang, late 1990s for Hebei and in 2000 for Shandong. Moreover, no fruit flies have been detected in the NFFTN in these areas since its establishment in 2000.

The trapping records, climatic information, scientific literature and audit visits provide a high level of confidence that Hebei, Xinjiang and Shandong are free of native and exotic fruit flies.

## **Recommendations**

Biosecurity Australia recommends that Xinjiang, Hebei and Shandong are recognised as pest free areas for economically significant fruit flies.

Recognition of Hebei, Shandong and Xinjiang as fruit fly pest free areas will apply to pears and any future approved fruit fly host horticultural commodities for export to Australia.

The current requirement for specific monitoring systems for fruit flies in orchards that export pears to Australia can be removed. This function is being effectively fulfilled by the NFFTN.

Recognition of Shaanxi, Henan, Shanxi and other apple production areas as fruit fly free areas will depend on the provision of information regarding fruit fly distribution, audit visits and the examination of trapping records for these areas. Shaanxi and Henan are further south than Shandong and closer to the 32°N latitude, above which AQSIQ has advised Biosecurity Australia that Oriental fruit flies cannot survive.

## **Next steps**

The next steps are:

1. Consideration of stakeholder comments on this report and finalisation of any recommendations.
2. Preparation of a document setting out the areas recognised, outbreak criteria and reporting requirements.
3. Recognition of Hebei, Shandong and Xinjiang as areas free of economically significant fruit flies.

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