



Kiwifruits “Most Unwanted”

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Introducing Erin Lane

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KVH and pest risk management



- Our next biosecurity incursion could be a known threat or something unknown
- On-orchard practice to deal with risk generically is most important (On-orchard guidelines, KiwiNet, etc.)
- However having a list allows prioritisation and communication of our most significant threats.

The KVH logo is in the top right corner of the red box. Below it, the text 'MOST UNWANTED!' is written in large, white, distressed, all-caps font.	FRUIT FLY <i>(Mediterranean, Oriental and Queensland species)</i> A photograph of a Queensland Fruit Fly next to a ruler for scale. The ruler shows markings from 0 to 10 mm. ✓ High likelihood of entry – has crossed our borders many times ✓ Production impacts for a wide range of horticultural crops ✓ Severe market access restrictions, particularly for QFF which is not present in nearly all major kiwifruit markets ✓ High risk entry period: September to June	BROWN MARMORATED STINK BUG <i>(Halyomorpha halys)</i> A photograph of a Brown Marmorated Stink Bug next to a ruler for scale. The ruler shows markings from 0 to 2 cm. ✓ High likelihood of entry as a hitchhiker on shipping containers, cars and passenger luggage ✓ Significant production impacts to many horticultural crops ✓ Extremely difficult to eradicate – early detection is essential ✓ Major nuisance pest – can impact orchards and infest your home ✓ High risk entry period: September to April
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Process summary

Organism List

- A comprehensive list of over 100 threats (pests and pathogens) to kiwifruit

Risk Matrix

- 20 of kiwifruits greatest threats are run through the Risk Matrix

Most Unwanted

- From the risk matrix, eight of kiwifruits top threats create our "Most Unwanted" list

Risk register

- Standing item on board agenda - provides updates on the Most Unwanted threats as well as any other threats

Offshore risks

- KVH maintains a register of potential biosecurity threats (pests and pathogens) to the kiwifruit industry.
- Long list with over 70 pests - publications, scientific community, international connections (ZGS), informal discussions.
- 24 pest facts sheets of those pests and diseases of specific concern to the kiwifruit industry that could impact our ability to produce or market kiwifruit.

Kiwifruit risk organisms – March 2019



Insects				
Name	Current Distribution	Damage	Industry Impact	Image
Mediterranean Fruit Fly (<i>Ceratitis capitata</i>)	Originated in tropical Africa and spread to Mediterranean area, central and south America and South West Australia. Not present in New Zealand.	- Significant damage to some crops - Production impacts to kiwifruit in Europe, especially young vines - Market access implications likely.	High	
Queensland Fruit Fly (<i>Bactrocera tryoni</i>)	Present in Australia (large populations throughout Eastern Australia), New Caledonia and Austral Islands (French Polynesia). Not present in New Zealand.	- Significant damage to crop - Market access implications likely.	High	
Oriental Fruit Fly (<i>Bactrocera dorsalis</i>)	Present mainly in Asia and South East Asia and it has been introduced to Palau, Hawaii, Nauru and Tahiti. Not present in New Zealand.	- Significant damage to crop - Market access implications likely.	High	
Brown Marmorated Stink Bug (<i>Halyomorpha halys</i>)	Native to parts of Asia (China, Japan, Myanmar, Taiwan, Vietnam, and Korea). Invader in USA and Europe. Not present in New Zealand but climate is suitable.	- Damage to fruit causing rotting of ripening fruit - Impacts to kiwifruit reported in Italy, up to 30% fruit loss on some orchards - Hitchhiker species - Highly mobile and invasive - Shelter in houses and protected areas during autumn and winter	High	
Other Species of Fruit Flies	World Wide	Potential damage to crop and market implications	High	



South American Fruit Fly (<i>Anastrepha fraterculus</i>)	The most serious fruit fly pest in tropical Americas. Distribution ranges from Texas to Argentina. Was eradicated from Chile in 1964 so no longer present in any kiwifruit production regions.	- Broad host range that includes both <i>A. chinensis</i>, <i>A. delciosa</i> but not present in kiwifruit production regions so extent of these impacts unknown. - Serious pest of guavas, mangos and citrus. - No effective lures available – would not be detected in the New Zealand surveillance system. - Not present in any major kiwifruit markets so high market access implications likely.	High	
Asian Hornet (<i>Vespa velutina</i>)	Native to Asia and widespread. Recently invading Europe since 2006 (Belgium, France, Italy, Portugal, Spain)	- Most significant impact is loss of honey bees. Single hornet can catch 25-50 bees per day, and rob brood nests to feed their own larvae. - Thought to be causing significant impacts to pollination in France and Spain but extent of damage not well quantified. - Aggressive invader, in France it invaded 120,000 km² within three years. - Can survive long distance transport and enter as a hitch hiker on a number of pathways including containers, vehicles and machinery.	High	
Spotted Lanternfly (<i>Lycorma delicatula</i>) In China referred to as "Ban yi la chan"	Native to China where it is listed as a kiwifruit pest. Present in Korea since 2004 Present in Pennsylvania since 2014, eradication attempts have so far been unsuccessful.	- Emerging biosecurity threat to many horticultural industries, including kiwifruit. - The potential impacts to kiwifruit are unclear but kiwifruit is a reported host. - Hard to control - Capable of flying and hitchhiking on inanimate objects.	High	



Long list of threats to kiwifruit identified.



This risk matrix incorporates some criteria used by the MPI Emerging Risk System. The framework has been developed so that a consistent approach can be used for insect pests and bacterial, fungal or viral pathogens.



“Living document” updated to reflect changes in risk profiles and levels on intervention.



Peer reviewed by MPI Risk Analysis team and Kiwifruit Biosecurity Steering Group.

Development of the risk matrix

Matrix framework



- The risk matrix was created to provide an appropriate, simple and useful way to prioritize our readiness and response planning. It helps to ensure our investment in biosecurity readiness is well targeted and clearly communicated.
- The allocation of scores for each category is still somewhat subjective and can be influenced by biosecurity measures implemented across the system.

Table 1: Description of the risk matrix framework

Category	Score considers:	Maximum Score
Likelihood of entry*	• Global distribution and do we trade with these countries • Pathways that could potentially result in entry • Level of border and post-border interceptions	1
Likelihood of establishment**	• Organism's ability to colonise other countries • Suitability of the New Zealand climate • Likelihood of the organism finding a host post-border • Ability to establish effective trapping or surveillance system • Ability to spread and potential extent of spread	1
Impact to Production	• Known production impacts offshore • Likely production impacts in New Zealand • Ability to control if established	10
Impact to Trade	• Likely market access implications	10
RISK SCORE	(Entry x Trade Impact) + (Establishment x Production Impact)	20

* the entry of one or more individuals.

** this refers to the establishment of a population for longer than a year.

Updated risk matrix

- **Spotted Lanternfly** is a new addition to the matrix. Increasingly invasive and thought to be bigger threat than BMSB in USA.
- **South American FF** also another new addition. Non lure responsive fruit fly with major market access implications.
- **Spotted Wing Drosophila** out as kiwifruit thought not to be a host. Found in all kiwifruit growing areas and no reports of impacts to kiwifruit.
- Separated out the fruit flies based on different risks

Rank	Name	Type of organism	Total
1	Queensland Fruit Fly	Lure responsive fly	8.4
2	Mediterranean fruit fly	Lure responsive fly	5.5
3	Oriental Fruit Fly	Lure responsive fly	5.2
4	Brazilian Wilt	Soil borne fungi	4.9
5	Brown Marmorated Stink Bug	Sap sucking insect	4.6
6	Spotted Lanternfly	Sap sucking insect	4.5
7	Psa non-NZ biovars	bacteria	4.4
8	South American Fruit Fly	Non-lure responsive fly	3.5
= 9	White Peach Scale	Scale	3.3
= 9	Verticillium Wilt	Soil borne fungi	3.3
= 9	<i>Phytophthora dreschleri</i>	Fungal-like organism	3.3
12	Yellow Spotted Stink Bug	Sap sucking insect	2.8
13	Summer Canker	bacteria	2.7
= 14	Yellow Peach Grub	Moth	2.6
= 14	Fruit Piercing Moth	Moth	2.6
=16	Asian Hornet	Winged Insect	2.1
=16	Esca Disease	Soil borne fungi	2.1
18	<i>Phytophythium helicoides</i>	Fungal-like organism	2
19	Spotted Wing Drosophila	Fly	1.4
20	Pelargonium zonate spot virus	Virus	1

Rank	Name
1	Fruit Flies E.g. Queensland, Oriental, Mediterranean, South American
2	Brazilian Wilt
3	Brown Marmorated Stink Bug
4	Spotted Lanternfly
5	Psa non-NZ biovars (<i>Pseudomonas syringae actinidiae</i>)
6	White Peach Scale
7	Verticillium Wilt
8	Invasive Phytophthoras



“Kiwifruits Most Unwanted”

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KIWIFRUIT HEALTH

E.g. Spotted Lanternfly



Spotted Lantern Fly			
Likelihood of entry	Items likely to be associated with	Hitchhiker pest- inanimate pathway with concentration on vehicles and machinery.	0.3
	Where does it occur?	Native to parts of Asia, spread to Korea and Japan and is now invasive in the USA	
	Are the items that it is likely to be associated with currently traded or likely to be traded?	Lays its eggs on smooth vertical surfaces so containers, vehicles and equipment could be considered high risk.	
	Do we know of any border or post-border detections?	No recorded post border interceptions	
	Is it associated with countries we are trading with?	Yes	
Likelihood for establishment	Demonstrated ability to colonise?	In Korea, it spread across the whole country in under 2 years. Invasive in US since 2014 and quickly spread throughout the state of Pennsylvania.	0.7
	Exposure assessment - once post-border how likely is the organism to find suitable hosts?	Over 70 hosts reported. Tree of heaven is preferred host and is present in NZ but not widespread.	
	Is NZ climate considered favourable?	Yes- more suitable in the warmer North Island climate.	
	Can an effective trapping system be implemented to reduce risk of establishment?	No, there are currently no known pheromone aggregation traps for SLF. Currently method is visual monitoring and sticky traps	
	Spread assessment – how likely and to what extent could it spread?	Not a strong flier but thought to easily make its way around through movement of egg masses on vehicles, outdoor furniture etc.	
Production Impact	Are there known production impacts on kiwifruit industries internationally?	Reported as a pest of kiwifruit in China.	6/10
	Likely production impacts?	Yes, main impacts centre around the sooty mould growth on the excretions of the SLF.	
	Do we have the tools to manage if it arrived in or detected in NZ?	No.	
Trade Impact	Degree of market access implications if established?	Likely to be low or non-existent as markets consider fresh produce a low risk pathway	1/10
Risk Score (Entry x Trade Impact) + (Establishment x Production Impact)			4.5



