



Risk Management Proposal:

Import requirements for *Cucurbitaceae* seeds.

FOR PUBLIC CONSULTATION

April 2016

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Submissions

The Ministry for Primary Industries (MPI) invites comment(s) from interested parties on the proposed additional measures for *Cucumber green mottle mosaic virus* (CGMMV) and *Kyuri green mottle mosaic virus* (KGMMV) in the import health standard (IHS) 155.02.05: *Importation of Seed for Sowing*. The proposed measures are supported by this risk management proposal (RMP).

An IHS “specifies requirements to be met for the effective management of risks associated with importing risk goods, including risks arising because importing the goods involves or might involve an incidentally imported new organism” (section 22(1) Biosecurity Act 1993).

If you disagree with the measures proposed to manage the risks, please provide either data or published references to support your comments. This will enable MPI to consider additional evidence which may change how risks are proposed to be managed.

The following points may be of assistance in preparing comments:

- wherever possible, comments should be specific to a particular change in IHS requirements or a question asked in this document (referencing section numbers or commodity names as applicable);
- where possible, reasons, data and supporting published references to support comments are requested;
- the use of examples to illustrate particular points is encouraged.

The changes proposed in this risk management proposal are intended to update the IHS to ensure measures aimed at minimising the importation of viral contaminated seed for sowing are maintained in response to changing global distribution and trade.

MPI encourages respondents to forward comments electronically. Please include the following in your submission:

- the title of the consultation document in the subject line of your email;
- your name and title (if applicable);
- your organisation’s name (if applicable); and
- your address.

Send submissions to: plantimports@mpi.govt.nz.

However, should you wish to forward submissions in writing, please send them to the following address to arrive by close of business on **10 May 2016**.

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New Zealand

Submissions received by the closure date will be considered during the development of the final IHS. Submissions received after the closure date may be held on file for consideration when the issued IHS is next revised/reviewed.

Official Information Act 1982

Please note that your submission is public information and it is MPI policy to publish submissions and the review of submissions on the MPI website. Submissions may also be the subject of requests for information under the Official Information Act 1982 (OIA). The OIA specifies that information is to be made available to requesters unless there are sufficient grounds for withholding it, as set out in the OIA. Submitters may wish to indicate grounds for withholding specific information contained in their submission, such as the information is commercially sensitive or they wish personal information to be withheld. Any decision to withhold information requested under the OIA is reviewable by the Ombudsman.

Purpose

1. The purpose of this document is to:
 - a) review the emergency management measures for *Cucumber green mottle mosaic virus* (CGMMV) on *Cucurbitaceae* seeds for sowing from all countries;
 - b) provide information about the CGMMV and *Kyuri green mottle mosaic virus* (KGMMV) associated with and transmitted through *Cucurbitaceae* seeds;
 - c) propose phytosanitary measures which can effectively manage the risk of entry and establishment of CGMMV and KGMMV;
 - d) Establish the feasibility and practicality of implementation of the proposed measures.

Scope

2. This document provides the rationale for the proposed measures for the seed transmitted viruses CGMMV and KGMMV associated with imported *Cucurbitaceae* seeds for sowing from all countries. It includes:
 - a summary of risk posed to New Zealand by the viruses
 - an assessment of the risk management options considered for the viruses.

Background

3. MPI introduced emergency measures for CGMMV on 1 December 2014 to manage the risk of this virus in imported cucurbit seeds.
4. MPI previously considered the risk from CGMMV in USA melons in 2013 (PP 13-247) and Canadian cucumbers (PP 14-159) in early 2014, and a review of the Import Health Standard (IHS) 155.02.05: *Importation of Seeds for Sowing* was recommended.
5. MPI's emerging risk system received a notification of a possible first record of CGMMV infecting watermelons in Australia in September 2014 and the Australian Department of Agriculture (DoA) subsequently advised MPI of the closure of the Northern Territory export pathway for these goods. Pumpkins have also been confirmed as host to this virus and new quarantine areas have been imposed on growers in the Northern Territory.

6. MPI identified that the import requirements for *Cucurbitaceae* seeds did not manage the risk to New Zealand posed by this virus, and as the virus appeared to be spreading fairly quickly, an urgent change to the IHS to require seed testing was recommended. The emergency measures for CGMMV were implemented on 1st December 2014.
7. On watermelon fruits, viral infection caused by CGMMV causes the pink/red flesh part of the fruit and its outer perimeter to change to a yellowing type of colour. Some fruits may develop internal cavities with areas that become prematurely soft and mushy. The exterior part of the fruit can appear malformed. Splitting of pumpkin shells has also been recorded as a result of CGMMV infection (Biosecurity Queensland 2015). In *Cucumis melo* (muskmelons), KGMMV has been reported to cause mosaic and leaf deformation, followed by fruit deformation
8. CGMMV was the first tobamovirus described infecting *Cucurbitaceae* species (Ainsworth, 1935; Hollings *et al.*, 1975). Since then a number of different strains of this virus have been recorded. Two former CGMMV strains have been re-classified and are now described as a different species, *Kyuri green mottle mosaic virus* (Francki *et al.* 1986).
9. CGMMV was first reported in the UK. Countries where CGMMV has been recorded are: China, Israel, Georgia, Iran, Lebanon, Myanmar, Sri Lanka, Turkey, Austria, Bulgaria, Germany, Holland, Hungary, Latvia, Lithuania, Romania, UK, Greece, Japan, India, Korea, Netherlands, Pakistan, Poland, Russia, Saudi Arabia, Spain, Taiwan, Ukraine, Sweden, Denmark, Syria, Finland, and Norway (Mandal *et al.*, 2008; CABI, 2014; Nontajak *et al.*, 2014). Recently new sites for this virus have been recorded in Canada and USA (2013), Australia and Thailand (2014) (Baker, 2013, Ling *et al.*, 2014, DPIF, Northern Territory, 2014; Nontajak *et al.*, 2014).
10. Weeds have also been identified as hosts for CGMMV. DAS-ELISA tests on different weed species present among watermelon infected plants revealed the presence of CGMMV in six plant species from five plant families: *Amaranthus retroflexus* (Amaranthaceae), *A. blitoides* (Amaranthaceae), *Heliotropium europaeum* (Boraginaceae), *Chenopodium album* (Chenopodiaceae), *Portulaca oleracea* (Portulacaceae) and *Solanum nigrum* (Solanaceae). None of the infected weed species tested showed any visible symptoms which could be attributed to a viral infection (Boubourakas *et al.*, 2004). CGMMV was detected in the following arable weeds at the recent outbreak in the Northern Territory, Australia, inside the quarantine farms and outside: *Amaranthus sp.*, *Solanum nigrum* (nightshade), *Portulaca sp.*, *Citrullus lanatus* var. *lanatus* (bitter melon, pie melon or wild melon) and *Cucumis sp.* All arable weed species detected in the Northern Territory were symptomless (Dr Tran-Nguyen, Darwin, NT, pers. comm.2015).
11. In *Prunus armeniaca* (apricot), CGMMV causes apricot bare twig and unfruitfulness disease syndrome only when co-infected with *Strawberry latent ringspot virus* (SLRSV) (Cech *et al.*, 1980; Blattny and Janecrova, 1980). SLRSV is reported to be present in New Zealand infecting a wide range of hosts (Tang *et al.*, 2013). When apricot is infected with both viruses, no fruits are formed and the short lateral fruit branches start to appear dry, dead and eventually fall off (die-back), no fruit or seed is produced. This decreases the likelihood of this disease being introduced to New Zealand from *Prunus armeniaca* via the seed pathway.
12. KGMMV current geographic distribution is limited to Japan (Inoue *et al.*, 1967), Korea and Indonesia (Lee *et al.*, 2000; Daryono *et al.*, 2005).

13. MPI has considered the risk of KGMMV entering New Zealand in consignments of Cucurbitaceae seeds coming from Japan and Korea and has included consideration of this virus in this Risk Management Proposal.

COMMODITY DESCRIPTION

14. New Zealand imports *Cucurbitaceae* seeds from a range of different countries. MPI's records from Quancargo (accessed 03/06/2015) show that in the last five years Cucurbitaceae seeds have been imported from 27 countries, across four continents: Argentina, **Austria**, **Australia**, Chile, **China**, Czech Republic, France, **India**, **Germany**, Guatemala, **Israel**, Italy, **Latvia**, *Japan*, Mexico, Peru, **Spain**, **Taiwan**, **Thailand**, Tanzania, Turkey, **United Kingdom**, **The Netherlands**, **USA**, *Korea*, Vietnam and South Africa. The exporting countries in bold have CGMMV. The exporting countries in italics have KGMMV. Of the countries that New Zealand imports *Cucurbitaceae* seeds from, 55% have either CGMMV or KGMMV.
15. *Cucurbitaceae* is a flowering plant family normally referred to as the gourd family. Its taxonomic classification is: Order: Cucurbitales; Family: *Cucurbitaceae* Juss. Around 118 genera are described as part of this family with 845 different species recorded as being used for food and ornamental purposes.
16. The following *Cucurbitaceae* species are eligible for import into New Zealand as seeds and are currently regulated for CGMMV:
- *Benincasa hispida* – wax gourd, winter melon
 - *Citrullus lanatus* – watermelon, wild melon
 - *Cucumis anguria* – burr cucumber, west India gherkin, gherkin
 - *Cucumis melo* – melon, cantaloupe, muskmelon, oriental melon
 - *Cucumis metuliferus* – african horned cucumber, African horned melon
 - *Cucumis myriocarpus* – gooseberry cucumber, gooseberry gourd
 - *Cucumis sativus* – garden cucumber, cucumber
 - *Cucurbita moschata* – winter squash, canada pumpkin, pumpkin
 - *Cucurbita pepo* – field pumpkin, vegetable marrow, squash, kamokamo, courgette, zucchini
 - *Cucurbita ficifolia* – seven year melon, figleaf gourd, pie melon
 - *Cucurbita maxima* – winter squash, great pumpkin, buttercup squash
 - *Cucurbita mixta* (syn. *Cucurbita argyrosperma*) – calabaza, mixta squash, winter squash
 - *Lagenaria siceraria* – bottle gourd, calabash,
 - *Luffa acutangula* – angled loofah, silk melon, ridged gourd, Chinese okra
 - *Luffa aegyptiaca* (syn. *Luffa cylindrica*) - smooth loofah, dish cloth gourd
 - *Momordica charantia* – bitter melon

TRADE VALUE

17. Squash varieties are planted in Gisborne, Hawke's Bay and Manawatu/Wanganui areas mainly because of fertile soils, combined with hot summer days and cool nights. The harvest period is from January to April.
18. According to FreshFacts (2014) the New Zealand squash industry in 2014 had a total planted area of 5,783 ha and a total crop volume of 72,235 tonnes. Squash export sales

was \$45.9 million fob (Free On Board) to Japan and domestic \$2.9 million fob. Pumpkin has a higher number of growers (98) than squash (34), but a smaller planted area of around 1,048 ha. In 2014, the total crop volume for pumpkin was 38,000 tonnes (no record is shown for export/domestic values).

19. Melons and other types of cucurbits are the third and fourth most important *Cucurbitaceae* crops in New Zealand. In 2014, melons had a total planted area of 273 ha producing 4800 tonnes, generating \$0.8 million fob as a fresh produce for export. All other cucurbits are grown on an estimated area of 50 ha with a crop volume of 1,770 tonnes.

SOURCE INFORMATION

20. The following information was used to assess the risk of CGMMV and KGMMV and the appropriate measures to manage its entry and establishment in New Zealand:
 - MPI Emerging Risk System (ERS) rapid assessment for melons, cucumber in USA: 2013
 - MPI Emerging Risk System (ERS) rapid assessment for cucumber in Canada: 2014
 - MPI Emerging Risk System (ERS) rapid assessment for watermelon in Australia: 2014
 - Relevant literature and database searches.
 - Information provided by international trading partners.
 - Stakeholder discussions during the development of this RMP.

INTERNATIONAL OBLIGATIONS

21. Where possible, phytosanitary measures are aligned with international standards, International Plant Protection Convention guidelines, and recommendations as per New Zealand's obligations under Article 3.1 of the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), WTO (1995) (http://www.wto.org/english/tratop_e/sps_e/spsagr_e.htm) and section 23(4)(c) of the Biosecurity Act 1993.
22. The SPS Agreement states that phytosanitary measures must not discriminate unfairly between countries or between imported or domestically produced goods, and where there is a choice of phytosanitary measures to reduce risk to an acceptable level, WTO members must select the least trade restrictive measure.
23. Emergency measures are temporary in their application (ISPM 13: *Guidelines for the notification of non-compliance and emergency action*, 2001). As a contracting party to the SPS Agreement and the International Plant Protection Convention (IPPC), MPI, as New Zealand's National Plant Protection Organisation (NPPO), undertakes to ensure that modifications (amendments) to phytosanitary measures are made promptly as a result of new or updated scientific information (Article VII.2(h), IPPC 1997; ISPM 1: *Phytosanitary principles for the protection of plants and the application of phytosanitary measures in international trade*, 2006) while taking into account domestic legislation (Biosecurity Act 1993, Section 24B(1)(a)).

Objective

24. To ensure the biosecurity risks associated with the import of *Cucurbitaceae* seeds are managed appropriately and are consistent with New Zealand's domestic legislation and international obligations.

Summary of Risk

25. Risk organisms are regulated on the commodity if:
- a) they are present in the exporting country and absent from New Zealand (or present but under official control);
 - b) they are likely to be present on the pathway if risk was unmitigated;
 - c) they are known to be associated with the commodity (as per previous risk analyses);
 - d) their hosts include species present in New Zealand;
 - e) they are climatically able to establish in New Zealand;
 - f) they are likely to cause adverse economic or environmental impacts to New Zealand
26. A summarised risk assessment can be found in Table 1 for CGMMV and Table 2 for KGMMV. In addition, further details about the assessment of risk are in the next section.
27. A Risk Assessment was completed and *Cucumber green mottle mosaic virus* was assessed as a hazard to New Zealand on the seeds for sowing import pathway because:
- It has a wide host range, demonstrated by hosts in 6 plant families (*Cucurbitaceae*, *Amaranthaceae*, *Boraginaceae*, *Chenopodiaceae*, *Portulacaceae*, *Rosaceae* and *Solanaceae*) and from 7 genera (*Benincasa*, *Citrullus*, *Cucumis*, *Cucurbita*, *Lagenaria*, *Luffa*, *Momordica*, *Portulaca* and *Prunus*) within the *Cucurbitaceae* family;
 - is associated with seeds of some *Cucurbitaceae* species, and has characteristics that give it high potential to be associated with the seeds of other species;
 - is known to be present in 15 of the countries that export *Cucurbitaceae* seeds to New Zealand;
 - is not recorded from NZ;
 - hosts of CGMMV are grown in New Zealand, so CGMMV can potentially establish in New Zealand;
 - CGMMV causes diseases in its host plants, so it can potentially cause unwanted impacts.
28. CGMMV is therefore considered a hazard on seeds for sowing of the following species: *Benincasa hispida*, *Citrullus lanatus*, *Cucumis anguria*, *Cucumis melo*, *Cucumis metulliferus*, *Cucumis myriocarpus*, *Cucumis sativus*, *Cucurbita moschata*, *Cucurbita pepo*, *Cucurbita ficifolia*, *Cucurbita maxima*, *Cucurbita mixta*, *Lagenaria siceraria*, *Luffa acutangula*, *Luffa aegyptiaca*, *Momordica charantia*, *Portulaca oleraceae* and *Prunus* in this RMP.
29. A Risk Assessment was completed and *Kyuri green mottle mosaic virus* was assessed as a hazard to New Zealand on the seeds for sowing import pathway because:

- is associated with seeds of four different cucurbitaceae species (*Citrullus lanatus*, *Cucurbita moschata*, *Cucurbita pepo*, *Lagenaria siceraria*), and based on similarities with CGMMV in viral-particle stability, there is a high potential for seed association in other species;
 - is known to be present in two countries that export Cucurbitaceae seeds to New Zealand (Japan & Korea);
 - is not recorded from NZ;
 - hosts of KGMMV are grown in New Zealand, so KGMMV can potentially establish in New Zealand;
 - KGMMV causes diseases in its host plants, so it can potentially cause unwanted impacts.
30. KGMMV is therefore considered a hazard on seeds for sowing of the following species: *Benincasa hispida*, *Citrullus lanatus*, *Cucumis anguria*, *Cucumis melo*, *Cucumis metuliferus*, *Cucumis myriocarpus*, *Cucumis sativus*, *Cucurbita moschata*, *Cucurbita pepo*, *Cucurbita ficifolia*, *Cucurbita maxima*, *Cucurbita mixta*, *Lagenaria siceraria*, *Luffa acutangula*, *Luffa aegyptiaca*, *Momordica charantia* in this RMP.
31. The potential host range of CGMMV within the Cucurbitaceae family is likely to be wider than is currently known, given that:
- a) the existence of natural host records from 6 plant families and 7 genera within the Cucurbitaceae family demonstrates that the virus is not specific and that plant susceptibility is not limited to just one genus or even one plant family;
 - b) it is expected that not all natural occurrences of CGMMV and seed transmission are reported and so there are naturally gaps in the evidence;
32. On this basis it is reasonable to assume that the cultivated cucurbitaceae species covered by this RMP that lack natural host records, (i.e. *Cucurbita mixta*; *Cucurbita maxima*, *Cucumis metuliferus*, *Cucumis myriocarpus* and *Cucurbita ficifolia*) are also biologically capable of being susceptible hosts of CGMMV.
33. The potential host range of KGMMV within the Cucurbitaceae family is likely to be wider than is currently known, given that:
- a) the existence of natural hosts of KGMMV from 5 genera within the Cucurbitaceae family (rather than just one genus) demonstrates that the virus is not specific and that plant susceptibility is not limited to just one genus;
 - b) it is expected that not all natural occurrences of KGMMV are reported and so there are naturally gaps in the evidence; and
 - c) KGMMV biology is similar to CGMMV (i.e. able to infect similar hosts; highly stable viral particles, so it is assumed that when KGMMV has the opportunity to be naturally exposed to other Cucurbitaceae species, the natural host range can expand.

Table 1. Summary of Risk Assessment of CGMMV in *Cucurbitaceae* hosts on seed imported for sowing.

Pathogen	Commodity Description (Seeds for sowing)			NZ Status of CGMMV	Likelihood of entry & establishment via seed for sowing	Consequences of CGMMV Introduction		Additional notes
	Hosts	Common name	References			Economic Impacts	Trade Impacts	
Cucumber green mottle mosaic virus (CGMMV)	<i>Benincasa hispida</i>	wax gourd; winter melon	Noda <i>et al.</i> , 1993	Not known to occur in NZ Regulated in NZ	The likelihood of entry of CGMMV is high (with high uncertainty for some cucurbitaceae taxa). The likelihood of exposure is high. The likelihood of establishment and spread is considered to be high.	The potential economic impact to the New Zealand economy is moderate and high for the Cucurbitaceae industry.	Export of fresh squash, pumpkin and possibly other <i>Cucurbitaceae</i> species.	Regulated in Australia. Non- eradicable and under management in the Northern Territory. Regulated as a transient, actionable, and under eradication pest in the USA
	<i>Citrullus lanatus</i>	watermelon; wild melon	Hollings <i>et al.</i> , 1975; Lee <i>et al.</i> , 1990, DPIF, Northern Territory, 2014					
	<i>Cucurbita ficifolia</i>	seven year melon; figleaf gourd	Avgelis and Vovlas, 1986 (experimental host)					
	<i>Cucurbita maxima</i>	winter squash; buttercup squash	BICON 2016					
	<i>Cucurbita pepo</i>	courgette; zucchini	Al-Tamimi <i>et al.</i> , 2009; Ali <i>et al.</i> , 2014					
	<i>Cucurbita mixta</i> (syn. <i>Cucurbita argyrosperma</i>)	calabaza; mixta squash	no studies have been performed in this species					
	<i>Cucurbita moschata</i>	pumpkin; canada pumpkin	Zhang <i>et al.</i> , 2009; Ali <i>et al.</i> , 2014; DPIF, Northern Territory, 2014					
	<i>Cucumis anguria</i>	burr cucumber; west indian gherkin	Mandal <i>et al.</i> , 2008, CABI, 2014,					
	<i>Cucumis metuliferus</i>	african horned cucumber; african horned melon	Rajamony <i>et al.</i> , 1987 (experimental host)					
	<i>Cucumis myriocarpus</i>	gooseberry cucumber; gooseberry gourd	no studies have been performed in this species					
	<i>Cucumis melo</i>	melon; muskmelon	Reingold <i>et al.</i> , 2014; Tian <i>et al.</i> , 2014					
	<i>Cucumis sativus</i>	garden cucumber; cucumber	Ling <i>et al.</i> , 2014; Moradi and Jafarpour, 2011; Hollings <i>et al.</i> , 1975					
	<i>Lagenaria siceraria</i>	bottle gourd; calabash	Al-Shahwan <i>et al.</i> , 1992, Hollings <i>et al.</i> , 1975; Ali <i>et al.</i> , 2014					
	<i>Luffa acutangula</i>	angled loofah; ridged gourd	Sharma <i>et al.</i> , 2014; Ali <i>et al.</i> , 2014,					
	<i>Luffa aegyptiaca</i> (syn. <i>L.</i> <i>cylindrica</i>)	smooth loofah; dish cloth gourd	Noda <i>et al.</i> , 1993					
	<i>Momordica charantia</i>	bitter melon; bitter gourd	Sandeep and Joshi, 1989; Noda <i>et al.</i> , 1993; CABI, 2014					
	<i>Portulaca oleraceae</i>	common purslane	Boubourakas <i>et al.</i> , 2004; DPIF, Northern Territory, 2015					
	<i>Prunus armeniaca</i>	apricot	Cech <i>et al.</i> , 1980					

Table 2. Summary of Risk Assessment of KGMMV in *Cucurbitaceae* hosts.

Pathogen	Commodity Description (Seed for sowing)			NZ Status	Likelihood of entry & establishment via seed for sowing	Consequences of KGMMV Introduction		Additional notes
	Host/s	Common name	References			Economic Impacts	Trade Impacts	
Kyuri green mottle mosaic virus (KGMMV)	<i>Benincasa hispida</i>	wax gourd; winter melon	no studies have been performed in this species	Not known to occur in NZ	The likelihood of entry of CGMMV is high (with high uncertainty for some cucurbitaceae taxa). The likelihood of exposure is high. The likelihood of establishment and spread is considered to be high.	The potential economic impact to the New Zealand economy is moderate and high for the Cucurbitaceae industry.	Export of fresh squash, pumpkin and possibly other <i>Cucurbitaceae</i> species.	Regulated in Taiwan
	<i>Citrullus lanatus</i>	watermelon; wild melon	Kwon <i>et al.</i> , 2014					
	<i>Cucumis anguria</i>	burr cucumber; west indian gherkin	no studies have been performed in this species					
	<i>Cucurbita ficifolia</i>	seven year melon; figleaf gourd	no studies have been performed in this species					
	<i>Cucurbita maxima</i>	winter squash; buttercup squash	Daryono <i>et al.</i> , 2006 (experimental host)					
	<i>Cucurbita pepo</i>	courgette; zucchini	Lee <i>et al.</i> , 2000; Daryono and Natsuaki, 2012; Daryono <i>et al.</i> , 2006					
	<i>Cucurbita mixta</i> (syn. <i>Cucurbita argyrosperma</i>)	calabaza; mixta squash	no studies have been performed in this species					
	<i>Cucurbita moschata</i>	pumpkin; canada pumpkin	Tan <i>et al.</i> , 2000; Lee <i>et al.</i> , 2010 (experimental host)					
	<i>Cucumis metuliferus</i>	african horned cucumber; african horned melon	Daryono and Natsuaki, 2012					
	<i>Cucumis myriocarpus</i>	gooseberry cucumber; gooseberry gourd	no studies have been performed in this species					
	<i>Cucumis melo</i>	melon; muskmelon	Kim <i>et al.</i> , 2009					
	<i>Cucumis sativus</i>	garden cucumber; cucumber	Inoue <i>et al.</i> , 1967; Tan <i>et al.</i> , 2000; Fukuta <i>et al.</i> , 2012					
	<i>Lagenaria siceraria</i>	bottle gourd; calabash	Daryono <i>et al.</i> , 2006; Lee <i>et al.</i> , 2010					
	<i>Luffa acutangula</i>	angled loofah; ridged gourd	Daryono <i>et al.</i> , 2005					
	<i>Luffa aegyptiaca</i> (syn. <i>L. cylindrica</i>)	smooth loofah; dish cloth gourd	Daryono <i>et al.</i> , 2006; Tan <i>et al.</i> , 2000 (experimental host)					
	<i>Momordica charantia</i>	bitter melon; bitter gourd	no studies have been performed in this species					

LIKELIHOOD OF ENTRY INTO NEW ZEALAND

34. CGMMV and KGMMV are not known to occur in New Zealand. Strains of both viruses occur in Cucurbitaceae crops in countries e.g. Japan¹ and Australia², from where New Zealand currently imports Cucurbitaceae seeds. Therefore, there is potential for both viruses and different strains of each virus to enter New Zealand. CGMMV and KGMMV are considered to be biologically capable of being associated with seeds of the commodity species.
35. CGMMV is able to remain infective in the seed coat where during germination it will go on to infect the seedling (Sastry, 2013). Infected seeds enable the virus to move between countries and/or areas further favouring its dissemination and establishment.
36. The viruses occur systemically in infected plants, in the fruit tissues where seeds are located and also on the seed coat (testa and endopleura). Given the very high stability of the virus-particles, contaminated seeds will have viable virus for a considerable time. Records by Sastry (2013) have shown that CGMMV viral particles on the seed coat of *Cucumis sativus* remained viable for three years.
37. Direct evidence of the biological association of CGMMV with seeds includes: a) records of it in seeds of *Cucurbita pepo* (zucchini) (Al-Tamimi *et al.* 2009; Kwon *et al.* 2014); and b) evidence of seed transmission in *Cucumis sativus* (cucumber), *Citrullus lanatus* (watermelon), *Lagenaria siceraria* (bottle gourd), and *Cucumis melo* (muskmelon).
38. Apricot stones can currently be imported under the *Prunus* schedule of the Seed for Sowing IHS, with a period of post-entry quarantine to observe for symptoms and test for the major regulated viruses. When apricot is infected with SLRSV and CGMMV, no fruit is formed, reducing considerably the risk of this disease been introduced to New Zealand via this pathway.
39. Apricot can also be imported as nursery stock and may be a possible pathway for the introduction of CGMMV, via infected rootstocks or plant material. Existing measures, including import into Level 3 Post-Entry Quarantine for growing season inspections, are adequate to manage the risk. Herbaceous indexing on *Cucumis sativus* and *Chenopodium quinoa* indicators are completed for all *Prunus* imports of seed and nursery stock which is likely to detect this disease.
40. Direct evidence of seed transmission in *Cucurbita pepo* (zucchini) was found for KGMMV in Korea (Lee *et al.*, 2000). This evidence together with the fact that the biology and viral-particle stability of KGMMV is similar to CGMMV (Daryono *et al.*, 2005 and Daryono *et al.*, 2006) it is assumed in this risk assessment that seed-transmission also occurs in other susceptible hosts of KGMMV.
41. The likelihood of entry of CGMMV and KGMMV via the Cucurbitaceae seed pathway is considered to be high.

¹ Quancargo Data from 2011 to July 2014 show that around 54.6Tonnes of Cucurbitaceae seeds from Japan have been imported into New Zealand. The main species being *Cucurbita maxima*, a host for both viruses.

² Quancargo Data from 2011 to July 2014 show that around 7.316Tonnes of Cucurbitaceae seeds from Australia have been imported into New Zealand. The main species are *Cucurbita pepo*, *Cucumis melo* and *Citullus lanatus*, hosts for both viruses.

EXPOSURE ASSESSMENT

42. CGMMV and KGMMV are not transmitted by a vector, either an insect or fungus. They are transmitted via seed (seed-borne) and mechanically (infected plant material/sap on tools, soil, water, machinery, clothes and human hands) (Daryono *et al.*, 2006; Mandal *et al.*, 2008; Kubota *et al.*, 2009; Daryono and Natsuaki, 2012; Baker, 2013, Nontajak *et al.*, 2014).
43. The stability of its viral particles allows this virus to be persistent in the soil (Fukuta *et al.*, 2012). Due to its viral particle stability CGMMV can maintain viability for a long period of time on contaminated seeds, clothes, farm tools, soil and in water (Mandal *et al.*, 2008; Baker, 2013; DPIF, Northern Territory, 2014; Nontajak *et al.*, 2014).
44. The location of the viral particles within the seed will determine the transmissibility of the virus from the seed to the seedling. Members of the genus Tobamovirus, CGMMV and KGMMV included, are one of a few cases where the virus does survive outside the embryo due to its highly stable particles. The virus can be transmitted from the seed to the seedling during germination through very small abrasions (Liu *et al.*, 2014).
45. This transmission mechanism provides the means by which the virus becomes exposed to a new host plant in New Zealand, i.e. the new seedling is the new host.
46. Percentage of seed to seedling transmission of CGMMV has been determined for cucumber (between 3-17%), for watermelon (5%), bottle gourd (2%), muskmelon (2.83%) and melon (1%). CGMMV can also be transmitted via pollen (51.2%). Given the very high stability of CGMMV and KGMMV viral particles, it is assumed that similar seed-to-seedling transmission rates would be observed in the other commodity species covered by this RMP, if investigated.
47. CGMMV and KGMMV can be easily transmitted between host plants. The virus can penetrate the leaf cuticle even when there is minimal injury to the epidermis, invading the plant cells and multiplying efficiently (APS, 2015).

LIKELIHOOD OF ESTABLISHMENT IN NEW ZEALAND

48. A virus can be considered established if there is a self-sustaining population; this occurs if the virus can be transmitted (spread) from the first infected plant to other hosts plants. There are several mechanisms by which this could happen for CGMMV & KGMMV (mechanical transmission, seed transmission, pollen transmission, soil transmission), and the series of events leading to establishment would depend on the location of the first exposure.
49. Viruses from the *Tobamovirus* genus, including CGMMV and KGMMV, are very hard to eliminate once established due to their highly stable particles and ability to survive and remain active in plant debris, soil and equipment surfaces for a long period of time (Sastry, 2013, CABI, 2014, Chang *et al.*, 2005, King *et al.*, 2012; Fukuta *et al.*, 2012).
50. Rao and Varma in 1984 showed that under experimental conditions the transmission rate of CGMMV in bottle gourd was 18% using soil mixed with infected plant debris. The virus remained viable for 10 months in the soil (Mandal *et al.*, 2008). CGMMV can also be disseminated through contaminated water as found in India and the Netherlands (Mandal *et al.*, 2008; Sastry, 2013).

51. Given that CGMMV and KGMMV can be transmitted through seed and CGMMV can also be transmitted via pollen, both methods of transmission are very important for the establishment and spread of both viruses in New Zealand (Liu *et al.*, 2014). Infected seeds do play a key role on the epidemiology of the disease as it can act as the primary source of inoculum providing a starting point of the disease in a new locality (Sastry, 2013, Liu *et al.*, 2014, Nontajak *et al.*, 2014, Reingold *et al.*, 2015). Once a crop is exposed to CGMMV and KGMMV via infected seed, the secondary spread of both viruses will be done by mechanical transmission through contact between infected plant material, cutting knives, pruning tools, machineries, clothing and shoes used by growers (Mandal *et al.*, 2008). Infected seedlings, people, water and soil are the most likely pathways for short distance spread (Sundheim *et al.*, 2008).
52. An establishment of CGMMV in watermelon, butternut pumpkin, zucchini and melon crops have the potential to spread throughout the crops via pollen, and mechanical transmission caused by crop handling. It is also likely to spread to other cucurbitaceae crops, e.g. buttercup squash (*Cucurbita maxima*) in the district via contaminated equipment used by contractors working in the crops.
53. If the virus infects a weedy species, the virus may be spread further afield by dispersal of weed seeds contaminated with virus. Those seeds may become infected with the virus as a result of the seed-to-seedling transmission mechanism. Infected seeds do play a key role on the epidemiology of the disease as it can act as the primary source of inoculum providing a starting point of the disease in a new locality (Sastry, 2013, Liu *et al.*, 2014, Nontajak *et al.*, 2014, Reingold *et al.*, 2015). Certain arable weeds (e.g. *Chenopodium album*, *Amaranthus retroflexus*, *Solanum nigrum* and *Portulaca oleracea*), are known to act as reservoir for CGMMV (Boubarakas *et al.*, 2004).
54. The likelihood of establishment of CGMMV and KGMMV in Cucurbitaceae hosts is considered to be high.

IMPACT OF ESTABLISHMENT

55. CGMMV and KGMMV are two very important cucurbit viruses responsible for serious economic losses in several countries (Ugaki *et al.*, 1991; Tan *et al.*, 2000; Daryono *et al.*, 2005).
56. KGMMV is considered to be one of the most significant pathogenic pests in cucumber (Lee *et al.*, 2000; Kubota *et al.*, 2009). In Japan, KGMMV causes serious yield loss in cucumber crops and is a major constraint for the cultivation of cucumber. Some Japanese farmers apply methyl bromide to sterilize infected fields to help control KGMMV, at high cost (Daryono *et al.*, 2005; Daryono and Natsuaki, 2012).
57. In New Zealand, the impact of establishment of CGMMV and KGMMV would be greatest for the squash and pumpkin industry.
58. Plants infected with CGMMV or KGMMV usually develop disease symptoms and the severity of those symptoms will determine the size of the direct economic impact. Leaf symptoms normally associated with CGMMV and KGMMV are mottles, mosaics, chlorosis and leaf distortion including wilting (Chang *et al.*, 2005, Hongyun *et al.*, 2008; Mandal *et al.*, 2008,). In extreme cases infected plants can wilt and die.

59. In Thailand, yield losses in cucumber have been reported to range from 5-16% with further losses mainly due to reduced product quality (Nontajak *et al.*, 2014). According to CABI, 2014 in *Cucumis sativus* (cucumber) at the time of infection, yields can be reduced by 5-16% and fruit quality was considerably reduced due to severe symptoms, with a financial loss between 2 to 24%. High field incidence of CGMMV, between 75 and 100%, was reported by Vani and Varma, 1993 in northern India for the crops bottle gourd, muskmelon and watermelon by the end of the growing season.
60. Given the annual sales value of butternut squash, pumpkin, melon and other cucurbitaceae grown in New Zealand (\$~51 million) the direct economic impact in the first year of CGMMV or KGMMV establishing in a New Zealand crop is likely to be in the millions of dollars.
61. Economic impacts will likely continue in subsequent years if the same cucurbitaceae crop are planted in the same field, because the new crop can become infected with the virus via transmission from the contaminated soil in the field.
62. Cases of reoccurrence have been reported from countries where the virus has been reported at least once. For example, in the USA, CGMMV was first reported in July 2013 in fields of cucumber and melon seeds. Affected fields were destroyed and growing Cucurbitaceae crops were prohibited for two years. Severe measures were introduced and the virus was considered to have been eradicated. A year later CGMMV was found again, at a different locality and in a seedless watermelon variety (Baker, 2013, Linden, 2015). In Norway, four greenhouses were found to be infected with CGMMV in 2007, after the disease was reported as not present since 1983 (Sundheim *et al.*, 2008).
63. In addition to crop losses, production costs may increase due to the need for increased labour and consumables for washing and disinfection of tools & equipment, the need for cooperation with other growers to establish hygiene barriers and potentially extra phytosanitary measures to comply with new importing requirements of other countries, including seed testing or testing/inspection during growth season.
64. The potential economic consequences of CGMMV and/or KGMMV within New Zealand are considered to be moderate from a national perspective, but high for individual cucurbitaceae growers.

CURRENT MEASURES TO MANAGE THE RISK OF CGMMV AND KGMMV

65. Seeds eligible for import into New Zealand are listed in the Plants Biosecurity Index (PBI): <https://www1.maf.govt.nz/cgi-bin/bioindex/bioindex.pl>
66. *Cucurbitaceae* seeds must meet the general requirements of the import health standard (IHS) 155.02.05: *Importation of Seeds for Sowing* and the specific requirements listed in the ‘*Cucurbitaceae*’ schedule. The general requirements for imported seed are stated in Part 1 of the standard, and require seed to be packaged in clean packets, clearly labelled with the scientific/botanical name, and clean of any contaminating plant material, debris, soil and contaminating seeds. Seeds are visually inspected at the border to verify that the basic conditions have been met.
67. The specific requirements listed in the ‘*Cucurbitaceae*’ schedule (Part 2) state that a phytosanitary certificate is required from the exporting country to certify that the seeds have been officially tested, on a representative sample, and using the appropriate method (ISTA-ELISA), and found to be free from CGMMV prior to import.

68. Visual inspection of seed at the border cannot detect seeds infected with CGMMV, and therefore the current requirement for seed testing is required to specifically manage the biosecurity risks of this organism.
69. Currently, no measures are in place to mitigate the risk of entry of KGMMV into New Zealand via the seed for sowing pathway.

Risk Management

70. CGMMV is regulated in New Zealand via the emergency measures applied on the 1st December 2014. The current measures require that all *Cucurbitaceae* seeds allowed for import into New Zealand must be tested for CGMMV using the ISTA-ELISA test. These measures were imposed to minimize the risk of this virus entering New Zealand. KGMMV is not currently regulated.
71. Both viruses are very similar in their biology, morphology, host range and symptoms, so the application of similar requirements for the mitigation of risk is reasonable.
72. Further options to mitigate the risk of both viruses include assurances by the importers that their seed sources are from healthy planting material grown and sourced from areas where the virus historically has not been reported. Importers can also source seed from reputable producers that follow good cultural practices and employ parent plant testing during seed production.
73. Apricot stones can currently be imported under the *Prunus* schedule of the Seed for Sowing IHS, with a period of post-entry quarantine to observe for symptoms development and to test for the major regulated viruses.
74. Apricot can also be imported as nursery stock, and may be a possible pathway for the introduction of CGMMV, via infected rootstocks or plant material. Existing measures, including import into Level 3 Post-Entry Quarantine (PEQ) for growing season inspections, are considered adequate to manage the risk at this time. Herbaceous indexing on *Cucumis sativus* and *Chenopodium quinoa* indicators are also completed for all *Prunus* imports of seed and nursery stock which is likely to detect symptoms of this disease. In this instance, it is proposed that CGMMV be listed as a regulated pest in the schedule for *Prunus armeniaca*.
75. *Momordica charantia* (bitter melon) can also be imported as nursery stock, and may be a possible pathway for the introduction of this virus via plant material for planting. MPI proposes that *Momordica charantia* imported as a nursery stock will have its status changed from 'Level 2 Basic', to 'Requires Assessment'. Over the last two years, this species has not been imported as nursery stock into New Zealand.

OPTIONS ANALYSIS

Pest free area

76. CGMMV has a worldwide distribution, so Pest Free Area declarations will only be possible for a few countries. KGMMV on the other hand has a limited geographic distribution, making it possible for most countries to provide a Pest Free Area declaration. For the countries where Pest Free Area can be declared for CGMMV and KGMMV, this measure offers a good level of assurance that consignments are free from these pathogens. Care needs to be taken by suppliers to source certified disease-free seed and nursery stock prior to planting. Guidelines for the determination of a Pest Free Area (PFA) can be found in the International Standards for Phytosanitary Measures (ISPM) 4.

Pest free place of production

77. Pest Free Place of Production systems are a practical alternative for specific quarantine pathogens which have visible symptoms. During the growing season, an official inspection for disease symptoms and/or parent plant testing for the absence of specific quarantine pests can be used for the official endorsement of Pest Free Place of Production on the phytosanitary certificate.
78. Foliar and fruit symptoms of CGMMV can range from mild and difficult to visually detect to quite severe. This level of variability can be attributed to the relationship between the strain/isolate of the virus and the species/cultivar infected. CABI 2014 and Chang *et al.*, 2005 have reported that some Asian *Cucumis sativus* cultivars appear symptomless. Notes taken from a presentation by Dr Aviv Dombrovsky in January 2015 during his visit to the Northern Territory mentions that although normally either the leaves or the fruits are symptomatic, it is not always the case. Certain varieties of melon, pumpkins and zucchini may show few or no symptoms in the field (Fullelove, 2015). Due to the high impact that this disease can cause on the *Cucurbitaceae* industry of New Zealand MPI requests that the Pest Free Place of production option utilises growing season testing of parent plants, using an NPPO approved testing method and sampling regime.
79. In the case of KGMMV, all reports describing its biological characterisation in a range of hosts from the *Cucurbitaceae* family were based on visual symptoms. Under experimental conditions, plants of *Cucumis melo* developed the disease one week after inoculation with the virus. For this virus, Pest Free Place of Production using visual inspection only will provide a means to ensure that consignments of seeds produced in the designated production area are free from KGMMV.

Seed testing

80. Sensitive and accurate diagnostic tests are available which can be applied to commercial seed lots to provide assurance that the seeds are free of CGMMV and KGMMV (Reingold *et al.*, 2014).
81. *Cucurbitaceae* seeds can be tested using an approved NPPO testing method, with testing endorsed on the phytosanitary certificate. The internationally available ELISA method published by ISTA (<http://www.seedtest.org/upload/cms/user/SH-07-026-2014.pdf>) is currently the method MPI is using under the emergency measures for CGMMV. Under the emergency measures, seed lots must be tested and found to be free of the virus. For seed lots greater than 5000 seeds, a representative sample of a minimum of 2000 seeds is tested, which has been officially drawn from the consignment according to ISTA or AOSA methodology. For small volumes, less than 5000 seeds, the importer is required to use ISPM 31 as a guide for sampling. For consignments smaller than 1000 seeds, two options are available:
 - a composite test may be performed on combined seed lots up to maximum of 50 lots from the same species and production area; and
 - testing will be performed using leaf material from the same species and production area from seeds grown in an appropriate Level 2 transitional (quarantine) facility approved to MPI Standard PBC-NZ-TRA-PQCON: Specification for the Registration of a Plant Quarantine or Containment Facility, and Operator.
82. Different polymerase chain reaction (PCR) testing methods have been published and are available for testing for CGMMV and KGMMV, (e.g. Kim *et al.*, 2003; Park *et al.*, 2006; Chen *et al.*, 2008; Reingold *et al.*, 2013; Moradi and Jafarpour, 2011; Ling *et al.*, 2014;

Liu *et al.*, 2014 and Hongyun *et al.*, 2008; Daryono and Natsuaki, 2012; Fukuta *et al.*, 2012). MPI proposes that both methods ISTA-ELISA test and an NPPO approved PCR method be accepted to show that the consignment is free of CGMMV. For KGMMV, MPI proposes that *Cucurbitaceae* seeds be tested using an approved ELISA or PCR NPPO testing method, where it will be endorsed on the phytosanitary certificate, to show that the consignment is free of this virus.

Seed disinfection

83. Current methods for the treatment of *Cucurbitaceae* seeds infected with CGMMV (heat and TSP or a combination of both) are insufficient to completely eliminate and/or inactivate the virus. As a result, seed treatments will not be considered as a risk management option for this virus.

Feasibility & Practicality of Measures

84. The New Zealand industries of squash, pumpkin and other *Cucurbitaceae* plants would benefit from the measures implemented to mitigate the risk of importing new viruses into New Zealand which could have significant impacts on production for these industries.
85. It is not known whether “Pest Free Area” declaration can be supplied by all exporting countries for *Cucurbitaceae* seed for these quarantine viruses.
86. It is not known whether all exporting countries for *Cucurbitaceae* seed could implement growing season testing of parent plants for CGMMV and visual inspection for KGMMV.
87. Seed testing allows access to seed produced for international markets, and gives a practical option for importing stored inventory of seed, where country of origin is not specified and/or growing season inspections have not previously been undertaken. The limitations include the cost and efficacy of testing, for CGMMV an international validated test (ISTA-ELISA) already exists and it is worldwide applied, the same is not the case for KGMMV. However, given an appropriate and statistically valid sample size, MPI considers that seed testing for KGMMV does provide a similar level of assurance as PFA and growing season inspection of parent plants declaration.
88. The size of the sample will change depending on the total size of the lot. For seed lots of 10,000 seeds or greater a minimum sample size of 2,000 seeds will provide at least a 95% confidence level in detecting 0.15% infestation. This means a maximum of 20% of the seed lot is sampled.
89. For seed lots less than 10,000 seeds a composite sample of 2,000 seeds has been suggested to enable the same percentage of each lot to be sampled (20%). Otherwise a larger percentage of the lot will need to be sampled to provide the same level of confidence in detecting CGMMV and KGMMV at the same infestation level. This sample size would then have to align with the ISPM guidelines where 20-100% of the lot would need to be tested depending on the lot size.
90. Other countries apply different sampling systems. New Zealand applies the same definition of size of a small seed lot for all species of *cucurbitaceae* listed under this RMP requiring testing and the sample size depends on the number of seeds in the lot rather than the weight. Generally small seeds lots have a maximum of 18,000 to 150,000 seeds

depending on the species. Under New Zealand requirements a small seed lot should have a maximum of 10,000 seeds for all species. A 95% confidence level in detecting a minimum of 0.15% infestation of CGMMV or KGMMV is only provided when the seed lot is close to the maximum weight stated. When the seed lot size is reduced below this maximum weight, a 20% sample will not provide the same level of confidence in detecting CGMMV or KGMMV for all species. New Zealand requires the same level of confidence irrespective of the seed lot size and the species of *Cucurbitaceae*.

Proposed Measures

91. Based on the evaluation of measures for the management of CGMMV and KGMMV, the following amendment to requirements for the import of *Cucurbitaceae* seed for sowing is proposed:
 - a) “Pest Free Area” declaration, or
 - b) growing season testing of parent plants for CGMMV and growing season inspection of parent plants for KGMMV declaration, or
 - c) Seed testing, using an international validated method or a NPPO approved method.

Proposed Import Health Standard schedule in the Seed for Sowing Standard 155.02.05

CUCURBITACEAE

The following entry conditions only apply to species in the Plants Biosecurity Index listed under Import Specifications for Seed as “see 155.02.05 under *Cucurbitaceae*”.

Countries: All

Quarantine Pests: *Cucumber green mottle mosaic virus* (CGMMV); *Kyuri Green Mottle Mosaic virus* (KGMMV)

Phytosanitary Certificate – Additional declarations

If satisfied that the pre-shipment activities have been undertaken, the exporting country NPPO must confirm this by providing the following additional declarations to the phytosanitary certificate:

The [*Benincasa hispida*; *Citrullus lanatus*; *Cucumis anguria*; *Cucumis melo*; *Cucumis metulliferus*; *Cucumis myriocarpus*; *Cucurbita ficifolia*; *Cucurbita maxima*; *Cucurbita mixta*; *Cucurbita moschata*; *Cucurbita pepo*; *Cucumis sativus*; *Lagenaria siceraria*; *Luffa acutangula*; *Luffa cylindrical*; *Luffa aegyptiaca*; *Momordica charantia*; *Portulaca oleraceae*] seeds for sowing in this consignment have been:

Inspected in accordance with appropriate official procedures and found to be free of any visually detectable regulated pests.

AND

The *cucurbitaceae* seeds for sowing have been:

For *Cucumber green mottle mosaic virus* (CGMMV):

- Sourced from a “Pest free area”, free from the named regulated viruses (*Cucumber green mottle mosaic virus*;

OR

- Sourced from a production area where the parent plants have been sampled according to a NPPO approved methodology and tested using the International Seed Test Association (ISTA) validated ELISA method or a NPPO approved PCR during the active growing period and found to be free from *Cucumber green mottle mosaic virus*

OR

- a representative sample, officially drawn from this consignment according to ISTA or AOSA methodology, has been tested using the International Seed Test Association

(ISTA) validated ELISA method or a NPPO approved PCR method for the presence and found to be free of *Cucumber green mottle mosaic virus*.

AND

For *Kyuri green mottle mosaic virus* (KGMMV):

- Sourced from a “Pest free area”, free from *Kyuri green mottle mosaic virus*;

OR

- Sourced from a “Pest Free Place of Production”, free from *Kyuri green mottle mosaic virus*;

OR

- a representative sample, officially drawn from this consignment according to ISTA or AOSA methodology, has been tested using a serological (ELISA) or molecular (PCR) NPPO approved method for the presence and found to be free of *Kyuri green mottle mosaic virus*.

Testing is required to be completed offshore prior to export, or on arrival in New Zealand by an MPI-approved testing laboratory.

Testing Requirements

For seed lots of more than 10,000 seeds a representative sample of a **minimum** of 2000 seeds, officially drawn from the consignment according to ISTA or AOSA methodology is required to be sampled and tested;

For seed lots with 10,000 seeds or less:

A composite sample of 2000 seeds must be officially drawn across seed lots of same species and place of production from a total size of 10,000 seeds or less (20% of the total). Therefore, at a minimum, 10 seed lots containing 1,000 seeds (200 seeds sampled per lot) would need to be imported.

Cucurbita pepo

Different varieties of Yellow Straightneck, Yellow Crookneck squash and Green Zucchini seeds have been genetically modified. The following varieties are prohibited entry to New Zealand without HSNO approval:

Cucurbita pepo event ZW20;

Cucurbita pepo event CZW3;

Yellow Crookneck squash variety “Revenue”; “Tigress”; “Destiny III”; Prelude II;

Yellow Straightneck squash variety “XPT1832 III”; “Conqueror III”; “Patriot II”; “Liberator III”;

Green Zucchini variety “SV6009YG”; “Judgement III”; “Justice III”; “Declaration II”; “Independence II”.

Cucurbita pepo importers are required to comply with one of the two options listed below:

Option 1:

a declaration signed by the exporter and importer must accompany the consignment declaring that the consignment does not contain GM seeds (the declaration form is provided in Appendix 1).

OR

Option 2:

samples must be representatively sampled, tested, and found to be free of unapproved GM seed according to the Protocol (refer to section 1.5.3).

Guidance

References:

Ling et al., 2014. First report of Cucumber green mottle mosaic virus infecting greenhouse cucumber in Canada. Plant Disease 98 (5): 701-2.

Reingold et al., 2013. First report of Cucumber green mottle mosaic virus (CGMMV) symptoms in watermelon used for the discrimination of non-marketable fruits in Israeli commercial fields. New Disease Reports 28, 11.

ISTA <http://www.seedtest.org/upload/cms/user/SH-07-026-2014.pdf>

Appendix 1: Exporter/importer non-GM assurance declaration

Declaration form to be completed and signed by the exporter and importer

As defined by the New Zealand HSNO Act 1996, Genetically modified organism means, unless expressly provided otherwise by regulations, any organism in which any of the genes or any other genetic material (a) have been modified by in vitro techniques; or (b) are inherited or otherwise derived, through any number of replications, from any genes or other genetic material which has been modified by in vitro techniques.

Note that under the Hazardous Substances and New Organisms (HSNO) Act 1996. The import and release of any genetically modified crop without approval from the Environmental Protection Authority (EPA) it is unlawful.

I,..... (exporter's name and address).....declare that according to the requirements set out in the Seed for Sowing Import Health Standard (MPI Import Health Standard: 155.02.05: Importation of Seed for Sowing - <http://www.mpi.govt.nz/importing/plants/seeds-for-sowing/steps-to-importing/>), (species name and lot/line number or unique identifier as stated on all the other import documentation) was produced neither "from" nor "by" genetically modified crops.

I undertake to inform immediately the importer and the Ministry for Primary Industries, MPI, New Zealand of any information that can undermine the accuracy of this declaration.

Note that MPI may request evidence as to how production, handling and transport of these seeds is performed in the field, or require and audit as a way to provide quality to the production system.

I,..... (importer's name and address).....declare to the best of my knowledge that according to the requirements set out in the Seed for Sowing Import Health Standard (MPI Import Health Standard: 155.02.05: Importation of Seed for Sowing - <http://www.mpi.govt.nz/importing/plants/seeds-for-sowing/steps-to-importing/>), (species name and lot/line number or unique identifier as stated on all the other import documentation) was produced neither "from" nor "by" genetically modified crops.

Signed by (exporter) and Company Name and details
(print name)

Date

Signed by (importer) and Company Name and details
(print name)

Warning: Any person who knowingly makes a statement of information or a declaration that is false or misleading in a material particular may on summary conviction, be sentenced to a term of imprisonment and/or fined not exceeding \$500,000.00

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