Submission to the Department of Agriculture and Water Resources on the topic of Draft review of import conditions for brassicaceous crop seeds for sowing into Australia.

Australian Organic Ltd.

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Background

The Australian Government Department of Agriculture released a draft review of import conditions for brassicaceous crop seeds for sowing into Australia, in February 2018.

The department invited stakeholders to provide comments on the measures described in this review and any other measures that might provide equivalent risk management outcomes. The department agreed to consider all comments received before finalising the Australian import conditions for brassicaceous crop seeds for sowing.

This submission has been prepared by Australian Organic Limited on behalf of our members and the Australian Organic Industry.

Introduction

Australian Organic appreciates the opportunity to provide input and comment on the draft review, and hopes that this input will be helpful for the department. Our goal is for biosecurity requirements to be satisfied, without damaging the Australian Organic industry.

The draft Biosecurity Advice 2018-02 identifies *Fusarium oxysporum* f. sp. *Raphani* (Fusarium wilt); *and Colletotrichum higginsianum* Sacc. (Anthracnose) as Quarantine Pests, for which an Appropriate Level of Protection is not yet in place.

The draft Advice goes on to propose “mandatory on-shore or off-shore fungicidal seed treatment with a broad-spectrum systemic fungicide” for the species: *Brassica oleracea, Brassica rapa, Eruca vesicaria* and *Raphanus sativus.*

The draft Advice includes discussion of alternative means, however restricts this heavily by requiring that such alternative means only be proposed by National Plant Protection Organisations (NPPOs). This provides no assistance to the Australian Organic Industry, as we are unlikely to be successful in lobbying overseas NPPOs to submit requests for alternative means approvals to our own government.

We believe the decision to include mandatory broad spectrum fungicidal treatment within this draft advice has been made without adequate consideration of the following:

- Potential economic damage to Australian Organic Industry
- Potential harmful effects of such treatment on Australian Agriculture and food security.
- Alternative means of protection

Herein this submission, we present the following:

1. Statement of effects on the Australian Organic Industry
2. Statement on potential negative effect on food security in Australia
3. Shortlist of alternative means (referenced)
4. Statement on disease suppressive organic soils

1. Statement of effects on Australian Organic Industry

The Australian Organic sector is one of the fastest growing sectors within Australian agriculture. Australia is heavily reliant upon imported vegetable seeds for organic and conventional agriculture.

Many of our larger farmers rely heavily on export markets for their premium organic products. Access to these export markets is made possible by one of three means:

-Equivalence arrangements (eg. Europe, Japan)

-Conformity assessment arrangements (eg. USA, China)

-Import country accepting the Australian organic certifications (eg. Singapore, Hong Kong).

All three of the above export market access channels would be put **under threat** should broad spectrum systemic fungicidal treatment of imported seeds become mandatory. The most immediate threat would be for USA and China access – these standards do not allow such seed treatment, so the loss of market for affected operators would be immediate. Access to Europe and Japan would require negotiation, which could be expensive and drawn out, and we are unaware of the likely outcome. Markets such as Singapore and Hong Kong may be unaffected – this would most likely depend upon consumer sentiment, should news of mandatory seed treatment spread.

Furthermore, potential for future equivalence arrangements could be under threat. Negotiations are currently underway with Korea, and the USA for establishment of an equivalence agreement, to facilitate access to these markets. These negotiations could also be put at risk.

2. Statement of potential negative effect – resistance build up

The build up of fungicide resistance in pathogen populations is a concern. Use of fungicides should be minimized where possible, as each use provides selection pressure on the population. The mandatory ongoing use of broad spectrum fungicide on each and every batch of seed of these varieties entering our country provides consistent selection pressure for fungicide resistance.

Mandatory treatment of all incoming seed of these varieties may lead to fungicide resistant populations of not just the target quarantine species, but also non target strains – a wide range of fungal pathogens which are currently easily controlled in field with fungicides, may develop resistance to these fungicides, causing an even larger problem.

3. Shortlist of Alternative Means

3.1. Heat and humidity treatments

Hot water treatment has long been used to manage the spread of seed borne disease. Methods have been refined in recent years, and now various approaches combining heat and humidity have been demonstrated effective for certain diseases.

Gilbert et al, 2010 demonstrated that a dry heat treatment of wheat seed was effective for Fusarium control, preventing seed borne spread of the disease.

Hot water, and aerated steam were demonstrated to be as effective as fungicide for seed borne disease control in lettuce, by Schmitt et al., 2009.

3.2. Biocontrol agents

3.2.1. Biological inoculations

Extensive work has been conducted on biological inoculations of seed to prevent disease outbreaks. The mode of action for the various identified inoculations varies, however broadly it is understood by organic farmers that non pathogenic colonisation of potential disease infection sites prevents proliferation of pathogenic species.

This work has advanced so far that there now exist many commercially available products for this purpose, including: Kodiak (*Bacillus subtilis*, Bayer CropSciences); Companion (*Bacillus subtilis*, Growth Products); Intercept (*Pseudomosas cepacia*, Soil Technologies Corp); Mycostop (*Streptomyces grieseoviridis*, Verdera); SoilGuard (*Gliocladium virens*, Certis); T-22 range (*Trichoderma harzianum*, BioWorks); and, Actinovate (*Streptomyces lydicus*, Natural Industries), among others.

Ramzan et al., (2016) demonstrated that a Fusarium sp in mungbeans can be controlled by seed pelleting with biocontrol agents – with *Bacillus subtilis* providing the best control.

Zhang et al., (1996) demonstrated that seed treatments with certain strains of *Gliocladium virens* and *Bacillus subtilis* strains reduced the colonization of tap roots and secondary roots of cotton seedlings by *Fusarium* spp.

Girija Ganeshan & A. Manoj Kumar. (2007) present numerous studies demonstrating efficacy of *Pseudomonas fluorescens* for control of soil and seed borne pathogenic fungi in a range of hosts, through "induced systemic resistance".

A highly relevant study was conducted by Steijl et al. (1999), on one of the 4 plant species, and 2 disease strains identified in the draft Advice that found that infecting radish with *Pseudomonas fluorescens* before pathogen infection induces systemic resistance in radish roots challenged by *Fusarium oxysporum f. sp. Raphani.*

3.2.2. Essential oils

Numerous studies have investigated the potential for effective management of seed borne pathogens with treatment of the seeds with essential plant oils.

Van der Wolf et al., (2008) investigated various essential oils for their ability to disinfect vegetable seeds. Thyme oil was found to be the most promising natural compound for reducing seed borne pathogens in *Brassica oleracea* seed, and the effectiveness was found to be highly significant compared to the untreated control, specifically for fungal contamination.

Schmitt et al., (2009) also found thyme oil to be highly effective for seed borne disease control in lettuce.

3.3. Chitosan

Reddy et al., (1999) demonstrated control of a *Fusarium* species in wheat seed using chitosan seed treatment. El Hadrami, et al., 2010 also demonstrated that chitosan can be an effective tool in seed borne disease management.

3.4. Tested disease free seed

Reliable and accurate testing procedures for the disease species in question are already available. The testing of a representative sample of seeds for disease free status may be an effective means of avoiding the need for any treatment at all.

Kim et al., (2017), isolated a novel primer for specific PCR detection of *Fusarium oxysporum* f. sp. *Raphani.* This is a significant recent breakthrough that cannot be ignored.

Fusarium and *Colletotrichum* can be easily cultured in laboratory situations, using simple agar plate testing. These methods are quantitative and considered accurate, and are used worldwide for various biosecurity measures.

If batches of seed can be sampled and confirmed to be free of the target pathogens, then these seeds pose no risk to Australia's biosecurity, and therefore should be allowed into Australia without treatment. This logic should apply with or without a proposal from an overseas NPPO.

Various laboratories exist in Australia offering these services, we would be happy to provide the details of these laboratories for the department's consideration.

4. Disease suppressive soils in organic farming

Farming practices have not been considered in the draft Advice. It is well known by organic farmers, academics and educators, that a healthy diverse soil ecosystem not only produces the highest quality produce, but helps prevent disease outbreaks.

Organic farmers successfully use compost preparations, crop rotations and other natural methods to effectively manage diseases – they have to do this, as they do not use systemic synthetic fungicides. The best defense against disease spread is a healthy organic soil, with a complex and diverse ecosystem, especially within the rhizosphere of the productive crop.

Toyota and Kimura (1992) reported that the growth of *Fusarium oxysporum* f. sp. *raphani* on radish roots was more suppressed in soils amended with farmyard manure than with soils amended with chemical fertilizers.

Toyota et al., (1994) furthered this work, demonstrating the mode of action of such disease suppression.

Yogev, A., et al. (2011) explain that organic farming, especially compost use leads to soil becoming more suppressive to *Fusarium oxysprorum* in melons.

Sullivan (2004) summarises what organic farmers around the world already know; that "restoring beneficial organisms that attack, repel, or otherwise antagonise disease causing pathogens will render a soil disease suppressive. Plants growing in disease suppressive soil resist diseases much better than in soils low in biological diversity."

Organic soils are more disease suppressive, so organic farmers are helping secure Australia's biosecurity. Should an infected seed be planted in Australia, the safest place for it to be planted is in an organic soil, on an organic farm. Because of the healthy soil, the disease is less likely to proliferate. We believe this should be considered by the department and investigated further.

Summary

Jobs, growth, and investment in the Australian Organic Industry will be significantly damaged if the Australian Government mandates broad spectrum systemic fungicidal treatment of these very commonly imported vegetable seeds.

Alternative means of achieving the Appropriate Level of Protection exist, however the requirement for proposals for approval of such to only come from National Plant Protection Organisations makes this unfeasible, as the Australian Organic Industry is unlikely to successfully engage various overseas NPPOs to make submissions to the Australian Government.

Given that in cases of unavailability, organic farmers are allowed to use non organic seed, if any exemption process is proposed by the government, it should not just be for organic seed, but for non-organic seed that *may* be destined for organic farms.

We seek assistance from the Department with establishing which of these above approaches will be practical, available, and cost effective, whilst still meeting biosecurity measures.

Australian Organic Ltd is looking forward to working collaboratively with the government and our industry to come up with a workable solution that will uphold our biosecurity, without damaging Australia's clean green image, and thriving and growing organic industry.

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