

4. Australia's report under paragraph 7 of decision Ex.I/4

Name of the nominating Party

Australia

Descriptive title of the nomination

Re-application by the strawberry runner industry of Victoria, Australia, for critical use exemption in 2018 from the phase-out of methyl bromide.

Crop name (open field or protected) or post harvest use

Strawberry runner production (open field)

Quantity of methyl bromide requested in each year

29.76 metric tonnes in 2018

Reason/s why alternatives to methyl bromide are not technically or economically feasible.

Technical feasibility

In July 2012, a five-year research program on alternatives to MB for strawberry runners was completed. The project identified methyl iodide/chloropicrin (MI/Pic) as the only short-term replacement for methyl bromide/chloropicrin (MB/Pic) for soil disinfestation in the runner industry. However, MI/Pic is no longer available as a replacement for MB for the Victorian strawberry runner industry. This is due to the 2012 decision of the manufacturer to withdraw its application to register the product in Australia. Furthermore, in September 2012, the manufacturer of ethanedinitrile (EDN) advised that research into the possible replacement of MB by EDN within the runner industry was being discontinued.

With the unavailability of EDN and MI, the research effort in Australia changed focus in 2013 to investigating combinations of herbicide and fumigants for soil disinfestations as a more viable alternative to MB/Pic for the runner industry. In 2005 the Tasmanian strawberry runner industry adopted alternatives Pic and 1,3-D; however, these alternatives failed to control weeds and other soil pests in runner crops. Soil pests accumulated to a level where continued runner production in Tasmania was no longer economically viable. The runner industry in Tasmania announced its closure in 2014 due to inadequate alternatives to MB/Pic. This example demonstrates that there are technical difficulties associated with the adoption of existing alternatives and highlights the importance of research currently undertaken in Australia to identify suitable complementary treatments.

Specific alternatives to methyl bromide for soil fumigation in the Toolangi plant protection area are not technically feasible for the following reasons:

Chloropicrin (Pic)

- Not yet a technically feasible alternative to MB/Pic because of incidences of significantly lower pathogen control (particularly at low soil depths), weed control, runner yields, and runner fruiting quality in research trials.

- Requires development of complementary treatments (i.e. combinations of herbicides, MITC generators, and fungicides) to improve its ability to control pathogens and weeds at depth before being suitable for adoption by the runner industry.

1,3-D/Pic Products

- Recent research shows that formulations of 1,3-D/Pic with lower concentrations of 1,3-D (e.g. TF-80® (20:80)) may reduce the risk of crop phytotoxicity.
- TF-80® is not technically feasible on its own because it does not control pathogens and weeds to the same level as MB/Pic.
- TF-80® is not registered and not available to Victorian runner growers, but current research is supporting its possible registration. A registration application for TF-80® has been submitted to the Australian Pesticides and Veterinary Medicines Authority (APVMA).

Pic or 1,3-D co-applied with MITC

- A metham spading rig was imported into Australia from Europe in 2013 for application of MITC in trials, but has proved an ineffective application method on clay soils.
- Not technically feasible because co-application of MITC (as spade injected metham sodium or incorporated dazomet) with Pic and 1,3-D/Pic has caused significant phytotoxicity in runner crops.
- Not approved for use by the runner Certification authority.

1,3-D co-applied with herbicides

- Recent research has shown that the pre-emergent herbicide isoxaben with Pic or 1,3-D/Pic can improve weed control without causing phytotoxicity in runner crops.
- Not technically feasible because these combinations do not control pathogens to the same level as MB/Pic.
- Isoxaben is not yet registered for use in strawberries, but current research is supporting its possible registration. A minor-use permit application for isoxaben is being prepared to submit to the APVMA.
- Not approved for use by the runner Certification authority.
- Other pre-emergent herbicides co-applied with Pic or 1,3-D/Pic, including pinene, chlorothal dimethyl, metolachlor, napropamide, oxyfluorfen and terbacil caused phytotoxicity or lower yields in runners compared with MB/Pic, and are not technically feasible.

Ethanedinitrile (EDN)

- Trials with EDN recommenced in the runner industry in 2014/15.
- Not yet technically feasible because of inadequate pathogen control compared with MB/Pic, particularly at greater soil depths.
- Not registered and not available to Victorian runner growers, but research in the industry is supporting its possible registration. A registration application for EDN has been submitted to the APVMA.

Dimethyl Disulphide (DMDS)

- DMDS products are not registered for soil disinfestation or any other purposes and there is no certainty of its future registration status.

Dimethyl disulphide (DMDS)

- DMDS and DMDS/Pic were imported into Australia in 2014.
- Not technically feasible due to inadequate pathogen and weed control compared with MB/Pic.
- Not registered and not available to Victorian runner growers, but current research is supporting its possible registration. A registration application for DMDS will be prepared at the end of 2016, when two years of efficacy data are available.
- Still a long way from registration because DMDS is a new chemistry in Australia.

Propylene oxide

- PPO and PPO/Pic are being imported into Australia for trials in the runner industry in 2016/17.
- Not registered and not available to Victorian runner growers. Registration applications for PPO and PPO/Pic can only be prepared when two years of efficacy trials are completed in 2018.

Methyl iodide

- Withdrawn from registration and not available to Victorian runner growers.

Lower rates of MB (20g MB/m²)

- Three years of trialling have not demonstrated bioequivalence between lower and standard (25 g MB/m²) rates. This research does not allow registration applications for lower rates to proceed.
- Rates of MB below 25 g MB.m⁻² are not registered for use in Australia and are not available to Victorian runner growers.

Soil-less systems

- Soil-less systems for commercial production of Nucleus and Foundation stock are already adopted.
- Research shows that the current soil-less systems used for production of Nucleus and Foundation stock is the most technically efficient (i.e. produces the highest yields). Partial budget analysis shows that soil-less systems are currently not economically feasible for production of later generations of runners (Mother and Certified stock).
- Three small-scale scientific trials using combinations of hydroponics and aeroponics for production of runners to increase the efficiency of production, and improve their economic feasibility as an alternative to MB were completed in 2013/14.
- There are still technical issues that prevent adoption on soil-less systems in the Mother and Certified generations including:
 - Further commercial understanding required on the yields and production of runners in soil-less systems
 - Lack of information and data on accumulated chilling hours, soluble carbohydrate levels and in-field hardening on the physiology of runners
 - How these factors affect the capacity of runners to deliver equivalent strawberry fruit yields to bare-rooted runners grown in MB/Pic treated soils, and
 - Logistical constraints in disposing spent mix in an approved site.

Biofumigation

- Biofumigant crops do not release the same concentration of isothiocyanates into soil as commercial fumigants. Consequently, biofumigants have not produced the same level of pathogen and weed control as commercial fumigants.
- Current trials (2015/16) are evaluating the integrated use of biofumigants and alternative fumigants.

Anaerobic soil disinfestation

- Pot trials with this method have commenced, but so far have delivered inconsistent pathogen control.
- Is currently a component of a new proposed research program to manage *Macrophomina* in the strawberry fruit industry, but is a long way from commercial trials due to practical difficulties with implementation on steep slopes.

Rotation of MB with alternative fumigants

- Not currently technically feasible because of lower pathogen control and failure to control volunteer strawberries.

Impermeable barrier films

- Previous trials demonstrated that impermeable barrier films do not retain MB for longer periods in the high organic soils at Toolangi than standard LDPE films.
- Currently impermeable barrier films do not offer a reliable mechanism for reducing application rates of MB because they do not remain in place for long enough in the runner industry (due to high winds).
- Rates below 25 g MB.m⁻² are not registered and not available to Victorian runner growers under impermeable barrier films or standard LDPE films.
- Study tours of Japan and Europe were undertaken in 2014 and a study tour of South Africa was undertaken in 2015.

Economic feasibility

An economic analysis on the feasibility of adopting soil-less substrates as an alternative to MB shows that for the production of Mother and Certified strawberry runners in soil-less systems to break even, the price of a runner in each generation would have to increase by over 500% percent, from A\$0.34 per runner to A\$2 per runner. This price is similar to transplants produced in overseas soil-less systems (e.g. Japan A\$2.44 per transplant). This demonstrates that soil-less systems are currently not economically feasible for production of runners beyond the Foundation stock generation (which are priced at \$3.60 per transplant).

