

TOMATO TOPICS



**Hort
Innovation**
Strategic levy investment

**PROCESSING
TOMATO FUND**

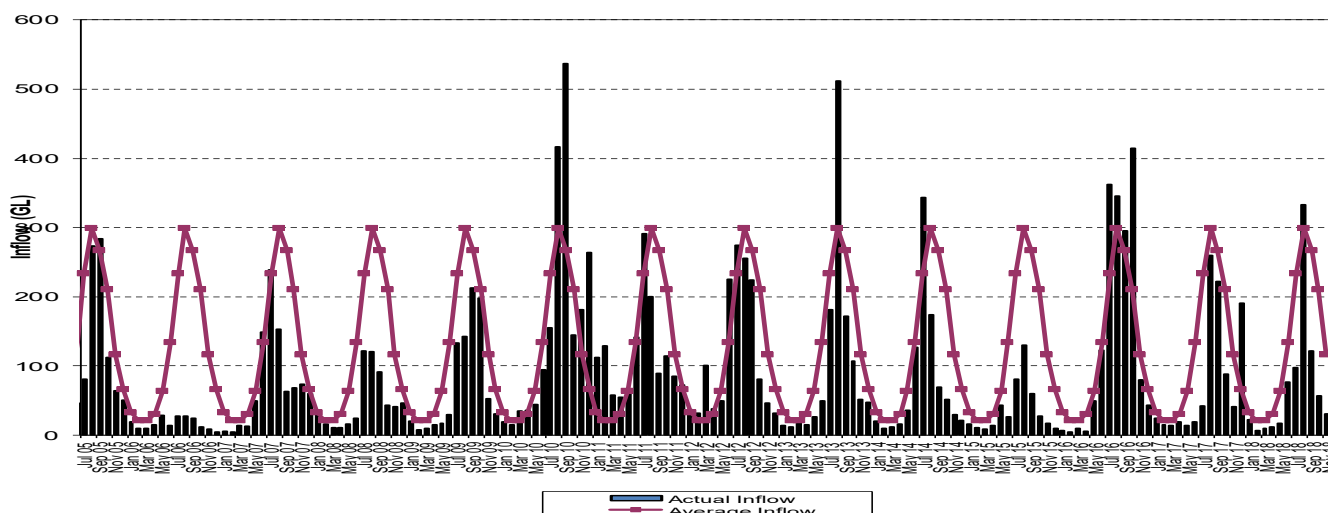
NEWS and INFORMATION
FOR THE PROCESSING TOMATO INDUSTRY

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Inflows to Lake Eildon
July 2005 to November 2018



235,200 tonnes are currently forecast for the 2018/19 season.

This season has started off with a cool start, with crops being slow growing. In addition high wind was experienced during transplanting which has also impacted upon the growth of crops.

Heavy rain was experienced across the region in mid December with bacterial speck and canker now becoming widespread. In addition to the bacterial diseases Sophia has been finding the “chocolate streak” symptoms in a number of paddocks (see page 2), and viruses transmitted by aphids are becoming more common.

Please note that the new email address is:

aptrc.idm@gmail.com

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Update from Sophia

This is a quick summary of some of the work which I'll be undertaking over the next few months. For a more in-depth description of my recent work, please have a look at the annual Australian Processing Tomato Grower 2018 magazine.

As you know, we are increasingly interested by the disease we have been calling "chocolate streak" (Fig. 1a & b). This disease symptoms include dark brown rot, centred above the tap root which extends into the base of the collar and a few cm up the stem. The chocolate streaking can sometimes also be seen in the large lateral roots (Fig. 1b) but the roots of these plants generally don't look as brown and rotten as plants infected with *Phytophthora* (Fig. 3). Plants with chocolate streak tend to be slightly stunted and sometimes wilted in the heat of the day. These plants occur randomly through the paddock, sometimes alone or in small groups along a row. This season we are doing a survey to document the incidence of this disease across all fields. Whilst performing this survey, we hope also to note the presence or absence of other easily identifiable diseases including *Sclerotinia* (Fig. 2), *Phytophthora* (Fig. 3), black dot (Fig. 4), bronze wilt, big bud, bacterial speck and bacterial canker. We would also like to correlate this information with paddock history. So, if you would like to help us out, please contact Liz, Ann or myself with reports of any of these diseases on your fields and also the crop history of your fields.

Meanwhile, back at the university, I am working towards attaining a better understanding of the organisms associated with plants showing poor growth, including those I have isolated from the chocolate streak disease. This includes molecular work, phylogenetics and further greenhouse trials. One greenhouse trial is an extended pathogenicity test with *Fusarium oxysporum* which was regularly isolated from tissue with the chocolate streak symptom. Although I have already run such a test, this one has a slightly altered method based on advice received from UC Davis and aims to properly confirm *F. oxysporum* as the causal agent of the chocolate streak. Another greenhouse trial is examining whether these same *F. oxysporum* isolates can infect and possibly cause disease on common rotation crops including wheat, faba, rye, oat and clover. I am also running a small field trial on one of Bruce Weeks fields to better understand symptom development of the chocolate streak disease.

Apart from the host (tomato plant) and the pathogen, the environment is the third critical component of any plant disease. Therefore, following on from my work examining the various pathogens and their interactions with tomato plants, the next natural step is to investigate the abiotic factors which might be conducive to disease proliferation. To start this work, an Honours student will soon be looking into the interaction between soil pH and some important pathogens identified during surveys. The pH has been identified as an important factor as it is reported to be influenced by the drip irrigation and may vary across various processing tomato fields.

Wishing you all well for the rest of the growing season!

Fig 3. Plant infected with *Phytophthora*. Internal stem tissue generally brown and rotten, tap and lateral roots brown and rotten, external stem tissue black coloured and soft.

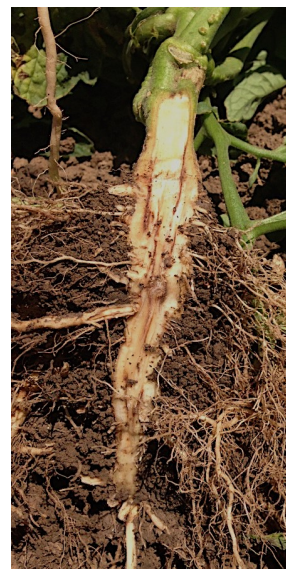


Fig 1a and b. Two examples of "chocolate streak" disease. Symptoms include a dark brown rot centred around the collar region, a rotten, stubby tap root (1a), and chocolate streaks in larger lateral roots (1b).



Fig. 2. Collar of plant infected with *Sclerotinia*. White feathery hyphae and black sclerotia can be seen at the base of the stem.

(Continued on page 3)



(Continued from page 2)

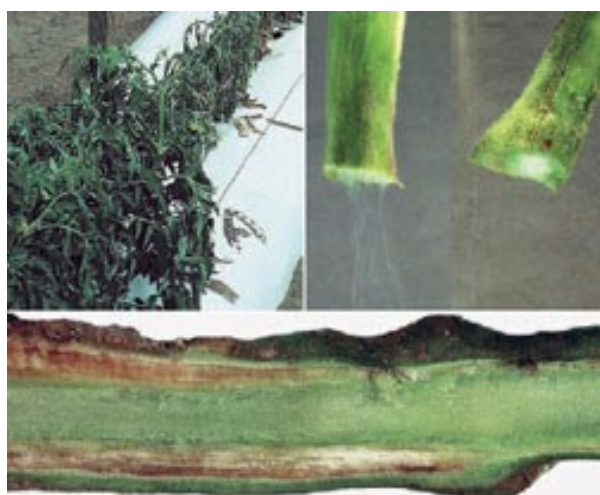


Fig 4. Lateral roots showing black dot disease caused by the fungus *Colletotrichum coccodes*. Identifiable by brown lesions covered in tiny black dots which are sclerotia.

Bacterial Wilt

Recently a number of people have thought that the wilting of scattered tomato plants has been due to Bacterial Wilt. Bacterial Wilt is caused by the bacterium *Ralstonia solanacearum* and can be easily diagnosed in the field by cutting the stem and placing in a vial of water. If it is Bacterial Wilt you will see a white ooze coming from the vascular tissue in the cut stem.

The disease initially appears as a wilting of the youngest leaves, quickly followed by a complete wilt of the entire plant. If the development of wilt progresses slowly enough, adventitious roots can sometimes form on the stem of the plant.



Susceptible and resistant varieties (left); bacterial ooze from infected stem (centre); healthy stem (right); affected stem (lower) (<https://www.daf.qld.gov.au/business-priorities/plants/fruit-and-vegetables/a-z-list-of-horticultural-diseases-and-disorders/bacterial-wilt>)

NB. Based on Sophia's work Bacterial Wilt does not appear to be the cause of the plant wilting this season.

The Emergency Plant Pest Response Deed and the Processing Tomato Industry

The Emergency Plant Pest Response Deed (EPPRD) is a formal, legally binding document between Plant Health Australia (PHA), Australian and state/territory governments, and plant industry signatories. A

s a signatory to the EPPRD, the Australian Processing Tomato Research Council has a seat at the decision making table and also contributes to funding if an approved Response Plan is implemented to eradicate an Emergency Plant Pest (EPP).

Under the EPPRD, the processing tomato industry has a responsibility to report suspect pests and promote the importance of reporting to processing tomato growers. The earlier a new pest is detected, the greater the chance an eradication response will be mounted and the more likely it will be successful.

An underlying principle of the EPPRD is that growers are neither better nor worse off as a result of reporting a suspect EPP. As a consequence, under the EPPRD, grower reimbursement payments (Owner Reimbursement Costs; ORCs) are included for direct costs incurred as a result of the implementation of an approved Response Plan. ORCs may cover direct grower costs or losses through such actions as the destruction of crops, enforced fallow periods and additional chemical treatments. For more information about the EPPRD refer to the PHA website at www.phau.com.au/epprd

Farm Biosecurity Material

The Farm Biosecurity website contains information to assist you to implement a Biosecurity Plan on your property.

<http://www.farmbiosecurity.com.au/toolkit/>

Free 25x Macro lens kit

For a short time, anyone who [signs up to receive Farm Biosecurity News](#) will receive a free 25x macro lens kit.

A macro lens can be attached to the camera of your mobile device to take pictures of plant pests and symptoms of diseases. The lens enlarges the subject while maintaining the resolution of the image, allowing an expert to make an accurate diagnosis.

Plant Health Australia has created a fact sheet [Tips for taking photos with a macro lens](#)

Pests and Diseases in the Production Region

Russian Wheat Aphid (*Diuraphis noxia*)

This insect is now widespread in SA, Vic & NSW, and has formally be identified this season in the processing tomato region in Northern Victoria. It is a major pest of wheat (*Triticum aestivum*), barley (*Hordeum vulgare*), and durum wheat (*Triticum durum*) and some grasses (these are primary hosts which support the entire lifecycle & allow reproduction to occur).

Oat (*Avena sativa*), rye (*Secale cereale*) and triticale (*X Triticosecale*) are secondary hosts that support adults and final instars only.

Unlike other aphids, Russian Wheat Aphids inject a toxin whilst feeding into susceptible crops which can severely retard growth or under heavy infestations, kill the plant. The toxins damage plant chloroplasts, resulting in reduced photosynthetic ability, delayed leaf initiation and tillering and reduced numbers of fertile tillers, shoot and root biomass, grains per ear and grain weight

If aphids are controlled, new growth proceeds normally (new root and shoots are unaffected). Symptoms could look like herbicide damage, thrips damage, mite damage or wheat streak damage.

Russian Wheat Aphid has a wide host range, predominately on grasses (Poaceae family). Primary hosts for Russian Wheat Aphid support the entire lifecycle and allow reproduction to occur. The primary hosts include wheat (*Triticum aestivum*), barley (*Hordeum vulgare*), and durum wheat (*Triticum durum*).

Secondary hosts are plants that support adults and final instars only. These hosts allow the aphid to survive but not to reproduce. Secondary hosts include oat (*Avena sativa*), rye (*Secale cereale*) and triticale (*X Triticosecale*).

While many grass species are considered hosts of Russian Wheat Aphid it is not known which native Australian grasses are suitable hosts.

Russian Wheat Aphid is also a vector (though not a major one) of *Barley yellow dwarf virus* (which is restricted in host range to Poaceae (true grasses)) and other cereal viruses. No information has been found about it'smimpact on tomatoes nor on the transmission of non-cereal viruses.

Sources:

<https://www.agric.wa.gov.au/barley/russian-wheat-aphid-declared-pest>

<https://www.dpi.nsw.gov.au/biosecurity/plant/insect-pests-and-plant-diseases/russian-wheat-aphid>

<https://www.cabi.org/isc/datasheet/9887>

<https://www.cabi.org/isc/datasheet/10539>

<https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2017/07/the-russians-have-invaded-tasmania-do-you-need-to-worry>

Alfalfa Mosaic Virus

Alfalfa Mosaic Virus has recently been confirmed in processing tomato crops in Northern Victoria.

Typical symptoms on tomato leaves include bright yellow blotches with some mottling. Leaves eventually turn bronze and phloem tissue will become necrotic, and usually causes death of the plant. Infections are often localised within crops.

Alfalfa mosaic virus infections of tomatoes generally occur when tomatoes are grown near lucerne. *Alfalfa mosaic virus* is seedborne in lucerne and most lucerne crops are infected and provide a good inoculum source. The virus is transmitted by several species of aphids, including the green peach aphid. Aphids transmit *Alfalfa mosaic virus* only when probing leaf tissues and not during feeding on plants. Once an aphid acquires *Alfalfa mosaic virus*, it retains the ability to transmit the virus for only a short period of time (minutes to hours) and spread is localised. Insecticides aimed at controlling the aphid vectors are often ineffective (<http://ipm.ucanr.edu/PMG/r783102111.html>).



Alfalfa Mosaic Virus in processing tomato crops at Rochester, November 2018

UPCOMING EVENTS

\$30m FOR ENERGY AUDITS

Victorian farmers who have spent more than \$8000/year on energy can apply for free on-farm energy assessments under the new \$30m Agriculture Energy Investment Plan. Ongoing until March 2020 or until funding is exhausted. **More?** agriculture.vic.gov.au/agenergy

Annual Drip Irrigation Crop Inspection and Dinner

Fri 18 Jan 2019

Meet 12:30 at Kagome for the Crop Inspection (will head to NSW)

6:30pm Onwards Dinner: Jason and Kellie's Fritsch's in Moama

RSVP to Liz by Tuesday 15 January,

Indicating people for crop inspection and/or dinner

No Cost for growers and levy paying processor representatives

Others cost for Dinner \$100/person

Sponsored by



Integrated Pest Management of vegetable pests - a more sustainable approach (webinar recording)

Integrated Pest Management (IPM) refers to the combination of chemical, cultural and biological options for controlling insect pests in Australian vegetable crops.

Watch this informative and interactive one-hour session to get the latest updates from vegetable industry experts, including IPM Technologies, E.E. Muir & Sons and Schreurs & Sons

<https://youtu.be/xIxdpqgnjEo>

Californian Research

Virus vectors also continue to be a challenge in California, especially Tomato Spotted Wilt Virus. Brenna Aegerter, Vegetable Crops Advisor has been working in collaboration with the research group of Clare Casteel (UC Davis), with funding from CTRI to look at reducing the attractiveness of tomato transplants to insect vectors. One approach that has shown some promise is to treat the transplants with an ethylene-inhibitor at the greenhouse, just prior to planting.

This has been shown to reduce both transplant shock as well as the number of visits by insects, and thus, hopefully also should reduce virus transmission.

Warm season cover crops have also been trialled in Califor-

nia. They are used to "add value" during a fallow period within a cropping system. The advantages of a warm season cover crop include: reduced soil erosion (wind or water), increased infiltration with autumn rain, weed suppression, enhanced nutrient cycling, reduced soil compaction, and increased water holding capacity. Depending upon the crop species that you chose, they may also provide additional nitrogen or disease suppression.

The benefit of warm season cover crops is that they typically "winter kill" so there is little issue with terminating the cover crop and managing the residue for spring planting, although the actual amount of residue and the breakdown rate will depend upon the species which you use.

Brown Marmorated Stink Bug

As temperatures continue to rise this summer, NSW freight and logistics businesses, producers and the general public are reminded to keep a look out for the brown marmorated stink bug (BMSB).



We are lucky in Australia, as BMSB hasn't established itself. In the northern hemisphere, it has spread rapidly by 'hitchhiking' in freight vehicles, cargo containers and other packaging materials. This year and last, a number of BMSB have attempted to enter Australia in containers through our international freight and trade.

BMSB is a highly mobile and invasive plant pest that can move from host to host during warmer months, when it is feeding and breeding. It eats a large number of plants and would cause serious damage to our backyard gardens and horticultural and vegetable industries.

Early detection is the key to stopping BMSB from taking hold in NSW.

The Australian Government has stepped up efforts, with new national border quarantine controls and enhanced inspection of cargo, however we are asking transporters, farmers and residents around our ports, warehouses and intermodals to remain on alert and keep a close watch out for these bugs. Please report any suspicious sightings immediately to the Exotic Plant Pest hotline on 1800 084 881.

The adult BMSB is the size of a five cent coin with white bands on the antennae, sides of the abdomen and on the legs. Stink bugs emit a pungent odour when disturbed. The months from September to April are the bug's favourite time to travel.

Farm Hygiene and Biosecurity

Disinfectants:

Virkon® S can be used to disinfect machinery. It can be sprayed on the surface at a dilution rate of 1 in 100 and then rinsed off with clean potable water after 10 minutes.

There is no need to rinse it off concrete, wood, plastics, rubber, glass, stainless steel, fibreglass. It is best rinsed off various alloys after 10 minutes.

Galvanised and iron will corrode, but not if you follow the recommended rinse off routine.

For more information: www.alltech.com

Results of the ongoing Tom'ability projects

(taken from <http://www.tomatonews.com>)

Since 2015, researchers in France have been carrying out several recurrent projects (Tom'ability projects) focusing on the integration of the agricultural upstream and the industrial downstream sectors as well as on the management of quality issues in the production of tomatoes. The main topics being studied have been the impact of irrigation water restrictions on the quality of fresh fruit and subsequent alterations in quality of manufactured products.

- Decreasing irrigation to the point of only replacing 50% of water has little or no effect on yield, and in any case does not reduce the soluble solids contents (though it may actually increase it), which is a bonus for processors.

The fruit produced with a water deficit present more or less the same composition as other fruit, and do not present any metabolic disorders. However, they do not always have the same reactivity with regard to processing operations: when put through the same cooking processes, they tend to lose less viscosity when they are processed into purées in certain conditions, which is an indication of a lower level of pectinolytic enzymes (responsible for modifications in the texture of the purées).

- The quality of purées, particularly the texture, varies greatly depending on the date of the harvest.
- There is a clear disconnection between the soluble sugars contents (°Brix), viscosity, and soluble solids content. Furthermore, the rheological mechanisms that control these changes in viscosity are not always the same. When they are induced by a given cooking method, it is mainly the viscosity of the serum (the liquid part of purée) that is affected. When they are induced by the use of a variety with a strong viscosity potential (tomatoes intended for ketchup), it is the size and shape of the particles and their potential for aggregation that make the difference. So it is possible to make use of several levers in order to modify the quality of purées.
- Infrared spectroscopy coupled with a multi-annual model is able to predict the precise composition of fruit with one single measurement (not only Brix, but also the soluble solids contents and the titratable acidity). This technique has also shown potential for discriminating between products according to their cooking method and their origin (variety and place of production). Transferring this tool to an industrial setting is one of the challenges for better fruit grading at factory reception points as well as the monitoring of the quality of products manufactured during the process.

These projects can now serve as a basis for the development of innovative solutions for the processing industry (development of an infrared tool adapted to the tomato processing industry, identification of new criteria for genetic selection etc). The project partners are open to new collaborations.

Source: INRA, Contact: David Page (david.page@inra.fr), Stéphane Georgé (sgeorge@ctcpa.org), Nicolas Biau (nbiau@ctcpa.org), Robert Giovino (rgiovino@sonito.fr)

Tomatoes and Human Health

Tomato Juice Reduces Inflammation in Athletes

According to a recent Lycored's announcement, research has shown that properly fueling the body up before a workout helps it not only during exercise but during recovery as well. This insight led the company to develop its proprietary sports nutrition tomato nutrient complex that's specifically designed to help athletes' bodies through their entire workout routine. The results of that research on Lycored's tomato nutrient complex have been published in the International Journal of Sports Nutrition and Exercise Metabolism.

The double-blind, randomized, placebo-controlled crossover trial determined if ingestion of a supplement containing a tomato complex with lycopene, phytoene, and phytofluene (T-LPP) and other compounds for 4 weeks would attenuate inflammation, muscle damage, and oxidative stress post exercise and during recovery from a 2-hr running bout that included 30 min of -10% downhill running.

Study participants ingested the T-LPP supplement or placebo with the evening meal for 4 weeks prior to running 2 hour at high intensity. Blood samples and delayed onset muscle soreness ratings were taken pre- and post-4-week supplementation, and immediately following the 2-hr run, and then 1-hr, 24-hr, and 48-hr post run.

After a 2-week washout period, participants crossed over to the opposite treatment and repeated all procedures. Plasma lycopene, phytoene, and phytofluene increased significantly in T-LPP compared with placebo. Significant time effects were shown for serum creatine kinase, delayed onset muscle soreness, C-reactive protein, myoglobin, 9- and 13-hydroxyoctadecadienoic acids, ferric reducing ability of plasma, and six plasma cytokines.

In summary, supplementation with T-LPP over a 4-week period increased plasma carotenoid levels 73% and attenuated post-exercise increases in the muscle damage biomarker myoglobin, but not inflammation and oxidative stress. The results from this double-blind, placebo-controlled, cross-over study revealed that consuming supplements rich in carotenoids and phytonutrients could be a helpful strategy for preventing exercise-related wear and tear on our muscles.

The company looks forward to building on these encouraging results and continuing the study on the role its products can play in an active lifestyle and the comprehensive pursuit of wellness.

Source : journals.humankinetics.com

Lycopene and Osteoporosis

There is evidence for the potential use of tomato lycopene & polyphenols as an alternative or complementary treatment with drugs for prevention and management of postmenopausal osteoporosis. Lycopene & Polyphenols (supplements) may lower the risk due to antioxidants that lower oxidative stress and stimulate bone formation.

- ***Natural Antioxidants Lycopene and Polyphenols Lower the Risk of Postmenopausal Osteoporosis and are Shown to Stimulate Bone Formation and Inhibit Oxidative Stress in Osteoblast Cells Cultured In-vitro***, L. G. Rao, A.V. Rao, N. King, St. Michael's Hospital, Calcium Research Laboratory and Dept. of Nutritional Sciences, University of Toronto, Canada. Paper forthcoming
- ***Lycopene Decreased the Lipid Peroxidation Parameters Which Interacted with the Paraoxonase (PON1) 172T→A Genotype to Decrease the Bone Resorption Markers NTx in Postmenopausal Women*** L. G. Rao, A.V. Rao, E. Mackinnon, St. Michael's Hospital, Calcium Research Laboratory and Dept. of Nutritional Sciences, University of Toronto, Canada. Paper forthcoming

Other Possible Health Benefits

There are considerable benefits of consuming fruits and vegetables of all kinds, including tomatoes. As the proportion of plant foods in the diet increases, the risk of heart disease, diabetes, and cancer goes down, along with the risk of obesity.

Tomatoes are packed full of beneficial nutrients and antioxidants and are a rich source of vitamins A and C and folic acid and can help combat the formation of free radicals which are known to cause cancer.

According to John Erdman, Ph.D., Professor Emeritus of the Department of Food Science and Human Nutrition at the University of Illinois, "There's very good, strong, epidemiological support for increased consumption of tomato products and lower incidence of prostate cancer."

Beta-carotene consumption has also been shown to have an inverse association with the development of colon cancer in Japan. The American Cancer Society has also conducted studies, with some showing that people who have diets rich in tomatoes may have a lower risk of certain types of cancer, especially cancers of the prostate, lung, and stomach. Further human based research is required through to find out what role lycopene may play in the prevention or possible treatment of cancer.

Lycopene may also be linked to lowering the risk for prostate cancer. Several studies have found lycopene's power in reducing the aggressive potential of prostate cancer by inhibiting the growth in tumour development. It has also been found that men with low prostatic lycopene levels were more likely to be diagnosed with the disease.

Kilter Rural Seasonal Update

<https://www.youtube.com/watch?v=2ctjTpd6LPY>

Chain of Responsibility - Master Code

Significant changes came into effect in October 2018 relating to the of Chain of Responsibility provisions within the Heavy Vehicle National Law and the associated Master Code.

These changes align the Chain of Responsibility more closely with work health and safety laws. Companies that operate, load, drives, sends or receives goods using a heavy vehicle, need to make certain all reasonably practicable steps are taken to ensure vehicles are properly loaded and goods secured.

To assist you to understand what these new changes mean to you Agsafe have prepared a short online course as an introduction to the new Master Code. This training material has been prepared in consultation with the Regulator of the Heavy Vehicle National Law and with assistance from the Australian Trucking Association and the Australian Logistics Council.

<https://www.agsafe.org.au/events/event/chain-of-responsibility-master-code>

More information on the changes to the Chain of Responsibility are also detailed in a number of videos on the following website:

<https://www.nhvr.gov.au/safety-accreditation-compliance/chain-of-responsibility/changes-to-cor>

Bioclay

Topical application of pathogen-specific double-stranded RNA (dsRNA) for virus resistance in plants represents an attractive alternative to transgenic RNA interference (RNAi). However, the instability of naked dsRNA sprayed on plants has been a major challenge towards its practical application.

It has been demonstrate that dsRNA can be loaded on designer, non-toxic, degradable, layered double hydroxide (LDH) clay nanosheets. Once loaded on LDH, the dsRNA does not wash off, shows sustained release and can be detected on sprayed leaves even 30 days after application. Significantly, a single spray of dsRNA loaded on LDH (BioClay) afforded virus protection for at least 20 days when tested on sprayed and newly emerged unsprayed leaves.

Mitter, N., Worrall, E.A., Robinson, K.E., Li, P., Jain, R.G., Taochy, C., Fletcher, S.J, Carroll, B.J., Lu, G.Q. and Xu, Z.P. 2017. Clay nanosheets for topical delivery of RNAi for sustained protection against plant viruses. *Nature Plants*, Vol 3, Article 16207

<https://www.nature.com/articles/nplants2016207>

ACKNOWLEDGMENTS:

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Opinions expressed in "Tomato Topics" are not necessarily those of the APTRC unless otherwise stated.

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