

Pepino mosaic virus of tomato – new results on virus persistence and disinfection

Tim O'Neill, ADAS and Nicola Spence, Rick Mumford and Anna Skelton, CSL

This factsheet summarises new information on the efficacy of disinfection treatments against pepino mosaic virus (PepMV) of tomato.

Information is provided on persistence of the virus in dried sap at different temperatures, chemical disinfectants suitable for various surfaces within the glasshouse, soaps and sanitisers for food areas and high pressure, hot water washing for plastic trays and the glasshouse structure.

Persistence in dried sap

The survival of PepMV in dried sap depends on temperature, with longer persistence at cooler temperatures. At 5°C, the virus survived and was infective after 4 weeks but not

5 weeks. At 15°C, the virus survived and was infective after 2 weeks but not 3 weeks. At 25°C, the virus survived and was infective after 4 days but not 7 days.



Restricting access to infected areas and the use of oversuits may delay the spread of PepMV

Chemical disinfectants

The effectiveness of chemical disinfectants is affected by many factors including concentration, duration of exposure and level of organic matter contamination. Treatments are generally considered to be ineffective once they have dried.

Although it is possible to give long duration treatments (eg 1 to 24 hours) during an end-of-season clean-up, a more rapid treatment is required during the growing season for treatment of knives, fork lift truck wheels etc when trying to prevent or contain an outbreak.

Long exposure time (1 to 24 hours)

Seven chemical disinfectants tested at their recommended rates (Table 1) were fully effective in disinfecting a range of surfaces (aluminium, concrete, glass, plastic and polythene) deliberately contaminated with pepino mosaic virus (PepMV) in tomato leaf sap. When they were used at full rate, disinfection was successful after 1 hour, the minimum time tested in this experiment.

When products were tested at reduced rates disinfection frequently took longer, up to 24 hours, or was not fully effective. Results shown in Table 1 are at the label recommended use rate and one quarter of that rate.

The disinfectants which performed best on all surfaces at the two dilutions shown were Horticide, Panacide M and sodium hypochlorite. One product, Horticide, was tested against fruit juice and was found not to be effective in the removal of PepMV from rigid plastic trays contaminated by squashed tomato fruit (data not shown).

Short exposure time (1 to 30 minutes)

Of five products tested, those most effective at quickly disinfecting a surface deliberately contaminated with PepMV, in either tomato leaf sap or fruit juice, were Virkon S and Unifect G (Table 2).

Table 1
Summary of disinfectants tested and found to be effective against PepMV in leaf sap (1 hour contact time) on various surfaces

Disinfectant	Rate used ¹	Surface				
		Aluminium	Concrete	Glass	Polythene	Plastic
Horticide	1:25	✓	✓	✓	✓	✓
	1:100	✓	✓	✓	✓	✓
Jet 5	1:125	✓	✓	✓	✓	✓
	1:400	X	✓	✓	✓	✓
Menno Florades	4%	✓	✓	✓	✓	✓
	1%	X	X	X	✓	X
Panacide M	0.5%	✓	✓	✓	✓	✓
	0.125%	✓	✓	✓	✓	✓
Sodium hypochlorite	400 ppm	✓	✓	✓	✓	✓
	100 ppm	✓	✓	✓	✓	✓
TSOP	10%	✓	✓	✓	✓	✓
	2.5%	X	✓	✓	✓	✓
Virkon S	1%	✓	✓	✓	✓	✓
	0.25%	✓	X	✓	✓	✓

✓ fully effective;

X not fully effective

¹Maximum label rate and one quarter of that rate (See Annual Report of June 2001 for more detailed results)

Table 2

Summary of disinfectants tested and found effective against PepMV with a short contact time (1 to 30 minutes)

Disinfectant	Rate used (dilution in water)	Contact time against PepMV in leaf sap (mins)			Contact time against PepMV in fruit juice (mins)		
		1	5	30	1	5	30
Jet 5	1:125	(✓)	X	X	X	X	X
Sodium hypochlorite (5% chlorine)	1:10 [#]	(✓)	(✓)	(✓)	(✓)	X	X
Panacide M	0.5%	X	X	X	X	X	X
Virkon S	1%	✓	(✓)	✓	✓	✓	✓
Unifect G	1:25	✓	✓	✓	✓	✓	✓

✓ fully effective

(✓) partially effective

X not effective

[#]Equates to 5000 ppm available chlorine

Food grade disinfectants

Disinfectants recommended for use in food areas (eg canteens) and on hands differ from those recommended for use in empty glasshouses. Two handwash soaps and a table spray

were tested for their efficacy against PepMV. These were 'Sensisept' handwash soap (ai chlorheximide), 'Med' handwash gel (ai alcohol) and 'Delladet' table spray (ai QAC).

For contaminated hands, washing with Sensisept soap followed by rubbing with Med gel was fully effective, and thoroughly washing in water

followed by rubbing with Med gel gave a large reduction. Washing in water alone gave no reduction and rubbing dirty hands with Med Gel was also not effective. For a contaminated table top (Formica surface), Delladet table spray proved ineffective.

High pressure, hot water washing

The preferred, commercially acceptable method for cleaning plastic trays on tomato nurseries is with water and a detergent, not with chemical disinfectants. Cleaning equipment supplied by BritClean (UK) Ltd of Stoke on Trent was tested on

rigid plastic deliberately smeared with squashed tomato fruit and PepMV. Sap transmission tests showed that the following two treatments were equally effective:

- Manual washing for 3 mins at 60°C or above
- Pressure washing at 1300 psi for 3 seconds at 50°C, or above, at the nozzle.

Action points

- During end of season turn-around, closing the greenhouse during a sunny spell to raise the glasshouse temperature will reduce the survival of any PepMV in dried sap present in the house.
- Chemical disinfectants can be harmful to operators. For example, products containing glutaraldehyde (eg Horticide, Unifect G) may cause burns and sensitisation by skin contact. Carefully follow the directions for use and the safety precautions on the product label.
- For quick disinfection of knives or other small glasshouse equipment, consider using Virkon S or Unifect G. Both of these disinfectants were found to be effective against PepMV in both leaf sap and tomato juice, removing infection after just one-minute contact time when used at the recommended rates.
- Where a contact period of one hour or more is possible for disinfection, Horticide, Jet 5, Menno-Florades, Panacide M, sodium hypochlorite, TSOP and Virkon S can be used against PepMV contamination. Pay particular attention to cleaning and disinfection of equipment contaminated with squashed fruit.
- Washing hands with Sensisept soap followed by rubbing with Med gel, or thoroughly washing in water followed by Med gel, will reduce the risk of spreading PepMV on hands. Simply washing hands in water, or rubbing dirty hands with Med gel may not be effective. A strict hand-washing routine needs to be followed if spread of PepMV from contaminated hands is to be prevented.
- High pressure, hot water washing (3 sec at 50°C and 1300 psi) or manual washing for 3 minutes at 60°C is effective at removing PepMV dried in sap from rigid plastic trays. Review your plastic tray and glass and equipment washing procedures, taking into account these findings.



Characteristic 'nettle-head' symptom showing leaf crinkling and distortion