

# Pathogens of importance and their economic impact on the Australian vegetable industry

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In 2007 a series of industry workshops was conducted as part of a gap analysis to identify pathogens of importance, their economic impact and assess the need for new integrated pest management strategies in the Australian vegetable industry.

## Industry consultation

Eight regional industry workshops were conducted in six states of Australia. Over 120 key growers, chemical resellers, consultants and researchers participated. Participants nominated 'priority pathogens' based on the following criteria:

- Crop loss
- Difficulty and cost to control the pathogen
- Risk of future control failure due to chemical resistance, product withdrawal or regulatory changes.

Individual priority rankings were combined to determine the top six pathogens for each state. These pathogens were given a score of 5-10, with 10 being the pathogen ranked most important by participants (Table 1). Participants provided estimates of crop losses and the cost to control each pathogen (Table 2).

Table 1. Priority pathogens in the Australian vegetable industry

Pathogen/Disease	Key crops	VIC	TAS	QLD	SA	NSW	WA	Total
<b>Sclerotinia</b>	Lettuce (Sm) Brassicas (S.s.) Beans (S.s) Carrots (Ss)	10	10	8	-	5	10	43
<b>Viruses<sup>A</sup></b>	Lettuce, Cucurbits, Celery, Carrots, Capsicum, Brassicas	5 CeMV CaVY TSWV TuMV	- - - - -	10 TSWV CaCV WMV	6 TSWV CMV CaVY LBVV	10 TSWV LMV TuMV	7 TSWV ZYMV LBVV	38
<b>Downy mildew</b>	Lettuce, Peas Brassica seedlings, Cucurbits	9	7	-	9	7	-	32
<b>Fusarium</b>	Melons Capsicums Snow peas	-	-	9	7	8	8	32
<b>Pythium</b>	Beans, Peas, Carrots, Cucumber, Brassicas	-	-	-	10	9	9	28
<b>Powdery mildew</b>	Greenhouse Cucurbits	-	6	7	-	6	5	24
<b>Rhizoctonia</b>	Brassicas, Beans, Peas, Lettuce, Carrot	-	8	5	5	-	6	24
<b>White blister</b>	Brassicas	7	9	-	-	-	-	16
<b>Botrytis</b>	Capsicums, Cucumbers, Beans, Lettuce	-	5	-	8	-	-	13
<b>Chlbroot</b>	Brassicas	8	-	-	-	-	-	8
<b>Anthracoese</b>	Lettuce, Celery, Spinach	6	-	-	-	-	-	6
<b>Sclerotium</b>	Capsicum, carrot Beans, Eggplant,	-	-	6	-	-	-	6

<sup>A</sup> Viruses are listed in order of importance for each state.



Sclerotinia on lettuce



TSWV on lettuce



Downy mildew on brassicas



Fusarium on snow pea



Pythium (cavity spot) on carrots



Powdery mildew on cucurbits



Rhizoctonia on brassicas

## Priority pathogens

Sclerotinia and viruses were consistently identified as the most important vegetable pathogens, with Sclerotinia the most highly ranked in Vic, Tas and WA, and viruses in Qld and NSW. Of the viruses, tomato spotted wilt virus was the most predominant. Other pathogens of importance, in order of priority, were downy mildew, Fusarium, Pythium, powdery mildew and Rhizoctonia (Table 1). Australian vegetable growers estimated total annual crop losses due to vegetable pathogens of up to \$150,000 and \$54,000 for greenhouse and outdoor vegetable crops respectively (Table 2).

Table 2. Annual economic impact of pathogens on the Australian vegetable industry

Pathogen	Crop loss (%)		Crop loss (\$/ha)		Cst to control (\$/ha)	
	Greenhouse	Field	Greenhouse	Field	Greenhouse	Field
<b>Sclerotinia</b>		beans 0-50 brassicas 0-5 carrots 5 celery 15 lettuce 0-100 (30)		beans 200-1000 broccoli 0-6.5K carrots 300 celery 7.5-10K lettuce 0-20K		beans M-H brassicas M carrots L celery M lettuce M-H
<b>Viruses</b>	cuc/cap/ep 10-100 hydro lettuce 50	carrots 10-50 capsicum 0-30 celery 25 cucumber 0-10 lettuce 0-50	cuc/cap/ep 60K-150K 32K hydro lettuce	carrots 5K celery 15K lettuce 2-30K	cuc/cap/ep 40-150K hydro lettuce H	carrots H capsicum H celery no control cucumber M lettuce H-no control peas L-M
<b>Downy Mildew</b>	cuc/cap/ep 15	cucurbits 30 lettuce 0-50 peas 5-10 snow peas 0-100 spring onions 20	cuc/cap/ep 14-22.5K	lettuce 0-15K (4K) peas 100-200 spring onions 4K	cuc/cap/ep 35K	lettuce H peas L-M
<b>Fusarium</b>	cuc/cap/ep 5-30	0-100 snow peas	cuc/cap/ep 0-20K		cuc/cap/ep 37K (some states no controls available)	snow peas no control
<b>Pythium</b>	cuc/cap/ep 0-30 (10) hydro lettuce 30	baby carrots 0-50 baby leaf spinach 0-75 carrots 0-25 lettuce 10-100 parsnip 20	cuc/cap/ep 0-15K	baby carrots 0-25K b. Spinach 0-54K carrots 0-5K lettuce 7.5-75K(?) parsnip 6K	cuc/cap/ep 35K (some states no controls available) hydro lettuce H	baby leaf spinach M carrots M-H lettuce H parsnip L
<b>Powdery Mildew</b>	cucumber 0-10	capsicum 0-30 parsnip 5-30 peas 0-100 silver beet 0-3	cucumber 0-2K	cucurbits 1-2.5K peas 500-800	cucumber L	capsicum L cucurbits L-H (M) peas M silver beet L
<b>Rhizoctonia</b>	capsicum 0-20	beans 0-100 (5) beetroot 0-15 brassicas 0-80 carrots 5 cauli 40-100 lettuce 0-20	capsicum 0-30K	beans 300-6K brassicas 0-8750 carrots 300 cauli 8-20K	capsicum 36K	beans L beetroot H brassicas H carrots L cauli H lettuce H

Cuc/cap/ep = greenhouse cucurbit, capsicum and eggplant. The epidemiology and loss to pathogens on these crops were considered similar enough to group together. H, M & L refer to high (>\$750/ha), medium (\$250-750/ha) and low (<\$250/ha) costs of control. K denotes thousands of dollars. Numbers/letters in brackets are averages.

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