VG110

Gummy stem blight of rockmelons and other cucurbits

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Know-how for Horticulture™

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HORTICULTURAL RESEARCH AND DEVELOPMENT CORPORATION

FINAL REPORT : **GUMMY STEM BLIGHT OF ROCKMELON AND OTHER**
(1 YEAR PROJECT) **CUCURBITS**

PROJECT OBJECTIVES:

- Evaluate the efficacy of a range of fungicides in glasshouse and field experiments.
- Develop a simple and reliable seedling inoculation technique suitable for a breeding program.
- Assess the introduction of melon germplasm from the USA for tolerance to gummy stem blight.

SUMMARY

Seven fungicides were evaluated for control of gummy stem blight, *Didymella bryoniae* which is a serious foliar disease in early season melons grown through periods of prolonged rainfall and high humidity. Weekly sprays of tebuconazole (100g a.i./ha), prochloraz + manganese (231g a.i./ha), benomyl (500g a.i./ha) + white oil (2L/ha), fentin hydroxide (226g a.i./ha), propiconazole (100g a.i./ha), mancozeb (1600g a.i./ha), and mancozeb + phosphonic acid (1000g a.i./ha) reduced the disease when melon plants were assessed 45 days and 55 days after transplanting. Effective disease control increased the total yield and number and weight of marketable fruit and reduced premature ripening.

Genetic resistance to gummy stem blight was evaluated in two accessions of *Cucumis melo*, PI 266935 and PI 266934. Comparison of disease reaction scores revealed PI 266934 possessed much greater resistance than PI 266935. The quality of resistance of PI 266934 was unaffected by seedling age and inoculum concentration. This high level of resistance should be useful in a breeding program.

RESEARCH ACHIEVEMENTS:

Chemical Control

A fungicide spray trial was conducted at the Bundaberg Research Station during the spring growing season 1991. Fungicide applications commenced two weeks after the speedlings were transplanted with the first three sprays applied at seven day intervals and the remaining five sprays applied every four to five days.

Due to unseasonal dry weather, the trial site was artificially infested with the gummy stem blight organism. Field inoculation occurred three days after the third fungicide application

with the aid of a controlled droplet applicator. Plants were inoculated in the early evening following 30 minutes of overhead irrigation.

All chemical treatments significantly reduced the disease (P=0.01) at disease assessments conducted 45 days and 55 days after transplanting (Table 1). After 45 days, tebuconazole was significantly superior (P=0.01) to all chemicals except fentin hydroxide. At the 55 day assessment, tebuconazole and fentin hydroxide had significantly less disease (P=0.01) than all treatments except prochloraz + manganese. There was no significant difference between mancozeb and mancozeb + phosphonic acid at either assessment.

Table 1. Effect of fungicide on control of gummy stem blight of rockmelon cv. 'Laguna'

Treatment	Fungicide application (g a.i./ha)	Disease assessment[A] Days from transplanting	
		45	55
mancozeb	1600	2.23 d	3.85 d
prochloraz + manganese	231	1.95 bcd	3.33 bc
tebuconazole	100	1.20 a	2.90 a
benomyl + oil	500	1.78 bc	3.48 c
fentin hydroxide	226	1.58 ab	3.10 ab
propiconazole	100	1.95 bcd	3.50 c
mancozeb + phosphonic acid	1600	2.00 cd	3.88 d
control	1000	3.10 e	4.95 e
l.s.d. (P=0.05)		0.39	0.26
l.s.d. (P=0.01)		0.53	0.35

[A] Gummy stem blight severity assessed on 10 terminals/plot. 0 = nil disease, ... 5 = >50% of leaves dead with severe crown and runner lesions.

All chemical treatments produced a significant increase in the weight of marketable fruit (P = 0.05) and all except mancozeb produced a significant increase in the number of marketable fruit (Table 2). Total soluble solids were significantly greater in all chemical treatments except propiconazole and mancozeb + phosphonic acid when compared with the unsprayed treatment. The average number of days to harvest showed fruit from untreated plots ripened significantly earlier (P = 0.05) than fruit from unsprayed plots.

Although satisfactory control of gummy stem blight may be obtained with proper application of protectant fungicides during normal weather conditions, chemical control is not effective during periods of high humidity and rainfall. The regular use of overhead irrigation in the

experiment disadvantaged the protectant fungicides but created the type of environment in which severe outbreaks occur. Results from the experiment show that using systemic chemicals such as tebuconazole, prochoraz + manganese and benomyl + white oil can do much to slow the development of gummy stem blight of rockmelon.

Table 2. Effect on total weight of fruit/plot, number and weight of marketable fruit, total soluble solids and average number of days to harvest following different fungicide applications to control gummy stem blight of rockmelon cv. 'Laguna'

Treatments	Total weight of fruit (t/ha)	Weight of marketable fruit (t/ha)	Number of marketable fruit	Total soluble solids	Average number of days to harvest
mancozeb	43.65 c	35.22 d	87.50 cd	6.80 a	63.33 b
prochloraz + manganese	51.92 a	42.04 b	97.50 abc	6.93 a	65.02 ab
tebuconazole	53.71 a	48.27 a	107.25 a	7.28 a	65.05 ab
benomyl + oil	46.03 bc	41.82 bc	96.50 bc	6.60 a	64.51 ab
fentin hydroxide	50.63 ab	45.37 ab	103.25 ab	6.95 a	65.94 a
propiconazole	44.35 c	38.47 cd	91.00 c	6.05 ab	64.02 ab
mancozeb + phosphonic acid	44.15 c	36.80 d	91.00 c	6.15 ab	63.61 b
control	37.74 d	31.16 e	79.50 d	5.00 b	60.83 c
l.s.d. (P=0.05)	5.60	3.90	10.39	1.26	1.98
l.s.d. (P=0.01)	7.63	5.31	14.14	1.71	2.70

Genetic Resistance

Two experiments were conducted. The first experiment compared four genotypes (Laguna, Planters Jumbo, PI 266935 and PI 266934) where seedlings of two ages (29 and 44 days after sowing) were inoculated with a spore suspension of 1 x 10^6 spores per ml. The second experiment compared disease severity levels on two genotypes (Laguna and PI 266934) using three inoculum concentrations (0, 1 x 10^5 and 1 x 10^6 spores/ml) with four seedling ages (11, 17, 25 and 32 days after sowing).

Seedlings of PI 226934 were significantly less diseased than all others at each of two seedling ages (Table 3). Inoculated seedlings of Laguna developed more disease in younger (11 days) than older plants (17, 25 and 32 days) and when inoculum concentration was high (1 x 10^6 spores/ml) rather than low (Table 4). No significant disease developed on any inoculated plants of PI 266934 (Table 4). The high level of resistance to gummy stem blight in PI 266934 should be useful in a breeding program. Work is required to clarify the inheritance of this resistance and relationship to previously identified genes.

Table 3. Ratings of foliar disease severity on seedlings of two ages of four melon cultigens inoculated with 1 x 10^6 spores/ml of Didymella bryoniae.

Cultigen	Disease severity rating[a]	
	Seedling age (days) at inoculation	
	29	44
Laguna	5.0	4.8
Jumbo	1.2	1.0
PI 266935	1.5	0.7
PI 266934	0.3	0.3
$LSD_{0.05}$[b]	0.4	

[a] Disease ratings were from 0 (no visible necrosis) to 5 (81 to 100% leaf area necrosis).
[b] $LSD_{0.05}$ Least significant difference for P=0.05.

Table 4. Ratings of foliar disease severity on seedlings of four ages of two melon cultigens inoculated with two concentrations of Didymella bryoniae.

Inoculation concentrations (spores/ml)	Disease severity rating[a]							
	Seedling age (days) at inoculation							
	11		17		25		32	
	Laguna	PI 266934	Laguna	PI 266934	Laguna	PI 266934	Laguna	PI 266934
1 x 10^5	4.25	0	2.75	0	3.0	0	1.0	0
1 x 10^6	4.17	0.50	4.75	0.25	4.08	0	3.33	0
$LSD_{0.05}$[a]	0.76							

[a] Disease ratings were from 0 (no visible necrosis) to 5 (81 to 100% leaf area necrosis).
[b] $LSD_{0.05}$ Least significant difference for P=0.05.

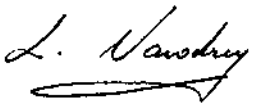
Extension and Publication

Research findings were published in the following extension and research publications.

McGrath D., Vawdrey L., and Walker I. (April 1992). Rockmelon gummy stem a blight of the past? Queensland Fruit and Vegetable News 12-13.

Vawdrey L. and McGrath D. (August 1992). Control of gummy stem blight of Rockmelon. 1st Australian Melon Conference, Griffith NSW.

McGrath D.M., Vawdrey L.L. and Walker I. (In Press). A source of genetic resistance to gummy stem blight of rockmelon. American Journal of Horticultural Science.



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