

16 July, 2010

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Title: Efficacy of fungicides on *Pythium* root rot on Geranium.

Host: In May, 2010 *Pelargonium x hortorum* (geranium) 'Elanos Bright Red' plugs were planted in 4 inch pots containing Fafard Mix 2B. The plants were fertilized with 1/2 tsp. Osmocote Plus 15-9-12 (8-9 month) the same day. The test was conducted in an unheated greenhouse with poly and shade cloth covering the top and sides.

Inoculation: Plants were inoculated with a culture of *Pythium irregulare* mixed with sterilized water. The inoculum was drenched into the potting medium at the rate of 10 ml per pot and watered in lightly on 8 June, 2010.

	Treatments:	Rate/100 gal
A.	Water noninoculated	-----
B.	Water inoculated	-----
C.	FenStop	7 oz
D.	FenStop and KleenGrow	7 oz and 25.6 oz
E.	KleenGrow	25.6 oz
F.	Adorn	1 oz
G.	Adorn and KleenGrow	1 oz and 25.6 oz

Chemical application dates: All treatments were applied as a drench at 50 ml per 4 inch pot as listed above on 1, 15, 29 June and 13 July, 2010.

Date	Time applied	Air temperature	Water temperature	Weather
1 June	9:00 AM	13.9 C	18.0 C	overcast
15 June	7:00 AM	15.0 C	22.0 C	partly cloudy
29 June	6:30 AM	19.4 C	23.0 C	clear
13 July	8:00 AM	21.1 C	25.0 C	clear

On 28 June, 2010 top grade was recorded using the following scale: 1 - plant dead, unsalable, 2 - poor, unsalable, 3 - moderate, salable, 4 - good, salable to 5 - excellent, salable.

Trt 1 2 3 4 5 6 7 8 9 10 Mean

A.	4	2.5	3.5	4	3.5	2.5	3.5	2	4	2.5	3.2 a
B.	3	3.5	3	3.5	2.5	3	4	3	2.5	3	3.1 a
C.	3	3.5	3	4	4	2.5	3.5	2.5	3	4	3.3 a
D.	3.5	2.5	3.5	3	4	4	4	3.5	4	4	3.6 a
E.	3.5	2.5	3.5	4	3	2.5	2.5	2.5	3	2.5	2.9 a
F.	3	2.5	3	3	4	2	4	2.5	3	3.5	3.0 a
G.	4	3.5	4	3.5	3	3	4	2.5	3	2.5	3.3 a

Source	DF	Sum of squares	Mean square	F value	P value
Treatment	6	2.736	0.456	1.303	0.269
Error	63	22.050	0.350	not significant	
Total	69	24.786			

Conclusions: After two applications, the differences in top grade were not statistically significant. However, best top grade was found on plants in the FenStop/KleenGrow treatment. These plants were infected with *Pythium* sp. before test initiation.

On 28 June, 2010 plant height (cm) was recorded.

Trt 1 2 3 4 5 6 7 8 9 10 Mean

A.	15	13	13	14	15	15	15	10	16	14	14.0 a
B.	9	14	14	14	12	12	15	14	13	13	13.0 a
C.	11	13	14	12	13	11	15	12	13	12	12.0 a
D.	13	13	16	11	15	14	15	16	15	15	14.0 a
E.	12	14	14	15	13	14	11	15	14	15	13.7 a
F.	10	14	12	13	16	10	11	14	11	15	12.6 a
G.	13	14	15	15	12	13	15	10	13	12	13.2 a

Source	DF	Sum of squares	Mean square	F value	P value
Treatment	6	27.171	4.529	1.692	0.138
Error	63	168.600	2.676	not significant	
Total	69	195.771			

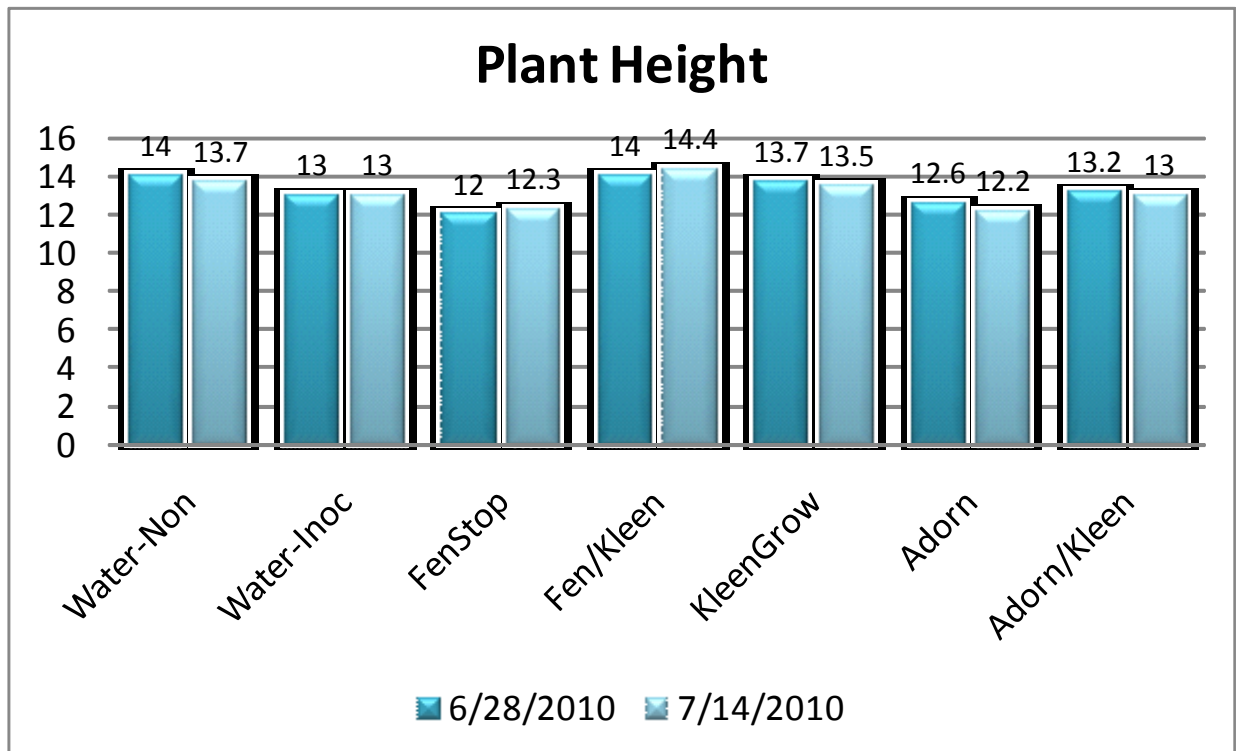
Conclusions: After two applications, the height was not significantly affected by treatment. However, the shortest plants were those treated with either FenStop alone or Adorn alone. The tallest plants were the noninoculated controls and the FenStop/KleenGrow combination.

On 14 July, 2010 plant height (cm) was recorded.

Trt	1	2	3	4	5	6	7	8	9	10	Mean
A.	16	14	13	12	15	14	15	10	17	11	13.7 a
B.	10	13	15	14	12	13	16	12	12	13	13.0 a
C.	12	12	14	12	13	10	15	11	13	11	12.3 a
D.	13	13	16	13	15	15	16	14	14	15	14.4 a
E.	12	14	13	15	13	14	12	15	12	15	13.5 a
F.	10	13	11	13	17	9	11	12	11	15	12.2 a
G.	13	16	15	14	11	12	14	10	12	13	13.0 a

Source	DF	Sum of squares	Mean square	F value	P value
Treatment	6	36.571	6.095	1.933	0.089
Error	63	198.700	3.154	not significant	
Total	69	235.271			

Conclusions: Final plant height was not significantly affected by treatment. The tallest plants were those treated with FenStop/KleenGrow and the shortest plants were those treated with FenStop alone or Adorn alone.

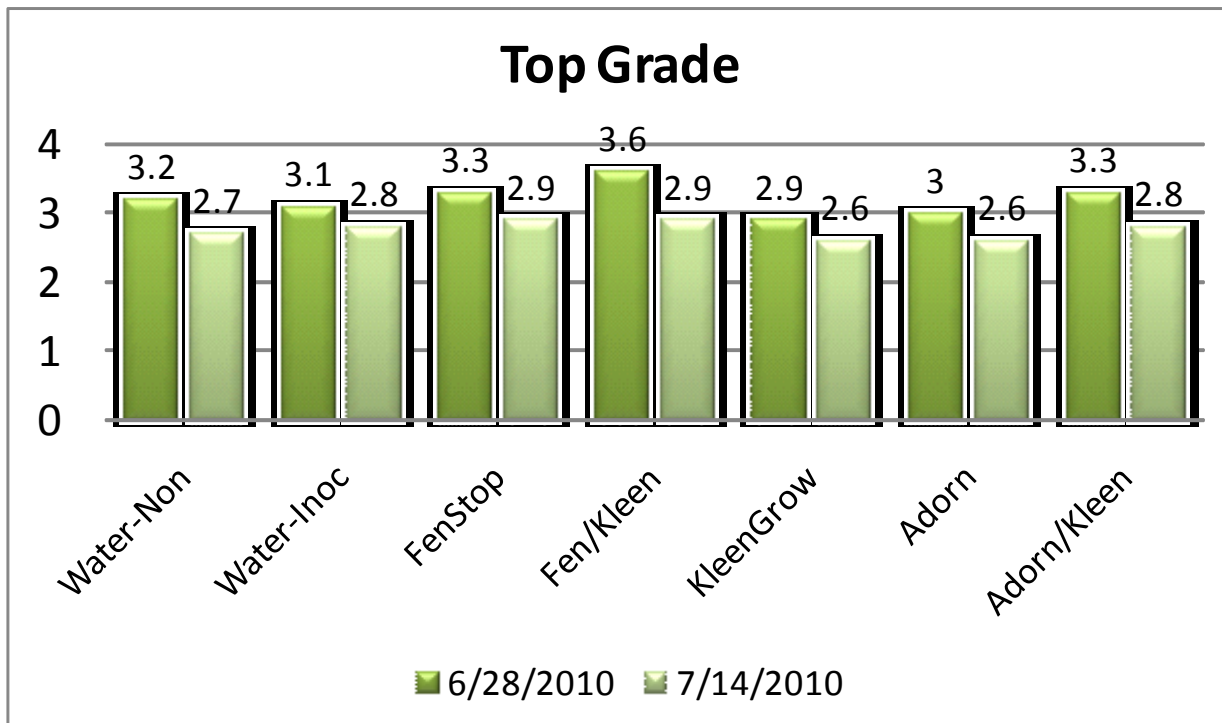


14 July, 2010 top grade was recorded using the following scale: 1 - plant dead, unsalable, 2 - poor, unsalable, 3 - moderate, salable, 4 - good, salable to 5 - excellent, salable.

Trt	1	2	3	4	5	6	7	8	9	10	Mean
A.	3	2.5	3	3	2.5	2.5	3	2	3	3	2.7 a
B.	3	3	3	2.5	2.5	2.5	3.5	3	2.5	3	2.8 a
C.	3	3	3	3	3	2.5	3	2.5	3	3	2.9 a
D.	3	2.5	3	2.5	3	3	3	3	3	3	2.9 a
E.	3	2.5	2.5	3	2.5	2.5	2.5	2.5	3	2.5	2.6 a
F.	3	2.5	2.5	2.5	3	2	3	2.5	2.5	2.5	2.6 a
G.	3	2.5	3	3	3	3	3	2.5	3	2.5	2.8 a

Source	DF	Sum of squares	Mean square	F value	P value
Treatment	6	0.886	0.148	1.898	0.095
Error	63	4.900	0.0778	not significant	
Total	69	5.786			

Conclusions: Final top grade was not significantly affected by treatment. The plants with the highest top grade were those treated with FenStop alone or in combination with KleenGrow. The poorest quality was those treated with Adorn alone or in combination with KleenGrow. The loss in overall quality was due to heat in July.

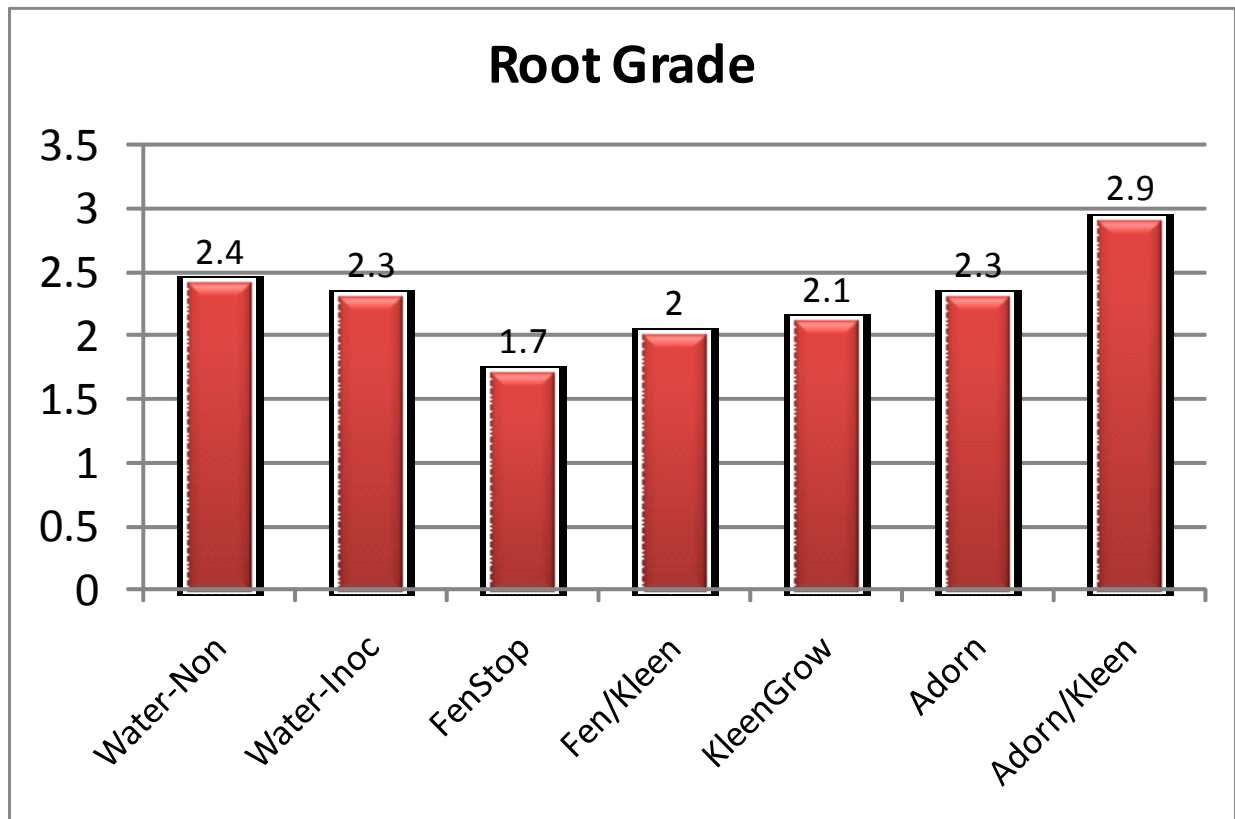


On 15 July, 2010 root grade (the degree of healthy roots) was recorded using the following scale: 1 – no roots, 2 – slight, 3 – moderate, 4 – good, to 5 – excellent roots.

Trt	1	2	3	4	5	6	7	8	9	10	Mean
A.	3	2	3	3	2	1	2	1	3	4	2.4 ab
B.	2	2	2	2	2	2	4	3	2	2	2.3 ab
C.	2	1	2	2	2.5	2	1	1	2	2	1.7 a
D.	2	1	2	2	2	2.5	3.5	2	2	1	2.0 ab
E.	2	2.5	1	4	2	2	2	1	3	2	2.1 ab
F.	2.5	2	2	3	3	1	3	2	4	1	2.3 ab
G.	3.5	3	3	3	3	3	4	2	3	2	2.9 b

Source	DF	Sum of squares	Mean square	F value	P value
Treatment	6	8.443	1.407	2.339	0.042
Error	63	37.900	0.602	significant	
Total	69	46.343			

Conclusions: The degree of healthy new roots was significantly higher for plants treated with Adorn and KleenGrow in combination. Poorest new root formation occurred with FenStop alone.



Summary for the efficacy of fungicides on Pythium root rot on Geranium

Treatment	Rate/100 gal.	Top grade 6-28-10	Height (cm) 6-28-10	Height (cm) 7-14-10	Top grade 7-14-10	Root grade 7-15-10
Water Noninoculated	-----	3.2 a	14.0 a	13.7 a	2.7 a	2.4 ab
Water Inoculated	-----	3.1 a	13.0 a	13.0 a	2.8 a	2.3 ab
FenStop	7 oz	3.3 a	12.0 a	12.3 a	2.9 a	1.7 a
FenStop and KleenGrow	7 oz and 25.6 oz	3.6 a	14.3 a	14.4 a	2.9 a	2.0 ab
KleenGrow	25.6 oz	2.9 a	13.7 a	13.5 a	2.6 a	2.1 ab
Adorn	1 oz	3.0 a	12.6 a	12.2 a	2.6 a	2.3 ab
Adorn and KleenGrow	1 oz and 25.6 oz	3.3 a	13.2 a	13.0 a	2.8 a	2.9 b