Efficacy and Tolerance of Medallion 50WP Fungicide (fludioxonil) for the control of Fusarium stem rot (*Fusarium solani*) in greenhouse pepper (*Capsicum annuum* L.)

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Statement of Confidential Business Information

No claim of confidential business information (CBI) is made for any information contained in this document on the basis of the definition of CBI in the Pest Control Products Act (PCPA), 2002.

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Introduction

Greenhouse vegetable production is an important component of the Canadian Agri-Food industry, producing high value crops including tomatoes, peppers, cucumbers, lettuce. In 2011 an estimated 380 ha of greenhouse peppers were grown in Canada for fresh market with a farm gate value in excess of $299 million. Greenhouse pepper production in Ontario and BC represents 97% of the national (Statistics Canada, 2012). Pepper is a solanaceous (nightshade) family fruiting vegetable (Crop Group 8) and the management methods used in the greenhouse for their production are similar to all vegetables grown in the greenhouse. Greenhouse peppers are affected by a number of foliar, stem, fruit and root diseases. Crown and root rots and stem fruit rots (*Fusarium* spp.) in particular

are a major challenge for Canadian greenhouse pepper growers; the occurrence of the disease is routine in the greenhouse every growing season with increased spread and severity in recent years and with the potential for extensive damage and significant yield losses if not properly managed.

Description of the Pests

Fusarium crown, stem, root rot disease of greenhouse peppers is caused by the deuteromycete *F. solani*. It is commonly found in Canadian soils (Howard et *al*., 1994) and widespread yearly occurrence with high pest pressure (Anon., 2011). It is the main disease of peppers in British Columbia, Ontario and Alberta. Vigorously growing pepper plants are very susceptible to *Fusarium solani* with the points of infection occurring at the plant nodes or at the soil line (Cerkauskas, 2001; Howard et *al*., 1994). Disease symptoms first appear as dark brown to black soft lesions located at nodes and wound sites on the stem. Fruiting bodies, appearing as orange-red spots, may develop into lesions that girdle the plant and eventually leading to the plant death.

Growers in British Columbia have observed fruiting bodies growing on the rockwool medium during the early growth stage of the pepper plants after propagation (Cerkauskas, 2001). Growers need to keep rockwool blocks constantly moist, which unfortunately creates a perfect environment for spore release and plant infection. Profuse growth of fungal mycelium occurs under high humidity and when temperatures exceed 25°C.

Description of the Product

Fludioxonil is a phenylpyrrole which was developed following the discovery of the natural antifungal agent pyrrolnitrin produced from *Pseudomonas pyrociniae* (Ziogas & Kalamarakis, 2001). In Canada fludioxonil is considered a Reduced-Risk pesticide and it is registered as a seed treatment for the control of a wide range of fungal pathogens, on over 150 crops including pepper (Anon., 2005a). Fludioxonil is also registered in other countries including the USA (EPA Product Registration Number for Medallion 50 WP: 100-769). As a Group 12 fungicide, fludioxonil is considered to be a low to medium risk for resistance development (Anon., 2005b). Fludioxonil is a contact protectant and a non-systemic fungicide that targets fungal signal transduction and further results in inhibiting spore germination, the growth and penetration of germ tubes and mycelia (Anon., 2004a).

There are currently 2 active ingredients registered in Canada for the control of fungal root rots in pepper transplants, dazomet and captan, which give inadequate control. In addition, Basamid is under re-evaluation at PMRA. Mycostop (*Streptomyces griseoviridis* strain K6) is also registered, but the product provides only suppression under low disease pressures of Fusarium rot.

Description of Proposed Treatment

The proposed use pattern of Medallion 50 WP fungicide (50% fludioxonil) is for the control of Fusarium rot (*Fusarium solani*) in greenhouse pepper by one application per crop and a maximum of 3 drench applications per year at a rate of 7.4 grams of product in 100 litres for 10 m^2, with an active ingredient application rate of 3.7 grams per 100 litres water. The application is to be made at the seedling stage prior to transplanting or transfer to large containers. The pre-harvest interval is 1 day.

Summary of Research Trials

Three efficacy trials were conducted at Ag Quest Research Station, Minto MB during the 2007 growing season. Each trial used a different cultivar. The pepper cultivars 'New Ace', 'Valentina' and 'Fascinato' were tested. The test plants were seeded into cell packs containing moist soil-less growing medium Sunshine Mix #2, on June 4, 11 and 28, 2007 for 'New Ace', 'Valentina' and 'Fascinato' trials respectively. The emerging seedlings were first transplanted into 4" pots on July 4, 6 and 18, 2007 at first true leave stage respectively. Then, the transplants, 20 cm high, were set in the greenhouse on July 25, 26 and 30, 2007 into 30 cm diameter pots respectively. One seedling was transplanted into each pot. The pots were arranged in a ventilated greenhouse in a randomized complete block design with 4 replicates per treatment. Each treatment was made of 4 pots and placed by 2 across 2 in one square meter plot area. Water and nutrients were supplied to the plants by drip irrigation. Fertilizers at the concentration of 200 ppm Nitrogen, 50 ppm Phosphorus, 300 ppm Potassium were applied to plants as 20-5-30 solution. The plants were supported with bamboo stakes pushed into the potting soil. Fungicide treatments were applied as a drench to the potting mix on 25, 26 and 30 July 2007 for New Ace, 'Valentina' and 'Fascinato' trials respectively. The potting medium was stirred with a trowel to incorporate the fungicide solution into the root zone.

Plants were inoculated 24 (trials 147 and 149) or 48 (trial 146) hours after fungicide treatment, by a spore suspension of *Fusarium solani* that was obtained from the Alberta Research Council. The concentration of the spore solution was set at 10^6 spores per ml. Inoculation was performed by nicking the stem of each inoculated plant (4 closely spaced nicks) with a sterile scalpel and pipetting two ml of spore's suspension onto the wounds. The plants were misted after inoculation and then periodically during the course of growing season to maintain a high humidity and favour the development of the disease.

Plants were assessed for disease incidence and severity. Disease incidence was expressed as the percent infection per plot. Disease severity was rated on each plant and averaged per plot on a 0-5 scale:

0 - no disease detected
1 - 1 - 2 mm combined lesion length
2 - 3 - 5 mm combined lesion length
3 - 6 - 15 mm combined lesion length, lesion may be sunken into stem tissue
4 - plant wilting
5 - plant dead.

A last assessment was made using the following severity scale:

0 - no disease detected
1 - 1 - 5 mm combined lesion length and/or pinpoint internal stem discoloration
2 - 6 - 15 mm combined lesion length and/or pinpoint - 10% internal stem diameter discoloration
3 - 16 -30 mm combined lesion length and/or 11 - 25% internal stem diameter discoloration
4 - 31 - 50 mm combined lesion length and/or 26 - 50% internal stem diameter discoloration
5 - 51 - 75 mm combined lesion length and/or >50% internal stem diameter discoloration.

Plants were examined for phytotoxicity at each assessment date on a scale 0=no phytotoxicity to 100%=plant dead. Symptoms of phytotoxicity were defined as burning, discoloration, stunting or distortions. Yield was obtained at the end of the growing season. Harvested fruits were separately sorted into unmarketable undersized fruit (<55 mm diameter) and marketable (≥55 mm).

The pathogen inoculation of plants was successful and effective and disease pressure increased steadily over the course of the experiment period (Table 1.1). Stem lesions appeared 13 days after fungicide application. All fungicide treatments significantly reduced disease incidence and severity when compared to the untreated and inoculated control, except for the half rate Medallion treatment for disease severity. The treatment of Medallion at label rate reduced disease incidence and severity up to 100%. The Medallion treatments at 1X and 2X rate as well as the commercial standard Maestro 80DF (80% Captan) had significant lower disease incidence and severity than Medallion 50WP applied at the ½ rate.

At the next assessment made 26 days after treatment, disease incidence was relatively high and varied from 69% in Maestro 80DF treatment to 100% in the untreated and inoculated check. Only Maestro 80DF had significantly lower disease incidence than the inoculated check but not statistically different from all the Medallion treatments. Compared to the untreated and inoculated control, disease severity was reduced 17% in the Medallion 50WP treatments applied 2X and 1X rates and in the commercial standard treatments. This reduction was only 8% in the Medallion treatment applied at the 1/2 X rate (Table 1.1).

At the assessment of made 33 days after application, disease incidence was numerically reduced by 12% in the Medallion treatments applied at the 2X and 1X rates and by 19% in the commercial standard treatment. Disease severity was significantly reduced by 33% in all fungicide treatments except in the Medallion 50WP treatment applied at the 1/2X rate, which significantly reduced disease severity by 20%, compared to the untreated inoculated check.

The assessment made 56 days after treatment showed a reduction of disease incidence in the range of 6, 12 and 19% in the Medallion treatments applied at 1X and 2X rates and in the commercial standard treatment respectively. Disease severity was reduced by 46%, 54% and 42% for the same treatments respectively. Half rate of Medallion applied only reduced 21% disease severity compared the untreated inoculated check.

An additional assessment was made at 92 days after application, when disease incidence reached 100% in all inoculated treatments. Disease severity was reduced by all fungicide treatments except in the treatment of Medallion applied at 1/2 X rate. Reductions were 22% and 31% for Medallion 50WP applied at 1X and 2X rate respectively. In the commercial standard treatment, the reduction was 19% only (Table 1.1).

Crop tolerance to Medallion 50WP drench application to the seeding medium was excellent as no crop injury or phytotoxicity was observed at any assessment date.

There was no significant difference in total yield between all inoculated treatments. Marketable yield was slightly increased by 9% and 4% in the Medallion 50WP treatments at 1X and 2X respectively, when compared to the inoculated untreated check.

Similar results were obtained in the efficacy trial conducted on 'Valentina' pepper cultivar (Table 1.2). At the first disease assessment made 12 days after fungicide application, all fungicide treatments significantly reduced disease incidence by 39% except in the Medallion 50WP treatment applied at the 1/2 X rate where reductions significantly were only 33%. In subsequent three assessments at 25, 32 and 56 days after treatment, disease incidence was reduced by 12% to 14% in the Medallion 50WP treatment at the proposed use pattern of 7.4 g product per 100 L (1X rate). Similarly, disease severity was reduced by 17% to 24% for the same treatment and period. By comparison, these reductions were 25% to 27% and 17% to 29% in the Medallion 50WP treatment at the 2X rate for disease incidence and severity respectively. In the commercial standard treatment, these reductions were 6% for disease incidence and varied from 17% to 24% for disease severity during the assessment period. In the additional assessment made of 92 days after treatment, disease severity was significantly reduced by 24% and 20% when Medallion 50WP was applied at the 1X and 2X rates respectively. Only a reduction of 12% was observed in the commercial standard treatment. Medallion applied at the ½ X rate showed little efficacy throughout the trial.

There was no report of crop injury or phytotoxicity in any treatment and at any assessment date. No significant difference in marketable and total yield was observed between all treatments including the untreated and non-inoculated checks.

The results of the third and final efficacy trial conducted using the pepper cultivar 'Fascinato' were similar to the previous two trials. Disease symptoms in the form of stem lesions appeared 9 days after inoculation. Disease pressure was relatively high as incidence reached 69% at 9 days after inoculation (Table 1.3). At the first disease assessment made, 10 days after treatment, all the fungicide treatments significantly reduced disease incidence when compared to the untreated and inoculated control. In the Medallion 50WP treatment at the proposed use pattern of 7.4 g product per 100 L, disease incidence was reduced by 72% equal to the commercial standard treatment (Table 1.3). At the 2X rate of Medallion 50WP, the reduction was 55%. Disease severity was reduced by 20% by all fungicide treatments except in the Medallion 50WP treatment applied at the 2X rate. In subsequent three assessments made at 23, 30 and 56 days after treatment, disease incidence and severity were reduced by 31% to 36% and 17% to 27% for the Medallion treatment at the proposed use pattern. By comparison, these reductions were 31% to 40% and 17% to 27% in the commercial standard respectively. There was no significant difference between all fungicide treatments at any assessment date during this period. Yield was generally higher in the treated plots than in the inoculated untreated control. However, no significant differences in marketable, unmarketable and total yield were observed between all treatments including the untreated ones. No phytotoxicity or crop injury was reported in any treatment.

The results of an additional efficacy trial conducted on an ornamental plant *Caladium hortulanum* (Florida Cardinal) in Florida (McGovern & Singh, 2003) showed that tubers immersed in Medallion 50WP solution at the concentration of 30 g product per 100 L significantly reduced the *Fusarium solani* tuber rot by 70% when compared to untreated control. Fusarium severity was also significantly reduced by 50%. No phytotoxicity or crop injury was reported.

In other efficacy trials conducted in growth chambers, Medallion 50WP applied to Lisianthus *Eustoma grandiflorum* (Maurine Blue) at the rate of 15 g product per 100 L significantly reduced Fusarium wilt caused by *Fusarium oxysporum* by 64%, completely prevented plant mortality and increased three folds the height of treated plants when

compared to untreated control (McGovern et *al*., 2001). In a similar efficacy trial on the same plant species as previously, Medallion 50WP applied at the same rate significantly reduced final disease incidence by 91% and final mortality by 93% (McGovern et *al*., 2001b). In an efficacy study on greenhouse asparagus for the control of Fusarium crown and root rot caused by *Fusarium oxysporum* f. sp. *asparagi* and *F. proliferatum*, Medallion 50WP treatment increased asparagus biomass and decreased root disease compared with inoculated control at low level of infection. Medallion 50WP treatment limited plant death caused by *Fusarium* spp. at high inoculum levels (Reid et *al*., 2002)

Discussion

The present efficacy trials were conducted using the wettable powder (WP) formulation of Medallion 50WP. However, this application is for the registration of the soluble concentration (SC) formulation of Medallion 50SC. Syngenta Canada has a submission under review by PMRA to bridge efficacy data generated with WP formulation to the SC formulation (Sub No 2012-5360) and once the SC is registered and the equivalence between the two formulations is established, Syngenta plans to transfer all uses on the Medallion 50WP label to Medallion 50SC label.

In Canada, several products are registered for the control of root rot in GH peppers and only Mycostop (PCP # 26266), a bio-fungicide that is specifically registered as a drench application to the substrate media for the suppression of *F. solani*. It requires repeated applications to reach reliable level of suppression and it is generally efficacious when applied preventively and under low disease pressures. Captan formulations (Captan 80WDG (PCP# 23691), Maestro 80DF (PCP# 26408), etc.) are registered for the treatment of GH peppers transplants, but not registered specifically for *Fusarium solani* and these products provide inadequate, poor to fair control of this disease. Basamid, a granular soil fumigant (PCP # 15032), is also registered for the control of soil fungi in greenhouse peppers but not specifically for the control of Fusarium rots caused by *F. solani*. In addition, the use of this product is very limited because of its toxicity to plants and the requirement of repeated germination tests before planting seeds in the treated soil. This compound is under re-evaluation by the PMRA and its use on GH pepper may be phased out in the near future. However, fludioxonil as a fungicidal active ingredient would be the best candidate for the control of Fusarium rots in GH peppers. Chase and Harris (2013) summarized fungicide tests for the control of Fusarium diseases on ornamentals and they found that Medallion 50WP (fludioxonil) provided the best control for various Fusarium diseases compared to other tested fungicides.

Fungicides applied to the growth media are considered a part of integrated strategies recommended for the management of Fusarium stem, fruit, crown and root rot diseases. Use of cultural practices including practices those to prevent free moisture or a nearly saturated environment, prevention of introduction or spread of disease within and between adjacent greenhouses and appropriate crop management practices are also important. Therefore, the registration of Medallion 50WP would provide a reduced risk fungicidal component for the management of this potentially damaging disease of peppers and other fruiting vegetables grown in greenhouses.

The presented efficacy data obtained in greenhouse experiments conducted under relatively high disease pressures generated by successful inoculation and the maintenance of optimal environmental conditions for disease development showed that Medallion 50WP applied once to the growing media constantly reduced the incidence and severity of *Fusarium solani* throughout the experimental period and increased yield

of marketable pepper fruit by 9 to 11% in two out of three efficacy trials conducted in Canada. In trials conducted elsewhere on ornamental plants and asparagus (McGover and *al*., 2001a and b, 2003, Reid et *al*., 2002), Medallion 50WP was found to reduce final plant mortality and to increase plant height and root mass. In addition, Medallion 50WP was found safe to apply as no crop injury or phytotoxicity was reported even when Medallion 50WP was applied at the 2X rate.

These results were obtained under conditions where the pathogen was physically introduced deeply into the plant bypassing the fungicidal barrier in the form of pellicle film that surrounds and protects the root system. Under normal natural infection conditions, it is reasonable to expect that Medallion 50WP performance would likely be improved greatly compared to the results obtained in the presented efficacy trials, after artificial inoculation with the pathogen in order to ensure disease pressure. *Fusarium solani* disease pressure would be expected to be lower as a fungicide application combined with sound cultural practices (Cerkauskas, 2001), which would effectively prevent or at least delay infection of treated pepper plants. Thus the integrated disease management would result in higher reductions of Fusarium stem and root rot incidence and severity and increase greenhouse pepper marketable yield.

Conclusion

The registration of Medallion 50WP would provide growers with a unique reduced risk fungicide to be integrated with other management strategies for the control of this increasingly important disease of greenhouse grown peppers.

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Table 1.1 Efficacy of Medallion (fludioxonil) for the control of Fusarium crown, stem and root rot in GH peppers (Continued on next page)
Crop: GH peppers (*Capsicum annuum,* cv. New Ace)
Pest: Fusarium rot caused by *Fusarium solani*

Trial Identification		Treatment	Rate		Spray		# of apps	Application timing	Application time	Performance assessments (% control)						
Trial Ref. No.	Author/ Year/ Location		g or ml product/100L	g a.i. per 100L	Conc. (g ai/L)	Volume (L/10m^2)				n	Disease incidence (%)	Disease severity (0-5)	Disease incidence (%)	Disease severity (0-5)	Disease incidence (%)	Disease severity (0-5)
							Date assessed				24-Jul-07		7-Aug-2007		20-Aug-2007	
							Days after treatment				-1 DAT		13 DAT		26 DAT	
AAFC07-021-146	D. Logeot/2007/ Minto, MB	Untreated & non inoculated check					1	beginning of branching, king flower visible but not open. Drench directed to pot media prior to house set	25-Jul-07	4	0,0 a	0,0 a	0,0 c	0,0 b	0,0 c	0,0 c
		Untreated inoculated check				100					0,0 a	0,0 a	69,0 a (0%)	1,1 a (0%)	100,0 a (0%)	1,2 a (0%)
		Medallion	7.4	3.7	0.037						0,0 a	0,0 a	0,0 c (100%)	0,0 b (100%)	75,0 ab (25%)	1,0 b (17%)
		Medallion	14.8	7.4	0.074						0,0 a	0,0 a	6,0 c (91%)	0,3 b (73%)	88,0 ab (12%)	1,0 b (17%)
		Medallion	3.7	1.85	0.0185						0,0 a	0,0 a	31,0 b (55%)	1,0 a (9%)	94,0 ab (6%)	1,1 ab (8%)
		Maestro 80DF	125	100	1						0,0 a	0,0 a	6,0 c (91%)	0,3 b (73%)	69,0 b (31%)	1,0 b (17%)

Disease incidence expressed as the percent infection per plot.

Disease severity was rated on each plant and averaged per plot on a 0-5 scale

Table 1.2 Efficacy of Medallion (fludioxonil) for the control of Fusarium crown, stem and root rot in GH peppers (Continued on next page)
Crop: GH peppers (*Capsicum annuum*, cv. Valentina)
Pest: Fusarium rot caused by *Fusarium solani*

Trial Identification		Treatment	Rate		Spray		# of apps	Application timing	Application time	Performance assessments (% control)						
Trial Ref. No.	Author/ Year/ Location		g or ml product/100L	g a.i. per 100L	Conc. (g ai/L)	Volume (L/10m^2)				n	Disease incidence (%)	Disease severity (0-5)	Disease incidence (%)	Disease severity (0-5)	Disease incidence (%)	Disease severity (0-5)
							Date assessed				25-Jul-07		7-Aug-2007		20-Aug-2007	
							Days after treatment				-1 DAT		12 DAT		25 DAT	
AAFC07-021-147	D. Logeot/2007/ Minto, MB	Untreated & non inoculated check					1	beginning of branching, king flower visible but not open. Drench directed to pot media prior to house set	26-Jul-07	4	0,0 a	0,0 a	0,0 c	0,0 b	0,0 c	0,0 c
		Untreated inoculated check				100					0,0 a	0,0 a	75,0 a (0%)	1,0 a (0%)	94,0 a (0%)	1,2 a (0%)
		Medallion	7.4	3.7	0.037						0,0 a	0,0 a	38,0 b (49%)	1,0 a (0%)	81,0 ab (14%)	1,0 b (17%)
		Medallion	14.8	7.4	0.074						0,0 a	0,0 a	38,0 b (49%)	1,0 a (0%)	69,0 b (27%)	1,0 b (17%)
		Medallion	3.7	1.85	0.0185						0,0 a	0,0 a	50,0 b (33%)	1,0 a (0%)	88,0 a (6%)	1,2 a (0%)
		Maestro 80DF	125	100	1						0,0 a	0,0 a	38,0 b (49%)	1,0 a (0%)	88,0 a (6%)	1,0 b (17%)

Disease incidence expressed as the percent infection per plot.
Disease severity was rated on each plant and averaged per plot on a 0-5 scale

Table 1.1 Efficacy of Medallion (fludioxonil) for the control of Fusarium crown, stem and root rot in GH peppers
Crop: GH peppers (*Capsicum annuum,* cv. New Ace)
Pest: Fusarium rot caused by *Fusarium solani*

						Yield			Comments
Disease incidence (%)	Disease severity (0-5)	Disease incidence (%)	Disease severity (0-5)	Disease incidence (%)	Disease severity (0-5)	Marketable (g/m^2)	Unmarketable (g/m^2)	Total (kg/ha)	
27-Aug-2007		19-Sep-07		25-Oct-07		25-Oct-07			
33 DAT		56 DAT		92 DAT		92 DAT			
0,0 b	0,0 d	0,0 b	0,0 d	0,0 b	0,0 c	4084 a	259 a	43425 a	No phytotoxicity or crop injury was reported in any treatment
100,0 a (0%)	1,5 a (0%)	100,0 a (0%)	2,4 a (0%)	100,0 a (0%)	3,2 a (0%)	2910 b (0%)	196 a (0%)	31063 b (0%)	
88,0 a (12%)	1,0 c (33%)	94,0 a (6%)	1,3 c (46%)	100,0 a (0%)	2,5 ab (22%)	3174 b (9%)	241 a (0%)	34150 b (10%)	
88,0 a (12%)	1,0 c (33%)	88,0 a (12%)	1,1 c (54%)	100,0 a (0%)	2,2 b (31%)	3025 b (4%)	270 a (0%)	32953 b (6%)	
94,0 a (6%)	1,2 b (20%)	100,0 a (0%)	1,9 b (21%)	100,0 a (0%)	3,3 a (0%)	2830 b (0%)	283 a (0%)	31125 b (0%)	
81,0 a (19%)	1,0 c (33%)	81,0 a (19%)	1,4 bc (42%)	100,0 a (0%)	2,6 ab (19%)	2800 b (0%)	258 a (0%)	30575 b (0%)	

Table 1.2 Efficacy of Medallion (fludioxonil) for the control of Fusarium crown, stem and root rot in GH peppers
Crop: GH peppers (*Capsicum annuum*, cv. Valentina)
Pest: Fusarium rot caused by *Fusarium solani*

						Yield			Comments
Disease incidence (%)	Disease severity (0-5)	Disease incidence (%)	Disease severity (0-5)	Disease incidence (%)	Disease severity (0-5)	Marketable (g/m^2)	Unmarketable (g/m^2)	Total (kg/ha)	
27-Aug-2007		20-Sep-07		26-Oct-07		25-Oct-07			
32 DAT		56 DAT		92 DAT		92 DAT			
0,0 c	0,0 c	0,0 c	0,0 c	0,0 b	0,0 d	3621 a	69 b	36900 a	No phytotoxicity or crop injury was reported in any treatment
94,0 a (0%)	1,3 a (0%)	100,0 a (0%)	1,7 a (0%)	100,0 a (0%)	2,5 a (0%)	2891 a (0%)	74 b (0%)	29650 a (0%)	
81,0 ab (14%)	1,0 b (23%)	88,0 ab (12%)	1,3 b (24%)	100,0 a (0%)	1,9 c (24%)	2880 a (0%)	171 a (0%)	30513 a (3%)	
69,0 b (27%)	1,0 b (23%)	75,0 b (25%)	1,2 b (29%)	100,0 a (0%)	2,0 c (20%)	2969 a (3%)	119 ab (0%)	30875 a (4%)	
94,0 a (0%)	1,2 ab (8%)	100,0 a (0%)	1,4 ab (18%)	100,0 a (0%)	2,3 b (8%)	2953 a (2%)	55 b (-20%)	30075 a (1%)	
88,0 a (6%)	1,0 b (23%)	94,0 a (6%)	1,3 b (24%)	100,0 a (0%)	2,2 b (12%)	3119 a (8%)	95 b (0%)	32138 a (8%)	

Table 1.3 Efficacy of Medallion (fludioxonil) for the control of Fusarium crown, stem and root rot in GH peppers (Continued on next page)
Crop: GH peppers (*Capsicum annuum* cv. Fascinato)
Pest: Fusarium rot caused by *Fusarium solani*

Trial Identification		Treatment	Rate		Spray		# of apps	Application timing	Application time	Performance assessments (% control)						
Trial Ref. No.	Author/ Year/ Location		g or ml product/100L	g a.i. per 100L	Conc. (g ai/L)	Volume ($L/10m^2$)				n	Disease incidence (%)	Disease severity (0-5)	Disease incidence (%)	Disease severity (0-5)	Disease incidence (%)	Disease severity (0-5)
							Date assessed				30-Jul-07		9-Aug-2007		22-Aug-2007	
							Days after treatment				-1 DAT		10 DAT		23 DAT	
AAFC07-021-149	D. Logeot/2007/ Minto, MB	Untreated & non inoculated check					1	beginning of branching, king flower visible but not open. Drench directed to pot media prior to house set	30-Jul-07	4	0,0 a	0,0 a	0,0 c	0,0 b	0 c	0,0 c
		Untreated inoculated check				100					0,0 a	0,0 a	69 a (0%)	1,0 a (0%)	81 a (0%)	1,2 a (0%)
		Medallion	7.4	3.7	0.037						0,0 a	0,0 a	19 b (72%)	0,8 a (20%)	56 b (31%)	1,0 b (17%)
		Medallion	14.8	7.4	0.074						0,0 a	0,0 a	25 b (64%)	1,0 a (0%)	50 b (38%)	1,0 b (17%)
		Medallion	3.7	1.85	0.0185						0,0 a	0,0 a	31 b (55%)	0,8 a (20%)	69 ab (15%)	1,0 b (17%)
		Maestro 80DF	125	100	1						0,0 a	0,0 a	19 b (72%)	0,8 a (20%)	56 b (31%)	1,0 b (17%)

Disease incidence expressed as the percent infection per plot.
Disease severity was rated on each plant and averaged per plot on a 0-5 scale

Table 1.3 Efficacy of Medallion (fludioxonil) for the control of Fusarium crown, stem and root rot in GH peppers
Crop: GH peppers (*Capsicum annuum* cv. Fascinato)
Pest: Fusarium rot caused by *Fusarium solani*

						Yield			Comments
Disease incidence (%)	Disease severity (0-5)	Disease incidence (%)	Disease severity (0-5)	Disease incidence (%)	Disease severity (0-5)	Marketable (g/m^2)	Unmarketable (g/m^2)	Total (kg/ha)	
29-Aug-2007		24-Sep-07		26-Oct-07		25-Oct-07			
30 DAT		56 DAT		92 DAT		92 DAT			
0 c	0,0 c	0 c	0,0 c	0 b	0,0 d	2765 a	210 a	29750 a	No phytotoxicity or crop injury was reported in any treatment
88 a (0%)	1,2 a (0%)	94 a (0%)	1,5 a (0%)	100 a (0%)	2,7 a (0%)	2443 a (0%)	210 a (0%)	26525 a (0%)	
56 b (36%)	1,0 b (17%)	63 b (33%)	1,1 b (27%)	88 a (12%)	2,1 bc (22%)	2703 a (11%)	168 a (-20%)	28700 a (8%)	
56 b (36%)	1,1 ab (8%)	63 b (33%)	1,3 ab (13%)	94 a (6%)	1,7 c (37%)	2709 a (11%)	169 a (-20%)	28775 a (8%)	
69 ab (22%)	1,0 b (17%)	81 ab (14%)	1,2 b (20%)	100 a (0%)	2,3 b (15%)	2806 a (13%)	135 a (-36%)	29413 a (11%)	
56 b (36%)	1,0 b (17%)	56 b (40%)	1,1 b (27%)	94 a (6%)	1,8 c (33%)	2681 a (10%)	96 a (-54%)	27775 a (5%)	