

# Great Lakes Fruit, Vegetable & Farm Market EXPO

December 9-11, 2008

DeVo Place Convention Center, Grand Rapids, MI



## Asparagus

**Tuesday morning 9:00 am**

**Where:** Grand Gallery (lower level) Room C

**Recertification credits: 1 (1B, PRIV OR COMM CORE)**

**CCA Credits: PM(0.5) CM(1.0)**

**Moderator:** Norm Myers, Oceana Co. MSU Extension

9:00 a.m. Managing Replant Suppression with Horticultural Strategies

- Mathieu Ngouajio, Horticulture Dept., MSU
- Buck Counts, Plant Pathology and Horticulture Dept., MSU

9:30 a.m. Michigan Asparagus Advisory Board Update

- John Bakker, Michigan Asparagus Advisory Board, Dewitt, MI

9:45 a.m. New Management Techniques for Fusarium and Phytophthora Control in Asparagus Production

- Mary Hausbeck, Plant Pathology Dept., MSU
- Brian Cortright, Plant Pathology Dept., MSU

10:25 a.m. Irrigation and Rye Living-Mulch in Asparagus Production

- Daniel Brainard, Horticulture Dept., MSU
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# NEW MANAGEMENT TECHNIQUES FOR *FUSARIUM* AND *PHYTOPHTHORA* CONTROL IN ASPARAGUS PRODUCTION

Mary K. Hausbeck, Professor and Brian Cortright  
Michigan State University, Department of Plant Pathology, (517) 355-4534

***Fusarium* and *Phytophthora* Effects on Asparagus Production.** *Fusarium* species and *Phytophthora* species can attack and kill asparagus crowns in both nursery and commercial fields. Both of these pathogens can be introduced early in the crown's life as small infections on either the crown or roots. Over a period of growing seasons and under the right weather conditions, heavy rainfall or drought, these early infections can spread to healthy parts of the crown and start the process of crown death. This process of disease spread on the crown occurs after planting (when the crown is no longer visible) making proper diagnosis of the problem difficult. The deterioration of the crowns can occur unnoticed over several years.

Both cultural and chemical controls have limitations in controlling these pathogens and have been mostly ineffective. Many of the commercial asparagus growing areas have large populations of these pathogens already in the soil. This fact coupled with the long growth cycle of the crop limits the effectiveness of crop rotation as a disease management tool. Research into tolerant varieties has been limited and no commercial lines are currently available for planting that show resistance to both pathogens. The practice of planting crowns deep into the soil limits the ability to apply chemical or biological control products at a site where they would be effective. Other factors that can limit the length of productivity of commercial asparagus fields include; drought stress, low pH that can favor the development of *Fusarium*, defoliation of the fern by purple spot and rust, and the use of herbicides that may stress the crown potentially increasing its susceptibility to disease.

A new system of asparagus production needs to be adopted to ensure that newly established fields remain viable and productive to allow for adequate return on establishment investment. This new system will rely on the use of clean crowns grown in properly fumigated fields. Additional measures for crown disease management are also needed to help lengthen field productivity. Crown soaks of effective chemicals will help limit disease on newly planted crowns. Fumigation of production fields will help reclaim fields that have high levels of disease. Controlling foliar pathogens with fungicides will ensure that summer foliage growth has time to recharge the crown for next harvest season. Proper rotation of crops and management of soil pH and soil moisture can help keep crowns vigorous and resistant to infection. Research has been and is currently being conducted on commercial farms to help growers become aware of the benefits of these disease control strategies.

**Fumigating Crown Nurseries.** Research from our previous studies has shown that both Telone C35 and metam fumigant products (KPam, Secatagon) are very effective in reducing *Fusarium* colonies in a commercial field (see Fig. 1). The studies also indicated that the highest concentration of disease causing organisms is located in the top 12 inches of the soil profile. Common application equipment is available that can apply both types of fumigants into the top layer of soil where the pathogens populations are the highest. Fumigants need to be applied under favorable environmental conditions (soil temperature

and moisture, soil texture, and adequate soil sealing) to ensure they remain in the soil at a high enough concentration to kill the target pathogens. Fall fumigation is preferred as both soil moisture and temperature are more suited for effective applications. Applications in fall also offer more time for field preparation and off gassing needed for crop safety, though minimum soil temperature should remain high enough to ensure effective treatment. Soils that are too cold can limit the amount of fumigant available to kill soilborne pathogens such as *Fusarium* and *Phytophthora*.

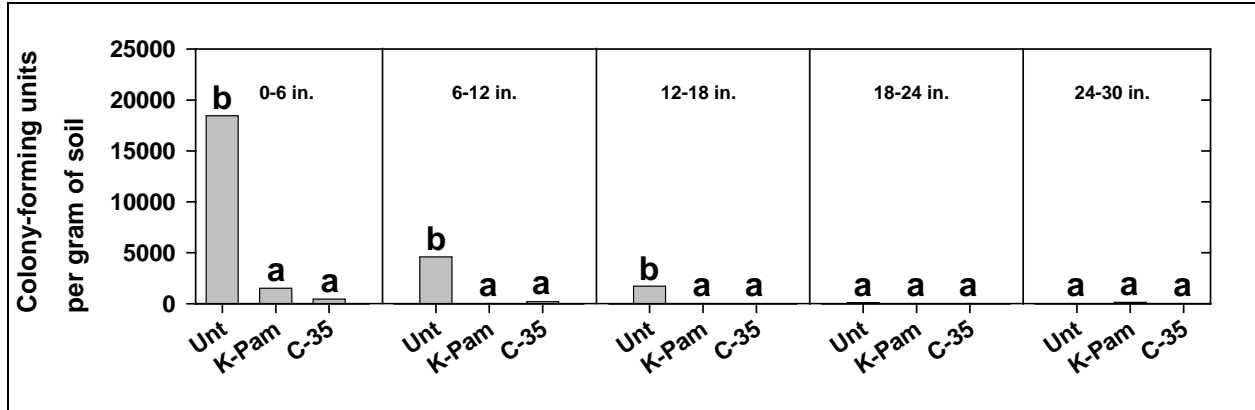


Figure 1. Colony forming units (CFU) of *Fusarium* in soil after fumigation.

**Crown soaks.** Even with the best fumigation application, disease levels will be reduced but not eradicated and may result in some diseased crowns used in a production field planting. Additional disease protection can be achieved using a crown soak of effective fungicides. Crowns should be soaked for a minimum of 10 minutes in a registered chemical solution before being planted in the field. Results from the past year's study shows that the registered product Cannonball has some activity on crown disease and can promote more spear production and taller fern (Table 1).

Table 1. Asparagus crown soak study for *Fusarium* crown rot.

Treatment and rate	Application	Mean height (in.)	Number of fern/20 ft
Untreated	--	24.9 ab*	68.8 b
Cannonball 50WP 0.1 oz/100 gal	crown soak	25.2 Ab	71.8 b
Cannonball 50WP 0.3 oz/100 gal	crown soak	24.2 B	70.3 b
Cannonball 50WP 0.5 oz/100 gal	crown soak	26.2 A	87.3 a
Cannonball 50WP 8.6 oz/acre	soil drench	25.9 A	69.3 b

\*Column means with a letter in common are not significantly different (Fisher LSD Method;  $P=0.05$ ).

Studies from 2008 (Table 2) shows that other products are also effective in promoting more fern growth compared to untreated crowns. The combination of Topsin M and Presidio had a significant increase in fern height compared to the untreated control. Another combination of Topsin M with Ridomil Gold gave a significant increase in the fern count compared to the untreated control. The combination treatments in this study give a broad range of control for both pathogens. Cannonball and Topsin M will target the *Fusarium* infections while Ridomil and Presidio will give control of *Phytophthora* species. Only Cannonball is registered for use as a crown soak and Ridomil Gold is registered as a broadcast application to production fields but not as a crown soak. Additional studies are needed on the other effective products before additional crop registrations for their labels can be pursued.

Table 2. Asparagus crown soak study from Oceana County, 2008.

Treatment (rate/100 gal)	Fern height (in.)		Fern count (20 ft)
	25 Jun	30 Jul	30 Jul
Untreated check .....	30.2 bc*	31.2 b	66.7 b
Cannonball 50WP 0.5 oz .....	31.7 ab	32.4 ab	69.0 ab
Topsin M 70WP 1 lb .....	31.5 ab	32.0 ab	74.0 ab
Ridomil Gold SL 1 fl oz .....	30.5 abc	30.9 b	71.7 ab
Presidio SC 4 fl oz .....	29.1 c	28.8 b	73.2 ab
Cannonball 50WP 0.5 oz + Ridomil Gold SL 1 fl oz .....	30.9 abc	31.6 ab	71.2 ab
Topsin M 70WP 1 lb + Ridomil Gold SL 1 fl oz .....	30.9 abc	30.1 b	79.2 a
Cannonball 50WP 0.5 oz + Presidio SC 4 fl oz .....	31.8 ab	30.9 b	75.5 ab
Topsin M 70WP 1 lb + Presidio SC 4 fl oz .....	32.8 a	43.4 a	78.0 ab

\*Treatments with the same or no letter are not significantly different (Fisher protected LSD;  $P=0.05$ ).

**Planning a cropping system for profitable asparagus.** Planting crowns grown in fumigated soil and that have also been soaked in a fungicide solution, are the two most important steps a grower can take to ensure a healthy field establishment. These two steps are the foundation upon which other practices can be built to help prolong the length of a production asparagus field.

Some replant fields may need to be fumigated before planting to reduce the level of disease populations. This type of fumigation will have to cover the entire field and should be viewed as a long term investment with the initial cost being spread over the years the field stays productive.

After the soil pathogens have been reduced via fumigation and crown soaks, each year's fern growth must be protected from both foliar pathogens and insects that can defoliate the plants. Asparagus miner larva tunnels can also allow the colonization of fern by the soilborne pathogen *Fusarium*. Long term crop rotation in combination with fumigation can help keep pathogen populations below economic threshold. Maintaining adequate soil moisture with a proper pH level allows the asparagus plant to thrive and resist infection. Herbicide applications and nitrogen sources are other production practices that may have an impact on asparagus health. Preliminary greenhouse studies are being conducted to determine the safety of commonly used herbicides on asparagus growth in both clean and infested soil.