

mushroomnews

April 2010



Pest Control

Effect of Spawn Type on Trichoderma Disease – Mark Spear

WPS Training: Do It Completely & Completely Document It – Jim Harvey

Microbes of Phase II – David M. Beyer & John A. Pecchia

mushroom NEWS flash

Volume 21 - Issue 4

April 2010

USDA Names Members to Council

Agriculture Secretary Tom Vilsack recently appointed three members to serve on the Mushroom Council. They started serving three-year terms in February and will continue until the appointment expires in December 2012. The newly appointed members are: James A. Angelucci, Naples, FL and Jim Howard, Cochranville, PA, Region 2; and Roberto Ramirez, Escondido, CA, Region 3.

Authorized under the Mushroom Promotion, Research and Consumer Information Act of

1990, the Mushroom Council, composed of fresh market producers or importers who average more than 500,000 pounds of mushrooms annually, administers a national promotion, research and consumer information program to maintain and expand markets for fresh mushrooms. USDA's Agricultural Marketing Service monitors the operations of the Council. More information about research and promotion programs can be found at <http://www.ams.usda.gov/fv/rpb.html> nf

OSHA Alliance News

The Occupational Safety and Health Administration (OSHA) Alliance was renewed in September for two more years. The Alliance Committee holds monthly meetings to develop safety programs on mushroom farms. The Alliance Committee has been working on site-specific programs. Current findings will be presented at the next general meeting on **April 29** from 1-4 pm at the Hilton Garden Inn, Kennett Square, PA. To reserve a spot at the meeting or to join the Alliance Committee, call the AMI Avondale office, 610/268-7483. nf

Sign Up!

Put your company name on the AMI Web site under

Industry Sources. Any grower or associate member may be included on the site but you need to contact AMI to let us know you want your company on the list. Email ami@mwmlaw.com to be included. nf

AMI Nominating Committee Set

The annual election for members of the AMI Board of Directors will be held by mail ballot in May. Please contact a member of the Nominating Committee if you are interested in serving on the Board. Committee members

include Ed Leo, Greg McLain, Don Hordness, Donna Silvestri Fecondo, Pete Gray, Charlee Kelly, Loyal Adams and Jack Reitnauer. New Board members will be announced after the annual meeting in June. nf

AMI Members Contribute To Haiti Earthquake Relief Fund

Monterey Mushrooms, Inc., Watsonville, CA, donated more than \$54,000 to the American Red Cross for the Haiti relief effort in February. Monterey's employees contributed \$26,520 and President Shah Kazemi matched the contribution. Associates at Highline Mushrooms farms in Leamington and Kingsville, Canada also donated to the earthquake fund. Collections from employees so far total more than \$11,000 with the company matching each donation. All donations collected will go to the Canadian Red Cross. nf



Mushroom Import Report Compiled from Department of Commerce Trade Data Services
Washington, D.C. – Reporting Month **December 2009**

	DEC. 2009 KILOGRAMS	2009 YTD KILOGRAMS	DEC. 2008 KILOGRAMS	2008 YTD KILOGRAMS
Fresh, Agaricus	2,585,469	27,343,753	2,384,300	25,684,990
Fresh, NESOI*	604,382	4,991,164	436,881	4,615,135
Whole < 225 g	126,437	1,296,847	188,251	2,219,840
Sliced < 225g	651,610	3,309,085	279,691	4,432,562
NESOI* < 225g	1,607,412	14,097,744	1,163,487	16,477,654
Whole > 225g	24,949	712,511	19,424	937,712
Sliced > 225g	104,877	3,709,824	186,102	5,065,976
NESOI* > 225g	1,894,457	25,597,649	1,625,027	36,115,840
Total Classified by Container Weight:				
< 225g	2,385,459	18,703,676	1,631,429	23,130,056
> 225g	2,024,283	30,019,984	1,830,553	42,119,528
Total by Container Weight:	4,409,742	48,723,660	3,461,982	65,249,584

* Not Elsewhere Specified or Indicated

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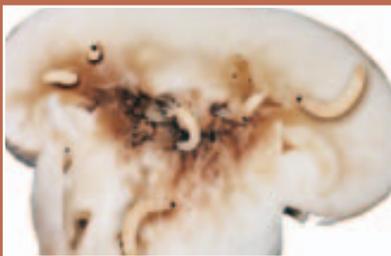
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There's Always Something New to Learn – Sara Manning, *Mushroom News* Editor

The *AMI Member Alert* highlights pesticide label changes used in mushroom production. All the information can be found on the AMI Best Practices Web site.

Effect of Spawn Type on Trichoderma Disease by Mark Spear shares results of a recent research project. Past studies reported that the grains used for spawn manufacture could supply food for the disease. For this research, *Trichoderma* was added directly to non-grain and reduced-grain spawn to see if outbreaks would occur. Study procedures, results and discussion as well as five conclusions are specified.

Jim Harvey explains the essentials of the Worker Protection Standard in *WPS Training: Do It Completely and Completely Document It*. Pennsylvania trainers must have a current state pesticide license. Options for accomplishing the instruction include using the Penn State video or the han-

dlers and workers manual. The article discusses components of the WPS training including having a central location for information, time frame for employee training, restricted entry requirements and protective equipment storage.

"Microbes of Phase II" is the topic of David M. Beyer and John A. Pecchia's *The Penn State Lines* column. Microbes that grow in Phase II compost like it hot and can survive in tight, dense compost. Various organisms in the compost provide food for growth while others compete for food and may cause disease. Phase II management is a difficult procedure due to weather fluctuations, compost quality or cultural problems. Competitor molds sometime appear as black spots on the compost. The authors are interested in isolating microbes from these spots to learn how they grow in substrate.

Energy Alert by Dennis E. Buffington explains what will happen when electricity deregulation takes hold at the end of 2010. He considers 12 questions that will impact mushroom growers in Pennsylvania. Answers on PECO rates changes, cost of electricity, purchasing options and homework to do before contacting a supplier are summarized.

The Big Ten conference is known for major sporting competitions but the one described in the *Mushroom Council Update* concerns a different kind of contest. During late fall and early winter, the chefs and foodservice directors from the Big Ten engaged in a friendly competition to create mushroom recipes in three categories. Check out the winning dish.

Also this month, *New Members* has a list of new growers and suppliers. *Industry News* highlights produce safety efforts of governmental agencies. Finally, the *NAMC Update* describes the first planning session of the conference committee held recently in New Orleans, LA. **mn**

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The AMI Board and 21st NAMC Planning Committee gather to discuss plans for next year's conference.

Letters to the editor- THE MUSHROOM NEWS welcomes letters to the editor from its readers on subjects of interest to the mushroom industry. All contributions to this department must bear the writer's signature and address and should be sent to Letters to the Editor, American Mushroom Institute, One Massachusetts Ave., NW Suite 800, Washington, DC 20001

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Monitor Pesticide Label Changes on the Web

Each year AMI staff and consultants update the Integrated Pest Management section of the AMI Best Practices Web site to reflect changes in labels and Material Safety Data Sheets (MSDS) for fungicides, insecticides and sanitizers used in mushroom production.



**MEMBER
ALERT!**

The following changes were made in late 2009:

FUNGICIDES	INSECTICIDES	SANITIZERS
Bravo Weatherstik® New Label & MSDS	Apex® - New Label & MSDS	Maquat 10 – New label
Mertect® 340-F –New Label & MSDS	Evergreen® Crop Protection EC 60-6 – New label & MSDS	Oxidate, Storox – New label
Jazz – New MSDS	Pyganic® Crop Protection EC 1.4 Spray – New MSDS	VigorOx F&V – New label & MSDS
	Pyganic 5.0 – New label & MSDS	1-Stroke Environ – New Label & MSDS
		Safetray P– New label & MSDS

If you use a product that is not listed above, there have been no changes to the label or MSDS since the last update in late 2008. However, changes can occur at any time. Proper labeling, use and storage of potentially hazardous chemicals is a component of the Mushroom Good Agricultural Practices (MGAP) program. All chemicals must be labeled, used according to the manufacturer's instructions, and stored in a safe manner so that chemical contamination of mushrooms is prevented. All relevant government regulations relating to

the application, use, or holding of these products should be carefully followed. Standard 10.1-10.3 outlines the requirements. The guidelines state: Material Safety Data Sheets and chemical labels should be available for inspection by all employees, and Material Safety Data Sheets and Chemical labels are included under Records. See www.mgap.org for more information.

AMI staff urges you to visit the AMI Best Practices Web site regularly for the most current information. [mn](http://americanmushroom.org/bestpractices_IPM.htm)

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Effect of Spawn Type on Trichoderma Disease

Trichoderma Compost Disease remains economically important more than 15 years after its unwelcome appearance. Since then, we have learned how to combat outbreaks with pesticides, improved sanitation and more selective compost. But disease losses continue, so more needs to be done.



Mark Spear, Ph.D.

Sylvan America

mspear@sylvaninc.com

Acknowledgments

This trial would not have been possible without the materials and interest supplied by Brian Angelucci and Joe Poppiti.

Fletcher, Grogan, Royce and others have reported that the grains in grain spawn can serve as a food source for *Trichoderma*. Non-grain and reduced-grain spawn formulations have been developed and marketed. We wanted to see if non-grain spawn or reduced-grain spawn would reduce disease outbreaks even when *Trichoderma* spores are added directly onto the spawn particle.

In order to obtain relevant results, compost and *Trichoderma* were taken from an eastern Pennsylvania mushroom farm. However, we would have to survey many more farms before we could be sure of the same results in every situation.

Conclusions

No *Trichoderma* was isolated from un-spawned mushroom compost after spores were added and incubated for two weeks.

Spawn run compost with or without grain can host "cryptic" *Trichoderma* infestations. In this context cryptic is used to describe living, recoverable *Trichoderma* colonies in spawn run that don't turn green or produce visible spore masses or readily discernable mycelial colonies.

Unprotected grain in compost helps turn cryptic infestations into full blown *Trichoderma* Disease outbreaks.

Reduced-grain spawn (Nexus) was not effective in reducing *Trichoderma* Disease outbreaks.

Tubs inoculated with both grain-less spawn (Matrix) and *Trichoderma* spores did not produce visible *Trichoderma* Disease outbreaks.

Procedure

Tubs were filled on Day 0 and scored on Day 16. Each tub got 400g compost. Each tub that got spawn got 5g. Millet spawn and Matrix were commercially prepared. All tubs were incubated at 82°F.

Trichoderma preparation was as follows: On Day -10 an eastern Pennsylvania grower was visited and a newly formed green colony obtained. The colony was used to inoculate three plates containing MEA plus antibiotics. Pure cultures of *Trichoderma aggressivum* var. *aggressivum* were isolated from these plates on Day -5. On Day 0 a pure *Trichoderma* colony was washed with 15 ml of sterile water to make a spore suspension. The spore suspension was diluted 1:10 to make a green spore stock. Each treatment requiring *Trichoderma* spores received 0.5 ml of green spore stock squirted directly onto a spawn particle on the surface of a freshly spawned tub. Small aliquots of the green spore stock solution were diluted and spread on MEA plates for germination and counting. Final calculations indicate that each tub receiving *Trichoderma* got approximately 1,500 spores.

On Day 17 the surface of each tub was sampled using a Rodac plate containing MEA plus antibiotics. Plates were incubated at room temperature for three days and resultant colonies were examined microscopically to identify *Trichoderma*.

Results & Discussion

Compost from eastern Pennsylvania was used to prepare the following treatments: no



Figure 1: Spawn Run Results

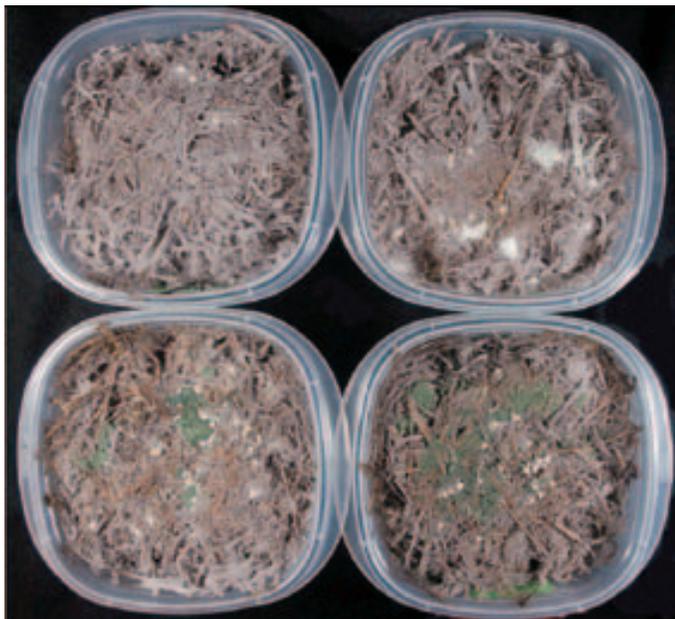
Treatment Name	Agaricus Colonization	Trichoderma Colonization
No spawn	0,0,0	0,0,0
No spawn & Trich	0,0,0	0,0,0
Millet Spawn	3,3,3	0,0,0
Millet Spawn & Trich	3,3,3	0,2,3
Matrix	3,3,3	0,0,0
Matrix & Trich	3,3,3	0,0,0
Nexus	3,3,3	0,0,0
Nexus & Trich	3,3,3	2,0,0

spawn, no spawn plus *Trichoderma*, millet spawn, millet spawn plus *Trichoderma*, Matrix, Matrix plus *Trichoderma*, Nexus, Nexus plus *Trichoderma*. Each treatment was carried out in triplicate.

After incubation, no *Trichoderma* colonies appeared in any tub where *Trichoderma* spores were not deliberately added. No *Trichoderma* colonies appeared in Matrix tubs. *Trichoderma* colonies showed up in the millet spawn and Nexus tubs where inoculated. See Figures 1 and 2.

After spawn run, surface samples (agar plates) were taken from all tubs to look for cryptic *Trichoderma* infestations. No *Trichoderma* colonies were recovered from the “no spawn plus Trich” treatment. This suggests that *Trichoderma* does not grow freely in un-spawned compost. It also argues that *Trichoderma* recovered from other treatments came from active *Trichoderma* colonies, not

Figure 2: *Trichoderma* colonization reference: Top Left =0 meaning no Trich visible, Top Right = 1 or weak Trich colony, Bottom Left =2 or Strong Trich colonization, Bottom Right =3 or Very Strong Trich growth.



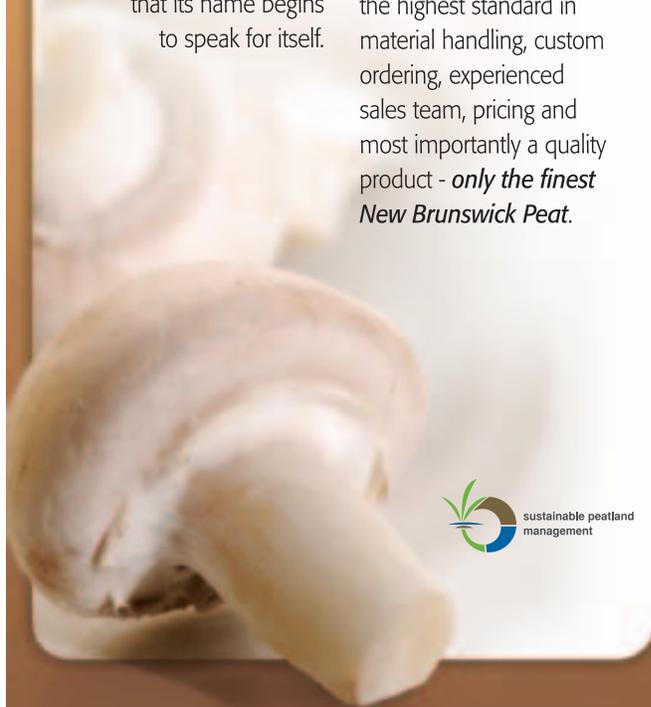
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Figure 3: Summary of spawn run results and surface sampling results.

Treatment Name	Trich Added	Trich on Tubs	Trich on Plates
No spawn	-	0,0,0	0,0,0
No spawn & Trich	+	0,0,0	0,0,0
Millet Spawn	-	0,0,0	0,0,0
Millet Spawn & Trich	+	0,2,3	2,3,3
Matrix	-	0,0,0	0,0,0
Matrix & Trich	+	0,0,0	1,0,1
Nexus	-	0,0,0	0,0,0
Nexus & Trich	+	2,0,0	3,1,0

just the original inoculum re-isolated. See Figure 3.

Several pots inoculated with spawn and *Trichoderma*, but showing no visible *Trichoderma* colonies after spawn run, produced surface sample plates with *Trichoderma* colonies. This suggests that cryptic *Trichoderma* colonies exist and can coexist with *Agaricus* without producing obvious symptoms during spawn run.

Even tubs inoculated with *Trichoderma* and non-grain spawn showing no symptoms after spawn run produced weak *Trichoderma* colonies on surface sampling plates. This is evidence that cryptic *Trichoderma* infestations do not require grain. The tubs inoculated with grain spawn and *Trichoderma* produced either weak or strong *Trichoderma* colonies in surface samples.

Non-grain (Matrix) tubs were the only *Trichoderma* inoculated tubs with

Example Surface Sample Plates

Millet Spawn:

Top row left: Pot = 0, Plate = 0;
 Top row right: Pot = 0, Plate = 0;
 Bottom row: Pot = 0, Plate = 0



No Spawn plus Trich:

Top row left: Pot = 0, Plate = 0; (Note, colony is not *Trichoderma*)
 Top row right: Pot = 0, Plate = 0;
 Bottom row: Pot = 0, Plate = 0



Matrix & Trich:

Top row left: Pot = 0, Plate = 1
 Top row right: Pot = 0, Plate = 0
 Bottom row: Pot = 0, Plate = 1



Millet Spawn & Trich:

Top row left: Pot = 2, Plate = 3
 Top row right: Pot = 0, Plate = 2
 Bottom row: Pot = 2, Plate = 3



good spawn run and no gross *Trichoderma* symptoms. This great reduction in *Trichoderma* spore production

should decrease on-farm disease pressure even if low-level cryptic colonies may still be present. mn

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WPS Training: Do it Completely & Completely Document it

In the November issue of *Mushroom News*, Ray Samp wrote about the sin of "coveting the cultural practices of other growers." This same "commandment" could apply to the Worker Protection Standard (WPS) regulation. Different growers have different situations and different strengths and weaknesses, so they need to fulfill the WPS requirements using a formula that works for them. Now, having said that, please remember that you **STILL** need to fulfill all the requirements of the WPS.

Jim Harvey

Worker Protection Specialist
Penn State

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814/863-8656

Let's put it another way. Do you remember in ninth grade math class when you not only had to have the right answer but you had to have the right formula to go with it? The WPS is concerned with the right answers but the formula can vary.

Media for Training

For example you can train employees using any Environmental Protection Agency (EPA) approved media such as the Penn State mushroom WPS video or the DVD remake that will come out later this year in high definition. You can use a flipchart or even the lowly handlers or workers workbook. The important thing is that you do that training, do it completely and document

it by having the trained employee sign off on it. You will need that sign off form on file for a WPS inspection. Your WPS pesticide training is currently good for five years from date of training.

Any employee going into production areas where it has been less than 30 days since the end of the last restricted entry interval falls under the WPS. This applies only to employees going into those growing areas. Once the product leaves the actual growing areas, it is no longer under the WPS. If you have packers who pack the mushrooms and never go into the growing areas to pick or collect mushrooms, they are not subject to the WPS.

Pesticide safety training is one of the WPS protections. Don't let any employee go into any



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growing area under WPS without this training. If you can't give an employee the full training on day one, just take them to the required EPA poster at your central location, read over it, identify the area as the central location and show them where decontamination supplies are located. In five minutes you have bought yourself five days that they can work before you absolutely must give them the full training. Don't let employees go into those production areas without at least the basic safety training. Don't forget that training must be done in a language that the employee understands.

For those of you in Pennsylvania make sure that your trainer has a current state pesticide license. Growers in other states might have more options for trainers so check with your local cooperative extension office or department of agriculture for clarification on what qualifications your state allows for trainers.

Central Locations

Central locations are an important part of the WPS. They need to be located in a spot that is always accessible to the employees. Lunchrooms or spots by a time clock are ideal. Many mushroom growers have widely dispersed growing areas thus the question: Do I need more than one central location? The answer is dependent on where your employees start work each day. If the employees all start at a central point each day and disperse from there, only one central location is needed. In situations where employees go directly to disperse locations at the start of the day, then you need central locations at those dispersed start points.

Your central location must have the required EPA poster and it must be fully filled in with the hospital information

and the state lead industry, which in Pennsylvania is your regional PDA office. You must also keep the required pesticide records posted here for at least the previous 30 days following the end of the last restricted entry interval. Yes, you can still keep pesticide records on your double doors but you still need them at the central locations.

Occasionally a grower might post an extra EPA poster in the facility in locations such as the pesticide storage. It's not a good idea. Although most inspectors in Pennsylvania are OK with this practice, there have been occasions when growers were told to remove the extra poster as it confuses employees about where the central location is. Other states might take a more stringent view of this practice too. There are other pesticide safety posters that you can place in these extra locations to remind employees about pesticide safety.

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Are you using sanitizers in the growing areas? If they have an EPA registration number or agricultural use statement on the label, they are subject to the WPS. Don't forget to list them on your pesticide records at the central location.

If you are using a pesticide that requires posting a no entry sign for the Restricted Entry Intervals (REI) be sure not to put that sign up any sooner than 24 hours in advance and be sure to take down the signs within three days after the end of the REI. You cannot use these signs as no trespassing signs.

Decontamination Materials

Don't forget your decontamination materials. Handlers need access to at least three gallons of potable water, soap and single use towels and an emergency change of clothes such as overalls at the mix and load site where PPE is taken off, and within a

quarter mile of the application site. If a handler is working with a pesticide that requires eye protection then the handler needs to have at least a pint of immediately available eyewash with them just in case. Some states such as Pennsylvania will accept fresh water. Workers need at least a gallon of potable water, soap and single use towels. With indoor plumbing, water is rarely a problem in the mushroom industry but a lack of single use towels seems to be a common problem in many mushroom operation inspections.

Occasionally, the question is asked, "Can we install air dryers in place of single use towels?" Although this would eliminate the issue of maintaining towel supplies, officials both in Pennsylvania Department of Agriculture and the EPA have said that air dryers are **not** mentioned in the regulation so they are not considered acceptable as substitutions for single use towels.

Personal Protective Equipment

Another common area of concern is Personal Protective Equipment (PPE) being left in the pesticide storage area. The WPS requires PPE to be stored in a clean place – not with pesticides. Unfortunately it is very easy for an employee to forget a pair of gloves in the pesticide storage so be sure to constantly remind employees to leave the PPE in its proper place.

If violations are found during an inspection, count on being re-inspected within a year, as inspectors are required to come back and make sure that you have corrected the problems.

It is easy to stay in compliance with the WPS. If Pennsylvania growers need help with any aspect of the WPS, contact me for free compliance assistance and for a copy of the new Penn State WPS training DVD for mushrooms. The DVD will be completed and available later this year. **mn**

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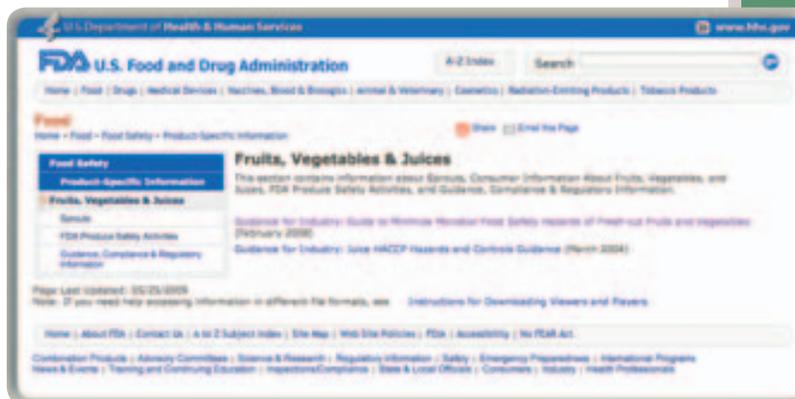
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FDA Requests Suggestions on Produce Safety Regulations

The Food and Drug Administration (FDA) is requesting information about current practices and conditions for the production and packing of fresh produce and practical approaches to improving produce safety. FDA is making this request in order to provide an opportunity for interested parties to provide information and share views that will aid in the development of safety standards for fresh produce at the farm and packing house and strategies and cooperative efforts to ensure compliance.

"U.S. Department of Agriculture (USDA) and FDA are working together to achieve the goals of enhancing the safety and quality of fresh produce in ways that take into account the wide diversity of farming operations. We are committed to leveraging the expertise of our partner agencies and working together to ensure that our current produce safety and quality activities are complementary and consistent," government officials said in a statement announcing the opening of the docket.

While USDA's Agricultural Marketing Service (AMS) is in the midst of evaluating a proposed marketing agreement for the leafy green industry, the FDA is currently developing a proposed produce safety regulation. FDA notes that it expects the regulations will take into account the diverse nature of farming operations and that any marketing agreement would conform to any regulations that may



be promulgated by FDA. There are 14 general categories for which the FDA asks for input.

FDA encourages all interested persons to submit information they believe will inform the development of safety standards for fresh produce at the farm and packing house, as well as strategies and cooperative efforts to ensure compliance with those standards. The American Mushroom Institute will be submitting comments and welcomes suggestions from its members for items to include. [mn](#)

For Further Information:

Federal Register Notice:

<http://edocket.access.gpo.gov/2010/pdf/2010-3409.pdf>

FDA Produce Safety Activities page:

<http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/FruitsVegetablesJuices/FDAProduceSafetyActivities/default.htm>

"How to Comment on Proposed Regulations":

<http://www.fda.gov/RegulatoryInformation/Dockets/Comments/default.htm>

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MGAP Training Held on West Coast

In early February, 40 West Coast growers from 12 farms attended a food safety training session in Morgan Hill, CA, with a focus on the implementation of the Mushroom Good Agricultural Practice (MGAP) program. The session was led by Sergio Nieto-Montenegro of Hispanic Workforce Management and Kim Snyder of Monterey Mushrooms. USDA Auditor Tony Souza was also on hand to outline the auditing process. A farm tour followed at Countryside Mushrooms in Gilroy. [mn](#)

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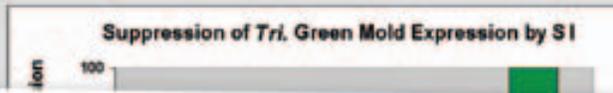
PROJECT OBJECTIVES

- ✓ Should give a faster spawn run than current grain products at the same rate.
- ✓ Should demonstrate disease resistant characteristics.
- ✓ Should be able to be used in all compost types.
- ✓ Should be cost effective to produce.
- ✓ Should be able to be produced using existing production facilities.
- ✓ Should be easy to distribute.

MATERIAL SAFETY DATA SHEET

LAMBERT

Summary of Trial Data of SI Suppressing Green Mold Expression



R&D PROJECT SUMMARY

DATE: For Immediate Release

RE: Synthetic Inoculum

Virtually all *Agaricus* mushroom spawn currently used worldwide is based on a grain substrate technology that was first taught by Sinden in 1932. Lambert's Synthetic Inoculum (SI) provides an effective alternative to grain spawn and incorporates characteristics that may be advantageous to the grower.

Green Mold Suppression - Use of SI offers significant protection against *Trichoderma*. Research has shown that the presence of soluble carbohydrate from grain spawn contributes to the growth of the virulent *Trichoderma* in the compost. Since the SI contains little starch or other readily available carbohydrate, the use of this formula was found to reduce the incidence and severity of the green mold disease. Controlled tests have shown that the incidence of *Trichoderma* is reduced by up to 87% when SI is used to spawn the compost, and up to 65% when used in combination with regular grain spawn.

Faster Spawn Runs - Use of SI offers the possibility, either singly or in combination with regular grain spawn, of reducing the total spawn run time. SI is nutritionally formulated for optimal performance in compost, and contains significantly more colonized particles per unit weight than grain spawn. When mixed with the compost, they efficiently inoculate the mushroom substrate. As a result, the time to achieve full growth through the compost is reduced. In pilot trials, spawn run was perceived to be complete within 10 days with the SI. In contrast, the grain spawns generally required 14 days to achieve a similar level of growth. A 35% SI and 65% grain blend reduced the duration of the spawn run by 2 days when compared to 100% grain spawn.

Efficacy In All Compost Types - The SI was designed to be used in a wide variety of compost formulations and conditions. Data shows it to be equally effective in compost prepared traditionally or in tunnel systems.

LAMBERT

Contact your Lambert Technical Representative to discuss how Synthetic Inoculum can maximize productivity in your operation.



Microbes Of Phase II

Many naturally occurring organisms are found in the raw materials that are used in substrate preparation. Organisms too small to see with the unaided eye and can only be seen with a microscope are called microscopic organisms or microbes. Bacteria, fungi and actinomycetes are only a few of the many types of microbes that exist in compost. Although they inhabit a different environment, microscopic organisms need some of the same things people need to survive. Food, water and air (oxygen) are the necessary requirements for these microbes.



David M. Beyer, Ph. D.

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However, many organisms cannot readily adjust to changes in the surrounding temperature where they live; microbes will only grow and survive within a particular temperature range. Most beneficial microbes that survive pasteurization and grow during Phase II composting are thermophilic; in other words, they are heat-loving microbes growing at temperatures roughly between 115° and 145°F (46-63°C).

The actinomycetes grow in higher temperature ranges (~ 130°-145°F) but convert compounds only in a defined surface area around their colony. The thermophilic fungi grow better in the lower temperature ranges (~ 115°-130°F), and their growth is more like spawn, filamentous and able to grow into tight, dense compost. Some of these organisms can be considered “beneficial microbes” that provide food for the mushroom. These microbes use up left-over Phase I residual carbohydrates and convert ammonia and other nitrogenous compounds into protein for the mushroom. This conditioning of the compost makes it selective for the

mushroom and not for its competitors. The dead bodies of these microbes also contain nutritious fats and oils that the mushroom requires. Others are “unfavorable microbes” that compete for food or may cause disease. The mushroom grower has the job of caring for the good microbes and eliminating the bad microbes.

Phase II objectives, pasteurization and conditioning seem simple to accomplish regardless

Figure 1: Black spots at the end of spawn run.



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of the system; whether it's in beds, trays or bulk tunnels. However, anyone who has tried managing a Phase II may recognize it is one of the most difficult procedures in growing mushrooms. Because of weather variations, compost or other cultural problems, growers sometimes have to change their Phase II programs. For example, with shorter, dense compost it is very important to favor the growth of the thermophilic fungi for a longer time so they can penetrate the tight dense areas of compost. Phase II may be managed more than one way, however when changes have to be made, the objectives in managing the activity of the good microbes should remain constant.

Being vigilant to the four basic needs (food, water, oxygen and temperature) of the microbes during Phase II will most often solve any conditioning problems and minimize the growth of competitor or weed molds. When the basic requirements are not managed properly, such as not ensuring enough oxygen during Phase II or not obtaining adequate pasteurization temperatures, problems will arise.

Some of the beneficial microbes growing during Phase II use other types of food besides ammonia. If this non-ammonia food is not completely used during Phase II, competitor molds or weed molds may use these readily available compounds to grow and develop. Not only may these undesirable molds be a visual concern, it also means there is less food available for the mushroom. A common sign or symptom of inadequate conversion is the appearance of "black spots" during the spawn run (Figures 1 and 2). These spots often suggest that compost in that "lump" was either not in a conditioning temperature range long enough, was too wet, (therefore oxygen deprived) or too much nitrogen was available to be fully converted by the



Figure 2: By lifting the plastic these black spots are easy to find.

microbes in the time allowed during the Phase II.

We are interested in trying to isolate microbes from these black spots, so if you have any, please send us a confidential email (dmb8@psu.edu; jap281@psu.edu) so we can arrange to collect a sample. A better understanding of how these microbes grow and work in compost substrate should make the management of Phase II a little easier. **mn**

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Frequently Asked Questions About Deregulation of Electricity Generation

For more than a decade I have been saying, "Deregulation of electricity generation is around the corner." Now it really is! At the end of 2010, the deregulation will be completed throughout the state of Pennsylvania. Then what happens? Each customer of electricity from the investor-owned utility companies in Pennsylvania will have the opportunity to shop for an electricity supplier. Actually, many of you have that opportunity already but there are not many suppliers who are able to compete with the utility companies while the legislated price caps hold down electricity prices to near the 1996 levels. But the price caps expire when the deregulation of electricity generation is completed at the end of 2010.



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Over the years I have been asked many questions concerning the deregulation of electricity generation, and I will answer some of the more common questions in this article.

How Will the PECO Rates Change?

Many of the familiar rate features of the PECO tariffs will be eliminated for the generation charges in 2011 and others will be phased out over the three-year period 2011-2013. The rate features being eliminated or phased out include:

- Declining block rates (2011-13)
- Demand charges (2011-13)
- Demand ratchet (2011)
- GS winter heating rates (2011-13)
- Night service rider (2011)
- Interruptible/Load Reduction (2011)
- Competitive transition charges (2011)

Please note that the above rate features will be eliminated in 2011 or phased out 2011-13 only for the generation charges. The above rate features will continue for the foreseeable future for PECO's distribution charges.

How Much Will the Electricity Cost?

Ask the different suppliers. It is likely that different suppliers will have different pricing strategies. The more common strategies anticipated are:

- Flat rate
- On-Peak and Off-Peak rates

- Real-Time Pricing (RTP)
- Day Ahead Real-Time Pricing
- Block and Index
- Combinations of the above

If you do not choose a supplier, then PECO will continue to provide your electricity at PECO's pricing terms.

What Are My Purchasing Options?

The options will be different depending on your customer classification.

Options for Large C & I Customers (> 500 kW demand)

- Contract with an alternate retail supplier
- Receive default service from PECO at day-ahead hourly prices
- Receive default service from PECO at fixed price per kWh (for 2011 only)

Options for Residential and Small C & I (< 500 kW demand)

- Contract with an alternate retail supplier
- Receive default service from PECO at fixed price per kWh

Where Will My Electricity Come From?

The same place it comes from now – the same wires, poles, transformers, substation, and PJM grid.

Who Will I Call When the Electricity Is Off?

PECO. It does not matter who you select as your supplier of electricity, PECO will continue

to be responsible for the restoration of your electrical service at all times. This service from PECO is required as part of the company's responsibilities as the electric distribution company throughout its territory.

Will I Get One or Two Bills for Electricity Each Month?

It depends. If you are considering alternate suppliers, ask each company if you can get one combined bill or separate bills from PECO and your selected supplier.

What If My Selected Supplier Cannot Provide All the Electricity I Need?

PECO - your "Wires Company" - serves as your default supplier or Provider of Last Resort (POLR) in all situations. However, the price you will pay for the electricity will be based on PECO's pricing strategy, not the price you had negotiated with your sup-

plier. There may be any number of reasons that your supplier will not be able to provide all your electricity needs. Maybe your supplier will go "belly up" or the supplier will not have the capacity to provide all of your electricity needs during peak periods. Whenever PECO becomes your default supplier because your selected supplier cannot meet your needs, then PECO will continue to be your supplier until you select another supplier. PECO may have a required minimum waiting period before you can select an alternate supplier.

What Happens If I Don't Shop for an Electricity Supplier?

Nothing! PECO will continue to serve as your default supplier or POLR. But the PECO electricity price

may be higher than a supplier's price. At this time, it is anticipated that there will not be much difference in PECO's price and the prices offered by various suppliers for 2011.

Who Are the Suppliers?

Go to PA Public Utility Commission Web site: <http://www.puc.state.pa.us/utilitychoice/listofsupp.aspx?ut=ec>

Suppliers are listed at the site in the two categories - residential and commercial/industrial. There are frequent changes to this list of suppliers, so check the site often.



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What Homework Should I Do before Contacting a Supplier?

First of all, make sure you know your electricity consumption patterns (kWh consumption and kW demand) for each month over at least the past year. Your objective needs to be to make your electricity account look as attractive as possible. Steps to take include:

- Manage kW demand for electricity
- Evaluate on-site generation capabilities for load curtailment/interruption rates
- Take advantage of the lead-time you have between now and the end of 2010
- Establish and maintain a good record of paying electricity bills on time

Just How Can I Manage My kW Demand for Electricity?

- Calculate your load factor,
 $L F = kWh \times 100 / (kW \times \text{Days in billing period} \times 24)$
- Determine when peak demand is occurring
- Stagger large loads during periods when peak demand is likely to be reached

- Shift loads to off-peak periods
- Use high efficiency equipment (pumps, fans, HVAC, lights, etc.) and use proper amounts of insulation
- Provide proper maintenance of the equipment to preserve high efficiency of operation
- Use on-site generator(s) to shave demand peaks

What Else Should I Do?

- Compare the prices of various energy sources on the basis of dollars per million BTUs
- Establish multi-fuel flexibility for your large uses of energy
- Don't focus on using less energy. Rather your focus should be on optimizing your energy use to increase profitability and net cash flow

Contact me by e-mail at dbuffington@psu.edu if you have any additional questions or concerns about how you can prepare for the impact of deregulation of electricity generation on your farm. **mn**



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The Dr. James W. Sinden Scholarship Committee is pleased to announce the availability of its scholarship award. The Committee awards one or more scholarships to a graduate student or students conducting dissertation research involving edible mushrooms and/or other edible fungi including but not limited to plant pathology, entomology, agricultural and biological engineering, food science, crop and soil science, forest resource science, environmental science and horticulture at an accredited college or university within the United States. Priority will be given to commercially edible fungi research.

The fund has been established in the name of Dr. Sinden in recognition of his outstanding contributions to the science and industry related to commercial mushroom growing. The scholarship is awarded on the basis of merit and not on financial need or regional considerations.

*Applications will be accepted until May 1, 2010.
The applicant will need to supply the following:*

- ✓ Undergraduate & Graduate Transcripts
- ✓ Four letters of recommendation – two of which should be from persons familiar with the applicant's academic record

- ✓ Results of the Aptitude Section (quantitative and verbal) of the Graduate Record Examination, including dates taken
- ✓ One page statement of the thesis research project and career plans
- ✓ List of current scholarships or grants, if any, to support research activities
- ✓ List sources of financial support (current and anticipated sources)

For more information or to receive an application, call the AMI Avondale office, 610/268-7483 or email, mushroomnews@kennett.net **mn**

Science & Technology Articles

Mushroom News publishes a series of peer reviewed scientific articles entitled, "Science and Technology" which deals with all aspects of adaptive and basic research on edible mushrooms. Papers to be published in this category are reviewed for scope, merit, originality and style by a panel of scientists knowledgeable in the discipline. Only those research papers judged to be of the highest quality and scientific merit will be accepted for publication.

Since the inception of the series in Jan. 1996, 17 papers have been reviewed. Researchers from Argentina, Canada, England and the United States have published works on topics that range from pest control to spent mushroom substrate (SMS) disposal.

We hope the original papers presented in the Science and Technology series help scientists working in the field share information and help growers improve production techniques.

Guidelines for Submission of Manuscripts

Authors who are interested in publishing with a refereed status should submit manuscripts directly to:

Dr. Peter Romaine
Editor in Chief *Mushroom News*, Science & Technology
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University Park, PA 16802 • USA

For inquiries: 814/865-7132 • Fax: 814/863-7217 • e-mail: cpr2@psu.edu

Mushroom News "Science and Technology" is interested in publishing scientific papers dealing with research on the biology, molecular biology, genetics, physiology, pathology, pests, nutrition, economics and cultivation of edible mushrooms. Submission of a manuscript to *Mushroom News* "Science and Technology" implies that the work is original and unpublished and is not being considered for publication elsewhere.

Manuscripts must be accompanied by a cover letter specifying the name, mailing address, telephone and fax numbers, and, if available, e-mail address of the corresponding author.

Manuscripts must be typed and double-spaced with one-inch margins on one side only of unruled white paper. Submit three complete copies of each manuscript, including figures and tables and a complete copy on a CD disk in Microsoft Word text format.

Manuscript Must Be Organized In The Following Sections

- 1: Title Page:** Include title of the paper, name, affiliation and institutional address of each author.
- 2: Abstract:** Summary of the content of the paper in 250 words or less.
- 3: Introduction**
- 4: Materials & Methods**
- 5: Results**
- 6: Discussion**
- 7: Acknowledgments**
- 8: References**— Arranged alphabetically by 1st author

Publication of a "Correspondent Footnote" will be by request and should include the name, address, phone and fax numbers and e-mail address of the corresponding author. **mn**



Mushroom Council Ignites Big Ten Culinary Competition

With eyes on the university market and intention of expanding its presence among collegiate foodservice leaders, the Mushroom Council tapped into relationships fostered at the 2009 National Association of College & University Food Services (NACUFS) annual conference to develop the "Best Mushroom Recipe Goes to Indianapolis" contest among Big Ten Conference foodservice directors.

Hosted from November 30, 2009 through February 15, 2010, the contest pitted executive chefs and foodservice directors from the 11-school conference against each other in a friendly competition to create mushroom recipes for three categories of university-favored cuisine: Pizza, Sandwich and Entrée. The entries were first narrowed down to 15 finalists (five in each category). In the final round of judging, students at Kendall College's School of Culinary Arts in Chicago prepared tasting portions of each recipe for a judging panel that included Bart Minor, Mushroom

Council president; Liz Grossman of Plate magazine; and Frank Chlumsky, chef instructor at Kendall. Recipes were judged based on creativity, flavor and visual appeal.

Purdue University won two of the three recipe categories. The Boilermakers' recipe for Vegetarian Mushroom Stir Fry won for the entrée category and best overall dish, earning them the grand prize, which includes a trip for four to the NCAA men's national basketball championship in Indianapolis this April. Purdue also received honors for their Roasted Portabella Pizza recipe. The University of Iowa's Chorizo Breakfast Sandwich with Mushroom Gravy scored best in the sandwich category. As category winners, both schools will receive scholarships to attend NACUFS this year.

The college and university market represents a particularly attractive foodservice division for the mushroom industry and this contest served as a means of increasing mushroom awareness among influential college and university foodservice members. Aside from its \$12.4 billion opportunity in retail sales, this market boasts a higher-than-average incidence of vegetarianism (7-8 percent versus 4 percent, according to Executive Chef Martin Breslin of Harvard Dining Services) during a critical time period when diners establish lifelong eating habits and preferences.

This year's experience primes the Council as a strategic partner and resource for similar opportunities in the future among other university and college groups. The Council has planned a similar contest for the PAC-10 later in 2010.



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- 1 CUP + 2 TABLESPOONS CORNSTARCH
- 3/4 CUP VEGETARIAN SOUP BASE

STIR-FRY

- 5 LBS. FRIM TOFU, DRAINED,
cut into triangles (1/2 x 1 1/2 inches)
- 3 LBS. DRY RICE STICK NOODLES
- 1 1/2 CUPS VEGETABLE OIL
- 1/4 CUP MINCED GARLIC
- 1/2 CUP MINCED PEELED GINGER
- 6 LBS. SLICED SHIITAKE MUSHROOMS, *cleaned*
- 1 1/2 LBS. SLICED CARROTS, *blanched & drained*
- 5 LBS. CHINESE BROCCOLI, *cleaned & cut into
4-inch pieces, blanched & drained*

To make the sauce: Whisk together the oyster sauce, sugar, soy sauce and sesame oil. Bring to a simmer. Whisk together the water, cornstarch and soup base. Combine with the oyster sauce mixture and heat until slightly thickened. Remove from the heat. Makes about 6 1/2 quarts.

Heat a deep fryer until 375°F to 400°F. Deep-fry the tofu triangles in batches until golden brown, turning once. Drain on paper towels. Set aside.

For each serving, to order: In a deep fryer, cook 1 1/2 ounces rice stick noodles until puffed but not browned. Drain on paper towels. In a wok, heat 2 tablespoons oil over high heat. Stir-fry 1/2 teaspoon garlic and 1 teaspoon ginger until fragrant. Add 4 ounces mushrooms and cook for 1 minute. Add 1 ounce carrots, 2 1/2 ounces broccoli, and about 2 ounces fried tofu. Stir-fry to heat through, 1 minute. Add about 1 cup sauce mixture and simmer until heated through. Put the rice sticks in a bowl and ladle the vegetables and sauce on top. Serve immediately, serves 24.

Recipe courtesy of Purdue University and mushroominfo.com

AMI Offers Cookbook For Sale

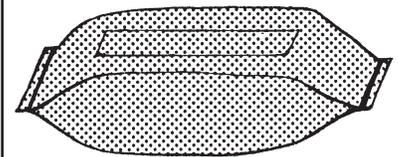
The Mushroom Lovers' Cookbook contains recipes ranging from appetizers to low-calorie dishes to a section dedicated solely to specialty mushrooms. Also included in the cookbook's 196 pages are helpful hints for cooking with mushrooms, nutritional facts and a history of the mushroom industry.

The cookbook is a collection of original recipes from people involved in the mushroom business as well as recipes from international restaurants and chefs. Throughout the book are hand-drawn sketches and illustrations that create a fun, family cookbook.

The price for each cookbook is \$10. Discount prices are available for large quantity orders. Please contact the AMI Avondale office, 610/268-7483, for further information.



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21st NAMC Committee Holds Planning Meeting in New Orleans

The 21st North American Mushroom Conference (NAMC) planning meeting took place in February at the conference site, The Roosevelt Hotel in New Orleans, LA. Under the direction of 21st NAMC Chairman Joe Caldwell, the AMI Board and Committee members toured the historic hotel and decided on guest accommodations, meeting rooms, Expo space and banquet facilities.

The Roosevelt has been in operation for more than 100 years. It has recently been renovated from top to bottom and stands at the heart of the history, cuisine, entertainment and culture that makes New Orleans famous. Just past the hotel's brass doors are the narrow streets and old-world charm of the French Quarter. With the St. Charles and Canal streetcar lines within blocks of The Roosevelt, the rest of New Orleans is just a few steps away.

Conference Committee Chairs have been selected and the program planning process is in the works. Each month we will bring news of speakers, events and activities scheduled. We'll highlight the historic city and suggest ways to enjoy the sites when you're not listening to important topics to help your business or visiting the Expo. If you have ideas to share, we welcome your involvement. Just give us a call at the AMI Avondale or Washington office.

There is a saying in New Orleans: *Laissez Le Bons Temps Rouler = Let The Good Times Roll*. This is going to be a great conference – it will be a lot more fun if you join us! **mn**

Participating in the planning meeting were:

Sitting (left to right): Pete Gray, Louise D'Amico, Carla Blackwell McKinney, Curtis Jurgensmeyer, Joe Poppiti, Charlee Kelly.
 Standing (left to right): David Iaconi, Jaime Keating Klco, Deena Iaconi, Kim Siebecker, Don Needham, Bill Barber, Chris Alonzo, Bob Darm, Joe Caldwell, Bart Minor, Laura Phelps, Dave Knudsen.



Mardi Gras Revelers



Producing Safe Mushrooms



Food Safety Tools Available

In an effort to help mushroom farms implement a Mushroom Good Agricultural Practices (MGAP) plan, the American Mushroom Institute (AMI), in cooperation with Penn State and Hispanic Workforce Management, has developed a number of food safety tools. We encourage you to utilize these tools in your workplace.

www.mgap.org

MGAP Website

The newest AMI website, mgap.org, is devoted to the Mushroom Good Agricultural Practices (MGAP) program. The website was designed to help make the development and implementation of a MGAP program on your farm as easy as possible. The website includes all of the latest MGAP information and materials.

Food Safety Training Kit (FSTK)

The Mushroom Industry Food Safety Training Kit (FSTK) was developed for production supervisors, quality control Personnel, extension agents, and/or industry consultants who wish to conduct food safety training at mushroom farms or packing houses. The full kit includes hard copy and electronic versions of the lessons in English and in Spanish. In addition, the kit includes PowerPoint slides, posters and other companion documents.



Hard copies of the FSTK may be ordered. Visit www.mgap.org for more information.

Food Safety Posters

These brightly colored, easy to read posters can be displayed around your company to remind employees of important food safety rules. There are seven different 11x 17 posters in English and Spanish. They can be ordered individually for \$5 each or you can purchase a set of seven for \$25. For more information visit www.mgap.org



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2010

April 20 - 23

United Fresh 2010 • Las Vegas, NV • 202/303-3400

June 13 - 15

52nd Annual Penn State Mushroom Industry Conference
The Nittany Lion Inn • State College, PA • 877/778-2937

July 25 - 27

World Congress of Industrial Biotechnology 2010
Dalian, China • www.bit-ibio.com

August 1 - 6

9th International Mycological Congress
Edinburgh, Scotland • www.imc9.info

Oct. 6 - 10

37th Australian Mushroom Growers' Conference
Perth, Western Australia • www.mushrooms.net.au

Oct. 15 - 18

PMA Fresh Summit • Orlando, FL • www.pma.com

2011

February 17 - 19

21st North American Mushroom Conference
The Roosevelt Hotel, New Orleans, LA

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