

THE

SPAWN RUN

journal of the
South African
Mushroom Farmers'
Association

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DECEMBER 2015

FROM THE EDITOR

In the last few months I have become increasingly frustrated and depressed by “bad news”.

In my attempt to keep up to date with current events by subscribing to online news feeds, I am finding myself less and less interested in the perpetual barrage of death, destruction, scandal and ignorance.

Reading the news, one cannot help but feel that the world is on a collision course with its own propaganda and negativity. And while there resides in me a fear of being oblivious, I recently decided to seek out some good news. It

turns out it was not too difficult to find and the stories of hope, discovery and love are without doubt far more edifying than the usual. I quickly find myself weighing up the value between the two sides and while hanging on either is not constructive, I think I found, at least for myself, what inspires hope.

While problems abound, it is the overcoming or conquering of the obstacles that makes the difference between good and bad news and if one is exposed to balanced versions of the two, suddenly it does not seem as if you are staring into an abyss of hopelessness.

Included in this issue, is one such article. While it lacks the warm and fuzziness one might expect of a feel good story, it is relevant to our industry in

that it shows how remarkable and diverse our fungal friend is.

As we enter the festive season I truly hope it proves to be a time of good news for all our readers and partners and that in one way or another represents some sort of victory.

On behalf of the Spawn Run I would like to thank all our readers, contributors and partners for your support throughout the year and to wish you all a happy and blessed time ahead.

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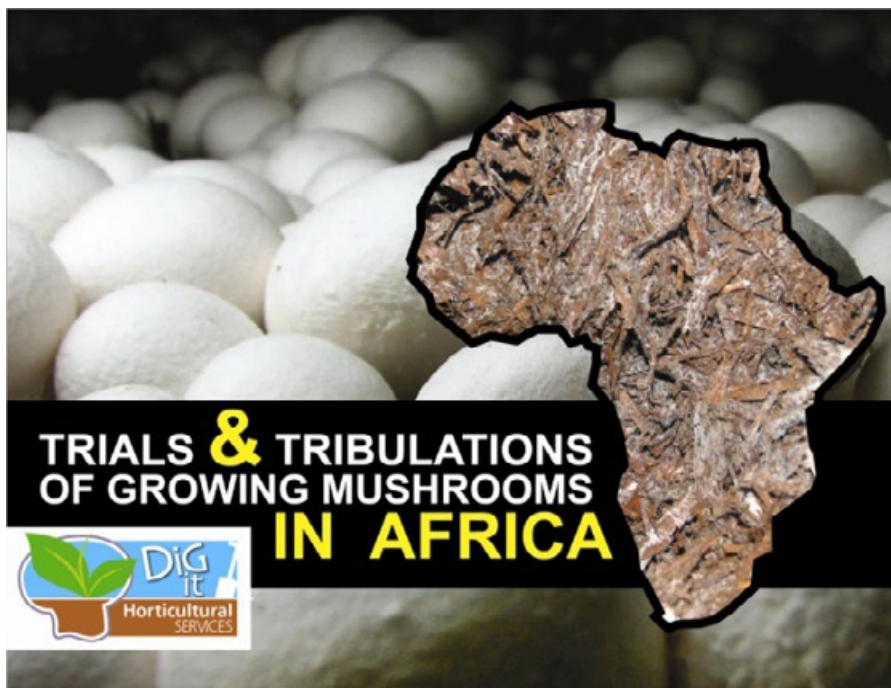
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By Mel Meyer,
Dig it Horticultural Services

After being asked to submit an article on my presentation at the last SAMFA conference, I told Nathan that this would not be a problem. Oops, mistake number 1! First of all, for those that were not at the conference, the presentation was very visual and utilised nearly 80 photos taken over many years. The next mistake is simply the fact that I would not even be able to fit the introduction of my article into the entire Spawn Run due to the lengthy nature of challenges with regards to growing mushrooms in Africa. Maybe I should rather get on with writing that novel instead...

Distant Africa remains for me a wonderful place to travel to. Yes, there are plenty of challenges - political, financial, cultural and others, but one thing you are certain to receive is true great smiley African hospitality. And don't worry if you suddenly have the need to purchase a mobile phone. There are a gazillion shops selling and repairing phones and supplying airtime. This multibillion dollar industry has infiltrated Africa in a big way. The only sad reality is that many households waste a lot of funds 'topping' up this almost addictive new trend of the modern world.

I suppose the best place to begin is at the beginning. The raw material challenges come to mind. Here in South Africa we have become so used to picking up the phone and ordering another load of straw or chicken manure. In central Africa, let's take Rwanda for example, it is a process of making sure there are enough sickles to go around. The next step would be to negotiate the entire process, from climbing the hill to descending the hill, to paying the organiser enough for him to take his 'cut' before paying the carriers who brought it down. Everything involves a lot of planning and patience, especially considering that most of the raw materials will be carried on someone's head, often over great distances (figures 1 & 2).



Fig. 2: Straw negotiation takes on a whole new meaning

The chicken manure follows much the same process, the only difference really, would be once you have it in your hands, what to do with it and how much does one really require for an ideal compost 'make-up' – there isn't always an analysis laboratory to rely on. In some cases there is, but be prepared to have some of that patience left to wait for one's results. The other thing that I have also found is that the previously almost 'unwanted' raw material begins to soar in price once a demand is established and this can be to the tune of 500%. Supplementing with other nitrogen sources also becomes ridiculously pricey.



Fig. 1: Straw carried long distances

The compost making process has its challenges at the best of times even in a first world country, but normal challenges are enhanced by the lack of equipment, water and often electricity.



Fig. 3: Hand mixing on a Zimbabwean farm

I have experienced these issues personally. Hand mixing remains an alternative on many of these sites (figure 3). Mushe Mushrooms in Zimbabwe did this with great success. Despite these challenges, more often than not, very good mixing is achieved.



Fig. 5: 44 Gallon drum boiler

On certain sites we have ventured into building our own aerated bunkers which have proved very effective (figure 4). It has also assisted us with the overall homogeneity of the compost that often has to be made with very variable straw. Again the main reasons for doing it this way has been the depleted local currencies versus the dollar. To import materials and equipment would just cost too much.

Peak heating of the pasteurisation phase is often done with the use of boilers which rely on wood as fuel. In Rwanda, where they were involved in the making of spawn for oyster mushroom growing, the boiler is simply a

few 44 gallon drums in which water is boiled to generate steam which is then used to pasteurise the substrate (figure 5). There is often a 'boiler man' that stokes the fire during the night. The cooled down substrate is then inoculated, incubated and then sent to 'out growers' to grow the final product. These 'out growers' have to be trained to achieve acceptable yields. Once again, having the substrate analysed at spawning on a regular basis is not always possible.

Many small farms rely on the spawning process to be carried out by hand (figure 6). This works well most of the time, but creating a mind set to main-

tain a high standard of hygiene remains an on going challenge on many sites. Training is made available constantly to deal with educating the staff.

The importation of spawn into certain African countries poses a huge challenge going forward. Due to the poor currency values as opposed to the American Dollar, importing spawn is by no means a cheap or simple logistical matter. Some growers have therefore begun to dabble with a bit of their own spawn making. We all know that this carries many risks, especially if not well managed.

Fig. 6: Spawning by hand out of a Pasteurisation tunnel



Casing materials have to be imported into most African countries. With the advent of alternatives such as Mabu (local (South African) alternative to peat), this may assist in combating

Fig. 4: Locally built aerated bunkers



Fig. 7: Peat preparation



Fig. 8: Nice heavy but “breathable” structure



almost mandatory. As these items do not fit the farmers' everyday budget, they are not always available and pose a huge risk upon the success of the business.

General drought conditions in Africa, as experienced on the Namibian farm I visited, plays a tremendous role in the way that one starts to appreciate the continuous supply of water which is often considered as a ‘normal’ raw material. Huge focus is placed on recycling and managing water resources to assist with the ongoing sustainability of the site.

The general supply of labour does not seem to pose too much of a threat on the business as the availability of this resource does not seem to be a huge issue. The challenge however, on these smaller facilities seem to be the ongoing

inefficiencies of the labour force, which as we all know, can have its own debilitating effects on the sustainability of the farm. Unfortunately a large proportion of the labour force is uneducated and this can prove challenging when one is training toward achieving a more multi-skilled staff environment.

Great distances are a fundamental factor in Africa. Everything seems to have to come from extremely far away. Simple things like punnets, “oh we’ll phone Bill to bring a thousand tomorrow”- forget it, it aint going to happen. Careful planning is required to keep all the sprockets turning.

Talking of sprockets or cogs, the challenges of managing a ‘well oiled’ mechanically inclined department does not come easily on many sites in Africa. One has to ensure that there are one or more members of staff that possess an aptitude for mechanically related issues. These, often isolated farms, have to be as self sufficient as possible. It is not as simple as phoning Joe Blogg’s plumbing down the road to come check out the plumbing of the toilet, but more like “today I need to get my hands seriously dirty”. I have found that it is extremely useful to have a staff member that can weld in a reasonable fashion. Many an extra-

this issue, but one cannot avoid the huge extra costs in getting the peat from harbours to inland areas. The fundamentals of peat management and preparation remain the same no matter where one is growing, hygiene and attention to water being the most important. Generally we try and achieve a fairly heavy peat with ample porosity and “breathability” (figures 7 & 8).

The African continent has huge challenges in respect of electricity, and it is for this reason that the acquisition of a generator becomes



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neous cost can be avoided if utilising in-house skills (figures 9 & 10).

As mentioned earlier, one would need to write a novel if one truly attempts to delve deep into African growing challenges, but I trust this small insight has enlightened you of the wonders,

opportunity and tribulations that Africa offers.

They are as diverse as the landscapes and cultures. I truly believe that there is opportunity in the more remote areas of Africa, it is just one's perception, passion and dreams that make one re-

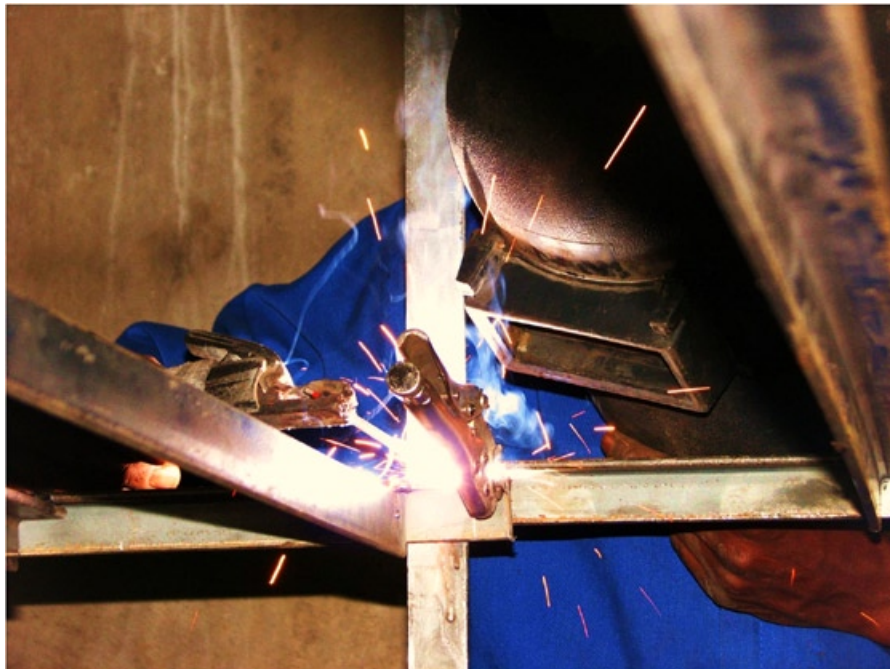


Fig 9: A trained welder on site is very handy



Fig 10: Even the owner has to fix his own pump

alise that opportunity does exist and that it is merely a case of understanding the means of tapping into Africa's hidden potential. One often forgets that we too are part of this immense continent.



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IMPORTANT DATES ON THE MUSHROOM CALENDAR

The 8th International Workshop on Edible Mycorrhizal Mushrooms (IWEMM8)

8th – 14th February 2016

Cahors, France

<http://www.iwemm8-cahors.com>

FEBRUARY

DLV Plant Mushrooms Short Course

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APRIL

2016

19th International Society for
Mushroom Science (ISMS) Congress &
34th Mushroom Days

29th May – 2nd June 2016, at the Muziekgebouw, Amsterdam, The Netherlands

1st – 3rd June 2016, Hertogenbosch,
The Netherlands

www.isms2016.com

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JUNE

2016

Australian Mushroom Growers Association Conference

13th – 16th October 2016

Mildura, Australia

www.mushrooms.net.au/amgaconference/home/

OCTOBER

The 9th International Conference on
Mushroom Biology and Mushroom Products (IC-MBMP9)

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ISMS 2016 AND THE MUSHROOM DAYS

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The International Society for Mushroom Science's 19th Congress and the 34th Mushroom Days will be held in Amsterdam and Hertogenbosch, The Netherlands, from the 29th of May until the 3rd of June 2016. This is surely the mushroom event of the year or even the past 4 years, where both the ISMS and the suppliers to the industry unite to provide a scientific and trade show double bill.

The ISMS congress provides the visitor with the latest scientific information on research and other projects specific to mushroom growing. The Mushroom Days is the largest trade show for mushroom equipment suppliers,

boasting over 83 exhibitors and attracting over 2,200 visitors from more than 62 countries.

This extravaganza of mushroom science and -business has been designed to provide the visitor with the ability to combine the two events into an action packed couple of days that will check all the boxes in any mushroom farmer, scientist or supplier's life.

As we know from past conferences the value of attending events like this far surpasses the cost in time and money as the information learned and benefits derived, continue to provide returns into the future. You cannot place a price on the international exposure that will be gained, especially

when we are often caught up in our farms' hectic day to day humdrum activities only focussing on the crisis for the day.

Direct flights to Amsterdam are available from Johannesburg and so getting to the event is by no means a concern.

You can Save €150 by registering on or before the 31 December 2015 so don't delay and visit www.isms2016.com for all registration details and additional information that you may need.

Visit [www.http://www.champignondagen.nl/](http://www.champignondagen.nl/)

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FORD AUTO PARTS MADE OF MUSHROOMS, RATHER THAN PLASTIC

Eben Bayer of Ecovative announced a new partnership with Ford to create compostable car parts from mushrooms.

Instead of wasting an enormous amount of energy and oil to make plastic or styrofoam, the New York-based start-up uses agricultural waste to create biodegradable parts and packing materials.

The fungus-based parts for Ford — automotive bumpers, side doors and dashboards — will be fireproof and waterproof. Best of all, if buried in soil they would decompose within one month.

His 26-year-old co-founder and chief scientist, Gavin McIntyre, says, “You would be able to compost your car.”

Ford, which already uses soy-based foam for seat cushions, wants to replace about 30 pounds of petroleum-based foam per car with eco-friendly alternatives.

The positive effects of biodegradable materials on our environment would be huge. Every time a consumer discards the white packing material cushioning their new TVs and computers, 1.5 li-



tres of petroleum are wasted (per cubic foot of styrofoam). This white stuff is filling our landfills, comprising fully 25 percent of materials dumped there, according to the EPA.

Computer-maker Dell, with its goal of eliminating 20 million pounds of packaging material from its shipments by the end of 2012, announced this week that it will use Ecovative's mushroom-based packaging to ship a line of its computer servers. In 2009, the company began using bamboo to cushion some of their elec-

tronics.

The eco-friendly packing material is just as sturdy as traditional foam, says Dell — and just as economical, according to Ecovative. Visit their website for more information:

www.EcovativeDesign.com.



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FOOD SAFETY ASSURANCE IN THE MUSHROOM INDUSTRY (PART I)

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Article Series:

Part I: Food safety assurance in the mushroom industry

Part II: Some important aspects regarding food safety

Part III: New challenges and special topics

Abstract

Implementing basic food safety systems in the mushroom industry is a pre-requisite for continued industry growth, maintaining market access, compliance to minimum standards and ensuring basic product safety. Although all standards and requirements currently implemented have food safety as its main objective, none address the specific needs of the mushroom industry. Multiplication of required standards is a further characteristic of the modern food landscape and industry is financially obliged to carry the cost of implementation and certification. The costs and benefits of these multiple standards have not been considered in the zest for safe and wholesome food as-

surance. This article provides a critical overview of multiple food safety assurance standards and requirements and poses the question if it is truly meeting its objectives of ensuring a safer product. It also provides a cost benefit approach to food safety assurance and proposes a MushroomGap for the industry that contains all the elements of Globalgap, HACCP and ISO 22000.

Introduction

Globally there has been a shift away from processed foods to fresh wholesome products. In addition, the consumer has become more sophisticated and demanding not only of high quality but also non-negotiable product safety

and a larger variety of produce supplied throughout the year at low prices. This has inevitably put pressure on retailers to procure the best quality products at the lowest prices. Most importantly, it has empowered retailers to demand compliance with their own or preferred quality and safety standards. With increasing global trade, retailers can now source food products from around the world and often deal directly with large commercial enterprises. Fresh produce markets had to re-invent themselves and now no longer play the role of the central delivery point for fresh products. Retailers on the other hand have built sophisticated distribution networks in continuous extended chains. This has



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obviously put tremendous strain on the system requiring products to stay fresh for longer periods as the product moves through this chain. Without effective cold chain management, product quality cannot be maintained nor safety assured. It is therefore essential that all role players are committed to maintain quality and prevent product contamination through effective Best Practices.

In South Africa, the major retailers require compliance with Globalgap certification or their own in-house quality standard. This is mainly due to the fact that most fresh produce farmers in South Africa export mainly to the European Union (EU). International retailers require Globalgap certification and in some cases also BRC (British Retail Consortium, <http://www.brc.org.uk/>) or Natures Choice (Tesco's own standard, <http://www.tescocorporate.com/>). This has prompted local retailers to follow suit and demand GlobalGap or their own standard from their suppliers. For exporting producers it provided an easy solution and prevented further proliferation of compliance to additional voluntary standards. However, for the non-exporters it required compliance to a more stringent standard than the national regulatory GAP (South African Food Safety Standard for Primary Production Areas Standards regarding Food Safety and Food Hygiene of Regulated Agricultural Products of Plant Origin destined for Export, <http://www.nda.agric.za/>).

For the South African mushroom industry it provided special challenges. Neither the previous version of the GlobalGap for Fruits and Vegetables, nor the Integrated Farm Assurance was adequately suitable for mushroom production. It was therefore decided to develop with the South African Mushroom Farmers Association (SAMFA), the National Regulatory and Standards authority (South African Bureau of Standards), the Department of Agriculture Forestry and Fisheries (DAFF) and representative retailers a National Mushroom GAP standard that can be benchmarked with Globalgap and the National Regulatory GAP. The aim

was to provide a more suitable alternative for the industry and avoid compliance to multiple standards.

Global Production

White button mushrooms is the most cultivated and consumed mushroom type globally (Largeteau & Savoie, 2010). The production and consumption of edible mushrooms has grown continuously during the last fifteen years (Royse, 2001; Boa, 2004). Total commercial mushroom production worldwide has increased more than 12 fold in the last 46 years, from 634 878 tons (1976) to 7 719 364 tons in 2011 (FAOSTAT, 2014). There are five main mushroom production areas in the world. These are continental Africa, the Americas, Asia, Europe and Oceania. With more than 65% input annually, Asia is the largest contributor of mushrooms to the total global production, with China producing almost 10 times more fresh mushrooms than its nearest rival, the United States of America. The significant growth in the mushroom industry is reflected in increased production and improved technology enabling higher yields.

Quality Standards

Quality standards form an integral part of trade and are set at an international level by Codex Alimentarius and between the customer and producer. Minimum quality standards are also set at a national level and regulated as part of international trade requirements. The South African mushroom quality standard for white button mushrooms (*Agaricus bisporus*) is being administered by the National Department of Agriculture, Directorate of Food Safety and Quality Assurance. The Agricultural Product Standards (Act 119 of 1990) STD No G14 sets the Standard and requirements for control of export of fresh vegetables. Mushrooms are classified according to this Act and are regarded by the department as a vegetable. Under regulation 4(3)(a)(ii) the Act stipulates the quality, grading, packaging and labeling of mushrooms destined for export. This Act is regulated by the Perishable Export Control Board. However, since mushrooms are currently not a major export prod-

uct this standard is used for domestic purposes but is not regulated by local authorities.

Some important aspects of Good Agricultural Practices

Chicken manure: Poultry feed is predominantly based on maize and, to a lesser extent soya, which are both easily assimilated by the bird (Martin, 2007). However, globally the demand for these products for human consumption is high and has resulted in major shortages. Added to this, the current move towards biofuels (particularly using maize in the USA) will in future contribute to an even bigger world shortage. Maize production in South Africa fluctuates from year-to-year and is often strongly affected by drought and world prices. Previously antibiotics and growth hormones were regularly fed to broilers to enhance growth (Martin, 2007). The growing global concern over antibiotic resistance in *Salmonella* and *Escherichia coli* populations in agriculture is a major point of concern regarding the prophylactic use of antibiotics in poultry factory farming. Today the use of probiotics in broiler formulations has to a certain extent replaced this practice. The use of *Lactobacillus spp* for instance is known to promote a balanced gut microflora and reduce the amount of urease liberated in bird faeces and ammonia released into the environment (Martin, 2007). In poultry feeding systems excess of the essential amino acids i.e. methionine and cysteine (which contain sulphur) are excreted in the form of uric acid that is responsible for the odiferous gases released from compost (Martin, 2007).

From an environmental point of view mushroom farms and more particularly composting yards have a major problem with ammonia and sulphur gases which affects neighboring areas. In most countries environmental pollutants are strictly regulated and can result in special taxes or fines for the industry. In South Africa air quality regulations have recently been promulgated and address emission into the atmosphere. The National Environment Management Air Quality Act, No. 39 of 2004 which falls under the Branch:

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The amount of feed manipulation utilised by the poultry industry affects the quality of the compost and should be considered on an individual supplier base level. The requirement that suppliers must provide certificates of analysis of manure forms an essential requirement in any food safety programme. Providing information on the broiler formulations is also essential and supports best practice principles. In the MushroomGap these elements of manure quality have been addressed. The specific mix of manure and straw are essential elements of a best practices approach and requires a thorough knowledge of the source and quality of raw material.

From a food safety point of view it might also be appropriate to mention bird-flu (AIV), since the global hype about this avian disease might negatively impact

on the movement of poultry manure in case of an outbreak. This inevitably will impact the mushroom industry that will have to consider alternative nitrogen sources such as rice hulls or sawdust, with admixtures of urea or other manmade ammonical fertilisers (Martin, 2007). These alternative man made "manures" will obviously have a cost and yield implication. The greatest concern for the mushroom industry is the potential loss of suppliers providing chicken litter and not the threat that the virus might contaminate mushrooms. It has been shown in Penn State Animal Diagnostics Laboratory that AIV in chicken manure dies quite rapidly i.e. inactivated after six days at 15-20°C, 36 hrs at 28-30°C, and after only 20 min at 56°C (Lu et al., 2003). Therefore the virus can be completely inactivated during Phase I and Phase II composting.

It is essential for the industry to be proactive and to develop an action plan and engage in discussions with DAFF and Veterinary Services to formulate a strategy and develop protocols with the poultry industry in case of an outbreak. This approach has been followed in Australia according to Martin (2007) and makes business sense. As part of Best Practices, mushroom growers should in future also receive assurances from their poultry manure suppliers that biosecurity control measures are followed on their farms and that they are participating in an active AIV surveillance program.

Water resource and safety management: Water is used extensively in mushroom growing operations for wetting of straw, preparation of compost and casing materials, application of pesticides, and for general facility and equipment cleaning and sanitising pur-

poses, personal hygiene and for mushroom wash treatments (if applicable). Water use can be separated into two important usages i.e. one for compost making and the other for mushroom production. In the case of the former, larger quantities of water are required and water quality is not as critical as with production practices. The water source is important from an environmental and renewable resource point of view and needs to be managed accordingly. GlobalGap requires compliance with national legislation and regulations and the use of potable water in a sustainable way. Since water can be a vehicle for the spread of pathogenic microorganisms and chemical contaminants, it is essential to effectively manage water for its intended use in a sustainable way.

In the case of production practices it is critical that only potable water be used. In this case water is often not recirculated but if it is, water should be effectively filtered or disinfected and thereafter tested for the presence of chemical or microbiological contamination at an accredited laboratory. It is particularly important that water that comes in contact with mushrooms or other food contact surfaces such as equipment, containers, and packaging materials be free from harmful microorganisms and chemical contaminants (LaBorde, 2001). However, not all countries have the same water quality standards or equally effective means of managing water or adequate accredited testing capacity. In the case of South Africa the national drinking water standards is managed by municipalities and falls under the Department of Water and Environmental Affairs.

Water used in composting is sourced from on farm dams supplied from rivers, ponds, lakes or reservoirs or are extracted from boreholes. Borehole water is, in general, safe but should still be tested for its quality since it can become contaminated after heavy rains or floods, or from adjacent septic tanks or industrial or agricultural sites (LaBorde, 2001). Rivers are often polluted particularly if nearby informal settlements are present as is the

case of most South African waterways. Any water that does not meet current national standards for drinking water should be filtered and or treated with a disinfectant before use and the source of contamination determined.

Cross contamination within a facility can also happen due to faulty plumbing where cross-connections in the system can allow potable water to inadvertently mix with a potentially contaminated source, such as wastewater or sewage lines (LaBorde, 2001). A well-designed and maintained plumbing system that includes air gaps and vacuum breakers is therefore the best defense against back flow problems. Older facilities should therefore be checked for cross-connections. Modifications to plumbing systems should be made by a qualified plumber according to national requirements.

Pest control: Mushrooms are affected by several fungal, bacterial and insect pests (Pennsylvania Mushroom Integrated Pest Management, 2002). To date the most effective way of dealing with these pathogens and pests has been by means of pesticides as with most other crops. However, effective registered pesticides for mushroom production are limited and maximum residue levels (MRL) are often set at unrealistic levels. Furthermore, due to high registration costs and stringent new toxicological and environmental impact assessment requirements, very few new pesticides are being introduced by major agricultural chemical companies particularly for minor use crops. In this context an organic production or an Integrated Pest Management (IPM) approach makes economic sense particularly seen against a backdrop of growing global concern over environmental protection and human health. Most countries have legislation in place to deal with pesticide use, storage, application, registration etc. In the case of South Africa, the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, No. 36 of 1947 under the Directorate of Food Control, Department of Agriculture, Forestry and Fisheries as well as the Registrar ensure all issues pertaining

to pesticides are regulated. However, due to a lack of capacity and skills and inadequate number of inspectors new chemical products have not been registered resulting in a serious back log for the chemical industry.

Since the mushroom industry has such a limited number of available pesticides, it is logical that the available ones need to be protected and used with care to prevent build up of pathogen or pest resistance. Resistance within mushroom pest populations has been reported and includes (Fleischer, 2002):

- Sciarid flies resistant to pyrethroids (Keil and Bartlett, 1996);
- House flies and stable flies in the composting wharf, which are resistant to many classes of insecticides;
- *Lecanicillium spp*, which is resistant to benomyl;
- Recently Chakwiya *et al.* (2015) reported on in vitro sensitivity testing of *Cladobotryum mycophilum* to carben-dazim and prochloraz manganese.

Today as new chemicals are released into the market a pesticide resistance management strategy (PRM) is often recommended to support the product in the market. Resistance management is therefore considered an integral part of IPM and modern best practices. In general the goals of resistance management according to Fleischer (2002) are to:

- avoid resistance;
- slow the rate of resistance development;
- manage programmes so as to revert resistant populations back to more susceptible populations.

Integrated Pest Management: Integrated Pest Management (IPM) programs have been known to man for more than 40 years (Fleischer, 2002). This age old philosophy has been practiced extensively prior to the advent of powerful pesticides such as DDT. Due to global environment awareness the concept of IPM has become popular again and has since evolved. Today IPM includes several other dimensions related to sustainable agriculture and form the basis of Good Agricultural

Practices (GAP). One definition of IPM from the Council of Environmental Quality is “*selection, integration and implementation of pest control information based on predicted economic, ecological and sociological consequences*” (Botrell 1979, according to Fleischer, 2002).

Today it is widely recognised that IPM has strong pillars in ecology (relationships of the pest and beneficial organisms within the biotic and abiotic environment, and an understanding of the distribution and abundance of these organisms). IPM lends itself to grower involvement and is strongly entrenched in the GlobalGap standard. Although not as commonly implemented in the mushroom industry, IPM lends itself naturally to mushroom growing. This is mainly due to the environmentally controlled and enclosed environment within which mushrooms are grown. Some examples of successful IPM include the Sciarid fly populations which exploded in mushroom growing rooms in the late seventies (Fleischer, 2002). Other examples later included:

- *Lycoriella mali* (Fitch);
- Phorid fly, *Megaselia halterata* (Wood);
- *Lecanicillium* or dry bubble (*Lecanicillium malthousei*);
- bacterial blotch i.e. *Pseudomonas tolaasi*.

There are several tools that can be used in an integrated way in IPM systems and include the following (Fleischer, 2002):

- Chemical control: Using pesticides to control pathogen and pest infestations. Within an IPM setting chemicals are used only as required and at optimum timing.
- Biological control: Applying commercial registered bio-control agents similar to applying pesticides or alternated with pesticides has become an excepted means of controlling pests and pathogens. The bio-control approaches can also be used to target the density or activity of beneficial organisms, either through cultural management or inundative release of additional beneficials into the target control area. According to Fleischer (2002),

composting techniques influence biological control of fungi. Other examples described include purposeful release of Pteromalid parasitoids on the composting wharf, or entomopathogenic nematodes as examples of inundative release of beneficials used in mushroom production.

- Biorational materials: Natural extracted or synthesised products, Generally Regarded as Safe (GRAS) products or extracted compounds are other examples used in mushroom production including insect growth regulators, botanical extracts and microbial metabolites (Fleischer, 2002).

- Sanitation: Because of the practice of steam-pasteurisation of the growing room before and after growth it provides an ideal opportunity to further manage hygiene and basically maintain it.

- Exclusion: Preventing the pest from entering the growing rooms through sealing walls and cracks, filtering air entering the rooms. Equipment entering a room must also be clean and/or sanitised and all workers must be trained in personal hygiene and wear protective clean clothing.

- Delaying access: Slowing down access by maintaining sanitation in and around premises including keeping grass and trees trimmed, regular rubbish removal etc.

- Cultural control: Selecting growing techniques less favourable for pests and pathogens and favouring beneficial organisms. Methods include: composting, shorter crop cycles, maintaining environmental conditions (i.e. temperature and relative humidity) that favors mushroom growth over pests / pathogens.

Traceability: Traceability is the ability to trace and follow food, feed, or substance intended to be, or expected to be, incorporated into food, or feed to all stages of production, processing and distribution (EU Regulation 178/2002) (www.gs1.org/traceability). Traceability is therefore the combination of tracing and tracking. Tracing is the link upstream to source of the item. Tracking is the ability to follow products through the supply chain. Traceability is preferred to tracing or tracking and is a

logistical infrastructure controlling the product flow defined as input, throughput and output (www.gs1.org/traceability). Although traceability is directly related to the responsibility and liability of the company it is part of a bigger system where aspects such as quality and safety are addressed. Traceability is a legal framework and a “business to business” tool.

In South Africa, the DAFF Food Safety Forum has approved a fast-track exercise to prepare and implement a Traceability Standard Operating Procedure for exports of food products that are regulated under the Agricultural Products Standards Act (Borkett, 2007). Traceability is also a requirement in South African Food Safety Standard for Primary Production Areas and in GlobalGap. Traceability has been introduced into the Mushroomgap in compliance with these two standards but include in addition, a requirement to ensure that traceability can be traced back to the raw material suppliers particularly wheat. Currently this is difficult since straw merchants are not able to trace the straw back to the farm from where it was originally harvested. This has been regarded in the current study as a major shortfall in the system since no record of pesticide spraying from the straw merchants could be provided or evidence that the farms have been certified to the national GAP standard or Globalgap. Currently the straw is also not tested for pesticide spray residues or mycotoxins. Although the argument has been put forward that pasteurisation brakes down mycotoxin and pesticide residues it has not been scientifically proven in a mushroom production system.

Conclusion

Globally the mushroom industry is faced with enormous challenges within the context of a growing international market. Complying with multiple standards has become a reality and will not in the foreseeable future change. Furthermore, adhering to good manufacturing practices during packaging or minimal processing, storage and distribution as well as regular safety assurance testing may reduce

the hazards of food-borne related diseases. Similar integrated management models have been implemented successfully in alternative fresh produce production systems and it is likely that such an approach will also work for risk minimisation of fresh white button mushrooms.

References

- Boa, E. 2004. Wild edible fungi a global overview of their use and importance to people, FAO, Rome, 148pp.
- Borkett, T. 2007. Smart Card Society, AF-RITAG, smartsa@icon.co.za.
- Chakwiya A, Van der Linde EJ, Korsten L. In vitro sensitivity testing of *Cladobotryum mycophilum* to carbendazim and prochloraz manganese. S Afr J Sci. 2015;111(11/12).
- FAOSTAT 2014. <http://faostat.fao.org> (accessed 23 November 2015).
- Fleischer, S.J., 2002. A. History, Definitions, and the Economic Threshold in Introduction in Mushroom Integrated Pest Management. Penn State University Handbook. <http://www.cas.psu.edu>.
- Keil, C. B. O., & Bartlett, G. R. 1996. Permethrin Resistance in *Lycoriella mali* (Fitch)(Diptera: Sciaridae) on Commercial Mushroom Farms. Mushroom news-kennett square 44, 8-13.
- LaBorde, L., 2001. Sanitation: The Key to Producing Safe Mushroom Products. Mushroom News. 49(9): 8-18, Sept. 2001.
- Largeteau, M. L. & Savoie, J. 2010. Microbially induced diseases of *Agaricus bisporus*: biochemical mechanisms and impact on commercial mushroom production. Applied Microbiology and Biotechnology 86:63-73.
- Lu, H., Castro, A. E., Pennick, K., Liu, J., Yang Q., Dunn, P., Weinstock, D. and Henzler, D., 2003. Survival of Avian Influenza Virus H7N2 in SPF Chickens and Their Environments. Avian Diseases 47:1015–1021.
- Martin, G., 2007. The Composting world is changed. Challenges met and those to be overcome. Part II. The Spawn Run March 2007.
- Royse, D. J. 2001. Cultivation of shiitake on natural and synthetic logs. Penn State's College of Agricultural Science.



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FESTIVE SEASON PR ACTIVITIES

by Riana Greenblo, Riana Greenblo Communications

It's that time of year when South Africans start winding down and when our thoughts turn to fun activities, summer holidays, lounging on the beach and glorious food. SAMFA's PR activities focus on taking advantage of the sentiment.

MAKE HOLIDAY MEALS EASY FACEBOOK CAMPAIGN

With everyone in the holiday mood, looking to plan the festive season meals with recipes that would be easy, delicious and nutritious, November created the perfect moment to run a Facebook campaign promoting our website Mealplanner

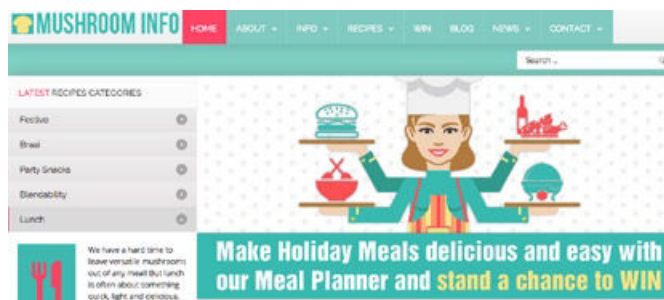
The campaign message was effective and well-timed: Make holiday meal planning easy with our brand new **#Mealplanner** and stand a chance to WIN cash!

The entry mechanism was also easy with Facebook fans directed to the website to register and use the Mealplanner.

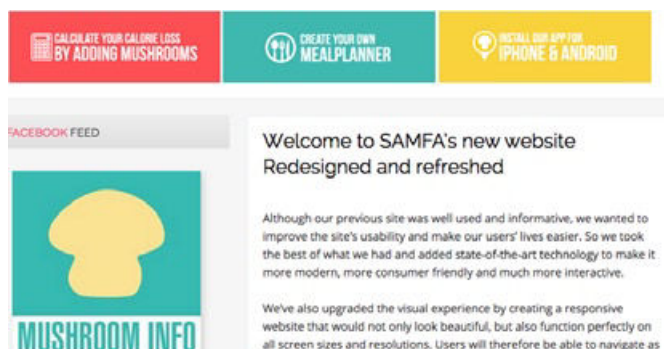
The major benefit of this competition is that it creates an awareness amongst the 35000 fans on the MushroomsSA Facebook page of the www.mushroominfo.co.za website and the beauty of a Mealplanner that allows them to properly plan their meals over the festive season with the added bonus of a downloadable shopping list for easy supermarket shopping.

To promote the Mealplanner further on the website the following have been added:

A slider on the Home Page:



A Banner on the Home page:



A pop-up banner

which opens immediately when visitors go onto the website to drive them to enter the competition:



ON-LINE MAGAZINE BANNERS

The competition is also extended to on-line magazines to improve the reach, the awareness and the potential for an increased response. Banners were placed on the on-line sites of Rooi Rose, Woman and Home, Destiny and Food24.

BANTING STILL RULES (ESPECIALLY IN CAPE TOWN!)

So we repeated an earlier promotion with a new design and new recipes to position mushrooms as the perfect banting option:



ONGOING COMMUNICATIONS WITH DIETICIANS

The festive season also sends many more patients, in search of a magical dietary solution for the holiday season, to dieticians. Appropriately our last 2015 send-out to our dieticians' database was a health message about mushrooms: including more mushrooms in your diet reduce both your carb and your calorie intake – specifically important over the holidays when everyone tends to indulge.

BLENDABILITY

Bendability has remained a key theme throughout the year and we continue looking at magazine options. We are also working with food bloggers who have become key influencers when it comes to food choices and recipe development.

An example of a magazine advertorial:

MORE MUSHROOMS
= a lower GI & less carbs

HERE'S HOW...
We've always thought that people love mushrooms because they are one of the tastiest, nutrient-rich, low energy-dense foods around with only around 24 calories in a 100gm serving of white button mushrooms!

But, we've done some research and discovered that mushrooms have so much more going for them. Yes, they're big on antioxidants, a good source of fibre and packed with minerals and vitamins but they also have an angelically low glycemic index (GI). Rated at 10, right up there with other low GI champions such as broccoli, cabbage, lettuce, onions and red peppers, you would want to eat a whole lot more.

Why is a low GI rating a big deal?

Low GI foods do not raise blood-sugar levels as significantly as carbohydrate-rich foods. In fact, they help to control blood sugar levels and your appetite. That's why they should play a bigger part on your plate to help you lose weight or maintain a healthy weight. Remember, it's excess weight, particularly the fat around your middle, that can make your blood glucose levels more difficult to manage because it contributes to insulin resistance.

So wise up to mushrooms - they're a Superfood simply too good to ignore!

3 WAYS YOU CAN ADD MUSHROOMS TO MAKE A GI DIFFERENCE®

REPLACE:
1/2 cup corn kernels with 1/2 cup sliced, cooked fresh mushrooms as a side dish.
BENEFIT:
Save 15.5 grams carbohydrate and lower the GI.

SUBSTITUTE:
1/2 cup sliced Portabellini mushrooms for 1/2 cup white rice as a side dish.
BENEFIT:
Save 20 grams carbohydrate and lower the GI.

An example of a food blogger blendability advertorial:

MORE MUSHROOMS + LESS MEAT = fewer calories

Add flavour to meals and save money by replacing half the meat (beef, pork, chicken, lamb or turkey... they all work well) in recipes such as burgers, meatloaf, lasagna or meatballs with chopped mushrooms. Meals are instantly more healthful, delicious AND lighter on the hips!

Mushrooms work so well because no other food can be used in so many ways, while bringing flavour and nutrition to the plate. They not only deliver a savoury, earthy taste, they also mean another serving of vegetables PLUS they're naturally low in calories, fat and cholesterol-free and provide important nutrients like B vitamins, antioxidants and potassium.

So make a few wiser decisions when grocery shopping. Buy more mushrooms and less meat; your figure will thank you!

DID YOU KNOW
Including equal parts mushrooms and meat double the volume without adding significant calories, fat, cholesterol or sodium.

Create your own meal planner at www.mushroominfo.co.za
Facebook: MushroomsSA

Cupcakes and Couscous
KITCHEN TALES FROM CAPE TOWN

HOME ABOUT TERESA RECIPE INDEX CONTACT POLICY IN THE PRESS TV & VIDEO

Tuesday, 10 November 2015
Spaghetti Bolognese

ABOUT ME

From my kitchen to yours, I'm Teresa and welcome to my blog! Here you will find sweet treats and savoury recipes, not family favourites and new creations. Come and soak with me!

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20 QUESTIONS WITH WENDY MATTHEWS

**TITLE: ADMINISTRATOR FOREST FRESH AND CAPE MUSHROOMS;
RELIEF GROWER FOREST FRESH MUSHROOMS**

How did you get into Mushrooms?

By default! Pete Leach, my brother, needed someone to manage the Plettenberg Bay Farm and his glance fell on me. It was an interesting choice as I knew absolutely nothing about mushrooms except that they could be eaten and that they might kill you!!

How many years have you been in Mushrooms?

That glance was in 1998, 17 years ago

What is most difficult task you have had to undertake while in Mushrooms?

Learning to grow them, successfully!

What is your greatest strength/talent?

I think my passion for the industry. Maybe you should ask my brothers.

What is your favourite pastime?

Birding

If you could change one personality/character trait you have, what would it be?

If you had asked me 20 years ago, I

might have said my forcefulness but now I realise that it can be an advantage. So no changes

As a student, what did you want to do or be after your schooling?

A long distance truck driver. My father did not agree.

What was the most significant event in your whole career so far?

I suppose it was when I reached retirement age and just knew it was not going to happen. That was ten years ago!!

What do you feel is your greatest achievement in life?

My long-standing fight against injustice in any form.

If budget was unlimited what car would you drive?

Not a priority in my life.

Who has had the greatest influence in your life and why?

My late father and for a myriad of reasons some of them painful

What is the craziest thing you have ever done?

Put it this way, it involved a freeway, a railing and impromptu striptease

What are you addicted to?

Poker

Do you have a nickname and if so what is it and why?

I was always given Xhosa nicknames by the people I worked with but no other.

What is your favourite movie?

Top Gun

What cheers you up?

Profits

If you could be, or were to describe yourself as an animal, what animal would it be and why?

Sadly not a Rhino.

What is your greatest fear?

Flying

What is your favourite meal?

A Round Table filled with friends, a good red wine and a memorable lamb curry.

What is the best life advice you have been given?

If you can't do it, don't try it!





Sylvan

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