The Spawn Run

JOURNAL OF THE SOUTH AFRICAN MUSHROOM FARMERS' ASSOCIATION

We are now in that time of the year where energy can easily be viewed as a commodity. Demand, consumption and price escalate exponentially and this leads to considerable economic, financial and ecological pressures. This is particularly true on a mushroom farm and even more so on South African mushroom farms. Renewable energy, going green, carbon footprints, recycling and a host of other "eco-terms" are on the tips of everybody's tongues and one cannot deny the fact that these concepts will play a major role in the success of any producer or manufacturer.

If one considers the progress that mankind has made in other fields such as information technology, communication, electronics, etc. I get the distinct impression that there remains a vast amount of work to be done in the realm of energy and fuel. There exists much scope for pioneers to discover and exploit this relatively new and untamed science. With this in mind I would like to encourage anyone who has made even small strides within their facility regarding anything green, and who would like to share or expose them, to let us know about it.

This edition of the Spawn Run is a medley of information; unfortunately it also serves as a memorial for Rufas Ramachela who, along with 4 other employees, passed away in a tragic car accident – they will be missed. It is however a celebratory issue as well and on behalf of SAMFA and the industry I would like to congratulate Ross and Angela Richardson on the birth of their beautiful little boy. May he bring you endless days of pleasure and make you proud.

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MUSHROOM GROWTH STIMULATION BY BACTERIA and MUSHROOM DISEASE SUPPRESSION BY BACTERIA AND YEASTS ISOLATED FROM CASING, COMPOST AND MUSHROOMS

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ABSTRACT

In the production of white button mushrooms, the casing soil is known for harbouring a host of microorganisms, especially bacteria that are involved in fruiting body formation. Casing bacteria were investigated for their effect on mycelial growth of *Agaricus bisporus in vitro*. Maximum *in vitro* growth stimulation by three *Pseudomonas* isolates, one *Arthrobacter* isolate and a mixture with fifteen other isolates was observed. Disease suppression of bacteria and yeasts isolated from casing, compost and mushrooms against common fungal pathogens of white button mushrooms was also examined *in vitro*. Different bacteria and yeasts showed inhibitory effects on growth of pathogens such as green moulds and fungi causing dry bubble, wet bubble and cobweb diseases.

INTRODUCTION

The casing layer plays a major role in commercial production of white button mushrooms (*Agaricus bisporus* (Lange) Imbach). Primordial initiation or pinning is a vital stage in the commercial mushroom production cycle. The fact that bacteria play a role in this process is important for devising ways of controlling production. Bacteria can stimulate growth of different organisms they associate with. Fungal growth stimulation by bacteria is recorded in literature (Sbrana *et al.*, 2002; Wheatly, 2002; Hildebrandt *et al.*, 2006; Kai *et al.*, 2009). Mycelial stimulation of mushrooms by pseudomonad bacteria was reported by Grewal and Hand (1992). In relation to disease suppression, different bacteria and fungi including *Bacillus* and *Pseudomonas* spp. have been reported as bio-control agents of white button mushroom diseases.

In this study, different bacteria isolated from the casing were examined for their effect on mycelial growth of *A. bisporus*. Bacteria and yeasts isolated from casing materials, compost and mushrooms were also examined for their antagonistic effect against fungal mushroom pathogens.

MATERIALS AND METHODS

In vitro growth stimulation

Spawn of two strains: the commercial strain A15 and strain A737 were obtained from Sylvan South Africa. Spawn was placed in a Petri dish containing malt extract agar (MEA) (Merck, Johannesburg,

South Africa). Peat used as casing material, was first autoclaved and an amount of 3g was placed on one side of each plate. Casing material in the plates was drenched with 3 ml of bacterial suspension of 108 colony forming units and with sterile water in the control plate. Duplicate plates were incubated at 25°C for 7 days. Growth of mycelium on the casing was measured using scores 1-5 on a scale basis, where 1 = no growth, 2 = 25%, 3 = 50%, 4 = 75% and 5 = 100% growth.

***In vitro* bio-control analysis**

The antagonistic effect of different bacteria and yeasts against common fungal pathogens of white button mushrooms was determined *in vitro* using the dual culture technique. The fungal pathogens of mushrooms that were tested were *Lecanicillium* (*Verticillium*) *fungicola* var *aleophilum*, *L.psalliotae*, *Cladobotryum dendroides*, *Mycogone perniciosa*, *Trichoderma aggressivum, f. europaeum*, *T. aggressivum, f. aggressivum* and *T. harizianum*. Different bacteria and yeasts evaluated for potential antagonistic effects were isolated from the compost, casing and mushrooms. A 4 mm diameter agar disc colonised by the pathogenic fungus was placed in the centre of a 90 mm potato dextrose agar (PDA) (Merck, Johannesburg, South Africa) plate. A bacterial or yeast isolate was streaked on two opposite sides of the PDA plate at a 40mm and 25 mm distance away from the centre for fast and slow growing fungi respectively. Control plates of each fungus were grown without bacteria or yeast. Plates were incubated at 25°C for 3-10 days. Growth diameters of the pathogens were measured between bacterial streaks and free sides. The difference between these diameters was used to analyse if there was significant growth inhibition by the bacteria or yeasts. This experiment was done in four replicates. GenStat ANOVA was used to compare results with the control.

RESULTS AND DISCUSSION

The degree of *in vitro* growth stimulation by the different isolates of bacteria varied from none to complete coverage of the casing material. The three *Pseudomonas* isolates, an *Arthrobacter* sp. and the mixed bacte-

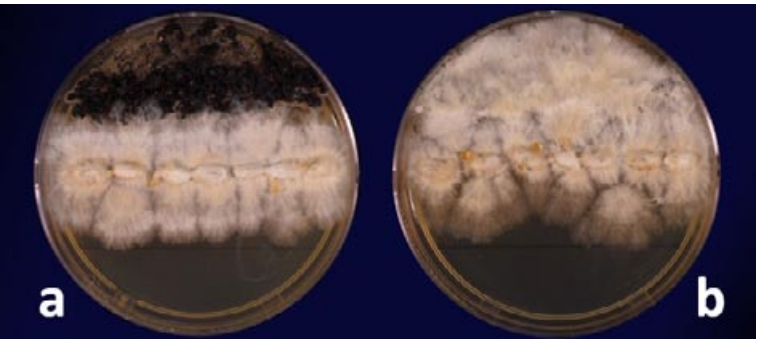

Figure1. Growth stimulation of *A.bisporus* by casing soil inoculated with bacteria (b) and sterile water, control (a)

ria demonstrated maximum scores of growth stimulation. Two *Bacillus* spp. and another *Arthrobacter* sp. showed no growth stimulation at all, especially on the commercial *Agaricus* strain A15 (Figure 1).

Regarding bacterial and yeast isolates tested for antagonistic effects against fungal mushroom pathogens, different degrees of suppression were observed. Many of the bacterial and yeast isolates suppressed growth of pathogens.

It is known that bacteria can stimulate growth of different fungi. Our results showed the effect of the bacteria isolated from casing materials on the mycelial growth of *A. bisporus* varied. 100% growth stimulation was obtained by the *Pseudomonas* isolates, an *Arthrobacter* sp. and a mixture of 19 isolates, while the *Bacillus* isolates alone had no effect. In agreement with our result, Grewal and Hand (1992) have reported that *Pseudomonas* spp. stimulated mycelial growth of *A. bisporus*.

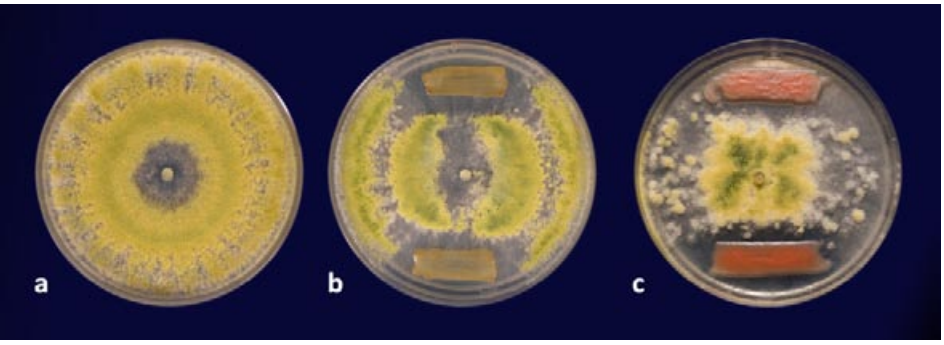

Figure 2. In vitro suppression of *Trichoderma* sp. by bacteria and yeast isolates, (a) *Trichoderma* sp. - control, (b) bacteria against *Tricoderma* sp. and (c) yeast against *Tricoderma* sp.

Bacteria and yeasts isolated from the casing, compost and mushrooms showed different degrees of suppressing fungal pathogens of *A. bisporus*. In this experiment, a greater number of bacterial isolates inhibited the growth of the *Trichoderma* isolates compared to other fungal pathogens. Suppression of *Trichoderma* by the natural compost or casing microflora is important in controlling the disease. The success of *Trichoderma* strains in soil was determined mainly as dependent on the competitive ability of the fungus against soil bacteria (Naar& Kecskés, 1998). Savoie *et al*. (2001) investigated specifically the colonisation of mushroom compost by *T. aggressivum europaeum* (Th2) and found it was mainly due to the pathogen's ability to tolerate the inhibitory effect of compost bacteria.

Growth of fungal pathogens causing dry bubble, wet bubble and cobweb disease was also suppressed by bacterial and yeast isolates. In some instances the yeast isolates showed better control compared to bacterial isolates and in other cases it was the other way round.Compared to bacteria very little attention has been given to yeasts as bio-control agents of soil borne fungal pathogens (El-Tarabily, 2006). Yeasts should be given more attention though, as they have suppressive potential and on some pathogenic fungi show even better inhibition than bacteria.

CONCLUSION

Soil is a microbiologically dynamic habitat and so are the casing soil and compost used in the production of white button mushrooms. It harbours many microorganisms that are involved in important processes in the overall production cycle. In this study, *in*

vitro experiments showed that some bacteria naturally inhabiting the casing could stimulate mycelial growth of *A. bisporus*. Bacteria and yeasts isolated from casing soil and compost were also found to suppress some fungi that are pathogenic to the white button mushroom.

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IMPORTANT DATES ON THE MUSHROOM CALENDAR

2012

ISMS 2012:
18th International Congress
on the Science and Cultivation of
Edible and Medicinal Fungi
25 - 30 August 2012, Beijing, China
www.isms2012.com

Mushroom Festival
8 - 9 September 2012,
Kennet Square, Pennsylvania, USA
www.mushroomfestival.org

39th Australian Mushroom Growers Association Conference
19 - 23 September 2012,
Stamford Hotel, Glenelg, South Australia
www.mushrooms.net.au

2013

7th International Conference on Mycorrhiza (ICOM7)
6 - 11 January 2013,
New Delhi, India
www.teriin.org/events/icom

Dutch Mushroom Days
29 - 31 May 2013,
Brabanthallen, Den Bosch,
The Netherlands

7th International Medicinal Mushroom Conference
7 - 10 July 2013,
Nantong, China
www.1mmc7.com

22nd North American Mushroom Conference
22 - 24 June 2013,
Vancouver, BC
Canada

2014

10th International Mycology Congress, Bankok, Thailand
Dates and venue to be announced

2012 SAMFA CONFERENCE

By Mike Wishart, Forest Fresh Mushrooms

The 2012 SAMFA conference was held at Emperors Palace on 15th May. With ISMS on the calendar in China later this year, the SAMFA committee decided to shorten the 2012 gathering to a "power seminar", packing an interesting and diverse range of sessions into one day. There was no farm walk, but the quality of presenters made for an extremely informative day and the delegates were able to take home plenty to think about on their own farms. The venue was conveniently located next to OR Tambo airport which allowed for a quick in – quick out day trip.

SAMFA chairman Ross Richardson welcomed 48 delegates to the seminar. Riana Greenblo then outlined the SAMFA marketing activities.

The anchor speaker was Brendan Burns who presented two topics. 'Growing in bags and on blocks' covered most aspects of growing for small and large farms alike. Brendan gave plenty of detail of things we as growers often forget about as we drift off our procedures.

'Yield and who is responsible' ran through the various 'departments' on a mushroom farm, again reminding growers of the details we should be taking care of daily as well as what should be done with the mushrooms right until they reach the shelf.

Thierrry Reignier updated delegates on his research into using essential oils for disease control. Thierry seems to be making progress with this research. Alinesi Chakwiya presented the status of Cobweb disease research at Pretoria University.

Mr Riaan le Roux, economist at Old Mutual talked about current and expected global and local economic trends. Prof Lise Korsten and Werner Rossouw of Pretoria University updated on mushroom research and food safety in mushroom research.

Tisgha Jones presented on procedures and practice in compost analysis and interpretation of results.

The day's proceedings were closed with the SAMFA AGM

After a few pre-dinner drinks delegates attended the SAMFA dinner where they were treated to an excellent meal accompanied by live entertainment. The usual raffle for the 'floating trophy' of millennium Scotch whisky was conducted by Rob Stewart in the absence of Rod Cairns, and an impressive R1350.00 was collected for charity. After floating for 13 years now, the bottle of millennium Scotch whisky finally sank at the 2012 SAMFA Seminar dinner. It was in good spirits that interested parties sampled this tenacious bottle of whisky.

The SAMFA committee would like to take this opportunity to thank the delegates for the healthy turnout at the Seminar. Thanks also to all our sponsors for their generous contributions and to Eastern Sun Events for again arranging a smooth and successful event.

Lastly, these events are perennial over-achievers. Farmers who have not attended a SAMFA seminar are encouraged to make use of the fountain of information one has access to, both with the content of the presentations and the networking with experienced growers and international presenters. The SAMFA committee looks forward to welcoming you to next year's event.

IN MEMORY OF RUFAS RAMACHELA

26 September 1963 – 28 May 2012

By Baring Richardson – Highveld Mushrooms

Rufas was for us, at Highveld and Meadow, a colleague and a friend that had been part of the business since the early 1980's. Through his hard work, enthusiasm and an understanding of the mushroom growing process he progressed to be one of the top growers in South Africa.

Rufas moved to Meadow Mushrooms in April 2002 as Farm Manager where he took on the challenge to run Meadow. I joined him in 2006 to assist, and together we worked closely for 6 years. We travelled a rocky road together and shared many frustrations, hardships and disappointments. Rufas was a great support to me, especially in the early days, when life at Meadow was highly unpredictable and someone needed to be available 24 hours a day. He was always ready and keen to try something new, and never got tired of teaching and showing our staff how things should to be done.

He and the other 4 employees are missed and their deaths are a great loss for us and their families. It is a horrible thing that occurred and under different circumstances the accident should never have happened; if only motorists were properly advised of the impending road works ahead.

I will always remember Rufus's remark when people said that he was getting old because his hair was turning grey. His reply was "It's not grey hair, it's just the mycelium" that was on his chin. His other great saying when approached by a difficult situation was "It is better to try and fail rather than fail to try".

CONTROL OF FUNGUS GNAT *Lycoriella ingenua* USING ESSENTIAL OILS

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We empower people

INTRODUCTION

Lycoriella ingenua (*Sciariddae*) is one of the most economically important fly pests of button mushrooms (Greenslade and Clift, 2004). The infestation generally occurs when the compost is cooling down (Fletcher *et al*. 1989), during spawning or by addition of infected peat material. Control of the fly population relies heavily on good hygiene, compost management and on commercial insecticides (Keil, 2002). However, repeated use of such insecticides often results in the development of resistance and leads to consumer concerns due to residue in mushrooms (Brewer and Keil, 1989a, 1989b). In addition, yield reduction may be observed when using certain pesticides. The requirements for flies' life circle encompass the availability of a good milieu for the fly to lay eggs, sufficient nutrient with no toxic compounds for the larvae to survive and an adequate environment for the flies to mate. One of these factors should be targeted to control the insect development. Following our constant research on the evaluation of the potential use of thyme oil to control the major pests affecting the production of edible mushroom, and because adult flies are known to act as vectors for the introduction of and spread of mushroom pathogens and mites, our research leads us to investigate the use of the oil as an insecticide. In this issue a brief literature review is presented to ensure that the use of essential oils could lead to the control of the flies' population.

PRELIMINARY LITERATURE REVIEW

Plant insecticides have been used to control a vast number of pests since ancient time (Isman, 2006). Larvicidal activity of essential oils extracted from commonly used herbs has been widely reported (Pavela, 2009; Kumar *et al*., 2011). To our knowledge, two major studies have demonstrated the potential use of the essential oils or plant extracts as potential insecticides against the mushroom flies and need to be further evaluated under a commercial environment. The first study conducted by Choi *et al*. (2006) evaluated the insecticidal property of some essential oils and monoterpenes against *Lycoriella mali*. According to these authors, the most effective fumigant toxicity was found in thyme oil followed by the oils of sage, eucalyptus and clove bud. The study identified α-pinene as the most toxic fumigant compound found in thyme essential oil (LD50 ¼ 9:85 µL/L air) followed by ß -pinene (LD50 ¼ 11:85 µL/L air) and linalool (LD50 ¼ 21:15 µL/L air). However, the mixture of α- and ß-pinene had a better toxicity than α - or ß -pinene itself. More recently, Yi *et al*. (2008) reported the potential use of plant extracts as the potential insecticides against *Lycoriella ingenua*. In this study, the toxicity of 40 plant methanol extracts to larvae of *L. ingenua Dufour* and *Coboldia fuscipes Meigen*, was evaluated using a contact+fumigant toxicity bioassay. From all the plants tested, extracts of *Acanthopanax sessiliflorum* (Chungpa-juhn), *Asarum sieboldii* (Wild ginger), *Aster tataricus* (Tatarian daisy), *Carthamus tinctorius* (Safflower), *Syzygium aromaticum* (Clove), *Illicium verum* (Star anise), *Leonurus japonicas* (Chinese motherwort) and *Rehmannia glutinosa* var. purpurea (Foxglove) were found to kill both *L. ingenua* and *C. fuscipes* larvae at 0.07 and 0.14 mg/cm^2, respectively. According to the results obtained in this study, several plants are of value. Therefore, further studies need to be conducted to confirm the potential insecticide property of these extracts and more studies on South African plants should be done.

CONCLUSIONS

It is apparent that many plant extracts can be used as potential insecticides for the control of mushrooms flies. In addition, it is clear that thyme essential oil, α- and ß-pinene could be valuable fumigants to control mushroom flies during mushroom cultivation. Thus, thyme oil could be used as fungicide, but also could be applied as fumigant for the control of mushroom flies. Even though strong data sets have been obtained during lab scale research investigations, studies under commercial conditions are vital to ensure large scale application of the oil as fumigant for the control of *L. ingenua*.

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NEWS FROM THE MARKETPLACE

by Riana Greenblo from Riana Greenblo Communications

INTRODUCING NICOLE SACKS, SAMFA'S NEW FACEBOOK DIETICIAN/NUTRITIONIST

We're delighted to welcome Nicole to the SAMFA team. Nicole, a registered dietician who boasts an impressive resume, is passionate about teaching people how to be "normal" and to eat normally. Besides her academic qualifications, she is also media savvy having written for magazines on a regular basis and appearing on both television and radio. We know that Nicole will add credibility and depth to the content we post on the SAMFA Facebook page (***www.facebook.com/mushroomsSA***) and we look forward to sharing her knowledge with our Facebook fan base. Nicole will post every Tuesday and Thursday from July 2 so make sure that you like our page and benefit from this great resource... we all need a little help from time to time!

MUSHROOMS ON FACEBOOK

Our Facebook page is a winner! Our recent competition Spot-the-odd-one-out drew over 944 unique entries increasing our fan base to over 2000! We were delighted that we had many repeat weekly entries - proof that we have loyal fans who participate and check on our page regularly. Please visit the page at (***www.facebook.com/mushroomsSA***) for some great insights on consumer perceptions of mushrooms. It's a shrooming experience!

NEW CONSUMER INITIATIVE

The in-store demonstrations SAMFA is running are proving to be exceptionally worthwhile and the insights from that market will enable us to adjust the mushroom message to highlight the positives and address the negatives. Demonstrations are taking place mid-month and month-end at Pick 'n Pay Southgate and Diepkloof (Soweto), Spar Katlehong (East Rand) and Shoprite Garankuwa and will go through to August.

Feedback to date

1. Consumers love the sampling of the mushrooms – no resistance to trying mushrooms
2. Love the taste and the fleshiness of the mushrooms, "they taste like meat"
3. The promotions are extremely well received
4. Approximately 30% of consumers, who sampled, purchased.
5. Consumers love the mushroom recipe books and leaflets and even those that don't buy want recipes.
6. Consumers are very willing to listen and learn about the mushrooms.
7. Consumers like the mushroom competition (Create your own original mushroom recipe and stand the chance of winning a set of pots and engage with promoters at the stand to create recipes to enter.
8. Consumers love the taste of the products - BUT there is a big resistance to actually purchasing due to the cost. Mushrooms are seen as a bit expensive. Consumers need to be convinced that mushrooms will feed (fill) their families and they need to be sure that their families would like the mushrooms as well.
9. No negative comments on the taste of the mushrooms

Insight:

New consumers have many positive associations with mushrooms once they taste it. SAMFA will need to combat the perception of price by increasing, for example, recipes that include a cost per serving component. Increased active sampling and advertorials in magazines will also continue to assist in educating this market on taste, usage, versatility and price.

GROWING ON PHASE II BAGS AND BLOCKS (Part 1)

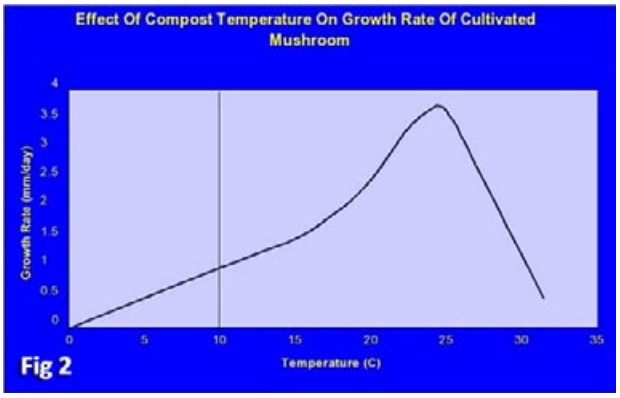
By Brendan Burns, Sylvan Ireland
Presented at the 2012 SAMFA Conference held at Emperors Palace, Johannesburg, 15 May 2012

Brendan Burns presented an interesting look at growing on Phase II bags and blocks at the 2012 SAMFA Conference. Many farmers in South Africa are using these methods of growing. We have summarised the major points in his practical talk below:

1. Spawn Run

The optimum duration for a spawn run is 16 – 17 days and can be extended to 19 or 20 days. *Fig 1* shows freshly spawned Phase II compost, then after 7 days, where the spawn is beginning to colonise the compost, and after 14 days where there has been good colonisation of the substrate.

Hygiene is one of the most important elements of this process and cannot be stressed enough. The phase 2 compost, even though it may be selective, will still be open to infection from mushroom pathogens that may be around the farm. Keeping the bagging areas and implements clean is vital. You will never yield good results or give yourself a chance to achieve these levels if you allow infection into the compost at this stage.



Maintaining the correct spawn running environment will greatly assist a good spawn run. A high humidity is required to stop any drying out and moisture loss of the compost. Oxygen is important at this stage and the degree of compression will depend on the compost moisture and structure. Having control over the compost temperature is the key to a good spawn run. The optimal compost temperature for spawn growth is 25°C as can be seen in *Fig 2*. It is important to note that mycelial growth is drastically reduced at temperatures above 25°C. Trichoderma' s optimal growth temperature is 28°C, so keeping compost temperatures below this has definite benefits for minimising this disease. The compost temperature should be measured at a few places in the room making sure that the temperature right in the middle of the bag is recorded as this is where it will be the highest. Ways in which temperature can be controlled are to cool the air in the room with air conditioners and/or outside air if it is cooler. A good tip is to move bags apart to allow air flow between the bags and lightly spray with water if compost temperatures go over 26°C. Remember with cooling and air flow the humidity must be kept high and so humidification devices may be needed to assist in reducing drying out.

2. Growing Room Hygiene

Prior to casing a farm must have a good hygiene programme that is managed and monitored on a daily basis. When cleaning, make sure that all the organic matter has been removed from drains cracks and places where it is difficult to see by scraping and using high pressure washers. Then disinfect the areas to ensure that the areas are as clean as possible. Flies must be controlled as they carry disease around the farm as they fly from diseased areas to clean areas.

Personnel are also great spreaders of disease. The hygiene programme must also incorporate methods to wash equipment, hoses, ladders, as well as dip trays for shoes. Don't forget picking staff and their knives and equipment which is moving around the farm from diseased areas to clean areas on a daily basis.

It is important to keep clean and dirty jobs separate in order to reduce hygiene risks and be self controlling. If a person does both a dirty job and a clean job it is almost impossible to ensure that they clean themselves each time they move between these different areas.
Room filters need to be in place on air handling equipment. This ensures that spores from disease in older crops are not sucked into the new crop's growing rooms. These must be changed regularly or cleaned according to a cleaning cycle.

Flies must be controlled by making sure rooms are well sealed. Ultraviolet lights and sticky traps can assist in making sure counts of these disease transporters are kept to a minimum.

When rooms are emptied the whole bag needs to be removed and taken off site. Refrain from emptying bags individually as this will heighten the risk of contamination. Don't leave spent mushroom compost near growing rooms or inlet areas. It is best to have it removed off site as soon as possible.

Choosing a casing day is important. Casing day varies from farm to farm, but it is mainly 14 to 21 days after spawning. The compost must be fully colonised indicated by a uniform grey to white coloured mushroom mycelial growth. The first flush would typically be harvested approximately 17 days after casing. The grower must therefore plan backwards from high sales days of the week to establish an efficient casing date.


Fig 3

3. Casing

Casing should be applied with uniform depth (usually 5 cm), density and moisture with uniform distribution of cacing or CIM. At the end of the case run one should see strong, uniform mycelium growth throughout the whole casing layer, with small uncolonised areas to act as water reservoirs as in *Fig 3*. The idea is to get all the bags to have the correct and similar amounts of mycelium growth on the surface for airing. This means that all the bags will crop at the same time and will have equal benefit to the airing regime. Uneven casing depths will guarantee some mushrooms will pin from beneath the casing and emerge dirty, as well as blank spots where the casing is very deep. There will be mycelium overlay and watering problems as a result of areas where the casing is too shallow.

In order to speed up the colonisation of the casing layer farms sometimes break the surface of the compost before casing, however all surfaces must be level. The application of cacing or applying CIM will assist in shortening the case run. Mix compost in at a rate of about 400g/m² or 80g/m² of CIM.

The process of casing is another stage where attention to hygiene is critical in order not to infect new crops with diseases from old crops around the farm. Personnel should wear gloves and have clean clothes and not work in dirty areas

on the same day as a bare minimum. Some farms turn exhaust / extractor fans off for the time that they are casing to minimise the amount of pathogen spores that are vented into the atmosphere around the casing area.
Peat storage areas must also be kept clean and have its own designated equipment which must be cleaned and disinfected regularly. It must be sheltered from wind, as well as from emptying areas or exhaust fans from rooms. Casing bags should be washed down on the outside prior to use.

4. Case Run

During the first 3 – 5 days after casing the compost temperature should be maintained at 25°C. Cooling should take place with the use of outside air or air-conditioned air and during the last 2 days before airing start setting the air temperature to 22°C in order to control a good recovery. As usual the aim should be to commence airing with the compost having a temperature of 25°C – 26°C which is the optimum temperature for spawn growth.

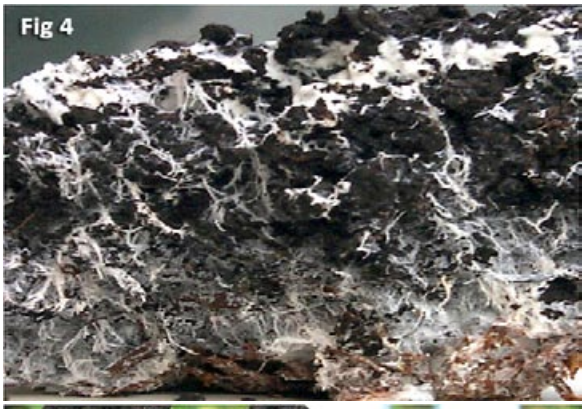


Fig 4


Fig 5

Some farms may want to consider ruffling. The advantages of ruffling are that the interface is adjusted, anaerobic areas removed and an even distribution of mycelium is created. Disadvantages are that by ruffling, more pins are created with an even distribution (that is not always desirable for farms who want staggered pins) and it may hold a disease risk.

5. Watering

Watering during case run will vary depending on the moisture and type of casing, as well as compost activity. It also has an important role in controlling the amount of mycelium in the casing. A rule of thumb is that 10 -20ℓ/m² should be applied at 1ℓ/m² per application up until 2 days before airing. Use a fine rose head with no drips and medium pressure. Be careful to ensure that one does not pan the casing soil with a too hard a pressure. Adequate water in the casing encourages strong white strands of mycelium giving the ideal type of growth for good cropping. A casing without sufficient water will produce very fine light stands of mycelium which will give too many pins and subsequently small mushrooms.
Fig 4 clearly shows delayed case watering where the interface between the substrate and casing is too dense with mycelium. *Fig 5* shows over watering and very patchy mycelium growth.

An example of a typical watering regime is tabled below:

Day	Water per m^2
Day 0	6 ℓ
Day 1	2 ℓ
Day 2	1 ℓ
Day 3	4 ℓ
Day 4	2 ℓ
Day 5	Sporgon after Ruffling

More water at the beginning will create a better interface with less, but stronger mycelium. Apply less water towards the end of the case run to avoid pre-pinning and allow the mycelium to grow to the surface for cleaner mushrooms.


Fig 6

6. Recovery

The recovery period requires a relative humidity of 95% and slow air movement should be maintained. The CO_2 level should be kept relative high, but limited to 10 000 ppm by sealing all seal vents (*Fig 6*) and watering the casing during this period (24 – 36 hours) should be avoided. Higher, closer to the surface pinning results in easier picking and more control, but also increases the risk of drying out and not achieving the pin set desired.

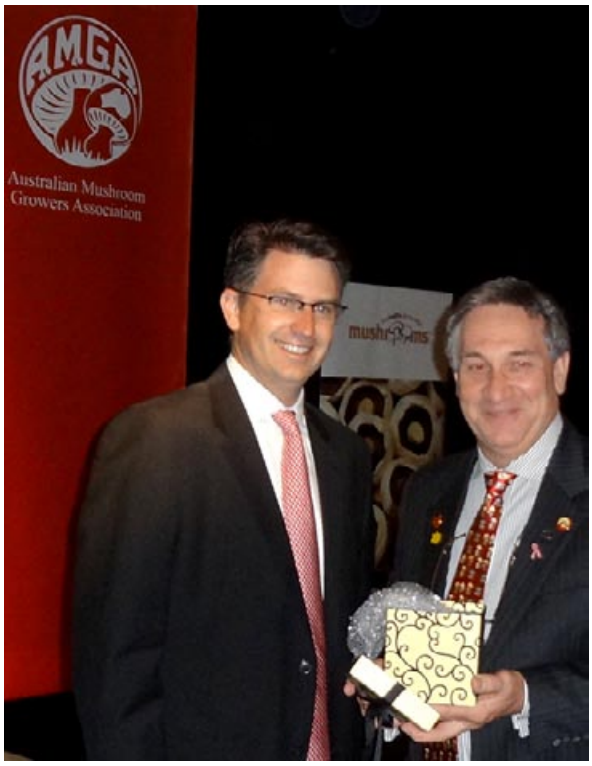
(End Part 1)

SAMFA CHAIRMAN'S REPORT

1 December 2010 – 30 November 2011

By Ross Richardson

This report covers SAMFA's last financial year, being from 1 December 2010 to 30 November 2011.
The previous financial year was reported at the last AGM held at Kloofzicht Lodge on 11 May 2011.



Ross Richardson, Chairman of SAMFA, presents a gift on behalf of the association to Greg Seymour, General Manager of the Australian Mushroom Growers Association. The hand over took place at the 50th Anniversary celebrations of AMGA in Sydney, Australia. SAMFA and the AMGA have had a close working relationship over the past years.

1. PR Initiative

Most of the income generated from the spawn levies is invested in public relations through Riana Greenblo Communications (RGCOMM). Over the years the committee has found that the generic nature of our product suits the PR vehicle. This allows us to leverage up our spend to obtain a greater than 1:3 investment. The return on investment for this year was an excellent R1.00 : R9.77

Over the period that the report covers there was a clear focus on generic magazine coverage as well as other initiatives such as the Soweto Mushroom Festival and the Rising Stars which was held again. Prizes were kindly sponsored by SAMFA, Pick 'n Pay and others, which resulted in a very successful event with lots of excitement and audience participation.

RGCOMM gained much ground in highlighting the health benefits of eating mushrooms with information provided by other mushroom associations in the USA, Australia and Europe. This has resulted in a huge change in the way that consumers are now seeing mushrooms and this also has great benefit for the industry. The message of versatility is now taken as given and the health benefits are being explored extensively by the media.

SAMFA has also delved into the social media arena and can now proudly boast a twitter account that tweets short messages about mushrooms as well as a Facebook page where more in-depth information can be shared between users. Social media is the buzzword in modern marketing and we are slowly exploring the possibilities of this vehicle, especially in terms of accessing the younger market.

The Pink Punnet campaign, where industry raised money in cooperation with Pick 'n Pay during the first 3 weeks of October, was a huge success. Last year it was seen as an experiment between a retailer and the industry working towards a needy cause, that seemed to work very well in generating PR coverage. The parties contributed a total of R1-00 per punnet of mushrooms sold in Pick 'n Pay during the 3 weeks to a Cancer rehabilitation organisation called Reach for Recovery. Over R370 000.00 was raised. A big thank you to Pick 'n Pay and the farmers involved.

The level of service delivered by Riana and her team is of an exceptional level. All events are always professionally arranged and I believe that we get the desired results, being most importantly wonderful coverage.

2. Industry Statistics

We have been recording key industry statistics for over 10 years. This gives us a snapshot of how the industry is faring based on the changing economic environments. This also assists us in the various applications that have to be made to government and provides a view on the industry size and progress.

The following key information is available for 2010 vs. 2011:

- Production has remained consistent at approx. 19 300 tons. There was however a 7 % increase from the previous year.
- Sales of Fresh mushrooms are up by 5.3% verses 7.5% growth the previous year.
- Revenues from the sales of fresh mushrooms in Rands are up by just over 10 %, the same as the previous year.
- The price of mushrooms has only risen by 4.6%, slightly lower than inflation rate of this period.

3. The Spawn Run

Nathan Jones has been our resident Editor on The Spawn Run and will hopefully continue to improve and develop the magazine.

The Spawn Run still is enjoying a profitable position thanks to the support of the advertisers. The Spawn Run generated approximately R 16 000 last year, down from R 32 000 the previous year. This income contributes to the basic running costs of the organisation.

The Spawn Run continues to contain high quality articles and has a broad readership from supervisors on our farms to farmers and academics in Australia, Europe and USA. I believe that this publication continues to be a credible publication covering some of the technical issues that face the industry as well as updates on our various projects that are in progress.

A project of reviewing the mailing data base should be planned for this financial year.

4. Research and the University of Pretoria

The University of Pretoria continues with its research. Having moved the focus from the casing project to disease diagnostics, the following milestones were achieved last year:

- Continued study into casing soil and more specifically the bacterial ecology in the casing soil and how it changes through the stages of the mushroom growing cycle.
- The collection of research on the alternative casing studies have been written up and handed over to the SAMFA committee.
- Maintenance of the one of the World International Mushroom Pathogen collections continues.
- Being a leading member of the International Diagnostic Team for Mushroom Disease Detection.
- Through the International Diagnostic Team for Mushroom Disease Detection we have continued with the "Health Check" programs for farms. This programme means that through regular health checks, different disease problems can be diagnosed prior to crop infection and losses. These techniques can also assist in identifying the sources of diseases in farms which have the pathogens present. I am sure that many of the farms can report on the benefit of this programme.
- The THRIP program no longer supports our research on a 1:1 basis, but on a 2:1 basis. This means that larger financial contributions must be made by SAMFA to sustain the current research levels.

5. Conference at Kloofzicht Lodge

The 2010 – 2011 conference was held at Kloofzicht near Lanseria, Johannesburg on the 10 and 11 May 2011. The conference was well attended and lots of interesting information presented. The highlights were a talk by Hennie van Einde from Walkro, Barrie Bramley's talk on the After Shock and Januz Luterek's discussion on the New Consumer Protection act.

Highveld Mushrooms kindly hosted an informative farm walk on their farm. SAMFA's proceeds from the conference after all the costs was approximately R60 000. This funding is also used to finance the running costs of the organisation.

6. Administration

The Committee agreed to adjust the spawn levy fees for SAMFA from June 2011 to R1.81 per litre. This is in order to assist in reducing the loss position and to take SAMFA forward to a profitable position again.

SAMFA's financial administration affairs are conducted professionally each year by Marlize Naude. The Committee thanks her for a necessary job that often goes unnoticed.

7. Conclusion

Lastly, I would like to thank the committee members for their work, and I have no doubt the members appreciate the efforts made. Let's continue to grow and move our industry forward within our developing and exciting economy.

20 QUESTIONS WITH CHRIS RICHARDSON

Title: Chief Executive Officer, Highveld Mushrooms

1. **Why did you choose a career in Mushrooms?**
   By accident. I was looking for accommodation. I had been given a position on a farm North of Johannesburg when I came across Mr.Denny who agreed to find me a place to stay on condition I came and worked for his newly formed company, Denny Mushrooms.

2. **How many years have you been in Mushrooms?**
   48 years.

3. **What has been the highlight of your career?**
   Starting Highveld Mushrooms (Pty) Ltd. in 1979.

4. **Do you have any hidden talents?**
   None that I know about but I am still looking.

5. **What superpowers would you like to possess?**
   To be able to bring South Africa to its true economical potential and in so doing reduce poverty, transform her leaders and heal her communities.

6. **What is your best characteristic and biggest flaw?**
   I don't have a rear view mirror and there is nothing the future can't sort out.

7. **If you weren't involved in mushroom farming what might you be doing now?**
   I would have so much time on my hands I would probably get up to no good.

8. **What have you learned the hard way?**
   Structure in Bunkers is the key for good Compost.

9. **What is the best and worst advice on mushroom growing that you have come across?**
   The importance of the biological phase in Compost making. Compost should be kept anaerobic during Phase 1 for maximum yields. Really bad advice.

10. **If budget was unlimited what would you buy for the farm that you work on?**
    Automatic watering system for trays.

11. **Whom do you admire the most and why?**
    My Father, who turns 100 in July, who never complains about anything and has maintained his sense of humour.

12. **If you could come back as someone / something else what would it be?**
    One of those Bankers that achieve bonuses of $10 million a year.

13. **If you had a tattoo what would it be, or if you do what is it?**
    Not a mushroom, perhaps the South African flag.

14. **What are you addicted to?**
    Speed.

15. **Do you have a nickname, and if so what is it and why?**
    Mr. Spit, it appears that when I start shouting at someone I spit.

16. **What is your favourite holiday spot and why?**
    Mozambique near Vilanculos.

17. **What cheers you up the most?**
    Driving my vintage 911 Porsche on the back roads.

18. **What's the best life advice that you've been given?**
    What comes around goes around. Keep yourself honest.

19. **What are you most terrified of?**
    Losing a whole tunnel to negligence.

20. **Who is your favourite singer or band?**
    I like most music, at the moment it is Anna Netrebko, an opera singer and Karl Jenkins as a composer and conductor.

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