

# THE *Mushroom* JOURNAL

OFFICIAL JOURNAL OF THE MUSHROOM GROWERS' ASSOCIATION  
DECEMBER 1990 NUMBER 216 ISSN 0144-0551



**INSIDE** NEW DEVELOPMENTS ■ CONFERENCE '90  
FOOD SAFETY ACT ■ CHRISTMAS PUZZLE

## AGARICUS

— SMOOTH WHITE

*Bitorquis*  
*Hybrid*  
*Hybrid*

MILLETT

RYE

PELLET

*Somycel* 191  
*Horst* K26\*  
*Horst* U3  
*Somycel* 112

*Somycel* 521    *Somycel* 521P\*  
*Horst* U3 SS    *Horst* U3P\*  
*Somycel* 512    *Somycel* 512P\*

— WHITE

*Hybrid*  
*Hybrid*  
*Hybrid*  
*Hybrid*

*Horst* U1  
*Somycel* 209  
*Somycel* 205  
*Somycel* 208

*Somycel* 611  
*Horst* U1 SS    *Horst* U1P\*  
*Somycel* 609    *Somycel* 609P  
*Somycel* 605    *Somycel* 605P\*  
*Somycel* 608    *Somycel* 608P\*

— CREAM

*Somycel* 344

*Somycel* 765

— BROWN

*Somycel* 856    *Somycel* 856P\*

## PLEUROTUS

*Ostreatus*  
*Ostreatus*  
*Pulmonarius*  
*Pulmonarius*  
*Colombinus*  
*Ostreatus*  
*Cornucopiae*  
*Eryngii*  
*Ostreatus*  
*Sporeless Hybrid*  
*Sporeless Hybrid*

*Inra* 3001\*  
*Somycel* 3004\*  
*Somycel* 3014  
*Somycel* 3015\*  
*Somycel* 3030  
*Somycel* 3035\*  
*Somycel* 3040  
*Somycel* 3058\*  
*Somycel* 3100\*  
*Somycel* 3200\*  
*Inra* 3300\*

## PHOLIOTA AEGERITA

*Somycel* 4021\*

## COPRINUS COMATUS

*Somycel* 4030\*

## LENTINUS EDODES (SHII-TA-KE)

*Somycel* 4055  
*Somycel* 4065\*

## LEPISTA NUDA

*Somycel* 4101\*

\*ON FIRM ORDER



# Somycel



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# THE Mushroom JOURNAL

December 1990

No 216

## EDITORIAL

### Today it's new, tomorrow basic

If it was possible to predict the success or failure of new developments we would all make our fortunes. But, of course, it is not and that is why any review of innovations must simply present the facts as clearly as possible leaving you to make up your mind over whether to experiment with them or not.

And, as new developments are constantly occurring, this is no easy matter. Evaluation, even on a small scale, may involve considerable investment which has to be written off.

This is why detailed explanations of new techniques and equipment, cultural regimes and environmental controls have always formed a major part of this journal. After all growing on trays, in bags and on shelves were new developments in their day although they now form the basis for three commonly applied systems.

Naturally, nowadays, when many of the basics have been completely investigated and become merely matters of routine, most of the new developments are concerned with the improvement of quality, or, as we often suspect, what the multiple buyers perceive as quality. Under this heading Richard Green's interesting review of casing spawn fits exactly since this technique, although it does not increase yield, improves the quality, particularly of the first harvest.

On the theme of quality as well, the surface area factor in bag growing systems has long been considered by critics of the system to be a limitation so that the invention of a device to increase it is likely to be of interest to bag growers seeking to improve both quality and the task of harvesting.

Air flow and distribution attract developments more than ever before because of the quality factor and also in the growing of hybrid strains and we shall continue to see innovations here.

But it is the currency of developments that is vital if the industry is to benefit and we would therefore welcome comments and opinions on the subject from all concerned. The sooner today's innovations become tomorrow's basic techniques the better.

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# DIRECTOR'S NOTES

## S E II Area Meeting at Beaconsfield

The October meeting looked at alternative methods of selling mushrooms, with a talk by two Geest staff, Trevor Evans, business development manager and Cliff Clifford.

## Field Fresh

Their presentation was on the development of an improved method of servicing smaller retail chains and individual shops, from a wholesale market. The first area was developed around their Glasgow market stand.

Geest offer retailers a consistent supply of quality produce, using the Field Fresh logo to concentrate the image for the participating shops. Special price, or PR promotions are provided regularly. For the shops, it gives a method of assuring quality on their shelves, with the benefit of building consumer confidence. In the Glasgow trial, many shops have increased business significantly – over 30%.

For the produce supplier, in this case mushrooms; it gives the opportunity to link into a retail supply system, using the wholesaler as the supply depot.

In discussion it was suggested that growers around a wholesale market, could work together to assure continuity and build business, maybe on a fixed price basis. One grower saw the development as a threat to local retail sales. Whether a threat, or an opportunity, it was valuable to understand more of the development that is occurring at wholesale and smaller retail level, to combat the high street threat of the multiples.

Thanks were expressed by area chairman, Chris House, for yet another interesting discussion. They may be small in number, but the area meetings always generate interest and plenty of discussion!

## GCRI, IHR, BSHR, HRI.

Can any member get beyond GCRI in understanding the meaning of these initials? Our research stations have gone through all of these in a very short time and I went to the launch of Horticultural Research International recently.

It now has responsibility for all horticultural research in the UK, funded by MAFF, the industry (by levies and contracts) and the Department of Education and Science. It has ex-Dalgety chief, Terry Pryce, as chairman and an excellent scientist, Dr Chris Payne, from East Malling, as its chief executive. I suggested to Dr Payne that the mushroom panel, under Paul Middlebrook, will soon be needing discussions with him to check on progress towards the new facility at Wellesbourne. He was positive and so must we be as an industry in using our research resources – staff and buildings.

## NNS

Another set of initials hiding yet another organisation? No, it is the way that new Blue Prince managing director, Robin Stewart, sees part of the role of the MGA. It stands for "no nasty shocks" and refers particularly to political and technical requirements which may be impositions on the industry, without the MGA making a case, or even making members aware. I had the pleasure of holding a first discussion with Robin Stewart in October. He is looking for an industrial organisation which acts, not just talks, so we set some preliminary targets to enable him to monitor action. Watch this space!

## Mereside Mushrooms

We were very sorry to hear from John Bleazard that his local authority have given full planning permission for a major development of houses and hotel next to his mushroom farm. As a result of taking advice, both scientific and legal, John has decided that it is not possible to continue growing and for at least the period of the development, which is around five years, he will be out of business.



Ken James

Both John and Peter, his son, will be very much missed within the industry; John, for his valued advice and often outspoken expressions of views at meetings, Peter, for his enthusiasm for the industry itself.

We hope to welcome them back in five years or so, but as Peter commented, the industry will be entirely different by then and his father is very welcome to sell the overalls of the pickers in the auction which is being held at the end of November, for he has no intention of having any pickers when he starts again!

The industry was going through difficult times when John was Chairman in 1973/74 and he hopes we may have established a good base again by the time he returns! We wish John and his family well in the next few years.

I am writing these notes on the weekend prior to the conference, so my mind is inevitably full of check lists. Several months ago I was being warned that this year the numbers will be low because of the economic situation. I am very pleased for chairman Gerry Parker, that members from all over the world have supported his plea to join the conference this year – so far we have a total delegate list of over 300, with a further 24 booked for the farm walk only. I know that we shall all gain something of commercial value from the next week.

The Sunday Times has been an interesting read over the past two weeks. First there was a front page article on the levels of radiation found in wild mushrooms picked in Poland. Chernobyl has a lot to answer for, but it is vital that commercial crops are very obviously seen as separate from those picked wild.

Today, the colour supplement included a major survey of multiple retailing. Headlined "Trolley Fodder. How the supermarkets make a meal of you." The survey confirms that British supermarkets are the most profitable in the world – I mentioned their high net margins in World of Mushrooms recently. That they do their market research superbly – and act on it, is highlighted in many examples.

Having spent much time in the past year lobbying against the use of irradiation for mushrooms, it was encouraging to see a quote from the Tesco technical director, Dr Richard Pugh. His PhD was on irradiation and he cannot understand why any retailer would dally with it. "If there's no bug count, we'd have no way of knowing if a food has been handled to our standards or not."

Of course they set high standards, for quality and service, but they offer opportunities for growers who are prepared to meet those standards consistently. It is the grower's job to ensure that the level of service is recognised commercially.



# The Conference ... an onlooker's view

says in the lavish brochure of the Royal Bath Hotel at Bournemouth: "Walk in and you immediately feel how friendly it all is." Some mushroom growers arriving for the conference on Wednesday afternoon might have been forgiven for thinking that this was an elaborate leg-pull for, crowding the restricted entrance, was a motley congregation of individuals in every conceivable kind of apparel bellowing for taxis and jostling to enter their cars, none of which could approach closely enough to clear the jam.

Presiding over this mob, from what we were told was "an advertising and public relations gathering running late", were the most urbane and delightfully dressed of all porters imaginable. In an almost uncanny fashion they dispersed the arrivals, mollified the arriviers, oiling troubled waters and even calming those whose rooms were 'almost ready'. Trays of tea appeared efficiently held by attractive young ladies operating at a jog-trot and soon the hotel resounded with the noise of many baths being run and the first drink of the evening being poured.

By the time of the chairman's reception so much had the brochure message been taken to heart that apart from the huge numbers involved, the general warmth of the greetings resembled nothing so much as a family gathering, expressed as they invariably were in warm osculatory embraces.

Not only did this highlight the popularity of this year's chairman and his 'supporting vice' (as I heard someone express it) but stressed yet again what a relatively small industry we are engaged in and how much still it is dominated by families.

Looking for the 'old' faces was easy for they were all there, the notable exception perhaps being Hugh Barton missing his

first for what must have been over 25 years. Scions of the houses which established the foundations of the present huge £300 million plus industry are still carrying their banners (with the sad exception of the late David Stanley-Evans), albeit sometimes beneath the encompassing shade of some conglomerate, but directly involved none-the-less, reminding us all that mushroom growing in the UK is still very much a 'way of life' activity - to our marketing detriment at times.

The international flavour of the occasion emerged not only from the large number of overseas visitors (and these were from 15 countries) but from the overheard conversations. Could one really have heard correctly that more than a few delegates present had been to Australia early in the year and more recently to Czechoslovakia, apart that is from the peripatetic and ubiquitous persons of Fred Hayes and John Rodwell whose international consultancies are a constant subject of conference conversation.

Could we really have been dreaming when we again eavesdropped on matters being discussed which suggested that rivalry between the Italians and the Dutch had surfaced at the British Mushroom Growers' conference running by now as it seemed with effortless precision?

It was hard to disagree with one eminent conference delegate who declared it was the best for content and achievement for many years and showed an awareness of matters which are likely to contribute to the survival of the UK industry. Though there were no solutions suggested, the conference at least identified some gaps in our knowledge on technical matters. Although the electrifying report on Poland by the leading French processor walked the narrow path between

marketing and politics, it would have been satisfying to have had in the programme some hard facts about our marketing, or in many cases, the lack of it.

Two excellent contributions from the industrial sector (Drs Border and Burden), one rather longer than expected, stressed the importance of privately-funded research and development as a natural component of the UK R & D effort as much as that of the National Institute, surely in tune with today's trends.

And, of course, taking the stage like the prima donna of some agoric opera, the industry's very own Geoff Ganney, who in his irrepressible, highly practical, devastatingly provoking and irreverent manner, reminded us all, yet again, that our industry is about basics and our ability to cope with them hour by hour, day in day out, every year.

If any grower's tax inspector dares query the charging of this conference against the business expense he should have been present on Thursday morning through those first five papers and seen all the note-taking and mental absorption and then gone, after a light lunch on the spot, round the effective and representative trade exhibition with its new Allied Trades Association backing and seen the interest and enthusiasm which it engendered.

And finally when, at the end of the activities, Ken James and his three capable ladies had lost their voices, but not their ability to cope with every contingency, we all felt how fortunate indeed is the Association to be represented by such officers. Officers? No, of course not ... new colleagues to carry on at Stamford the tradition established all those years ago in Peterborough.

## The Director's view

The Director writes: With a total of 350 delegates, this was the best attended in recent years.

Thanks to many overseas delegates who support the conference there were at least 15 countries represented.

Do not expect much personal service from Krijn Leendertse of Agrisystems over the next nine months. At breakfast one morning at the conference, he agreed with Frans Rats of CNC, that they would sail to the ISMS Dublin Congress next September. On leaving the English channel for the wider oceans to Ireland, they may well circumnavigate the globe before finding the emerald isle!

A conference session quote from Dr Joe Hussey, when talking of the problems faced by growers in meeting the new phenomenon of media interest in every possibility of health hazards. "These are 'no problems', but they can have dramatic effects." Growers beware.

The delegates coming out of the conference session after the paper by Dr John Burden, of Middlebrooks, were mostly looking ashen. His detailed appraisal of pests and diseases struck notes of fear - or recognition - that they had to go home to a real problem or two!

Our friends from Hungary, Dr Gabor Tasnadi and Lajos Kesthelyi, made a positive contribution as always. After the excellent paper given by Royal Champignon President, Alain Meulnart, Gabor suggested that the statistics on

production in Poland - admitted by Alain as sketchy - may have overestimated production in 1989. He still suggests production of 80,000 tonnes from 12,000 growers. So there is plenty of room for increase in productivity and more mushrooms into western Europe.

## International collaboration on R & D

The follow up to the Australian Workshop, held during the MGA conference at Bournemouth, proved to be very positive. Fred Hayes, President of ISMS chaired a meeting, which included delegates from 10 countries. There will be a full report prepared by the ISMS secretariat, but in brief, the meeting agreed:

(a) To ask scientific representatives from five countries - Australia, France, Holland, UK and USA, to consider the research requirements. This will avoid unnecessary overlap of research programmes in each country, seek ways of collaboration between scientists, and identify work which may require international funding. The first meeting is to be hosted by Holland, to take place in time for there to be a report and discussion on follow-up action, at the NAMC, San Antonio, in February 1991.

(b) That the ISMS secretariat will examine the potential for establishing a scientific data base and act as the focal point for collaboration.

(c) To hold a further meeting at San Antonio.



# 1990 BOURNEMOUTH CO

The Royal Bath Hotel proved to be a most gracious and hospitable setting for the annual MGA Conference. A record number of delegates, beating that of last year, attended lectures, visited the trade exhibition, met old friends, made new ones, took part in golf and clay pigeon competitions, wine, dined, danced and enjoyed themselves. The conference ended with a fascinating farm walk at Leckford and Tunnel-Tech.

Conference papers varied in subject matter and style of delivery, many delegates commenting how stimulating it was to hear about new ideas and methods; overseas speakers were particularly well received.

The exhibition attracted a record number of visitors to a wide variety of stands.

On the lighter side the social activities were a roaring success. Golf and clay pigeon competitions were as popular as ever, whilst the ladies enjoyed a pleasant (though chilly) visit to Poole Pottery and Athelhampton House. 180 Delegates went on the outing to Beaulieu and after gazing covetously at the magnificent collection of motor vehicles were entertained over supper by a pair of wandering minstrels. On the final evening Mr and Mrs Parker met guests at a drinks reception followed by a banquet in the Hotel's superb garden restaurant. Here, prizes were given and we were entertained by a rapid fire series of jokes and anecdotes by guest speaker Gordon Channon. We then danced, if not until dawn, at least until the band could no longer be cajoled into playing any more. There were a few tired heads and weary feet for the farm walk on the Saturday morning but this did not prevent delegates from taking an active interest in the modern technology of Leckford farm and Tunnel-Tech.

There will be a full Conference report on all the activities, including the farm walk, in next month's Journal. Meantime, these pictures give the flavour of a successful conference.

MARION SOAR.



Chairman's reception: Pam and Gerry Parker. Right: The farm walk hosts Mr & Mrs Ewin, Dr and Mrs Ross and Mr & Mrs Dicks.



Above: Dr Gerrits receiving the Sinden award. Right: M. Alain Meulnart who frightened some delegates with his information on Polish production.







Above: Maggie Dumbrek, patching up relations with Ireland.  
Left: All ears at the lectures.

Below: Norman House, winner of the raffle, with chairman's wife Pam Parker.



Les hommes charmants! From right to left Frank Stewart-Wood, Edward Spencer, Ron Jones, Tony Russell, Barry Woodcock and Dr John Fletcher.



Above: Ferd and Sylvia Hensby with a touch of class at Beaulieu.  
Left: The exhibition.



# Good health!



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# D. B. Stanley-Evans

## 1945-1990

**'He chose David to be his servant  
and took him from the sheep folds'**

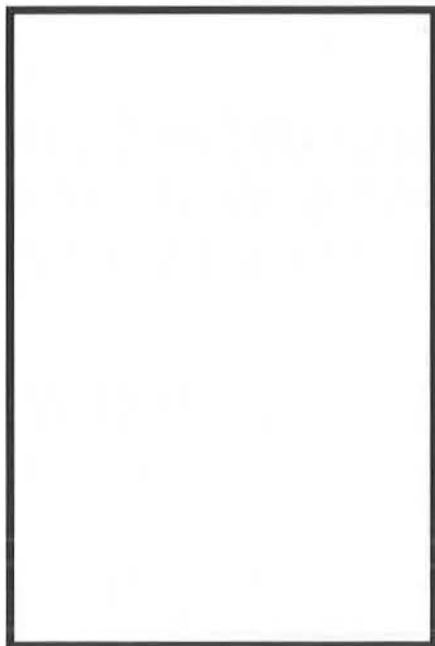
These moving words were expressed in the loving Address given by David's long-time family friend, the Reverend David Payne. He talked of David's courtesy and kindness, his meticulousness, his instinct for innovation, his uncompromising attitude to his own beliefs. He talked of David's love of choral music, particularly Handel's Messiah and especially its haunting recitative wherein is writ the question. 'My God, my God, my God; why?' The three hundred of David's family, friends and colleagues gathered at the Church of St. Mary, Shackleford, that Monday afternoon of October 22, were all wondering just that.

After twelve years in the family business of Shackleford Mushrooms, having already contributed greatly to the work of the Association through his membership of the Executive since 1972 and chairmanship of the Research Committee, David became the youngest ever Chairman of the MGA in 1978 and made the fourth father and son combination to occupy the premier MGA office.

At that time, my own links with our association were slight and with David not made until around 1981. A little back-reading of 70s Journals and a few telephone calls soon gave me a picture of his impact.

His energy and enthusiasm at attendance at MGA's London office (almost daily as well as every area meeting across the country) were manifest, not only in presence but in effect. The 1947 Rules of the Association were overhauled to encompass a radically-changed and larger industry, the Spawn Contribution Agreement was redrafted: he undertook to alter completely the accounting system of the association: and he was responsible for organising lecture tours of area meetings by well-known international celebrities.

Such determination and successful influence over events will inevitably provoke some resentment but David was too intelligent and self-examining not to realise this. In his thoughts of a past Chairman (November '78), he reflected: "I am sure there are some



who feel I have done too much, and been too closely involved in the running of the MGA . . . This is the only way I know how to work in such a situation. If it is my head on the chopping block, then I want to be fully informed and to have been involved in the making of any major decisions".

But perhaps I emphasise too much David's public works. The attention to detail at Shackleford is legendary. With a fill of twenty-four inches and a cropping cycle of eleven weeks, it arguably must be. But when the figure of 0.5% of turnover is revealed as the cost of all raw materials making up the compost, the rationale becomes clear.

David was very much a proponent of this thinking and echoed father Peter's 'enormous respect for the mushroom and the way in which, if you relax your concentration, things can go terribly wrong'. It was well-known that after driving home many miles from a distant area meeting or after a long day in London on Association business, David would doff his pinstripes and don his brown overalls for an hour or two of watering. 'We virtually have a board meeting on every stage of the cultural operations' and he meant it. The evolution of Peter's successful single-zone rack system to a three-zone tray system was very much David's initiative but yet he would always acknowledge the cohesive and cultural importance of a good team. It is indeed a sad but telling tribute to pay that Shackleford Mushrooms could continue to prosper during his ever-increasing absences through his cultivation of a skilled and trustworthy management team.

But there's a tap (a tap? he was a strong man) on my shoulder: 'too serious, Charles, too darned serious by half,' I can hear him saying and he would say that. Perhaps you're right David, but it's hard to be otherwise.

I know you won't mind when we all wish you these soothing words Fred Atkins once wrote in his appreciation of Guy de Mann: 'sleep well, dear boy; sleep well'.

**by Charles Spencer**





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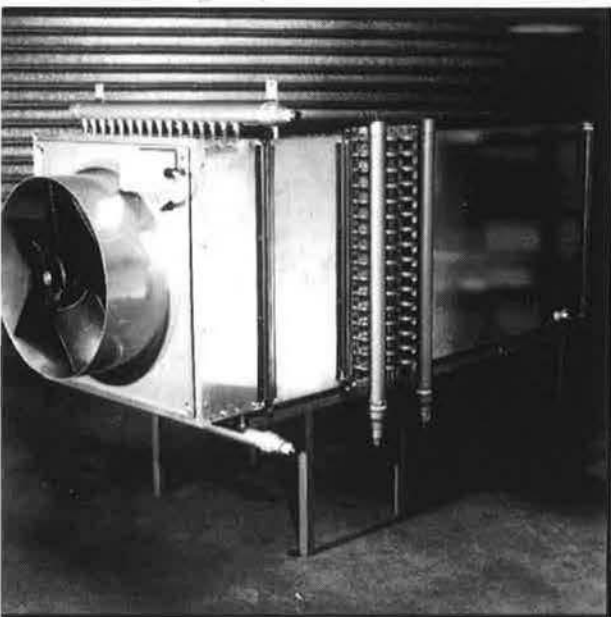


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# THE CHRISTMAS PUZZLE

In the following account the eighteen sets of underlined letter in bold type are one-word anagrams of the names of mushroompests, diseases or control. Can you work them out?

## Composting, a ZAP THEOREE.

This is an account of some spectacular research by that well-known manure expert, **Dr I Casi** working at **Ye Holdde Farm**. He got the idea while out walking his **lither poochy**. The theory is based on the **Loh Lloh C-N Ratio**. As a result of this brilliant work a new composting process has been developed which is **economyg** in every respect.

The starting materials include that old stand-by waste product **Despoos Manu** plus some **Miden Stroa**. These two materials are mixed together thoroughly and wetted so that the **mocrobos** can get to work. Soon a **hot ameumic** is given off. The mix is turned from time

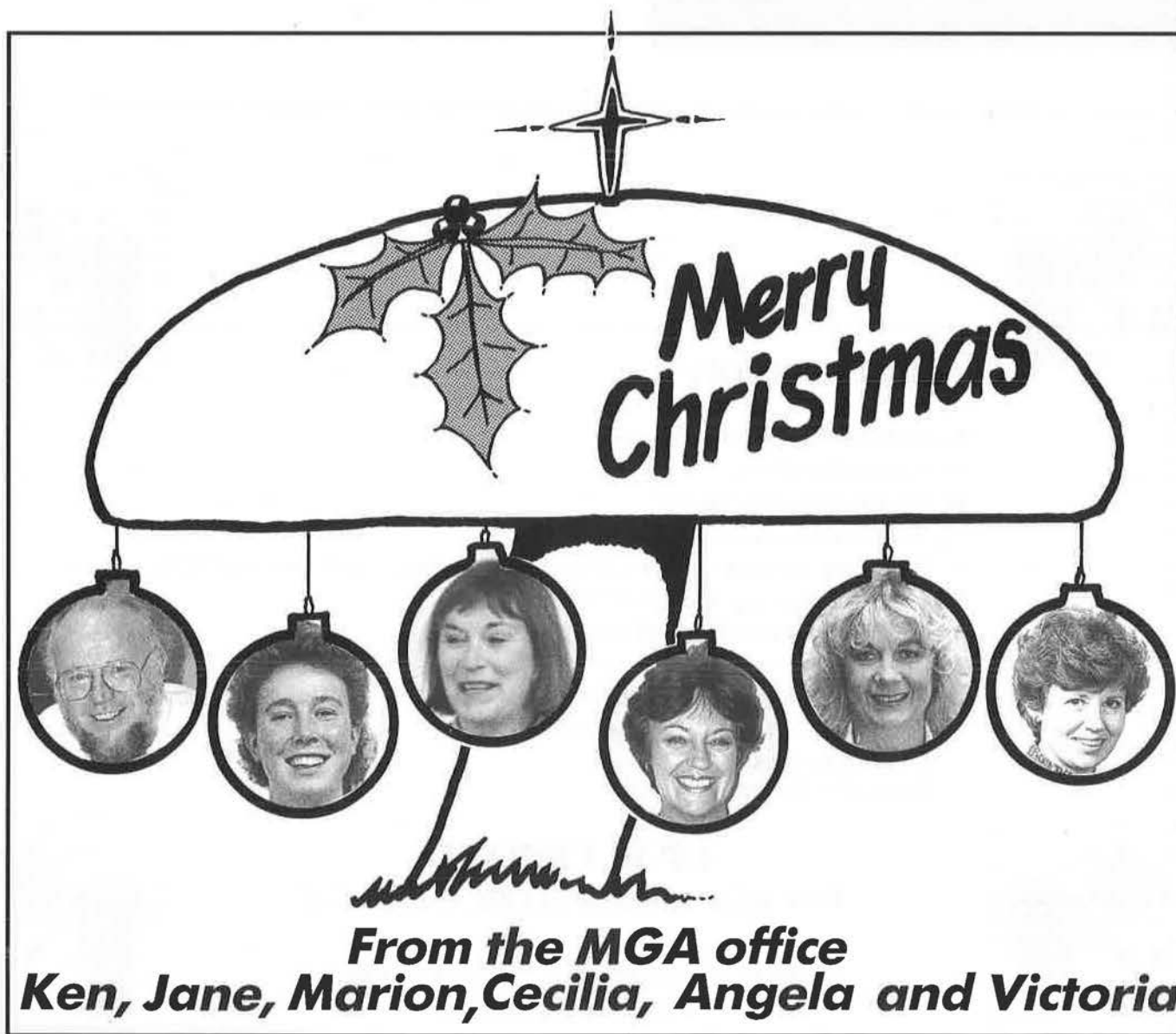
to time **til evil murci**. When this happens it is time for the next phase. Simply add the odd **Lyme Nob** and pasteurise thoroughly with lots of **Steim**.

Believe me, when spawned and cropped this compost will give you a **rich ode mart**. However, if you think this is all a **hort bar story** and worth nothing more than putting in **ze bin**, you may be right, but can you solve the anagrams? If not, and there is **no dam tee**, you had better do as we all have to in the end when dealing with mushroom pathogens, fall back on a double **Heye Gin**.

Happy Christmas to you,  
Pert Feggel.

Answers on postcards please to: **Puzzle, MGA, 2 St Paul's Street, Stamford, Lincs PE9 2BE.**

A magnum of champagne for the first correct result received and a bottle each for second and third.



# THE FOOD SAFETY ACT

by Clive Black

EU Food Policy Adviser

Earlier this summer the Food Safety Act was passed and major provisions come into effect on 1st January 1991. This Act requires consideration by all mushroom growers not least because of the changes in legal defences, the increments in the penalties available to the courts and the great powers conferred to the enforcement authorities.

The Act is a response by Government to a decline in the confidence of the consumer in both the safety of food and the effectiveness of the authorities to protect their interests. It is enabling legislation which provides Government with power to enact regulations when they see food safety being threatened or consumer protection in relation to food being prejudiced.

These objectives are the backbone of the Act and contravention of the four specified offences associated with them carry the greatest penalties. The offences are: rendering food injurious to health; offering for sale and/or possessing with the intention of sale; food failing to comply with food safety requirements; offering for sale food not of the nature, substance or quality demanded; and, falsely or misleadingly describing food.

Therefore, all mushroom growers must make sure that their picked mushrooms offered for sale, in whatever form, do not cause these offences. On successful prosecution the maximum penalties for cases tried in a UK Crown Court are unlimited fines and/or 2 years imprisonment, while in a Magistrates' Court the maximum penalties are a £20,000 fine and/or six months imprisonment.

## Penalties

The penalties suggest that Government is serious in its commitment to protect the consumer. This being the case it is important for mushroom growers to note the changes in legal defences. Statutory warranties have been replaced by the "due diligence" defence. This makes two requirements from mushroom growers. Firstly, all growers must show that they have in place, and take, all reasonable precautions to prevent the committing of an offence.

Therefore, good business practice must be followed such as checking inputs, applying all fertilisers, disinfectants and pest control substances according to the requirements of manu-

facturers' labels and taking measures to ensure that weighing equipment is operated correctly and labels do not mislead consumers.

These measures in place, the grower must then check that these practices are followed by taking accurate, up-to-date and presentable records of purchases, applications, batch numbers, employment training and other information which may enhance a legal defence. The checking process is the second requirement and means that growers must act with **due diligence**.

## Enforcement

The Food Safety Act will be enforced by Environmental Health and Trading Standards Officers. The procedures which enforcement authorities must follow are being set out in a series of Statutory Codes of Practice which should reduce the likelihood of varied enforcement occurring across the country and also provide the grower with some indication of the procedures which should be followed.

Enforcement officers have a wide range of powers. They can visit growers as part of routine work or as part of an investigation. They can inspect food, check staff and the premises in which mushrooms are grown. Should they discover any food or any other factor likely to cause food to fail to comply with the food safety and consumer protection requirements, they can seize food and apply to a magistrate to have it destroyed. If the magistrates disagree with the enforcement officer's decision, then the grower will be compensated to the value of the food destroyed.

Enforcement officers can also serve improvement notices and, if a health risk is imminent, emergency prohibition notices and orders. An improvement notice requires a grower to make adjustments according to those provided in a written brief from the enforcement officer. Under emergency prohibition notices and orders businesses can be closed, particular processes can be prevented from use, and certain equipment can be barred from use.

Where a grower has been prosecuted for an offence a magistrate may make a prohibition order to close down unsanitary food premises, to prohibit processes from being used for particular kinds of

food and individual people from carrying out a food business for a specified period. Finally where major risks to health exist with a certain food product Ministers can serve emergency control orders which can prevent any business activity from occurring. Naturally failure to comply with these regulations carries a punishment by the courts.

In addition to these enforcement procedures the Act contains further provisions which the mushroom grower should understand.

First, from April 1991 it is likely that all growers will have to register with their local authority. This register will contain a minimal amount of information and will not affect the responsibilities of a grower or increase the likelihood of a visit from an enforcement officer. However, it will assist the enforcement authorities to conduct their activity more efficiently.

Second, there may be some requirements to train staff in basic hygiene and food safety. Such training should enhance a "due-diligence" defence.

## Irradiation

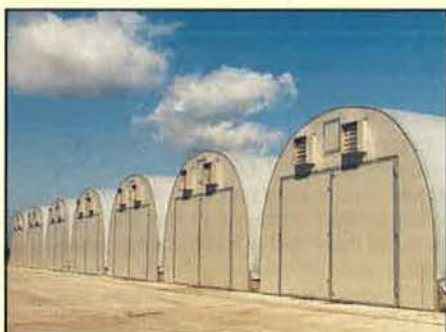
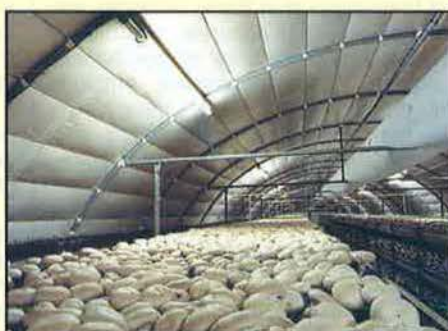
Third, the Government has consulted on the Control of Irradiation Regulation which will permit the sale of irradiated fruit and vegetables, including mushrooms, in the UK from 1st January 1991. A further regulation will make strict labelling requirements of all irradiated food. However, there is some concern that the list of approved products in the UK may be broader than that of the EC and cause confusion among consumers and threaten fair trade. Clearly it is important that both lists are compatible and the NFU has made representations to Government on this matter.

The Food Safety Act synthesises the regulation of the food industry in the UK. It is legislation of which the mushroom grower must be aware so as not to contravene any of its major offences. Key to avoiding such problems is taking all reasonable precautions to avoid committing an offence and being duly diligent.

**If industry responds positively to this Act the reputation of the UK food industry should be enhanced and consumer confidence in food further restored. This must be an objective of all those involved in the food chain.**



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# EASTERN AREA MEETING

In late October the Eastern Area was very pleased to welcome Hans Tschierpe to their meeting. A talk entitled "Fact fantasy and fiction of compost making", brought a large number of members and allied trades. Area chairman, Damien Hearne will provide the notes on the presentation by Dr Tschierpe in January's issue.

Eight members were brave enough to bring samples of mushrooms and very good they all were. The chips were well inspected by all present; hopefully to pick up some tips on quality and presentation! I do like the chips which still use lightweight paper as a lining and cover for the mushrooms.

Dr Tschierpe put his life at risk and selected Robert Brown's Woodland Mushrooms pack as the winner. Maybe on another occasion, the area will look at further aspects of mushroom quality and presentation.

Damien wound up a very enjoyable meeting in time for a gathering at the bar for soft drinks before travelling back to the fray of growing!

Right:  
Judging  
mushrooms  
is a serious  
business!  
Hans  
Tschierpe,  
with Guy  
Gooding and  
chairman  
Damien  
Hearne.

Below: Some  
of the  
entries for  
the meeting.



Robert Brown, ready for a rainy day after his mushroom pack had been judged best at the Eastern Area meeting.

## A quick overview of French production

by Agnes Bernardin

In 1989, the 250 growers, produced 210,000 tons. The two world-wide companies Champi Jandou and Royal Champignon have integrated all steps of the process. They operate in three markets which are different from each other: fresh, canned and deep frozen. The international dimension of Royal Champignon is even more important since its recent establishment in Poland.

France is the world's third producer of

fresh cultivated mushrooms after the USA and China.

French national production of cultivated mushrooms varies since 1985 from 200,000t to 220,000t, of which 60% is destined for canning and 27% sold for consumption in a fresh state, amounting to 56,700t in 1989.

The total manufacture of canned mushrooms has increased more than sixfold in 25 years going from 24,000t in 1960 to 149,000 in 1985, an average annual increase of 8.5%, making France the first European manufacturer of

canned mushrooms – employing 2,800 in 8 companies.

The French consume on average 1.8kg of canned mushrooms per head per year. Nearly 40% of French sales are destined for export representing a positive balance of trade of 450 million francs. Of this export 90% are destined for the ECC of which around 58% are for West Germany.

The deep-frozen mushroom industry is very dynamic, and represents 20,000t. And more than half of this production was exported in 1989.



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# PURSUE PERFECTION TO SAN ANTONIO

**THE NORTH AMERICAN** conference is scheduled for February of 1991, so if we are to obtain space on flights, hurry to make your reservation.

**THE THEME IS "PURSUING PERFECTION"**. With Ron Jones as a speaker from the UK and plenty of others from around the mushroom world, there is sure to be commercial value in the conference.

**THE MGA IS ARRANGING A VISIT**, leaving Gatwick on Friday 15 February, returning 25 February. **THE PROPOSED ITINERARY** will give two days in San Antonio, prior to the President's reception on the evening of Sunday 17th.

**BREAKFAST AND BUSINESS SEMINARS** will ensure that the days are full, with an opportunity to spend time at the Mushroom Expo '91 exhibition, on the Tuesday and Wednesday afternoons. **A FOUR-NIGHT BREAK** special deal at Puerto Vallarta is included in the itinerary. The brochure describes it as "an ultimate incentive destination in one of Mexico's most unique Pacific Coastal resort areas". There is an 18-hole championship golf course, deep-sea fishing, cruises to deserted islands – and all the interest associated with a Mexican old time city.

**THE COST** – Based on approximately 15 participants:

– The maximum cost for 6 nights, bed and breakfast, twin room, at the Hilton Palacio, San Antonio (The Conference Centre), 3 nights in Puerto Vallarta including all flights, but subject to currency changes prior to booking

– Travel, baggage, sickness and cancellation insurance (tickets non-refundable)

– Conference Registration

Total Cost

Single supplement approximately

The MGA office have registration applications

£1,130

£ 73

£ 218

£1,421

£ 280

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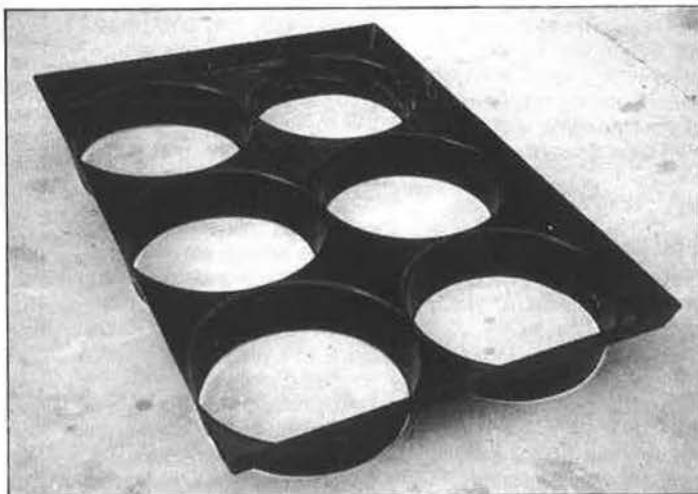


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# GROWING PAINS

## 1st October

Can it be that over-compression of compost at spawning really has a deleterious effect on yield and quality of mushrooms? Discussions with various growers leads me to believe that this may well be the case. Compression of fully grown compost, however, probably has a different result. What a subject area for debate and good commercial trials. You mean it has all been done before?

Commenced filling polythene bags into the Woodhurst farm.

## 2nd October

First flushes 36 hours late this week, although airing was at the normal time, but for some reason the mycelial vigour is lacking. No 'on growth' took place with the mycelium just stopping dead. Subsequent pinhead formation slowed and development into sporophores seemed to take for ever. While the usual blame is the weather, maybe in this instance we had too much water in the casing layer. When waiting for mushrooms to grow it always seems that they are reluctant and yet when you wish they would slow down they never do.

## 3rd October

**Insisted that pickers' knives were sharpened and stalk length returned to a commercial level.**

## 4th October

I was told the ADAS early warning and information service in relation to mushroom pests and pathogens had reached the drawing board. Such progress must be warmly welcomed. Are the various methods of cultivation likely to give the same priorities to individual problems or would, for example, sciarids become more of a problem in bags

than on trays? Such is the biology of the mushroom that different production on changes in preparation methods have profound effects.

## 5th October

Beware the pitfalls of using returnable (or otherwise!) trays in mushroom growing sheds! The dangers can be of such magnitude as to establish major pest or pathogen problems in a relatively short period. One could imagine cecids and mites sticking well to both inside and outside eagerly awaiting a succulent crop to fall onto! Mushroom spores, *Verticillium* spores or more and more spores would be there in abundance.

## 7th October

Repairs around a mushroom farm seem to be so commonplace that they become expected as a matter of routine. This knocked down; that fallen off; those just collapsed; these we are always replacing; he said it was worn out; it was just one of those things; well, we had a spare and thought it should be changed!! Other than going totally into polythene bags what is the answer?

## 9th October

It occurred to me that bulk phase II in large quantities must send out some enormous signals to lurking sciarids whose attraction to phase II cool-down seems ever-increasing. No doubt trapping would reveal if this were so? Well recall when we started growing on the Catfield farm the inbuilt level of sciarids was such that you could sweep them from the floors! Equally it was possible to find adult females in peak heat rooms at cool-down. What chance with such early infestation?

## 10th October

Tony Claxton and Aoife O'Brien called in to see the state of play of the polythene bags on the Woodhurst farm.

I suppose with much Irish experience they thought it as well to ensure that some dumb tray grower could get it right. The combination of experience of converting Catfield from 40" trays to 40-pound polythene bags; having a tray satellite system at Marigold since 1982 and filling into an extremely sophisticated Dutch type (minus the shelves!) cropping unit, must have stood us in good stead! 'Very smart,' said Aoife. 'We don't actually have mushrooms,' I said, 'but the potential looks good!' Well as Tony put it, 'with all the control gear you have it should be possible to do anything with the environment, what have you in mind?' **To turn it off ... ?**

## 11th October

Much impressed with the rejuvenisation course taken by Paul Middlebrook which was so clearly displayed in the photograph in the October Journal which arrived today.

## 12th October

Production controller asked about the Christmas programme which prompted a mass exodus to local pub! Yes, it is here once again, the period of thanksgiving that takes three months to recover from financially and, for mushroom farms, is today a crippling experience. No doubt extra pre-Christmas crops are underway to take advantage of anticipated high wholesale returns and stimulated direct sales. In today's recession one has to wonder if this is in fact a likely reality.

## 14th October

Having **firmly** agreed only to pick certain grade-outs at the weekend, in order to simplify the whole procedure, it is now equally **firmly** obvious that it is not being done! But, no, well; if only they, we couldn't, it just happened; **WHY NOT SIMPLY DO IT?**

## 15th October

Annual insurance reviews certainly highlight the monies

invested into a mushroom plant old or new! How one actually values certain areas is not at all clear to me, or even how far you need to take areas like consequential loss. Perhaps an MGA joint funding could have assisted in reducing costs but primarily **ensuring** all have **insured** correctly.

## 16th October

Woodhurst polythene bags seem to be arriving with great regularity and by the end of the month the farm will be full. Then we will have to work out the most economic sequence 2, 3, 4 or 5 flushes. What do people do? Maybe 80% of the crop doesn't come in two flushes as it seems to do on our trays. Maybe it does if you only use 18 kg of compost per bag, but if you have 21 kg per bag you need four flushes! Having decided we would use a deep casing layer the first bags were cut too close to the compost and the casing all fell onto the floor! Had thought that only happened on trays? Have to speak with some Irish growers at the conference to get the right sequence of terminology for bags or we are going to get into some compromising predicaments.

## 17th October

Sweaty, sticky unproductive outside weather conditions giving everything that a mushroom grower dreads! No doubt those with full air-conditioning facilities are not experiencing wet mushrooms, marginal bacterial blotch, wet dank sheds, poor evaporation, too warm conditions rushing mushrooms forward, premature opening and extremely slow pinning. You are? Well maybe we can blame the problem on these dreadful late summer composting conditions or perhaps just our late reaction to normal autumn growing situations.

## 18th October

First really heavy rains for some months certainly managed to find all the

locked downpipes, gutters, racked roofing, blocked rains and any other so-called opening. As mentioned earlier there is a continual need for repairs around a mushroom farm which must either mean we didn't design right, use the right materials, spend enough money, or it is due to the pressure of daily operation or surely it is **worn out!** Ordered more repair materials ...

## 9th October

Casing mycelial supplement has increased by 25% to overcome what we determined as an 'irregular pawn growth'. You could say a 'bloody poor run'! Basically due to following early casing policies and this particular batch of compost being far too dry. We have had to introduce an extra dumping system from the 'goody pit', in order to get enough sprinkling time of the pre-wet straw heaps. Having gradually crept towards a totally straw based substrate has resulted in a longer and more controlled pre-wet watering time. Have to watch carefully we don't go the other way as with increasing soggy weather the 'back tack' condensation is becoming far more pronounced. As our daily compost talk-in sets out to explain: **'WE MUST SEEK CONTROL, RE-ADJUST AND CONTROL AGAIN.'**

## 2nd October

Daily Telegraph reports Mushroom Pickers' in Oregon while collecting wild pine mushrooms are armed with handguns and knives. Mushroom picking is illegal or requires a permit in most of the state's forest regions. Rangers at Crater Lake recently seized 500lb of mushrooms. Local buyers pay up to \$7 a lb and then resell them to Japanese traders. Mushroom rustling is now ranked with marijuana growing as the main crime in Oregon's forests. "Hopefully we will have a plan of action to combat the thieves by next year's harvest season," he said. Please send them to

Peterborough ...

## 23rd October

Second batch of mushrooms this month dispatched to ADAS centre at Harpenden for Daphne Wright to examine for virus-like particles. It is no short-sighted thing to do following a long period of warm, dry, dusty weather when the prevalence of flat mushrooms has at times been far too high. We are unfiltered, but even if we were filtered it is a procedure that would still be followed.

## 24th October

Block of smallish growing sheds at Marigold working without the heating operating due to 40-foot trailer running over the calorifier! Crop timing not ideal with late airing but quality of product is exceptionally good being hard, white and tight. Concerned if we should run into any 'Drippy Gill' but as we are harvesting everything closed it seems not to have appeared. We seem these days to be quite able to control harvesting patterns as desired, which I hear is not always the case on satellite units where expansion goes ahead of trained people. Oh well, that's the way this job goes!!

## 25th October

Nitrogen levels are still too low at filling or to be precise the ammonia figures. Seems more than likely that the 1990 straw, which certainly has a wood-like nature, is low in natural nitrogen. Maybe with drought conditions the assimilation of nitrogen into flag and stubble is reduced. Decided to increase deep litter further at the stacking stage and hope we don't over-cook the recipe!

## 26th October

Having increased air changes dramatically a couple of days after airing, we still are not pinning as we should be on the first flushes. Logically, at the CO<sub>2</sub> levels we have, it should virtually be a case of **over-pinning**. No doubt these extremely high outside

humidity conditions are resulting in slow evaporation from the casing surface. A few night frosts might just help to correct what at present are still autumn conditions.

## 28th October

**Cost control has to do with people control, for it is both their direct costs and action in resultant expenditure that is UNDER or OUT of control.**

structure of the material	- CONSTRUCTABILITY
texture of the mixture	- BLENDABILITY
material unison	- MIXABILITY
machinery acceptance	- DESTRUCTABILITY
formulation control	- REPEATABILITY
uniformity of work standards	- FLOWABILITY
bulk density control	- CLOGABILITY
absorption potential	- ABSORBABILITY
total water holding capacity	- CAPACABILITY
retention of water	- RETENTABILITY
re-acceptance of water	- SOAKABILITY
commercial longevity	- PANABILITY

This is real growers' stuff; Fred Atkins would approve!!

## 29th October

Standard of recording growing detail in desperate need of updating and in need of being used in a far more analytical manner. It is from such data that standards are met and knowledge of progress obtained. Simply filling in the expected details without evaluating their meaning is worse than no records at all. Crop output recordings have gradually been ignored in the belief they are not accurate.

## 30th October

My keenness on international collaboration on the research and development front was well encouraged in attending the Australian workshop. Time will undoubtedly see that everyone's goodwill results in progress. The other side of the collaboration coin must be factors connected

with health and safety legislation, public liability trend, environmental issues at the legal level, economic format and publicity. Not a bad set of topics for Mushroom Association Directors to discuss their implications on a world basis at least annually!

Completed my Bournemouth Talk which, being a growers set of thoughts, will not be in published form. But you might like to consider some grower terminology:

## 31st October

Today I read in ADAS Advisor magazine for our area that 'Interest in organic farming methods, and the food they produce, has been brought about by concern for the effects of agriculture on the environment, animal welfare and food safety and perceived over-production of basic food stuffs. The idea that a "natural and sustainable" way of farming could address all these issues is obviously a great attraction.' Funny how I had imagined it was as a response to public demand for uncontaminated food ...

Wicked witches cast their brews of newts and toads, mushroom green or black which would simply fail to meet the needs of those who would cause the most hallowed to flinch on such a night as Hallowe'en.



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# NEW DEVELOPMENTS

In the following pages we highlight some of the new developments in the mushroom world.

## Casing spawn – a new development?

by Richard Green of E. Hauser (England) Ltd.

The technique of adding mushroom mycelium to the casing soil is not in itself a new development. Almost twenty years ago MacCanna and Flanagan added spawn through compost to the casing soil and were able to demonstrate a number of advantages:

- shorter time between casing and aeration.
- more regular appearance of the crop with no pre-pinning or clumping.
- no requirement for levelling of the casing soil.
- improved quality mushrooms.

A number of growers recognised the advantages and adopted the technique. However, following a number of serious virus infections the method was quickly abandoned.

In the early 1980s spawned casing was introduced into the rapidly developing Irish bag industry where it quickly became established and up to the present time it has remained an industry standard. The unique characteristics of the "satellite" bag growing system have made this possible without the onset of the aforementioned major disease problems.

Also in the early 80s the method was developed by a number of growers in the

USA where the technique of spawned casing became known as CAC'ing – compost added at casing. Sophisticated procedures for the production and testing of the spawn-run compost were recognised as essential.

The Dutch, also recognising the advantages of mixing mycelium into the casing soil, developed deep ruffling. However both spawned casing and deep ruffling have drawbacks when compared to the latest developments introduced by spawn producers.

In recent years the ever-increasing demand of the market for quality mushrooms has resulted in every aspect of the production process being re-examined. Concentration on the production quality alone is insufficient; mushrooms must be available at the right time on a repeated basis and be produced in a cost-effective manner. Present day economics dictate that increased productivity is also necessary and this is often achieved by a shorter cycle.

Adding mycelium to casing soil affects each of these areas. The use of commercial products prepared on sterile substrate eliminates the risk factor and spawns are now available for use specifically in the casing layer. Substrates have

been developed to provide the nutrition required by the mycelium, which are also capable of being sterilised and in a form suitable for easy distribution in the casing soil at the time of mixing. In other words a safe, very convenient, relatively low-cost method for the grower to use spawned casing.

The technique depends upon mycelial development occurring in all directions in the casing soil from each point of inoculation. Growth is stimulated by the carbon dioxide and heat released from the compost beneath, almost irrespective of the conditions in the air above. Each point develops to form a matrix of mycelium and colonisation of the casing is rapid. The time available for watering during the case-run period is reduced considerably with all the water being added on the third, fourth and fifth days after casing. The substrate must therefore be capable of supporting growth unchecked by the high moisture content needed in the casing layer at this time.

Air is introduced at an early growth stage that would otherwise be considered immature by previously accepted standards. Typically no more than the bottom 30% of the casing layer has a normal case-run growth pattern, the

Typical crop with 6-day ailing.

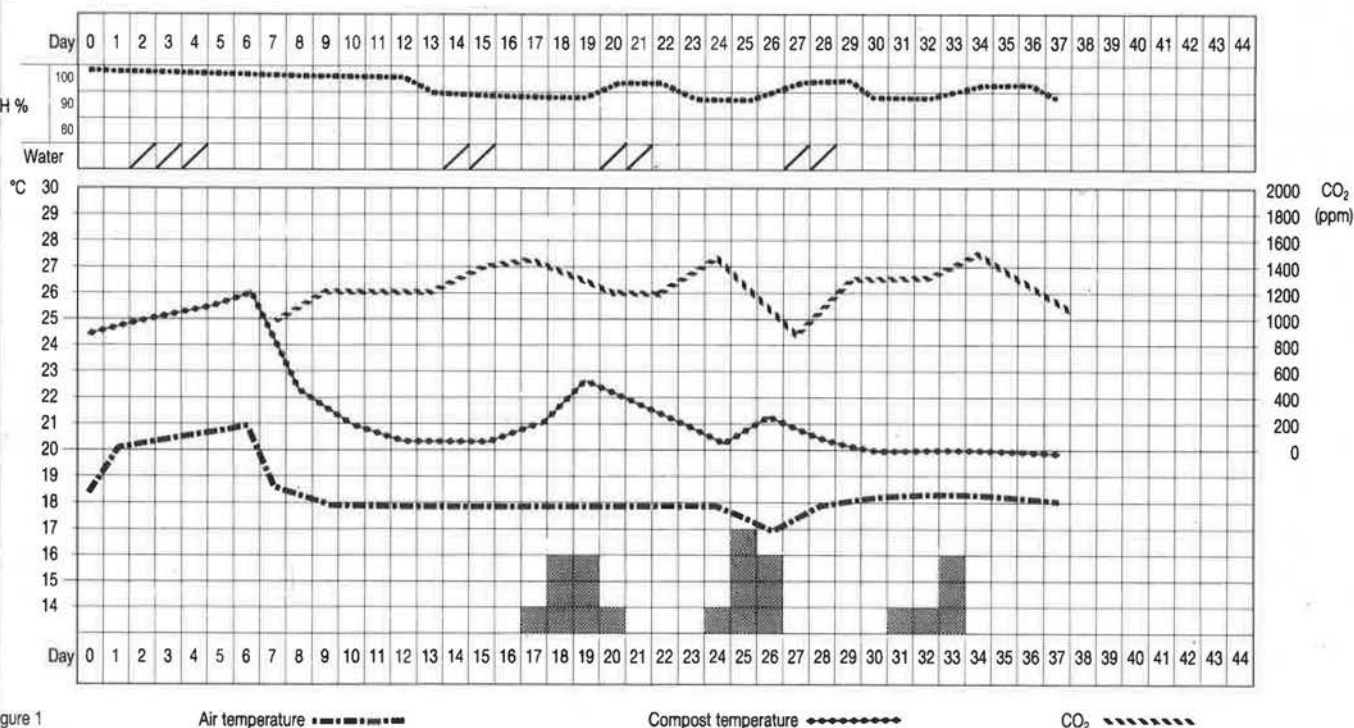


Figure 1 Air temperature — — — — —

Compost temperature .....

CO<sub>2</sub> —————



### Spawn running, compost and casing together.

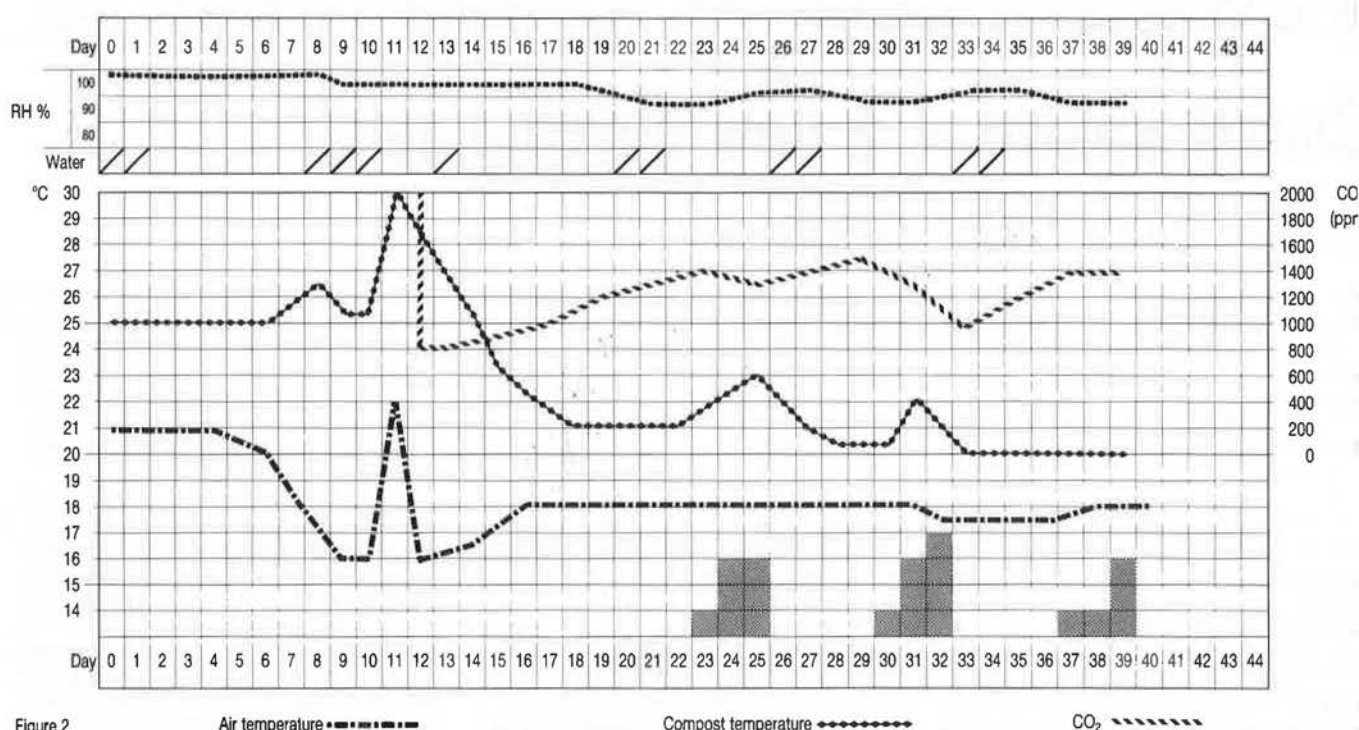


Figure 2

remaining 70% has an immature run which is sparse and leaves large pockets of casing uncolonised. This finer run rapidly changes as anastomosis between it and mycelium growing up from the compost occurs. Airing should always be under way before this anastomosis takes place. Failure to do so leads to over colonised casing with a 'corky' surface layer of mycelium.

Early airing avoids this, preserves the structure of the casing surface and makes pinning and timing of the later breaks much more predictable.

Having established the technique an examination of the major areas on which it impinges is needed.

### Uniformity and quality

Until recently true uniformity was available only to the shelf grower using the technique of deep ruffling or to the small number of tray growers who used a deep ruffling line. The hand-ruffling technique used on any other system was both difficult to achieve and time consuming and the results generally did not compare to the mechanical system. The advent of inoculated casing has achieved the same result as ruffling. A uniform stand of mushrooms with the absence of clumping or deep pinning. Uniformity brings benefits not only to quality but also to picking rates.

Typically picking rates rise by up to 25% compared to the same growing system before the use of inoculated casing. Since picking labour is the highest single cost item within most systems, a reduction of this level is significant in the quest to increase efficiency.

Uniformity also enables other benefits

to be taken, watering for the first flush can commence earlier than a normal flush. Water can be added as early as the 11th day after casing with all the water added by the 13th day, four clear days before picking. The need to dry off the crop is much reduced or eliminated altogether with consequent reduction in scaling on the first flush.

### Timing

Paramount for all growers is the need to produce quality mushrooms in conjunction with marketing needs. For larger growers who are casing several cropping sheds weekly the need to produce exact timing becomes vital. Even an efficient picking programme will not cope with mistimed crops and quality mushrooms produced on the wrong day will not be picked in prime condition.

Inoculation of the casing produces a direct and exact link between casing day and the two major pick-days. Hence casing on day 0 on *trays and shelves* will require airing on the sixth day followed by major pick on the 18th and 19th days. A variation on this is when Dutch-type casing is used as airing is then required on day 5 with major pick on days 17 and 18. For bags grown in single layer airing is typical on day 7.

The accuracy of timing is achievable on spawn runs ranging from 9 to 16 days in length. Fig 1 shows a typical crop with a six day airing.

## Time saving

For decades growing systems without spawned casing have rested on a 35-day time lapse from spawning to first pick.

indeed in some instances a longer spawning run and deep ruffling will extend the time by an extra 3 to 5 days.

On all farms the ability to rotate crops efficiently is important, however, on farms utilising sophisticated environmental control at high capital cost it is essential. Frequently the reduction of unit costs in a price-stagnant market is the only way to maintain margins.

Fig 1 shows the first step of time saving: a reduction of five days in case-running time plus a reduction during spawning of two days saves a week.

The logical extension of this is to reduce spawn-run times yet further. At present several systems are spawn-running for only 7 to 9 days whilst others are experimenting with spawning and casing together.

This is not an innovation in itself, but the ability to produce first-quality mushrooms using a very short or zero spawn run certainly is.

The concept of spawn running both casing and compost together is illustrated by Fig 2.

Many requirements of the pinning technique are changed, air temperature is brought down to low levels to control the compost whilst carbon dioxide levels are kept high to stop overpinning and over colonisation. The biggest change is airing only eight days after spawning, this is necessary to prevent uncontrolled colonisation of the casing. Whilst this technique will remain in the minority the idea of reduced spawn-runs is already used on the majority of tray systems.

The notion of inoculated casing is on its way to becoming as common as inoculated compost.

# A new level for bag growers

by David Walker

Production Director, Greenhill Nurseries, Leeds

**Introducing a new system which allows a quicker and more precise casing operation from the bag grower, enabling a larger and cleaner crop of mushrooms to be grown.**

The 'Bagspan' Tray is a lightweight, durable, plastic tray; its rectangular base has six cylindrical holes which are placed on the compost contained in plastic bags underneath.

After levelling the compost to the base of the tray, the casing material is applied, retained by the walled sides of the tray. The height of these side walls being the required depth of casing, it is easy to achieve a uniform depth. The tray remains securely held on the bags and the mushrooms are grown in the normal way. The uniformity of casing depth allows the use of casing additives to better effect, helping to produce a more even flush of mushrooms without clumping and less deep pinning. This in turn allows greater picker-productivity and improved mushroom quality.

As the tray sits on the bags it is designed to support casing material over the area between the bags. The casing becomes evenly colonised throughout the tray, allowing an effective cropping area increase of thirty percent.

Each tray is constructed to sit over six bags to allow its use in rows of two, three or four bags, providing a continuous, level cropping bed. This continuous cropping surface allows the adoption of mechanical watering, alleviating over-watering and panning; mechanical ruffling, if preferred to casing additives; and mechanical harvesting!

The Tray is therefore looking after the mushroom grower's most crucial commodity, the casing; promoting its better management. However, casing material, even with excellent handling, begins to limit the productivity of the compost in later flushes, by undergoing loss of structure, drying out or simply physical damage.

The Tray enables the exhausted casing to be removed after the third flush by lifting the tray and the top portion of the compost in the bags. After re-siting the empty tray and re-casing with a shallow depth of fresh material, the yield of mushrooms grown from subsequent flushes is far greater than would have been



This picture sequence shows the complete process.

achieved from the fourth and fifth flushes on the old material. The cropping cycle is not extended if already colonised casing is applied.

When positioning the tray over a set of six unevenly filled bags, a seventh bag of compost can be used to top up. This allows a greater weight of compost to be filled into a growing house, enabling a further potential increase in mushroom output, as well as easing the task of setting up the tray.

Further characteristics of the tray are its slightly angled walls which facilitate stacking for compact storage. The plastic material can be easily cleaned and also steam sterilised. The Tray can be purchased by the grower in small quantities, enabling him to build up the system gradually.

In trials, the extra thirty percent

increase in cropping area has comfortably allowed a ten to fifteen percent increase in yield over a twelve week cycle. Re-casing after the third flush has allowed a twenty five percent increase in yield over traditional casing management. This achieves an improved margin over the cost of spawned compost and using a shallow depth of casing will minimise peat costs.

In summary, the patented 'Bagspan' Tray offers the bag grower a unique opportunity to better manage his most important raw material, the casing, to promote higher yields and better quality. Its low, and gradual investment requirement with no disruption to the cropping programme enables the grower to adopt the new system at his own convenience.



## Economics of small button and extra small button production

R. Noble

BSHR Littlehampton

In the UK, demand for specific grades of mushrooms such as buttons or flats has increased in recent years, particularly from multiple outlets. The economics of producing a particular grade of mushroom depend on a number of factors:

- the effect on the yield and quality of the crop
- the effect on the picking rate
- the prices which can be obtained for different grades.

It is well known that by picking smaller grades, yield and picking rate are reduced. However, only by quantifying these reductions is it possible to determine whether it is economically worthwhile to produce a specific size or grade of mushroom. The effect of picking stage on the yield of mushrooms was investigated by Cooke and Flegg using a pure white prolific strain (1,2). Mushrooms were either picked as buttons (closed mushrooms greater than 19mm in diameter) or cups (veil partially broken). Yield was reduced by 23% by picking the mushrooms as buttons rather than as cups.

Working with hybrid strains, Visscher (3) found that the effect on yield of harvesting mushrooms open or closed depended on the strain used. With U1, yield was reduced by 45% if mushrooms were harvested closed, rather than if they were allowed to develop into open cups. With the strain U3, the reduction in yield was only 24%. This work indicated that U3 is more suitable for button production than U1.

The aim of the present work was to determine the economics of picking mushrooms as extra small buttons (15 to 19mm diameter) or small buttons (20 to 25mm diameter). The economics of producing specific grades of button mushroom were compared with production where all grades of mushroom above a minimum size (25mm diameter) were picked every two days.

### Picking treatments

Mushrooms were picked in the following grades:

1. extra small buttons (15mm to 19mm diameter) picked daily
2. small buttons (20mm to 25mm diameter) picked daily
3. control, all grades above 25mm diameter picked every two days.

### Cultural details

Phase II compost was spawned with the strain Somycel U3 and filled into trays at

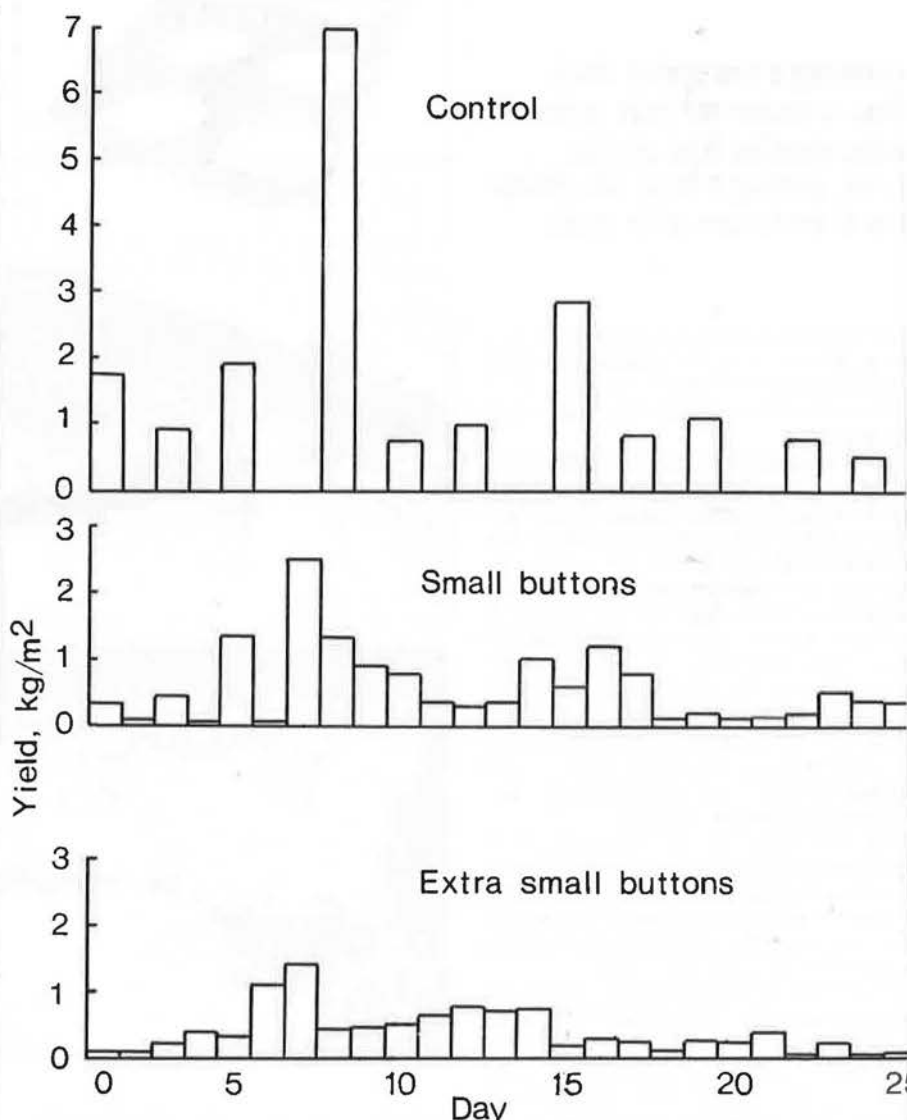


Figure 1: Effect of picking stage on daily yield of mushrooms

90 kg/m<sup>2</sup>. An Irish sphagnum peat and ground chalk casing was applied to the spawn-run compost to a depth of 50mm and ruffled after 9 days. At pinning, the air temperature was reduced from 23°C to 17°C. An air temperature of 18°C was maintained during cropping.

### Yield and picking rates

Picking treatments were allocated to individual trays, with 12 replicate trays for each of the three picking treatments. The yields from each of the trays were monitored over a six-week period. Mushrooms were graded into two classes; those with defects such as premature opening were downgraded into class II.

Picking rates were determined by measuring the quantity of mushrooms which could be picked from each treatment in one hour. The same pickers were used for each assessment.

### Results and Discussion

#### Flushing pattern

The flushing patterns of the button picking treatments were less distinct than that of the control treatment (Figure 1). The daily picking requirement of the extra small button treatment was more uniform than that of the other treatments.

#### Yield, quality and picking rates

The effect of the picking treatments on



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yield is shown in Table 1. Total yields from the extra small button and small button treatments were 38% and 20% lower respectively than the total yield from the control treatment.

Table 1 shows the percentage of mushrooms in each treatment which was class I produce and in the specified size range. The extra small button treatment resulted in the highest percentage of class I mushrooms (91.1%), although only 71.1% were in the 15-19mm size range.

There was a large effect of picking stage on the picking rate; the difference between the extra small button and control treatments was more than four-fold. Problems associated with picking the extra small button treatment were minimising the amounts of bruising and casing sticking to the mushrooms. Typical samples of mushrooms from the small and extra small button treatments are shown in Figure 2.

## Economics of button production

Average gross wholesale prices for the size and quality grades are currently:

	£/kg
Class I small buttons (20-25mm)	1.55
Class I large buttons (30-35mm)	1.32
Class II	0.65

No average prices were available for the extra small button grade but a price of £1.76/kg for the mushrooms in this experiment was obtained on the wholesale market.

Table 2 shows the revenue/m<sup>2</sup> for the three treatments and the cost of picking these mushrooms, using the picking rates in Table 1 and a labour cost of £7/hour. The production of extra small buttons at a price of £1.76/kg would not cover picking costs. A price of £4.21/kg for the extra small button grade would be required to compensate for the lower yield and higher picking cost, relative to the control treatment.

The economics of production of the small button grade (20-25mm) treatment were also unfavourable relative to the control treatment using the prices and labour costs quoted. A price of £1.77/kg for small buttons would compensate for the lower yield and higher picking cost relative to the control treatment.

The results show that there are high financial penalties if mushrooms are unintentionally picked too small. Unless there is a premium for smaller grades, a loss in revenue of £2.00/m<sup>2</sup> could result for every millimetre in diameter the mushrooms are picked too small, within the size range of 15 to 25mm.

It is possible that the culture of the crop could be modified to increase the yield of small button mushrooms. The use of other spawn strains (other hybrids and pure white strains) may be more suitable than U3. A more rapid introduction of fresh air and reduction in temperature at pinhead formation may increase the number of pinheads and maximise the yield of smaller mushrooms.

The production of extra small buttons

**Table 1: Yield, quality, and picking rate**

		Picking stage treatment		Control
		Extra small buttons	Small buttons	
Yield kg/m <sup>2</sup>	2 weeks	0.2	12.0	16.4
	Total	15.4	19.9	24.9
Class I, %	in size range	71.7	76.5	79.9
	not in size range	19.4	4.3	0
	Picking rate, kg/hr	3.3	11.6	16.0



**Figure 2: Extra small buttons (15-19mm) and small buttons (20-25mm)**

**Table 2: Returns and picking costs**

		Picking stage treatment		Control
		Extra small buttons	Small buttons	
Revenue, £/m <sup>2</sup>		24.26	27.21	29.51
Picking cost, £/m <sup>2</sup>		32.67	12.02	10.91
Margin*, £/m <sup>2</sup>		-8.41	15.19	18.60

\* Revenue minus picking cost, excluding other production and marketing costs.

can be combined with the production of open or 'flat' mushrooms; the picking of the extra small buttons being used as a thinning technique to leave sufficient space for a subsequent flush of flat mushrooms. The economics of this picking system depend on the prices which

can be obtained for both the extra small buttons and the flats, as well as the effects on yield, quality and picking costs.

## Conclusions

1. Yields of mushrooms picked daily

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specifically as small buttons (20-25mm) or as extra small buttons (15-19mm) were 20% and 38% lower respectively than from the control treatment in which mushrooms were allowed to develop to 25mm in diameter or greater and picked on alternate days.

2. Picking rates for small and extra small buttons were 28% and 79% lower respectively than from the control treat-

ment in terms of kg picked/hour.

3. Gross prices of £1.77/kg (£0.80/lb) and £4.21/kg (£1.74/lb) would be required for small buttons and extra small buttons respectively to compensate for the lower yield and higher picking cost relative to the control treatment.

4. There are high financial penalties if mushrooms are unintentionally picked too small.

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## PROCEEDINGS OF AMGA/ISMS INTERNATIONAL WORKSHOP-SEMINAR ON AGARICUS COMPOST

The Proceedings of the AMGA/ISMS International Workshop/Seminar on Agaricus Compost in Australia include articles on various aspects broadly classified under different areas of compost technology such as physical, chemical and biological aspects, energy balance, technology options, social implications, commercial situations and solutions, and international collaboration. The Workshop/Seminar format has also been described. The Proceedings is expected to be in print by January '91.

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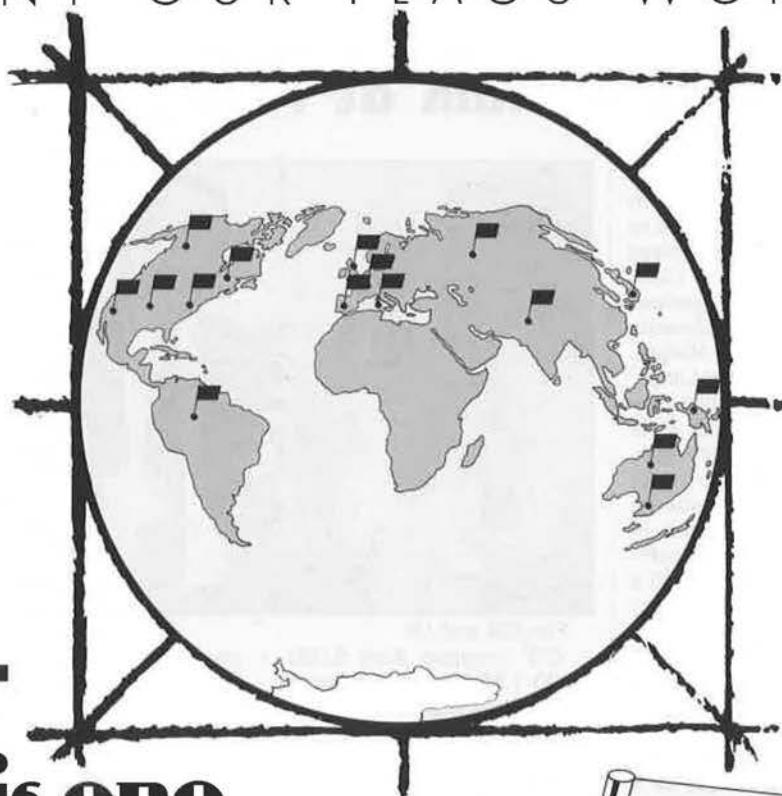
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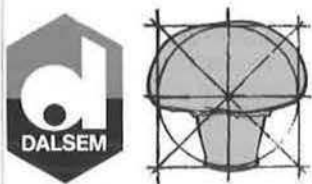
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## Blue Prince farm walk at Poling

Blue Prince hosted a national farm walk with ADAS and MGA at their Poling farm in September. Over 75 members came to inspect the new air-conditioning system installed by Tunnel Systems. Tony Claxton and Aoife O'Brien hosted the gathering with help from Bob Riley, Jeremy Jacobs, Mike Hayward, Simon Wright, Mike Berry, Alan Benfell and Alan Lister.

The site at Poling was originally purchased in 1972 by W. Darlington & Sons Ltd and existing glasshouses were converted for all-year-round mushroom production on a single-layer bag system. The present farm was redeveloped in 1980 changing to a tray farm with polythene-clad houses. In the spring of 1990 a major overhaul of the cropping house air-conditioning was undertaken.

Major specifications of the Poling Farm are as follows.

**Compost.** 200 tonnes of compost are filled per week, of a Sinden type made at Blue Prince's Burcross composting site; 5 days pre-mix (standard 1 straw to 3 manure) and 7 days under covered yard (turning programme 0.2.4.6). Additives used are: gypsum, chicken litter and Sporovite.

**Pasteurisation.** Filling rate approx. 19 lb ft<sup>2</sup>. Pasteurisation is carried out on a weekly cycle, the three rooms each holding 356 trays. A standard tray has an area of 22.66 ft<sup>2</sup>.

**Spawning.** Compost weight approx. 22 lb ft<sup>2</sup>. Spawning rate 1 litre per tray ex peak heat; supplemented at 1 kg Beta-myl per tray ex peak heat. Spawn running time of 11-14 days.

The four spawn-running rooms each hold 336 trays, two being filled each week.

**Casing.** Casing is applied to a depth of 1 3/4 in. The casing mix consists of three bales of Irish peat, one bale of Finnish peat, four 50 kg bags of chalk and 75 gal of water. Each mix covers approx. 11 trays.

Additional water can be added to the casing at point of application.

Somycel pellet spawn is added to the casing for all crops at the rate of 30 litres per 1,000 ft<sup>2</sup>.

**Holding.** The four holding rooms each hold 336 trays, two being filled each week, thus trays can be held for one/two weeks before transfer. It is possible to air the trays in the holding rooms, and BP are at present carrying out trials to compare the effectiveness of airing in the holding rooms against using the improved air-conditioning in our cropping sheds.

For 209 and 122 the airing regime is as follows: CO<sub>2</sub> is dropped from 6,000 + ppm to 3,500-4,000 ppm in 24 hours and to 1,000-1,500 ppm after 48 hours. Bed temperatures are dropped by 6°C in 96 hours.



For 208 and U1:

- CO<sub>2</sub> dropped from 6,000 + ppm to 1,000-1,500 ppm in 24 hours.
- Bed temperatures dropped by 6°C in 96 hours.

**Cropping.** There are 28 cropping houses, each holding 168 trays (3,808 ft<sup>2</sup>), with four sheds being filled each week, which are cropped over 4-5 flushes over 5 weeks. Yields average 5.15 lb ft<sup>2</sup> with 78% being picked as closed cup grade 1.

Spawn strains in use on the farm are 208, 209, U1 and 112. At the end of cropping trays are taken to a separate shed for methyl bromide fumigation.

Watering is carried out through DOFRA watering trees (a separate unit being designated to the holding rooms) and with better control of air humidities watering levels are being re-assessed.

### Hygiene

#### Pest and Disease Control.

Blue Prince's philosophy is to minimise use of pesticides consistent with effective control of pests and diseases.

**Diazinon** granules are added at the rate of 1.2 kg (40 oz) per ton of compost at spawning. Usually granules are not added during the coldest winter months.

**Dimilin** is added as a creamed solution at the rate of 13 1/2 oz (405 gm) per 1,000 ft<sup>2</sup> at case-mixing.

**Benlate** or **Hymush** are applied as a creamed solution at the rate of 8 oz (240 gm) per 1,000 ft<sup>2</sup> at case-mixing.

**Sporgon** is applied either at the rate of 6 oz (180 gm) per 1,000 ft<sup>2</sup> at day 12 after casing or at 4 oz (120 gm) per 1,000 ft<sup>2</sup> between the 1st and 2nd flush.

#### General Disinfection

**Environ** is used for washing down empty cropping sheds, machinery and roadways at the rate of 0.4% solution. 0.8 l Environ per 200 l (45 gal) water.

After emptying trays are dipped in a 1.5% solution of Environ (3 l Environ per 200 l water).

Tony Claxton discussing mushroom minutiae with Roger Kemp and Bob Riley.



Aoife O'Brien of Darmycel holds a pack of Somycel Pellet Spawn used at Blue Prince, Poling. This is an additive to the casing medium, which gives all the benefits of spawn-run compost mixed with casing as described by MacCann and Flannagan in Mushroom Science VIII, and is widely used in Ireland and North America, but without inherent risks of pests and diseases.

During the walk we all dutifully wore the coats, hats and masks provided and it was interesting to see the men operating the spawn-running equipment also wearing protective respiratory equipment. They wore Racal Aircrown Breath easy 6 hoods with battery and turbo unit and APC combination gas, vapour and particulate canister (or filter) belted round the waist and located at the back, leaving the men free to manoeuvre easily and safely. The same unit but with a full-face mask, system BE7, is used in the defumigating areas.

After the tour we all joined up in the canteen for tea and conversation - a great opportunity to catch up with friends and colleagues in the mushroom industry.

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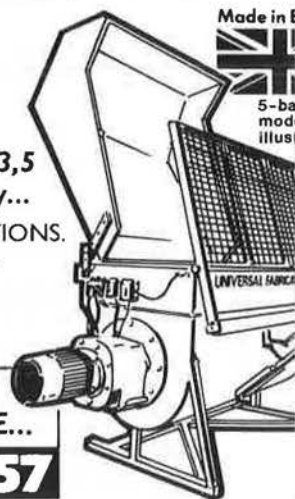


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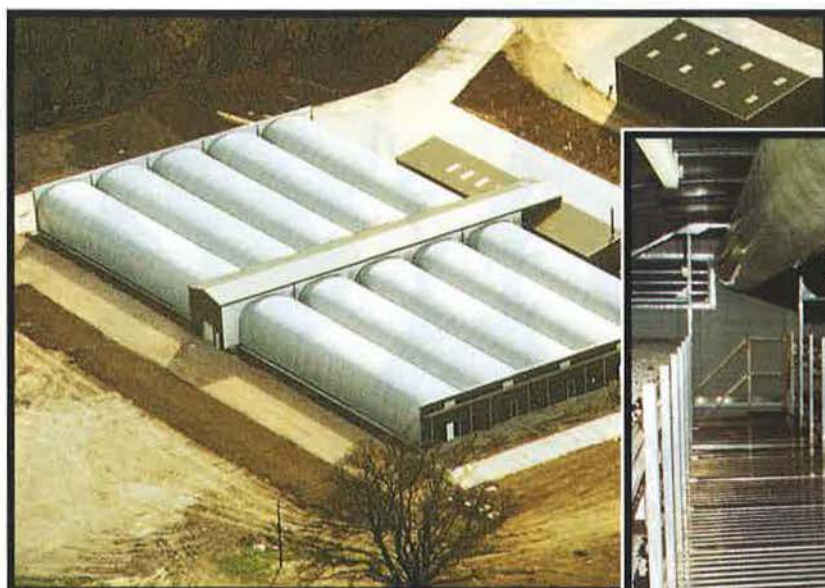
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