



MUSHROOM PEST & DISEASE

MU16003

fact sheet #1

Syzygites megalocarpus – Troll doll

GROWERS' NOTES

- Troll doll is caused by *Syzygites megalocarpus*
- *Syzygites* may develop post-harvest symptoms
- Treat infection as for Cobweb – cover with moist paper towel, salt edges then the middle
- Do not water over areas of infection
- Prevent the spread of airborne spores
- Cookout is an effective control measure against *Syzygites*
- Sanitizers are effective against *Syzygites* spores and mycelium
- Keep beds and floors clear of dead tissue, stumps and knock downs

INTRODUCTION

Troll doll (Fig. 1) is caused by *Syzygites megalocarpus* a Zygomycete which is ubiquitous in nature, colonizing a diverse variety of dead or moribund fleshy mushrooms. *Syzygites* (pronounced “size-a-guy-tees”) was initially observed on cultivated mushrooms between 2004 and 2007 in crops of *Agaricus blazei* (Sun mushroom) in Brazil. It was first recorded in Pennsylvania in August 2011 and has since become widespread on commercial beds throughout North America.



Figure 1 A portobello mushroom fully colonized by *S. megalocarpus*. Photograph: Courtesy Mark Spear

Confined initially to late flushes of brown portobello strains of *Agaricus bisporus*, *Syzygites* has since been observed on earlier flushes and on white strains of *Agaricus bisporus*. Due to the mould's tolerance to low temperatures, it has also been observed in post-harvest packaged product, the mould appearing while on the store shelf.

Syzygites produces two types of spore. The first type is Cobweb-like, large and light weight which, once dislodged, is likely to be spread by air currents within the grow room. The second type, the zygospore, is dark and large with a thick sculptured wall and is thought to be a resting structure enabling the mould to persist through unfavourable conditions.

Syzygites has become an integral part of growing for many North American mushroom farmers. While losses caused by *Syzygites* are an annoyance rather than devastating, spore reservoirs are building up on mushroom farms and the mould is adapting to its new environment.

SYMPTOMS

Fast growing *Syzygites* mycelium is initially white, subsequently becomes yellow to golden brown (Fig. 2) then finally greyish as it sporulates (Fig. 3). In addition to overgrowing *Syzygites* mycelium, colonized mushrooms show pitting, discolouration and areas of necrosis.



Figure 2 Yellowing mycelium of maturing *S. megalocarpus* colonizing a portobello mushroom. Photograph: Courtesy Kerry O'Donnell



Figure 3 Mature grey sporulating mycelium of *S. megalocarpus*.
 Photograph: Courtesy Kerry O'Donnell

In the early stages, white *Syzygites* mycelium may appear similar to Cobweb (*Cladobotryum* spp.) but Cobweb remains white or tends to pink as it matures. Furthermore, Cobweb mycelium has a consistent fluffy texture whereas the aerial mycelial filaments and clusters of terminal spores gives *Syzygites* mycelium a characteristic texture. The aerial strands and spore clusters may stand erect or lie prostrate over the bed and extend from the mushroom cap to more than one centimetre (Fig. 4).



Figure 4 Characteristic spore clusters of *S. megalocarpus* on aerial filaments extending from an infected mushroom cap.
 Photograph: Courtesy Mark Spear

First infections appear as the odd mouldy mushroom, but as the mould initially grows inside the mushroom, it appears the mould develops overnight. Freshly knocked over mushrooms on the bed will become symptomatic within four to eight days, depending upon the size of the inoculum and the room conditions.

DISEASE MANAGEMENT

Prevention is the most cost-effective and successful means of control. Ensuring both the floors and the mushroom beds are clean and the rooms are secure will slow the spread of the disease.

Keep the mushroom beds clear of knock downs, dead pins, stumps and dead tissue. Should symptoms be observed, treat as for Cobweb by gently laying moistened paper towel over the infection, salting the edges of the towel to seal spores beneath and then salting the middle of the towel. Check beneath the affected bed and clear away any mushroom debris whether it is infected or not. Harvesters must not touch infected mushrooms and the room air must be turned off while watering. Avoid watering onto areas of infection.

Heat treatment accounts for both spores and mycelium of *Syzygites*. Two hours at 49°C or one hour at 55°C have repeatedly proven effective in laboratory tests so between-crop cookout provides an effective control. Studies in the US indicate that fungicides are not particularly effective against *Syzygites*, the best performing being thiabendazole. However, quaternary ammonium compounds, iodophors, phenolics and chlorine are all effective sanitizers against *Syzygites* spores and mycelium.

REFERENCES

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