韓 國 菌 學 會 誌 第 16 卷 第 4 號
Kor. J. Mycol. Vol. 16, No. 4, 207-209, 1988

Sporocarp development of *Pleurotus tuber-regium* Fr. under different watering systems

J.A. Okhuoya and C. Ajerio
Department of Botany, University of Benin, P.M.B. 1154, Benin City, Nigeria.

ABSTRACT: Sporocarps of *Pleurotus tuber-regium* Fr. were subjected to aerial and substrate(soil) watering sytems. Although aerial watering enhanced quick enlargment of pilei, those watered indirectly through the soil developed more naturally pigmented sporophores and with higher overall yield. Thus, substrate(soil) watering after emergence is preferred to direct watering of fruits.

KEYWORDS: *Pleurotus tuber-regium* Fr. Sporophores

Cultivation of edible fungi in the continent is very limited. It is only common in Zimbabwe, Kenya and South Africa(Declaire; 1978). It is almost non-existent in Nigeria. Although many eat mushrooms, they collect them in their wild states. This practice is fraught with the danger of collecting poisonous species along with the edible ones.

These problems are highly minimised in developed countries of America, Europe and Asia, where mushroom farming is lucrative business. In these areas much work has been done to develope the best growth conditions and the appropriate technology for growing these mushrooms to maximise profit(Zadrazil, 1974; Block *et al.*, 1958, 1959).

Pleurotus tuber-regium Fr. is a very popular mushroom in Nigeria that has the potential of being commercialised. It produces tuberous sclerotia which can be as large as 25 cm or more in diam in dead wood(Oso, 1977). The fruits and sclerotia are eaten in Nigeria. The sclerotia are used for soup and tradomedical preparations(Oso, 1977). The sclerotia when planted in a humid environment produce sporophores in flushes. In mushrooms generally, primordia react to the type of environment they are exposed eg, some are known to develope abnormal pilei in an atmosphere with either too much carbon dioxide or RH(95+)(Plunket; 1956, Stoller; 1943, Harvey; 1952).

In this study the development of sporophores of *P. tuber-regium* under different watering systems was examined.

Materials and Methods

Eight metal containers(30×50×6 cm) were filled with white river sand and then seeded with 25g sclerotial piece. They were all kept moist with known volume of water(100 cm^3) and then left for fruit emergence at room temperature 24.2℃.

After 5-8 days, emerged sporophores with distinguishable caps were selected and treated in batches of threes as follows;

Aerial watering

This system was subdivided into three batches ① Sporocarps watered once a day, directly with 50 cm^3 of water, without allowing water to enter the soil. This was done by covering the soil with transparent polyethelyne sheath. ② Sporocarps watered directly twice a day with at least 6h intervals. ③ Sporocarps watered thrice a day with at least 4h intervals.

Substrate(soil) watering

Under this system, three regimes were also used ① Soil watered once a day with 50 cm^3 water. ② Soil watered twice a day with at least 6h interval. ③ Soil watered thrice a day with at least 4h interval.

Control

Sporocarps were not watered either aerially or

Table I. Effect of aerial watering on Sporophore development.

Watering once a day :	Daily measurements for four days[1]		
	Height of fruit bodies (cm)	Pileus diameter (cm)	Stipe girth (cm)
Initial measurement	5.5	4.5	5.7
	7.4	7.0	6.2
	8.3	5.9	6.5
	8.5	7.9	6.5
Increase after 4 days	3.0	3.4	0.8
Fresh body weight		22.5g	
Watering twice a day			
initial measurement	4.5	4.0	4.4
	6.8	6.8	5.2
	7.2	8.0	5.7
	7.4	11.0	5.7
Increase after 4 days	2.9	7.0	1.3
Fresh body weight		19.0g	
Watering thrice a day			
initial measurement	4.3	4.0	4.3
	6.6	7.0	5.1
	6.9	10.3	5.1
	6.3	12.0	5.1
Increase after 4 days	2.0	8.0	0.8
Fresh body weight		14.5g	

[1]Each record is an average of three replicates.

Table II. Effect of substrate(soil) watering on Sporocarp development.

Watering once a day :	Daily measurements for fou four days[1]		
	Height of fruit bodies (cm)	Pileus diameter (cm)	Stipe girth (cm)
Initial measurement	5.5	3.2	3.5
	7.3	6.0	4.2
	7.6	8.6	4.5
	7.6	10.2	4.5
Incfease after 4 days	2.1	7.0	1.0
Fresh body weight		18.0g	
Watering twice a day			
inital measurement	6.3	3.3	3.6
	7.4	6.6	4.4
	8.2	9.5	4.6
	8.2	10.9	4.6
increase after 4 days	1.9	6.6	1.0
Fresh body weight		20.0g	
Watering thrice a day			
initial measurement	4.0	3.0	3.2
	5.7	6.4	4.1
	7.6	10.3	4.4
	7.4	11.6	4.4
increase after 4 days	3.0	8.6	1.2
Fresh body weight		25.6g	

[1]Each record is an average of three replicates.

via the soil, till the end of the experiment.

At maturity, pileus diameter and stipe girth, height of sporophores were recorded and compared in all the treatments.

Results and Discussion

Aerial watering

The pileus diameter of the sporophores was more affected by this treatment. The caps easily expanded and increased with the frequency of watering. Thus the highest record of pileus diameter was recorded with "three times daily" watering regime(Table I). However the pileus starts curving at the periphery after some time. The height of the fruiting bodies was not enhanced with increased frequency of watering. Stipe girth was slightly increased with increased frequency of watering. The average fruit body weight was more with fruits watered once a day(22.5g) while the least was recorded with those watered three times a day(19.0g). The fruits were bleached and apparently unpigmented.

Substrate watering

The resulting fruits under this system were more naturally developed and pigmented. The yield was

higher than under aerial watering(Table II). Although the pileus diameter did not expand as fast as in aerial watering, it still attained almost similar size. The response of the fruits appear to be in the reverse order to those of aerial watering. The yield increased with increase in the frequency of watering. The height also increased with increased frequency of watering. The stipe girth also, was not significantly affected by the increase of watering frequency.

In the control, there was a gradual increase in pileus diameter(6.3 cm) and a height of 10.5 cm. The average body weight of the fruit was 12.0g.

Aerial watering of fruits encouraged rapid enlargment of fruits especially those watered three times a day. However such frequent watering makes the fungus cap to get to its limit of enlargment quickly and then begins to curve downwards at the periphery. It also lost its natural deep grey pigmentation to white colour. This direct imbibition of water into sporophores is common with different agarics especially the fleshy species. Buller(1922) reported that sporophores of higher fungi absorb water directly into their systems.

The imbibed water appear not to have helped the development of the stipe as its grith and height were not proportionally increased with increase in frequency of watering(Table I). From the difference between initial measurement and final measurement for height, and stipe girth, increase in frequency of aerial watering appeared to have depressed these values. Sporocarps of higher fungi are very sensitive to surface water. Waterlogging has been established to be inhibitory to normal functioning of hymenia of certain basidiomycetes (Okhuoya and Harvey, 1986). They also found that most basidiomycetes species tested were completely ruined by prolonged immersion(3hr) in water. Thus Frequent direct watering of the sporocarps may have waterlogged their tissues and resulted in poor development. This poor development was also reflected in the proportional decrease of fresh body weight(225-14.5g) with increase in frequency of watering(Table I).

Soil watering of sporocarps produced naturally pigmented(deep grey) sporophores. Although the growth rate was slow compared to aerially watered ones, growth was regular and normal.

Although there was no statistical difference between initial measurement of height of fruit, pileus diameter and stipe girth, there was gradual increase of fresh body weight of sporophores(18-25.6g) with increase in frequency of substrate(soil watering)(Table II). This watering regime appears to be pure valuable since sporophores had natural pigmentation and also enhanced fresh body weight, indices that are very important in mushroom sales.

Acknowledgement

We are highly indebted to University of Benin for a research grant(awarded to J. A. Okhuoya) that made this work possible.

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Accepted for Publication 23 September