

EFFECT OF MOISTURE-CONTENT OF THE
BASIDIOCARP ON SPORE-DISCHARGE AND
PERIOD OF SPORE-FALL IN
TRAMETES LACTINEA BERK.

BY

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Experiments have been undertaken to determine the effect of the moisture-content of the basidiocarp of *Trametes lactinea* Berk on spore-discharge and period of spore-fall and its relation with relative humidity of the atmosphere.

The most suitable moisture-content of the basidiocarp when spore-discharge starts ranges from 55-60 per cent irrespective of the relative humidity of the atmosphere. In drier atmosphere sporulation starts earlier whereas in moist atmosphere the process is delayed. The spore-discharge after starting gradually reaches a maximal stage after which the process slowly declines and ultimately stops when the moisture-content of the fruit-bodies is about 30 per cent.

The period of spore-fall is longest (36 hours) in 80 per cent relative humidity in which the basidiocarp can retain its suitable moisture-content for a long time. In lower grades of relative humidity the basidiocarp dries up quickly whereas the suitable relative humidity helps to retain the moisture-content of the basidiocarp for longer period thus prolonging the period of spore-fall.

Light does not play any important role in the spore-discharge of the test-fungus. The most important factors for the successful liberation of spores are thus the moisture-content of the basidiocarp and its relation with the relative humidity of the atmosphere.

INTRODUCTION

In higher fungi like Hymenomycetes the moisture content of the basidiocarp controls spore-discharge and period of spore-fall. According to Buller (1909, 1922, 1924), the atmospheric humidity does not make any appreciable difference in the rate of spore-discharge from certain corky and woody species of Hymenomycetes as long as their fruit-bodies have sufficient moisture-content in themselves. White (1919) also confirmed these observations working on *Fomes applanatus* (Pers.) Wallr. These reports, are, however, limited, and figures relating to actual percentage of the moisture-content of the basidiocarp and its relation to spore-discharge are very meagre. Banerjee and his collaborators (1954, 1956) have carried out researches in this direction and established a definite relationship between the percentage of moisture-content of the basidioscapes and period of spore-fall in *Marasmius campanella* Holterm. and *Polystictus sanguineus* (L.) Mey. It has also been proved that the period of spore-fall varies with the change in relative humidity under which the fruit-bodies are placed.

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With a view to determine the actual percentage of moisture-content of the basidiocarp of *Trametes lactinea* Berk. that regulates spore-discharge and duration of the same under varied conditions of relative humidity, experiments have been carried out in the laboratory.

MATERIAL

Fresh and mature fruit-bodies of *T. lactinea* were collected from a timber-yard near Calcutta and brought to the laboratory for the present investigation. The fructifications were found growing on infected poles of *Terminalia procera* Roxb.

EXPERIMENTAL PROCEDURE

A wide range of relative humidity (10-90 per cent.) was artificially produced in a number of air-tight desiccators by using different concentrations of sulphuric acid as suggested by McLeans and Cook (1952). A fresh and well developed fruit-body of almost equal size were then cut, weighed and their initial weights noted. A piece was then fixed by a pin to a thin piece of cork which was attached previously to the upper lid of a clean Petri dish. A clean dry slide was also placed in the lower lid of the Petri dish just below the hymenial surface of the rectangular piece. In a similar way several sets were prepared. A set of six replicates was placed under each grade of relative humidity at a constant temperature of 30°C. and in diffused light of the laboratory.

The glass slides were taken out at regular intervals and examined under the microscope to find out the spores. When the spore-discharge started the pieces were taken out carefully, weighed and again fixed to their original positions. When the spore-discharge ceased the pieces were finally weighed and dried to constant weight in an oven at 60°C. The time required for initiation of spore-discharge and the total period of spore-fall in each grade of relative humidity were recorded. The moisture-content of the pieces of basidiocarp at the onset of spore-discharge and that after the cessation of the same were then calculated in terms of their final oven dry weights.

RESULTS

The results are given in the Table 1.

CONCLUSION

From the table it is evident that the minimum amount of water that a basidiocarp of *Trametes lactinea* holds in a fully turgid condition is 78.56 per cent of its total fresh weight. The basidiocarp, however, does not liberate spores at this stage. It must give up a quantity of its moisture before the liberation

Table 1. Spore-discharge and period of spore-fall in *Trametes lactinea* as modified by various relative humidity.

Relative humidity	Serial No. of spore-phore	Initial weight when spore-phore fixed (in gms.)	Percentage of water content	Time taken to start spore-discharge (in hours)	Weight of the spore-phore on set of spore-discharge (in gms.)	Weight of the spore-phore when spore-discharge stops (in gms.)	Final oven dry weight of the spore-phore	Water content of the spore-phore at the onset of spore-discharge (%)	Water content of the spore-phore when spore-discharge stops (%)	Range (in %) favouring spore-discharge	Period of spore-fall (in hours)
10%	1	1.13	74.33		0.99	0.850	0.29	61.94	49.55	49.55 - 61.94	3½-4½
	2	1.02	72.54		0.90	0.750	0.28	60.78	46.07	46.07 - 60.78	
	3	1.15	73.04	2-2½	1.00	0.885	0.31	60.00	50.00	50.00 - 60.00	
	4	0.90	73.33		0.76	0.670	0.24	57.77	47.77	47.77 - 57.77	
	5	1.21	74.38		1.02	0.850	0.31	58.68	44.62	44.62 - 58.68	
	6	1.01	74.25		0.86	0.750	0.26	59.40	48.51	48.51 - 59.40	
25%	1	0.87	72.41		0.73	0.530	0.24	56.32	33.33	33.33 - 56.32	6-7
	2	0.76	72.36		0.65	0.450	0.21	57.89	31.57	31.57 - 57.89	
	3	1.02	70.58	2-3	0.87	0.660	0.30	55.88	35.29	35.29 - 55.88	
	4	0.63	71.42		0.54	0.380	0.18	57.14	31.74	31.74 - 57.14	
	5	0.82	73.17		0.67	0.480	0.22	54.87	31.70	31.70 - 54.87	
	6	0.78	73.07		0.64	0.450	0.21	55.12	30.76	30.76 - 55.12	
50%	1	0.85	69.41		0.75	0.540	0.26	57.64	32.94	32.94 - 57.64	11-12
	2	0.90	72.22		0.75	0.540	0.25	55.55	32.22	32.22 - 55.55	
	3	0.78	73.07	3-3½	0.65	0.460	0.21	56.41	32.05	32.05 - 56.41	
	4	0.75	74.66		0.62	0.430	0.19	57.33	32.00	32.00 - 57.33	
	5	0.85	71.76		0.70	0.500	0.24	54.11	30.58	30.58 - 54.11	
	6	0.95	73.68		0.79	0.550	0.25	56.84	31.57	31.57 - 56.84	

Table 1. (Contd.) Spore-discharge and period of spore-fall in *Trametes lactinea* as modified by various relative humidity.

Relative humidity	Serial No. of spore-phore	Initial weight when spore-phore fixed (in gms.)	Percentage of water content	Time taken to start spore-discharge (in hours)	Weight of spore-phore on set of spore-discharge (in gms.)	Weight of the spore-phore when spore-discharge stops (in gms.)	Final oven dry weight of the spore-phore	Water content of the spore-phore at the onset of spore-discharge	Water content of the spore-phore when spore-discharge stops	Range (in %) favouring spore-discharge	Period of spore-fall (in hours)
60%	1	1.30	75.76		1.10	0.750	0.315	60.38	33.46	33.46-60.38	20-21
	2	1.35	74.07	4-4½	1.15	0.820	0.350	59.25	34.81	34.81-59.25	
	3	0.85	74.11		0.72	0.490	0.220	58.82	31.76	31.76-58.82	
	4	0.87	75.28		0.74	0.490	0.215	60.34	31.60	31.60-60.34	
	5	0.97	75.77		0.80	0.565	0.235	58.24	34.02	34.02-58.24	
	6	0.77	74.67		0.63	0.435	0.195	56.49	31.16	31.16-56.49	
70%	1	0.70	78.57		0.54	0.340	0.150	55.71	31.42	31.42-55.71	37-29
	2	0.80	76.87		0.67	0.455	0.185	60.62	33.75	33.75-60.62	
	3	1.00	75.00		0.85	0.550	0.250	60.00	30.00	30.00-60.00	
	4	0.85	74.70	4½-5	0.71	0.475	0.215	58.23	30.58	30.58-58.23	
	5	0.70	76.42		0.56	0.390	0.165	56.42	32.14	32.14-56.42	
	6	0.65	75.38		0.53	0.360	0.160	56.92	30.76	30.76-56.92	
80%	1	1.30	71.53		1.14	0.760	0.370	59.23	30.00	30.00-59.23	35-36
	2	1.10	71.36		0.98	0.655	0.315	60.45	30.90	30.90-60.45	
	3	1.05	72.85	5-5½	0.90	0.620	0.285	58.57	31.90	31.90-58.57	
	4	0.80	70.00		0.73	0.480	0.240	61.25	30.00	30.00-61.25	
	5	0.80	73.75		0.69	0.460	0.210	60.00	31.25	31.25-60.00	
	6	1.25	71.20		1.10	0.750	0.360	59.20	31.20	31.20-59.20	
90%	1	0.97	74.74		0.83	0.560	0.245	60.30	32.47	32.47-60.30	30-31
	2	0.86	72.67		0.73	0.515	0.235	57.55	32.55	32.55-57.55	
	3	1.06	71.69	5-6	0.93	0.650	0.300	59.43	33.01	33.01-59.43	
	4	0.99	74.24		0.85	0.600	0.255	60.10	34.88	34.88-60.10	
	5	0.88	72.15		0.75	0.540	0.245	57.38	33.52	33.52-57.38	
	6	0.80	74.37		0.65	0.470	0.205	55.62	33.12	33.12-55.62	

of the spores. The moisture-content of the basidiocarp when spore-discharge starts lies between 55 to 60 per cent. Irrespective of different relative humidity, spore-discharge is always dependent on this range of moisture-content. The time taken to reach this stage from the fully turgid condition of the basidiocarp, however, varies directly with the variation in relative humidity. In a dry atmosphere the extra amount of water in the basidiocarp is evaporated rapidly. But a moist atmosphere cannot readily accept as much water as is required to be evaporated from the fruit-body. Consequently, there occurs a delay in adjusting the moisture-content of the basidiocarp. In 10% relative humidity spore-discharge starts within $2\frac{1}{2}$ hours while in 90% of the same 5 hours at least are necessary to gain this end.

It has been observed in the laboratory that this polypore liberates its spores in a definite manner, gradually increasing its rate still a maximal stage is reached. At this stage the fruit-body is most active and it discharges its spores so heavily that it takes very little time to render a glass slide opaque. After this active stage the rate of spore-discharge gradually declines with the gradual loss of moisture-content of the fruit-body and ultimately reaches a condition when it stops altogether.

The moisture-content of the basidiocarp at which spore-discharge stops is about 30%. From the table it will be evident that in almost all cases the liberation of spores does not take place below this level. This is also true under all cases of relative humidity. In 10% relative humidity spore-discharge, however, suddenly stops at an early stage. This is probably due to sudden adverse effect of too low a percentage of relative humidity. In this relative humidity spore-discharge also starts earlier and spore-fall prolongs for minimum period ($3\frac{1}{2}$ hours).

It is thus found that for *Trametes lactinea* the moisture-content of the basidiocarp favourable for spore-discharge ranges from 60 to 30 per cent and the period of spore-fall is maximum (36 hours) in 80 percent relative humidity. In this relative humidity the basidiocarp can maintain its moisture-content for a long period favourable for sporefall. In 90 percent relative humidity the period of spore-fall somewhat decreases. It can thus also be said that too humid atmosphere is not helpful for spore-discharge.

In low percentage of relative humidity the basidiocarp dries up quickly and all the functional basidia cannot complete their spore-discharging activity. At this stage any section through the hymenium shows basidia of different development stage. This fruit-body produces new crops of basidia with spores when moisture is again made available to it. But the basidiocarps discharging its spores in a favourable relative humidity exhausts all its functional basidia during the entire period of spore-fall. This basidiocarp never sporulates again in any condition. Section through the hymenium at this stage shows only collapsed basidia and the usual hyphal ends.

Light does not seem to exert any influence on the process of spore-discharge. The basidiocarp placed under bell-jar and covered by a black paper

during day time liberated spores a usual. Again during the night a basidiocarp liberates spores even under strong illumination by artificial light.

From the above observations it is clear that for successful liberation of spores in *Trametes lactinea* a favourable relative humidity of the atmosphere is essential. The moisture-content of the basidiocarp depends upon the source of water and the retention of the same within it. The source is evidently from the substratum and the retention of water depends upon the percentage of relative humidity of the atmosphere.

The most remarkable feature of this polypore is its power to withstand a considerably long period of desiccation. During this period it retains its vitality and with the return of suitable conditions it liberates viable spores. This is a unique adaptation of the species to survive through an unfavourable condition and perhaps true for all corky species of Polyporaceae.

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