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Short Communication

Preservation and decay of stimulus in light-induced sporulation of *Pestalotiopsis palmarum* (Cooke) Steyaert

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Abstract

Sporulation in *Pestalotiopsis palmarum* is induced by near-ultraviolet light. Induction and the subsequent fruit body development could proceed only at 25°C. Subjecting the fungus to relatively high temperature (35°C) during induction prevented sporulation. Early stages of development of fruit bodies are more sensitive to temperature than later stages. The light stimulus can be preserved for at least 72 h when the fungus is chilled and stored at 5°C immediately after induction. Sporulation occurs when the fungus is brought from 5 to 25°C suggesting involvement of thermolabile intermediate substance(s) in the sporulation-induction process.

Key words: *Pestalotiopsis*, temperature, light, sporulation, stimulus storage.

1. Introduction

Thermal treatment following irradiation neutralises the effects of ultraviolet and near-ultraviolet light on bacteria and higher plants. Treating *Escherichia coli* to 40 to 50°C following ultraviolet irradiation saved it from death[1]. Similarly in *Tradescantia*, incubation at 40°C for 30 min after far-ultraviolet light irradiation reduced chromosomal aberrations. Such incubation before irradiation was not effective[2]. The fungus, *Pestalotiopsis palmarum*, has been shown to require near-ultraviolet light for sporulation. A 60-minute exposure to this light was sufficient to induce sporulation[3]. In this report, the results of subjecting the fungus to chilling or to a thermal shock after photo-induction of sporulation are presented.

2. Materials and methods

Pestalotiopsis palmarum (Cooke) Steyaert used in this study is a subculture of the isolate used earlier[3]. Hyphal tips from the margin of a three-day old dark-grown colony was

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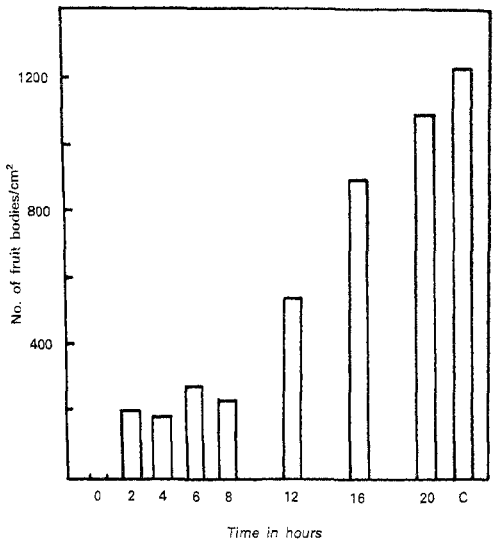

FIG. 1 Effect of thermal shock given during various stages of light-induced sporulation in *Pestalotiopsis palmarum*. C-level of sporulation in control cultures.

used as inoculum and placed in the centre of a petriplate containing Czapeck's agar medium (with 0·1% yeast extract) overlaid with a sterile disc of cellophane film. Cultures were incubated in a dark chamber at 25°C for three days before use in the experiments.

Light from two Sylvania B L B black light lamps emitting between 300 and 400 nm with maximum at 350 nm was used for irradiating the fungus for the induction of sporulation. The fungus received irradiation for 60 min (energy equal to 310 $\mu W \cdot cm^{-2}$ as measured with a YSI Kettering radiometer, Model 65A). After exposure the cultures were returned to dark and the number of fruit bodies developed were counted after 24 h. The extent of sporulation is expressed as number of fruitbodies/cm^2.

To subject the fungus to a sudden rise in temperature from 25 to 35°C, the following method was followed. The fungal growth was removed from the agar plate by lifting the cellophane disc from the agar and placed over another agar plate which had already been brought to 35°C. After 60 min the fungus was returned to 25°C.

Table I
Sporulation in *Pestalotiopsis palmarum* maintained for a while at 5°C after light induction

Treatment	Sporulation
	No. of fruit bodies/cm^2
Control	1,505
48 h at 5°C	529
72 h at 5°C	590

In chilling experiments, the fungus was transferred to agar plates chilled to 5°C and stored at that temperature in a refrigerator.

3. Results and discussion

3.1. Effect of thermal shock

A 60-minute exposure to near-ultraviolet light (350 nm) is sufficient to induce sporulation in this fungus. Profuse branching and septation of the marginal hyphae of the fungal colony is visible four hours after induction. By 12 h immature fruit bodies could be seen. It is only after 24 h that fully mature fruit bodies with spores are produced. The thermal shock given during irradiation completely negated the induction. Sporulation was inhibited to a greater extent if the thermal shock was given at 2, 4, 6 or 8 h after irradiation than at 12, 16, 20 h (fig. 1).

In *Alternaria tomato* and *A. dauci*, two phases have been noticed in conidiation. The first phase, known as induction phase, needs either light or temperature above 25°C. The second phase could proceed only at temperatures lower than 25°C[4]. This is in contrast to that observed in *Pestalotiopsis palmarum* where the early induction phase is sensitive to temperatures higher than 25°C and the later phase *i.e.* 12 h after irradiation could proceed even at 35°C.

3.2. Effect of chilling following irradiation

Chilling the fungus immediately after irradiation with near-ultraviolet light and keeping it at 5°C could preserve the stimulus received. From Table I, it is clear that the stimulus received 72 h earlier is expressed if the fungus is brought to 25°C. While the stimulus could be stored and expressed at a later point in time, it could not be translocated spatially in the colony since the sporulation following the return of the fungus to 25°C is confined to the area of the colony which was the growing contour at the time of irradiation. Ebrey and Clayton[5] have shown a stimulus storage in the light-growth response of *Phycomyces blakesleeanus* for eight minutes.

That the light stimulus could be negated by high temperature, and could be stored for a while at low temperature and expressed at a later point in time leads to the conclusion

that there could be thermolabile intermediate substance(s) linking initial light stimulus and the response.

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