SHORT COMMUNICATIONS

Red–Far-red Reversible Photoreaction in the Recovery from Blue-light Inhibition of Sporulation in *Botrytis cinerea*

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INTRODUCTION

Fungal photoresponses are generally due to light in the blue and near ultraviolet wavelengths (Carlile, 1965, 1970; Leach, 1971). Responses effected by the red end of the spectrum have been recognized only recently (Klein & Klein, 1962; Lukens, 1965; Ingold and Nawaz, 1967; Ingold, 1969; Brook, 1969; Calpouzos & Chang, 1971; Chang & Calpouzos, 1971) but repeated reversibility in the red and far-red, similar to that of plants (Borthwick, 1972; Fredericq & De Greef, 1972; Mohr, 1972), has not yet been reported in fungi. This paper describes such a response in sporulation of *Botrytis cinerea* Pers. ex Fr.

METHODS

The same isolate of *Botrytis cinerea* as in Tan & Epton (1973, 1974) was used. Cultures were incubated in the dark at 20 ± 1 °C for $4\frac{1}{2}$ days before use in the irradiation experiments. Detailed procedures for culturing, the light sources and filters used, and the method for quantification of spore production, have already been described (Tan & Epton, 1973, 1974).

After the initial dark incubation period, cultures were irradiated with 'black light' (> 97% emission in the 300 to 400 nm region, irradiance $151 \mu\text{W}/\text{cm}^2$) for 12 h before returning to darkness. They were then subjected to 4 h blue light (380 to 530 nm, irradiance $250 \mu\text{W}/\text{cm}^2$) at the 12th hour after the end of photoinduction, and subsequently treated with repeated sequences of 4 h far-red (> 720 nm, irradiance $1800 \mu\text{W}/\text{cm}^2$) and 30 min red light (620 to 720 nm, irradiance $150 \mu\text{W}/\text{cm}^2$), as shown in Table 1. The cultures were placed in darkness after the irradiation schedule, and spores were counted 72 h after the start of black-light irradiation.

RESULTS AND DISCUSSION

The results (Table 1) showed that the recovery from the blue-light inhibition of sporulation was repeatedly photoreversible; an irradiation programme terminating with red light resulted in reduced sporulation (sporulation being brought back to the blue inhibition level) as compared with a programme terminating with far-red light (sporulation being promoted). In another series of experiments in which the second far-red irradiation was shorter (30 min), similar red and far-red reversibility of sporulation was also demonstrated.

This repeated red and far-red reversible response in fungi suggests that phytochrome or

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Table 1. *Effect of red and far-red irradiation on the blue-light inhibition of sporulation in Botrytis cinerea*

Irradiation programme*	Sporulation† (%)
12 h BLB	100.0
12 h BLB+12 h D+4 h B	64.7
12 h BLB+12 h D+4 h B+4 h FR	100.2
12 h BLB+12 h D+4 h B+4 h FR+30 min R	75.8
12 h BLB+12 h D+4 h B+4 h FR+30 min R+4 h FR	100.1
12 h BLB+12 h D+4 h B+4 h FR+30 min R+4 h FR+30 min R	82.1

* Cultures were returned to darkness after the irradiation programme. BLB, Black light; D, dark; B, blue light; FR, far-red light; R, red light.

† Spores were counted 72 h after the start of BLB irradiation and were expressed as percentages of the sporulation of cultures kept in the dark for 60 h after 12 h BLB irradiation. Each value is the average of two independent experiments, with two cultures per treatment for each experiment.

some other similar pigment system may be involved but further characterization must await the results of detailed action-spectra studies.

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