EFFECT OF COLOR OF LED (LIGHT EMITTING DIODE) ON DEVELOPMENT OF FRUIT BODY IN *HYPSIZYGUS MARMOREUS*

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ABSTRACT

We aim to elucidate suitable color of light during development of fruit body in *Hypsizygus marmoreus*. The four color of LED (Light Emitting Diode), blue LED (475nm), green LED (525nm), yellowed LED (590nm), and red LED (660nm), were irradiated for formation of fruit body after mycelia growth. As effect of color of LED at all growth stage, the diameter and thickness of pileus and length of stipe in blue LED treatment were similar to control (Fluorescent lamp), and length of stipe was the highest at the red LED and darkness. The commercial yields in blue and green LED treatment were similar to control (Fluorescent lamp). Second, as effect of color of LED by light irradiation time, we could obtain the highest commercial yields at the blue LED 1/2(lighting/lighting-out, hours). And ergosterol was the highest at the blue LED continuous radiation.

Keywords: Ergosterol, LED, Light, Mushroom

INTRODUCTION

The storage of *Hypsizygus marmoreus* excellent vantage points as the export model is equipped with items at Korea. In Korea, there is very little research about the effect on mushroom bottle cultivation by light. Most mushrooms require light to develop properly. Also, light is required for cultivation *of Hypsizygus marmoreus*. And the fluorescent lamps are installed to house a week after planting is often replaced if power outages are occurring frequently. Therefore, we applied to the LED light to the cultivation of edible mushrooms was investigated.

MATERIALS AND METHODS

Experiment mushroom. *Hypsizygus marmoreus(Mangadak 2#)*
Growth environment. Temperature 16±1℃, Relative humidity 90±5%, CO_2 concentration 800~1,200ppm
<Experiment 1>
Light source. Fluorescent lamp(positive control), Darkness(negative control), Blue LED(475nm), Green LED(525nm), Yellow LED(590nm), Red LED(660nm)

<Experiment2>

Light time. Continuous Light(control), 1/1(on/off, hours), 1/2(on/off, hours), 1/3(on/off, hours), 1/4(on/off, hours), 1/5(on/off, hours)
* Experiment Light : LED Light selected at Experiment 1

RESULTS AND DISCUSSION

<Experiment 1>

Fluorescent lamp Darkness BlueLED GreenLED YellowLED RedLED

Figure 1: Primordia photographs under the LED light of *Hypsizygus marmoreus*

Table 1: Effect of LED sources on properties of fruit body in *Hypsizygus marmoreus*

Light source	Diameter of pileus(mm)	Thickness of stipe(mm)	Length of stipe(mm)
Fluorescent lamp	24a[a]	12a	79c
Darkness	16c	10b	105a
BlueLED	22a	12a	68d
GreenLED	19b	10b	89c
YellowLED	14c	10b	98b
RedLED	16c	10b	103a

[a] Values followed by the same letter do not differ significantly at $p>0.05$ according to Duncan's multiple range test.

Table 2: Effect of LED source on yield properties of *Hypsizygus marmoreus*

Light source	No. of available stipes(No./850ml)	Yield (g/850ml)	Commercial yields(g/850ml)	Commercial yields Index[b](%)
Fluorescent lamp	28 ab[a]	148 b	122 ab	82
Darkness	31 a	156 a	114 b	73
BlueLED	29 ab	159 a	135 a	85
GreenLED	35 a	158 a	130 a	82
YellowLED	28 ab	129 c	96 c	74
RedLED	27 b	126 c	77 d	61

[a] Values followed by the same letter do not differ significantly at $p>0.05$ according to Duncan's multiple range test.
[b] Commercial yields / Yield × 100

Fluorescent lamp Darkness BlueLED GreenLED YellowLED RedLED

Fig 1: Morphological properties according to LED of *Hypsizygus marmoreus*

<Experiment2>

Table 3: Effect of blue LED light irradiation time on properties of fruit body in *Hypsizygus marmoreus*

Light irradiation time (lighting/lighting-out, hours)	Diameter of pileus(mm)	Thickness of pileus(mm)	Thickness of stipe(mm)	Length of stipe(mm)
Fluorescent lamp	19 d[a]	7.0 d	11.3 b	82 b
Continuous light irradiation	30 a	9.3 a	11.1 b	73 c
1/1	25 b	9.0 a	11.9 a	73 c
1/2	22 c	7.4 c	10.7 b	84 b
1/3	26 b	8.6 b	12.1 a	82 b
1/4	21 c	7.6 c	10.7 b	85 b
1/5	18 d	6.4 d	10.9 b	93 a

[a] Values followed by the same letter do not differ significantly at $p>0.05$ according to Duncan's multiple range test.

Table 4: Effect of blue LED light irradiation time on yield properties in *Hypsizygus marmoreus*

Light irradiation time (lighting/lighting-out, hours)	No. of available stipes(No./850ml)	Yield (g/850ml)	Commercial yields(g/850ml)
Fluorescent lamp	36 a[a]	140 c	111 c
Continuous light irradiation	22 c	169 a	130 d
1/1	30 b	152 b	128 bc
1/2	38 a	176 a	146 a
1/3	31 b	148 bc	126 bc
1/4	36 a	172 a	130 b
1/5	38 a	177 a	120 c

[a] Values followed by the same letter do not differ significantly at $p>0.05$ according to Duncan's multiple range test.

CONCLUSIONS

<Experiment 1> We selected blue LED that yield, commercial yields and commercial yields index higher than these properties of the other LED treatment.

<Experiment 2> We selected 1/2(lighting/lighting-out, hours) that yield and commercial higher than these properties of the other light irradiation time.

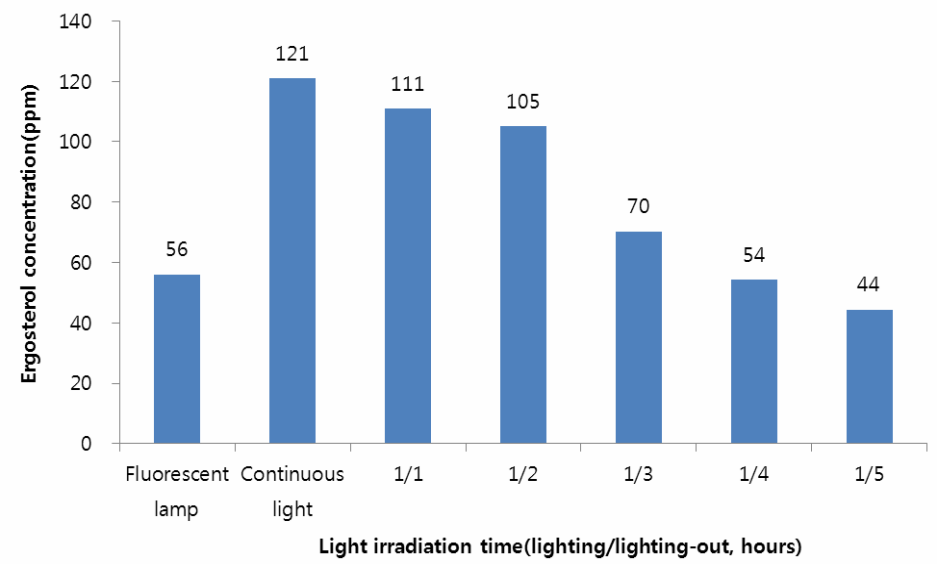

Fig 2: The ergosterol concentration of blue LED light irradiation time.

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