The Effect of Blue Light (445nm) Irradiation on the Antioxidant Capacity and Total Polyphenol Content of Yamatomana

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Problem /Question

Problem of the local traditional vegetable

Yamatomanna
(*Brassica rapa* L. *Oleifera* Group)

Traditional vegetable of Nara prefecture
similar to Komatsuna

Yamatomana is rich in polyphenol.

The amount of production and consumption of Yamatomana is low.

The loss of the biodiversity is becoming a big problem around the world.

Questionnaire to Seisho students and parents (n=204)

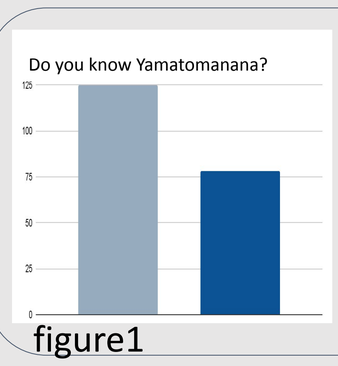

figure1

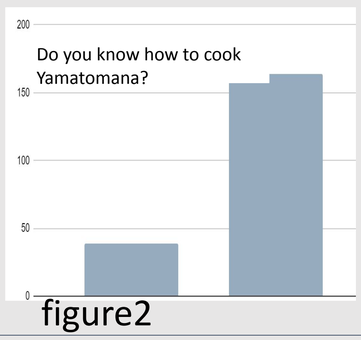

figure2

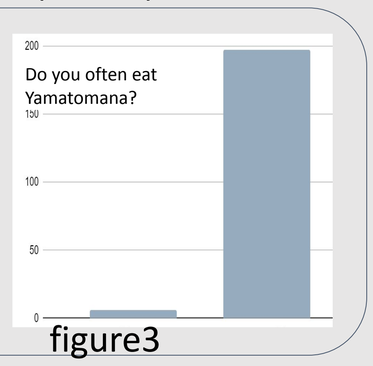

figure3

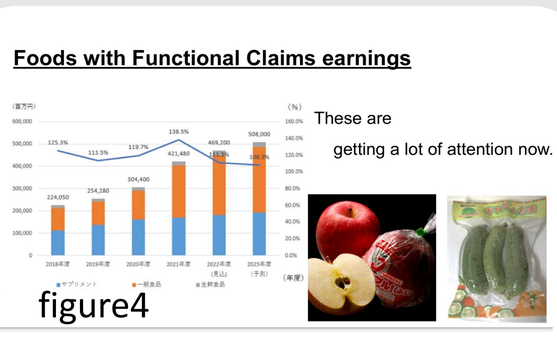

figure4

Previous research

- Blue light (445nm) is effective in increasing plants' antioxidant substances
- It increased Yamatomana's soluble polyphenols

Aim: To examine whether blue light increases Yamatomana's insoluble polyphenols and antioxidant capacity or not

Framework

Sprouts were grown for two weeks in an incubator. Temperature: 25℃

Treatment Plot
Blue light LED(445nm)

Control
Fluorescent lamp

Experiment 1
Sprouts were harvested and the length of both plots were measured

Experiment 2
The total polyphenol content of the sprouts was measured using the Folin-Ciocalteu method.

Experiment 3
The antioxidant capacity of the sprouts was measured using DPPH method.

Findings

- The amount of polyphenols: **increased**
- Antioxidant capacity: **No change**

Antioxidant Capacity
【DPPH method】

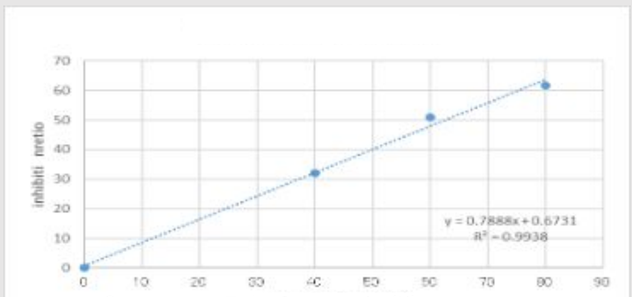

figure6 Trolox Concentration(%)

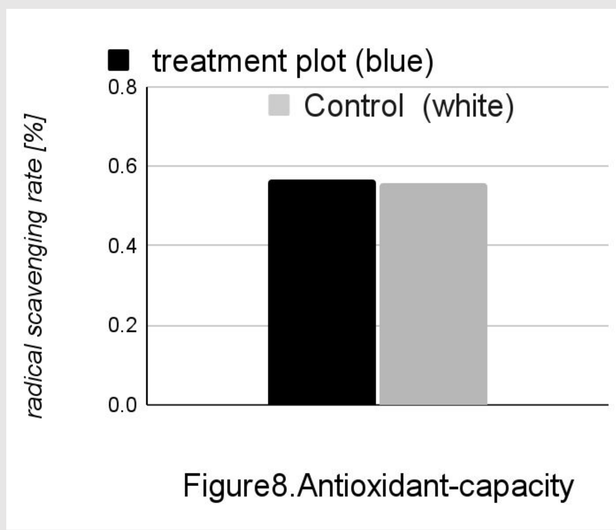

Figure8.Antioxidant-capacity

Problem

length of sprout
treatment < control

(t-test, $p < 0.05$ Excel)

figure5

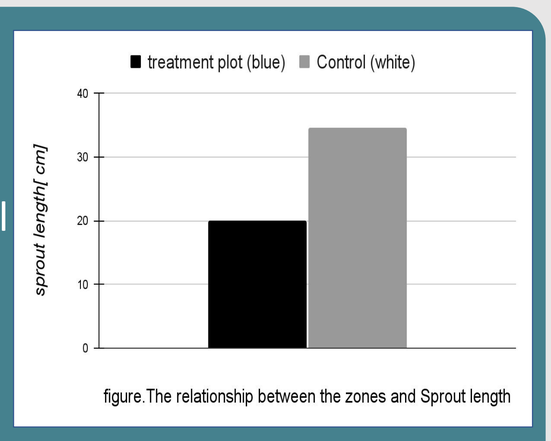

figure. The relationship between the zones and Sprout length

Total polyphenol
【via Folin-Ciocalteu method】

treatment > control

	Treatment	Control
Soluble	63.722	56.77
Insoluble	30.772	23.47

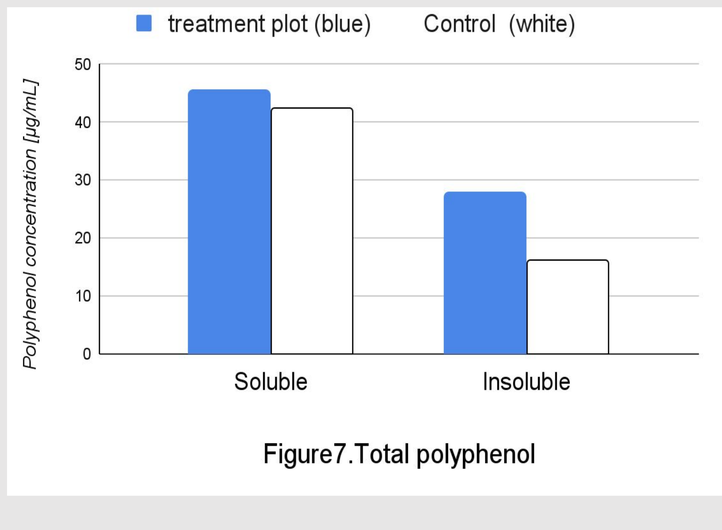

Figure7.Total polyphenol

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Discussion

Why the antioxidant capacity didn't increase

Possibility

1 Light intensity was not enough

our experiments:the PPFD was 42.5umol・m-2・s-1

different

Previous Research:the PPFD was90～220umol・m-2・s-1

2 The polyphenols increased by visible blue light **don't** have much antioxidant activity

There are many kinds of polyphenols however their antioxidant capacity is different

Future Prospects

To determine if UV irradiation is effective in increasing the antioxidant capacity of yamatomana.

It is known that UV rays are useful to increase plants' antioxidant capacity.