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CONFERENCE

Osaka, 22. 04. 2025

NAWA POLISH NATIONAL AGENCY FOR ACADEMIC EXCHANGE

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DEBATE

INNOVATIVE TECHNOLOGIES IN HEALTHCARE

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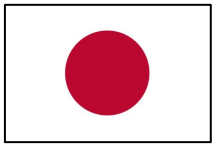
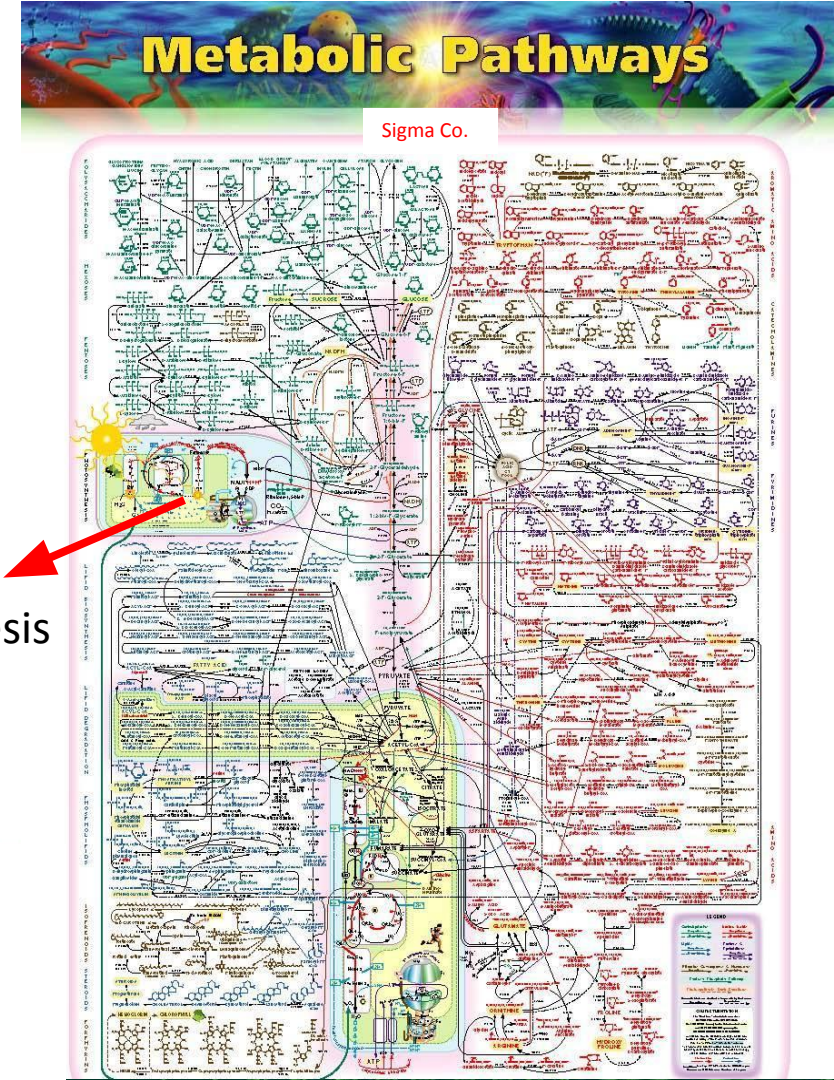
- Prof. Hazem M. Kalaji, Institute of Biology, SGGW
- Prof. Piotr Dąbrowski, Institute of Environmental Engineering, SGGW
- Mr. Ryszard Grodowski, Freelance Research Equipment Developer
- Dr. Seiya Sato, Visiting Professor, University of Pharmacy and Applied Life Sciences, Niigata
- Mr. Yasunarii Sato, President of Green's Green Company, Niigata



Photosynthesis



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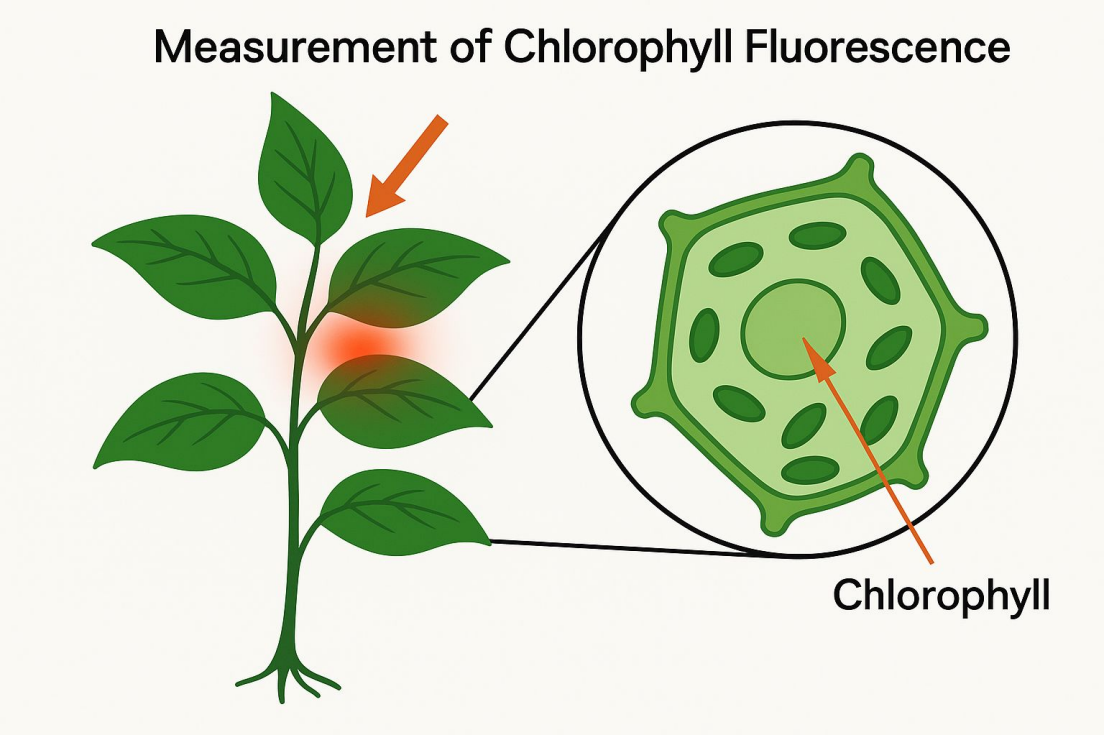

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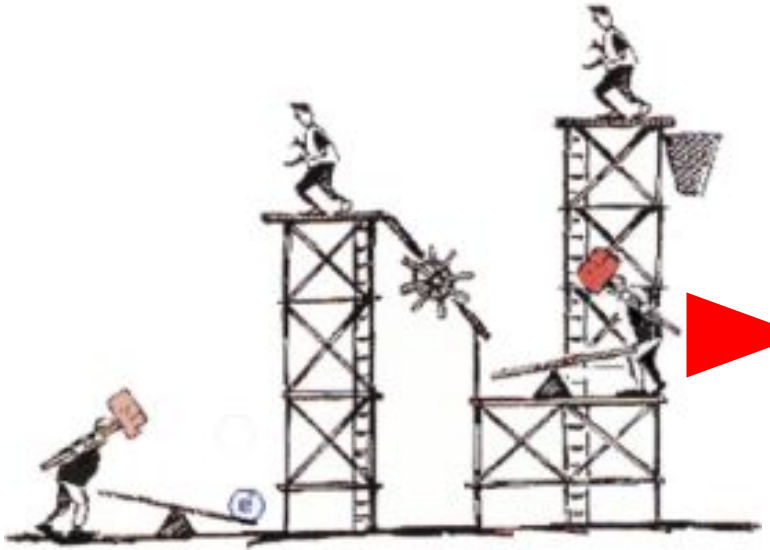
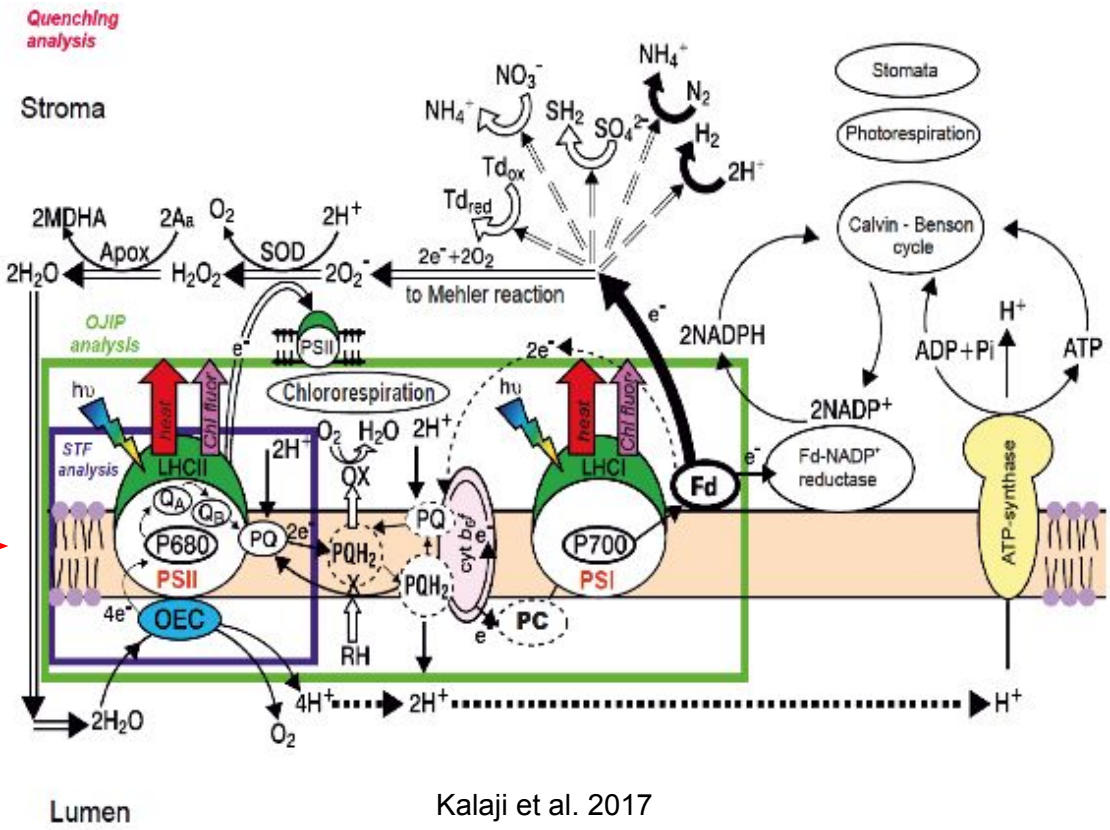


David Walker, Hansatech Instruments Ltd., UK



Kalaji et al. 2017

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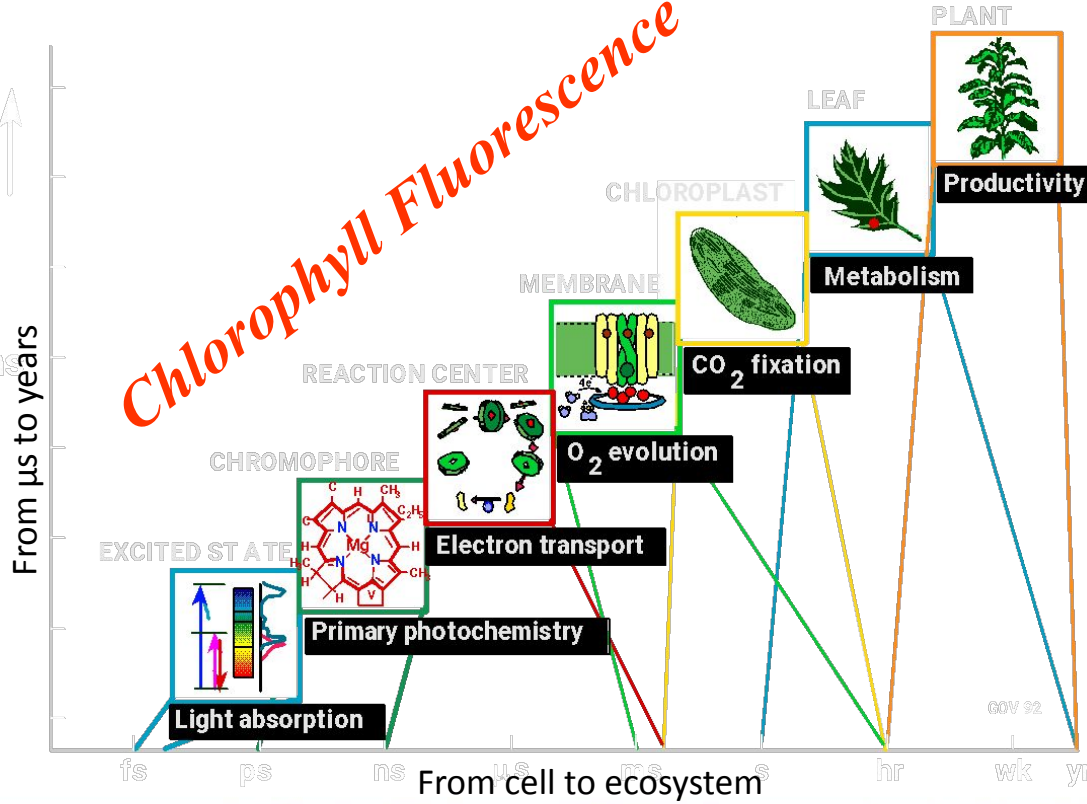
Measurement of Chlorophyll Fluorescence

bioindicator, biomarker, biosensor

- sensitive
- reliable
- non-invasive
- fast
- inexpensive
- broad applicability: plants, algae, mosses, lichens, etc.



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Plant ECG

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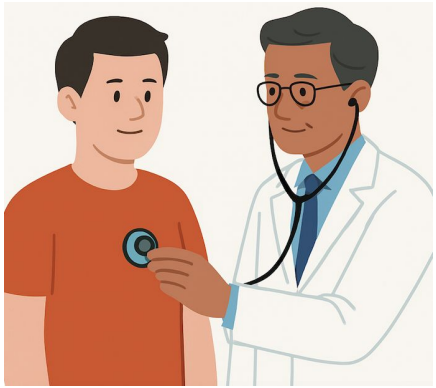
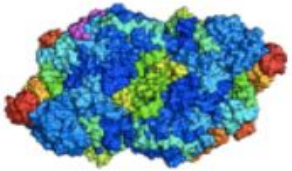
Pulse = 60-80/minute

Maximal quantum yield
Fv/Fm = 0.83-0.85 r.u.



Heart

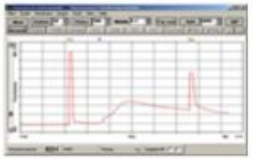


PSII

Stethoscope

Fluorometer

Electrocardiograph



Fluorescence curve

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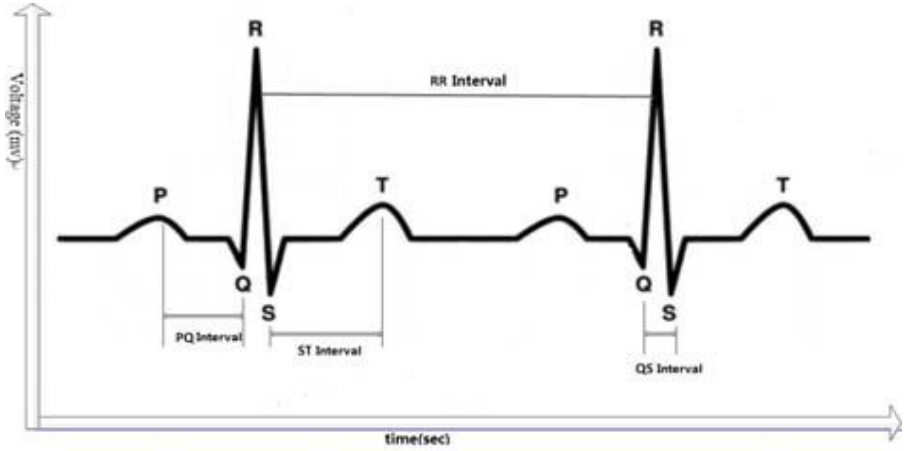
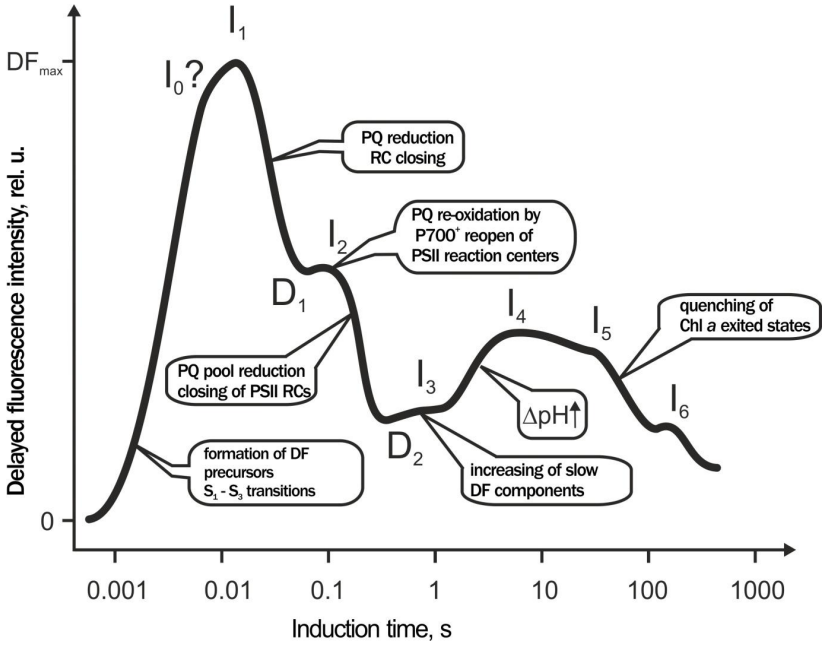


HUMAN

Lichen Xun, Gang Zheng, TELKOMNIKA, Vol.11, No.3, March 2013, pp. 1363 ~ 1370



PLANT

Kalaji et al. 2017

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Plants' „Big Brother" Monitoring System

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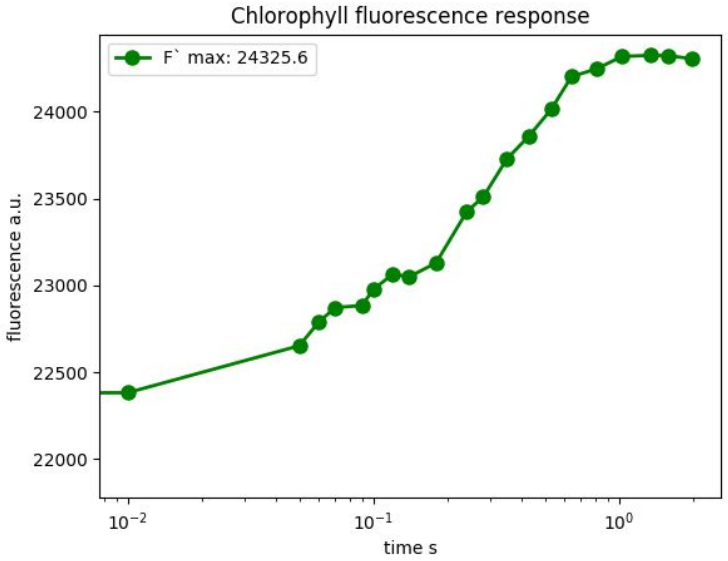

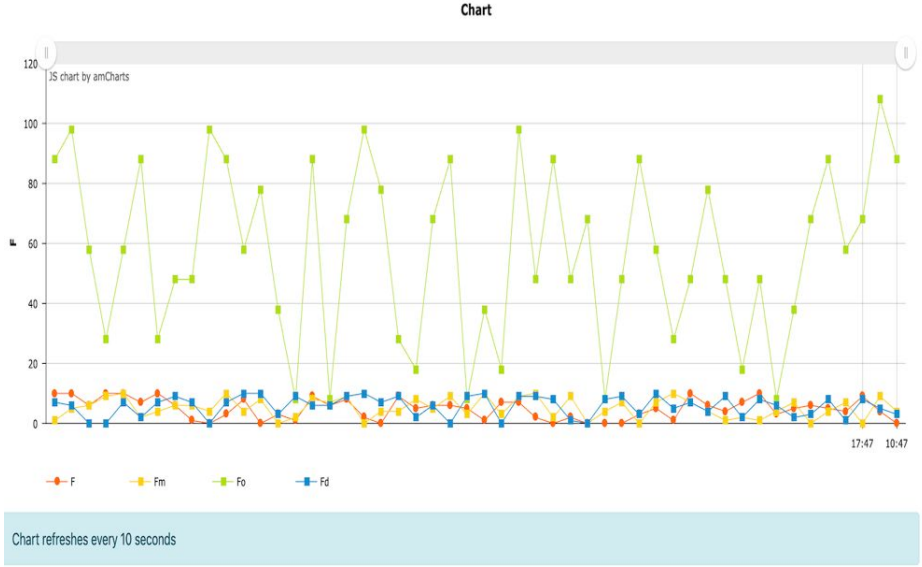

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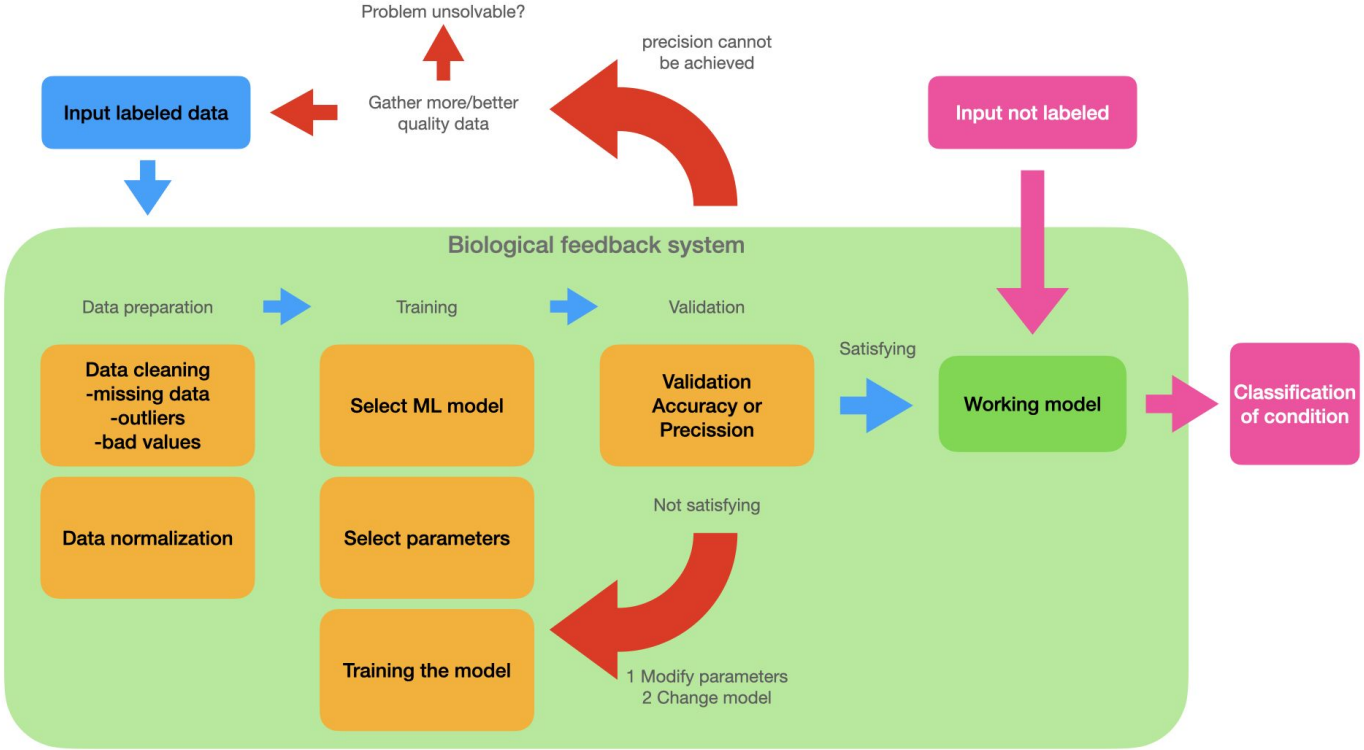

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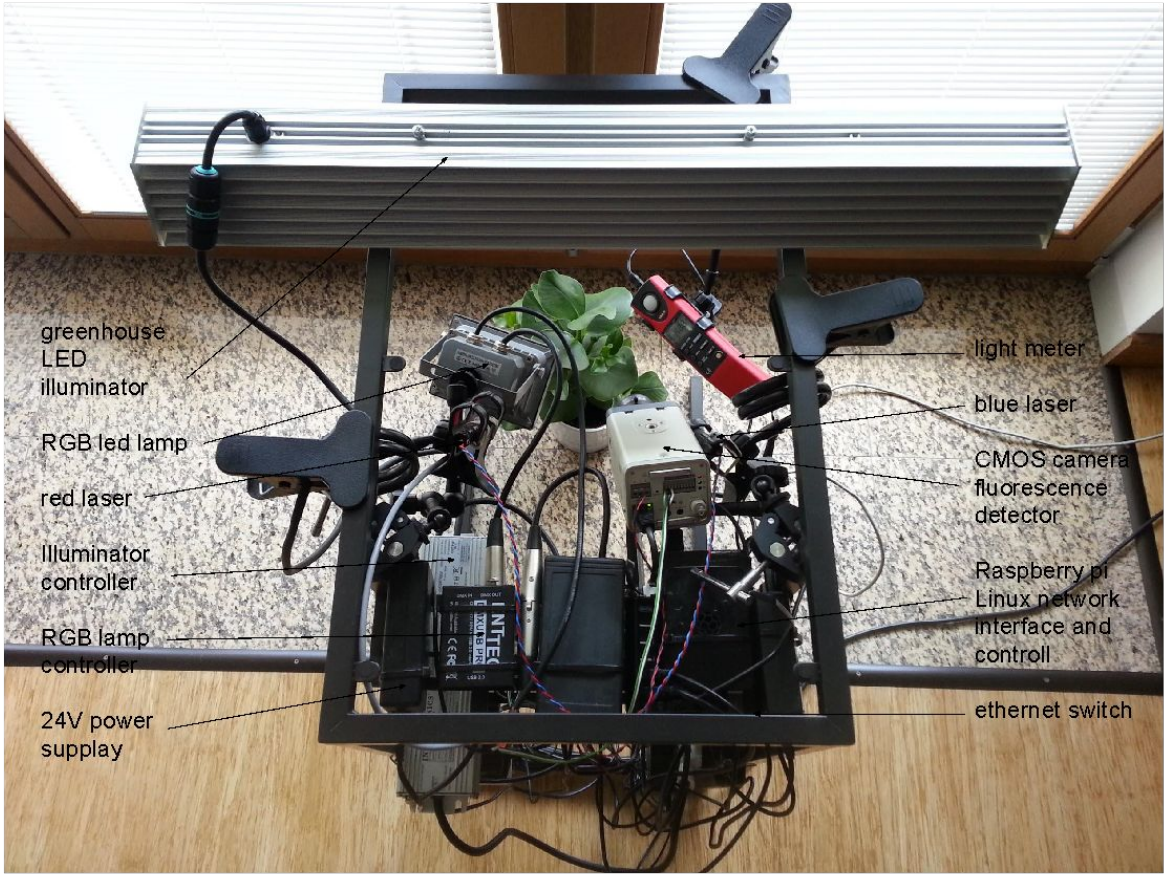

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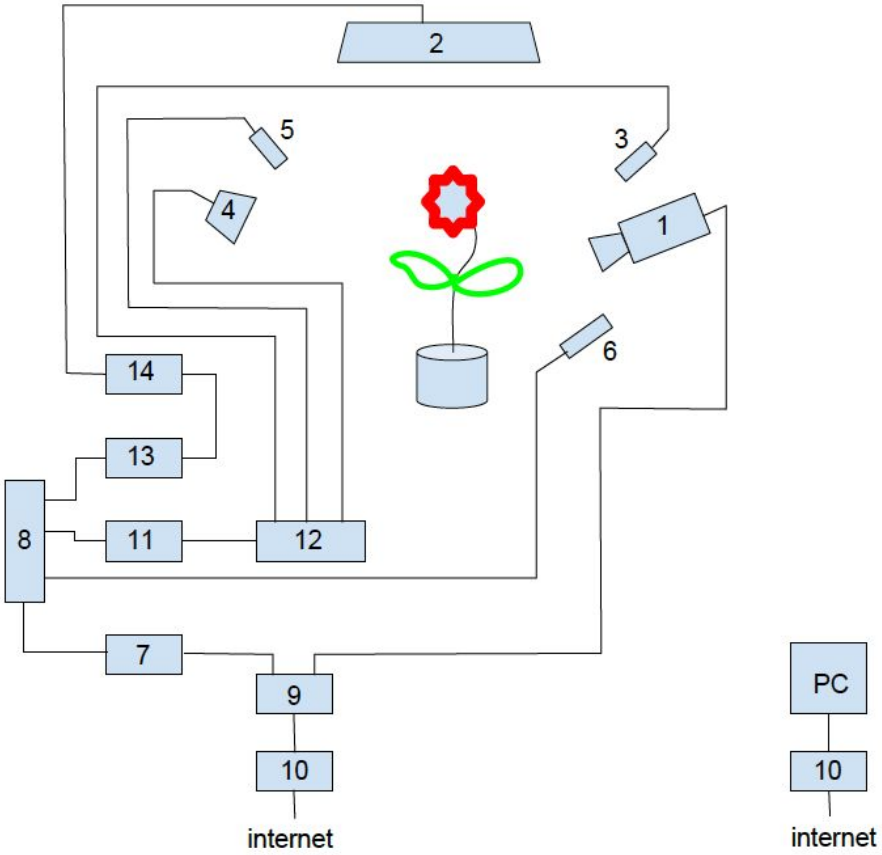

1. fluorescence detector radiometer CMOS camera
2. greenhouse actinic light LED lamp
3. fluorescence induction blue laser
4. RGB measurement light LED lamp
5. red laser
6. light meter
7. Raspberry pi microcomputer Python libraries and scripts for controllers and interfaces
8. USB hub
9. ethernet switch
10. internet router
11. USB-DMX512 interface
12. DMX512 PWM on-off controller
13. USB-DALI (Digital Addressable Lighting Interface)
14. DALI light controller-dimmer

PC remote computer vision (openCV) data acquisition and control algorithms

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MOSTRA

Polonia

Greenhouse Silent Disco

15 luglio – 11 dicembre 2022

Triennale Muzeum, Milano, Italy

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Mini „Greenhouse Silent Disco” System

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Description of operation

The light intensity control system for a plant uses the properties of chlorophyll fluorescence, measured to calculate a parameter that serves as a setpoint for the lighting controller.

This enables the limitation of light to an optimal value for the given plant, resulting in energy savings in electricity consumption.

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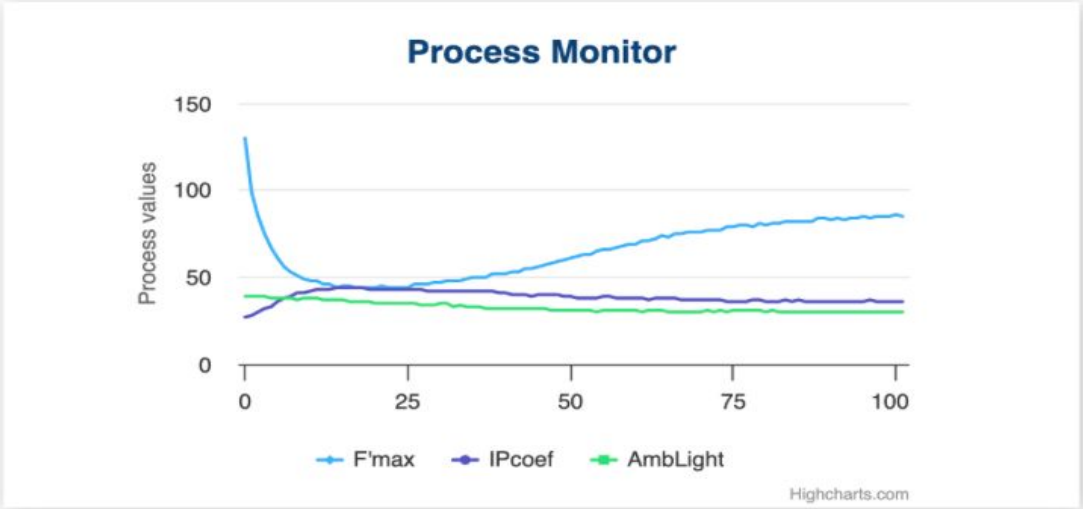
Light intensity controll based on IP-phase coefficient

Current data

F'max	IPcoef	AmbLight
85	36	30



Light Intensity [%]

Mini Greenhouse Silent Disco

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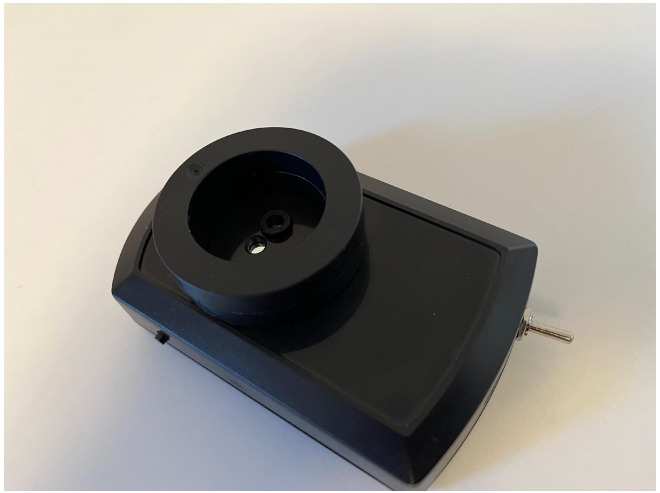
First Polish Fluorometer



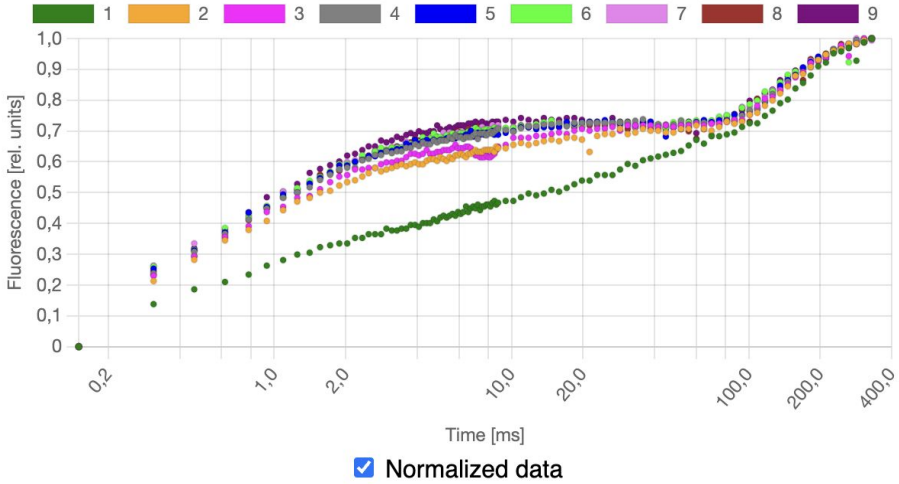
Blue (ca. 430 nm) 150 µs –-300 ms, 660 points (showing only 105 points

Chlorophyll fluorescence induction curve

Values of measured and calculated parameters

Temp [C]	Humid [%]	Atm press [hPa]	Fmax'	(Fp-Fo)/Fp	(Fp-Fi)/Fp
15	41	994	185	0.77	0.24

Save data



Normalized data

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Cooperation with Japan, 2019

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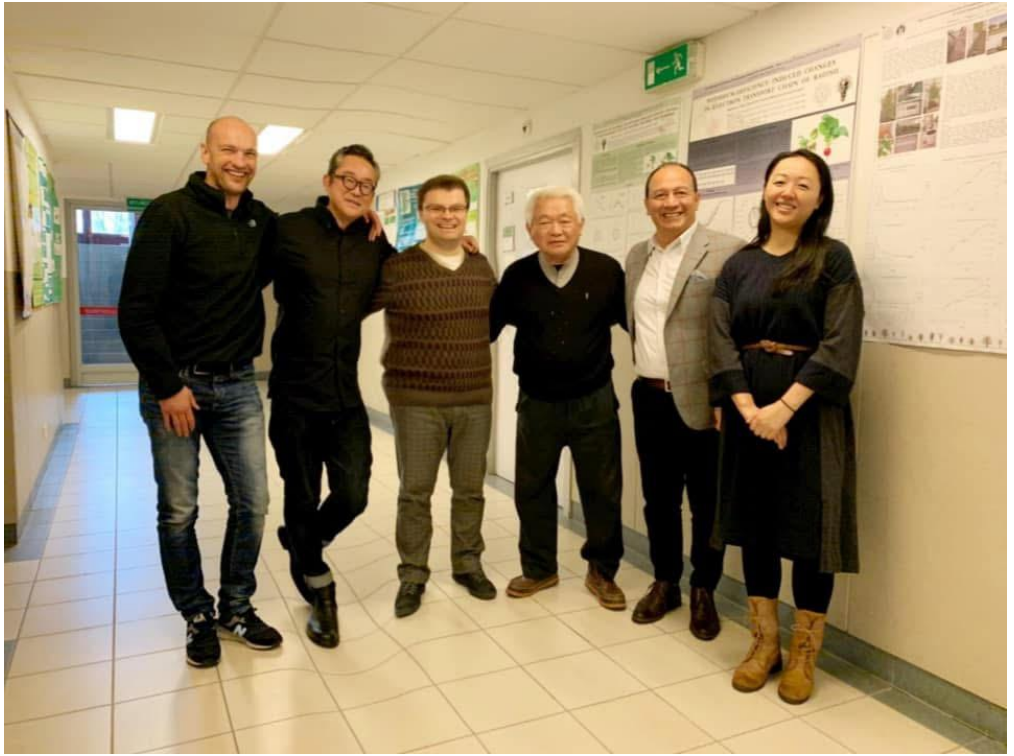

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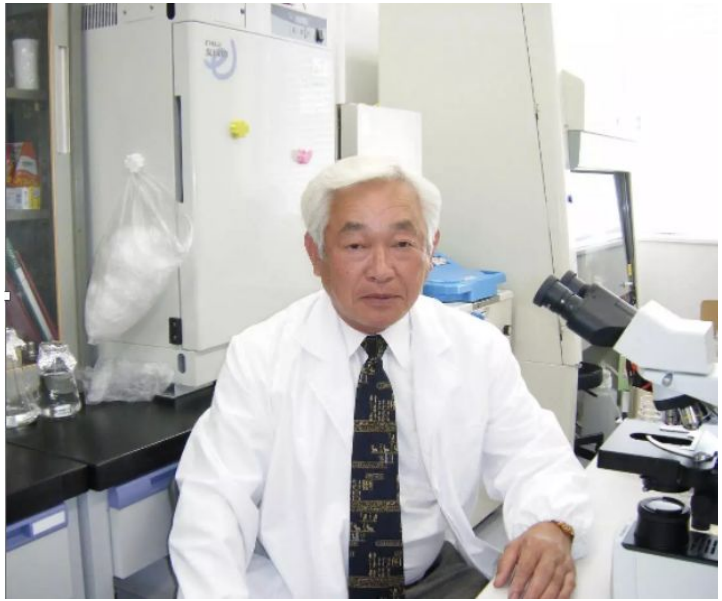
Cooperation with Dr. Seiya Sato, Visiting Professor, University of Pharmacy and Applied Life Sciences, Niigata



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Moss-Based Antiviral Filters

1st Patent at Japanese Patent Office, 2021

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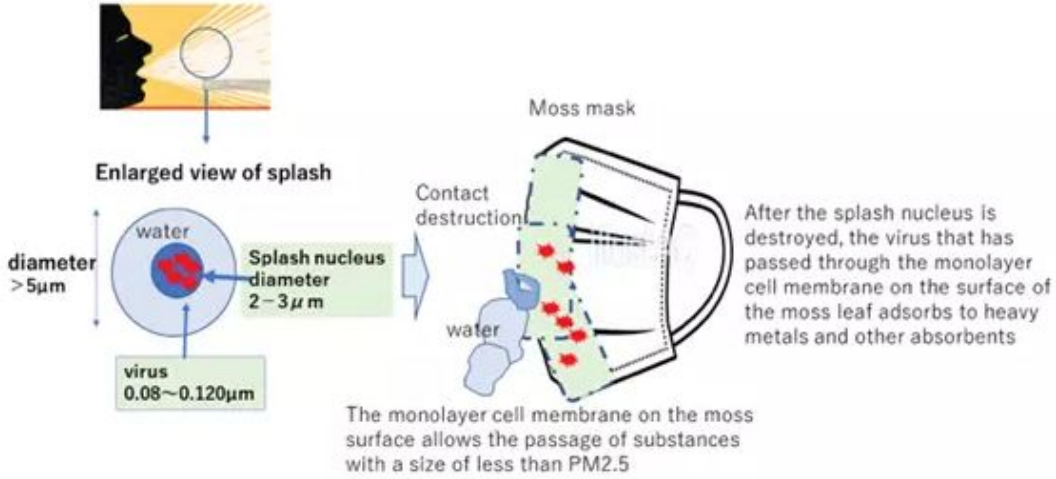

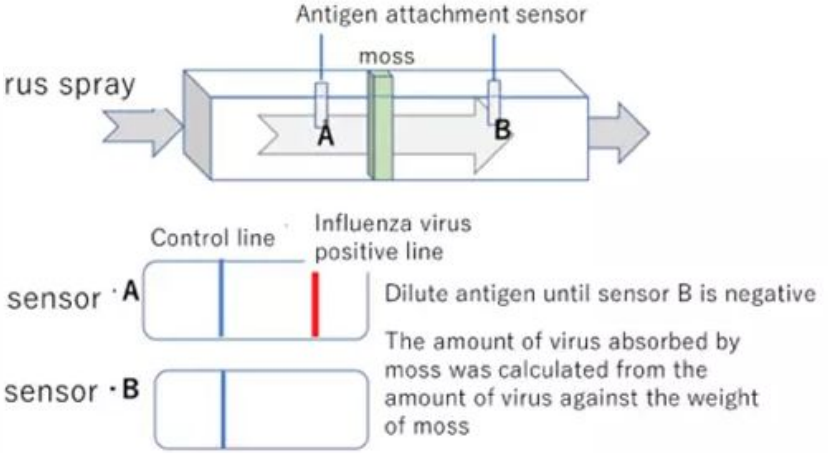

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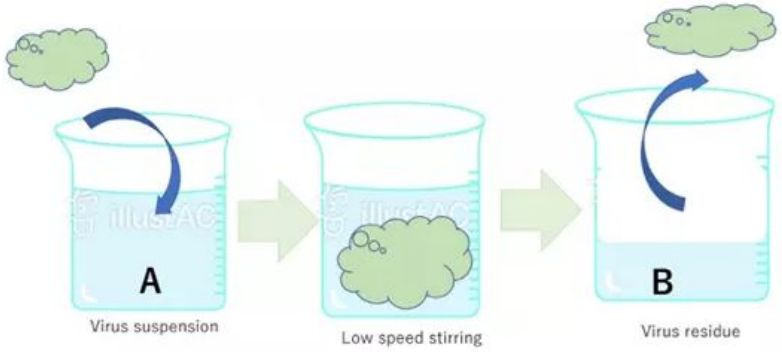
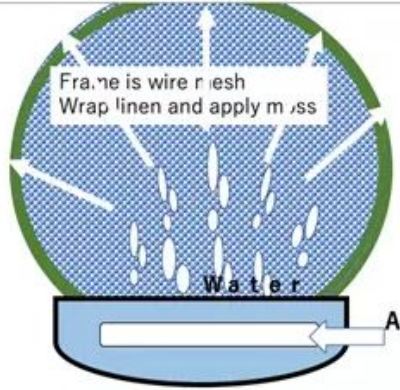


Influenza virus antigen titer
Hemagglutination titer(HA)
A 128 B <4

Coronavirus countermeasure air filter purifier

Moss ball specifications on the outside (30 cm diameter)



Pass the virus in the air through the water,
Make the virus a droplet

Advantage: It becomes a decorative item
Automatic irrigation of moss is possible
The virus in the droplet

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ChatGPT

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Jack (Sword) Bean Seed Powder as an Antiviral Agent in Food Production

2nd Patent at Japanese Patent Office, 2023

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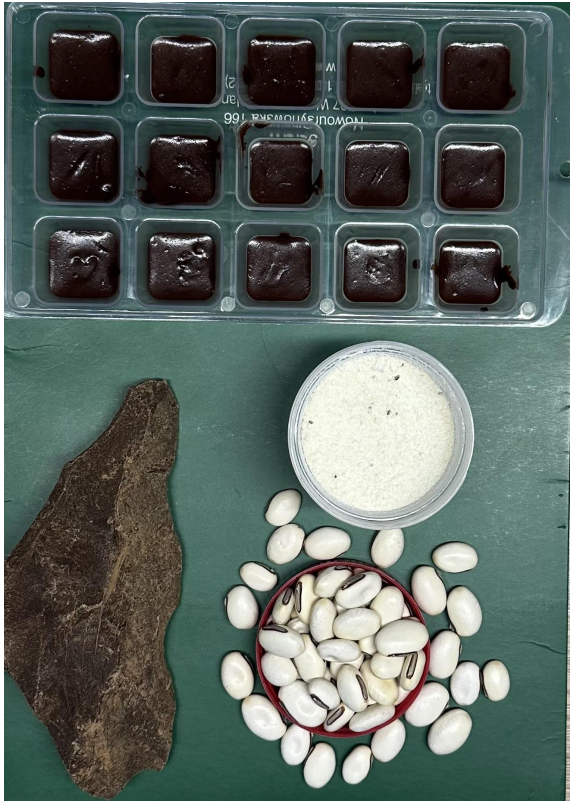
ANTIVIRAL CANDIES (CONCANAVALIN A)



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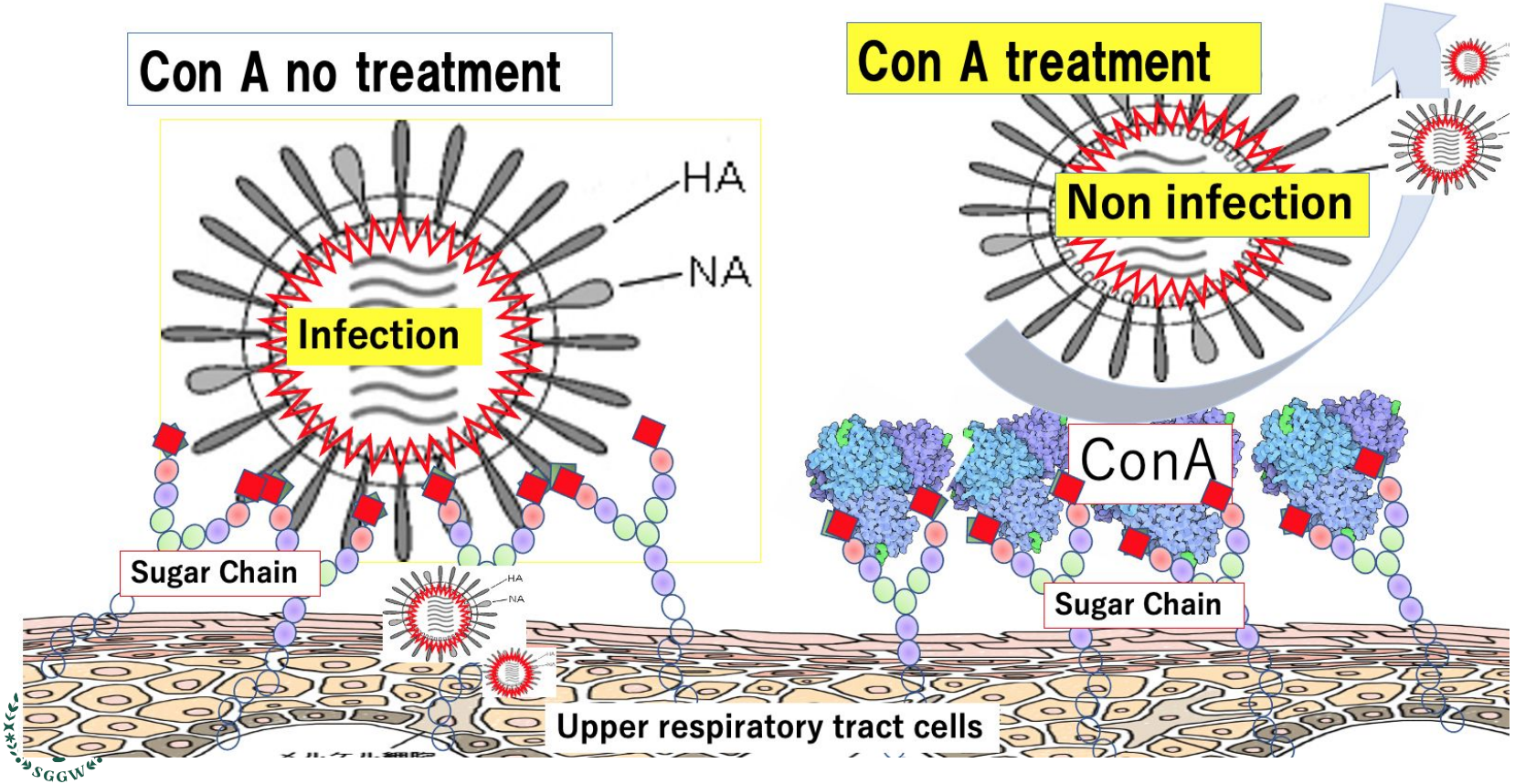
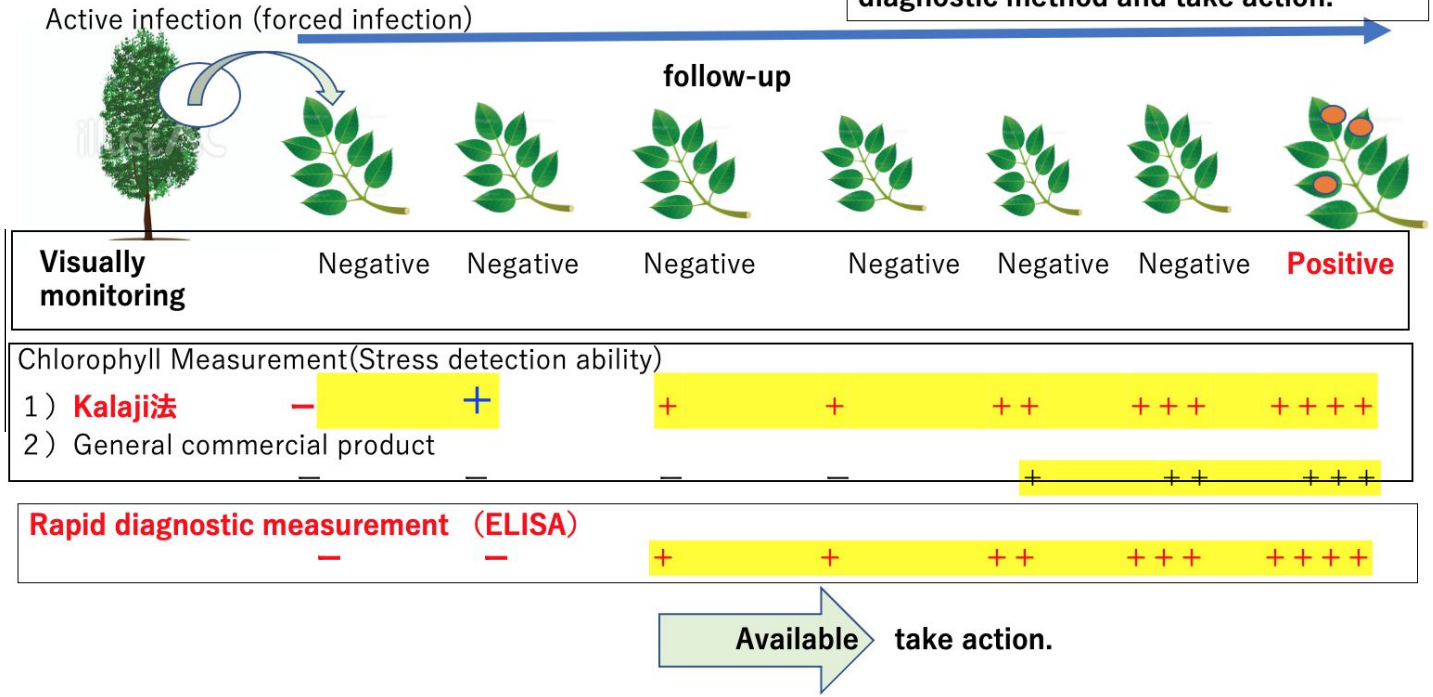

Con A no treatment
HA
NA
Infection
Sugar Chain
Con A treatment
Non infection
ConA
Sugar Chain
Upper respiratory tract cells

Confirmation of usefulness of chlorophyll method and rapid diagnostic method

When stress is confirmed, immediately identify the pathogen with a rapid diagnostic method and take action.



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Cooperation with Mr. Yasunarii Sato,

Green’s Green Company , Niigata

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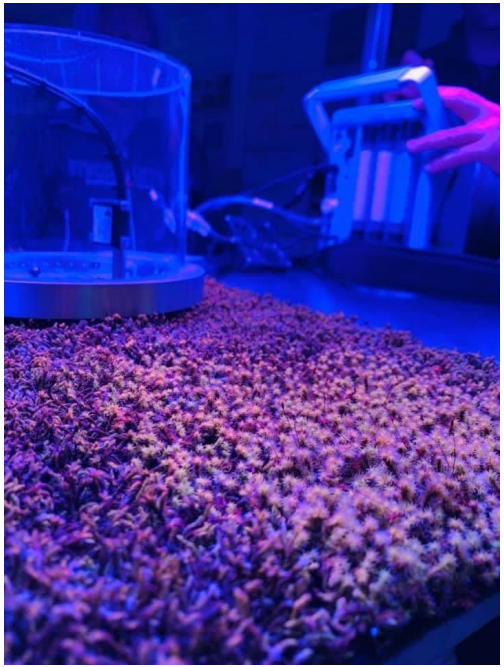
Green's Green Company , Niigata

CO_2 credits

Photosynthetic potential of Sungoake mosse to abosrb CO_2



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Potential of Sungoake for J-Credit Certification

1) The amount of carbon dioxide absorbed by sunagoke one year after seeding is 4.3 tons/ha, which is 1.4 times higher than the 3.6 tons/ha absorbed by cedar trees aged 1–5 years. This suggests that it could serve as an immediate countermeasure against global warming.

2) Even compared to the peak carbon dioxide absorption of cedar trees aged 20–25 years (9.6 tons/ha), Sunagoke achieves 47% of that amount.

3) By incorporating sunagoke's carbon dioxide fixation properties into the J-Credit scheme, it is possible to enhance added value.

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SEEKING COLLABORATION WITH JAPANESE UNIVERSITIES AND ENTERPRISES

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Ecological Ambulance

Mobile Plant Phenotyping Unit/ Ecological Ambulance

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Plants and Humans: A Physiological Analogy

Anesthetizing Plants Using Diethyl Ether

Study of Plant Reactions to Smoking

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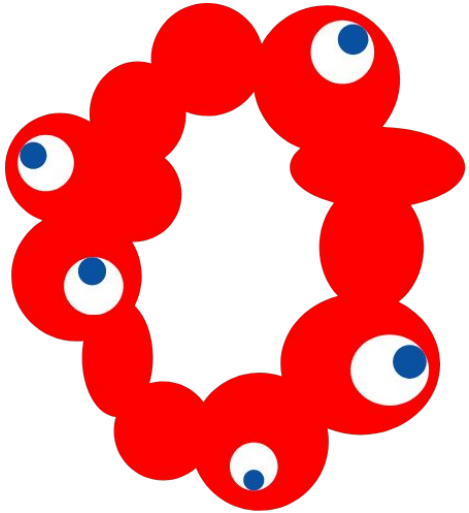

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EXPO
2025

Thank you for your attention

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