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CONFERENCE

Osaka, 22. 04. 2025



POLISH NATIONAL AGENCY
FOR ACADEMIC EXCHANGE

Programme International Scientific Event at the EXPO 2025 World Exposition in Osaka, Kansai – Call 2024 Agreement BPI/OSA/2024/1





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DEBATE

INNOVATIVE TECHNOLOGIES IN HEALTHCARE



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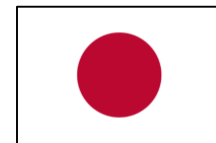
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- Prof. Hazem M. Kalaji, Institute of Biology, SGGW
- Prof. Piotr Dąbrowski, Institute of Environmental Engineering, SGGW
- Mr. Ryszard Grodowski, Freelance Research Equipment Developer
- Dr. Seiya Sato, Visiting Professor, University of Pharmacy and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



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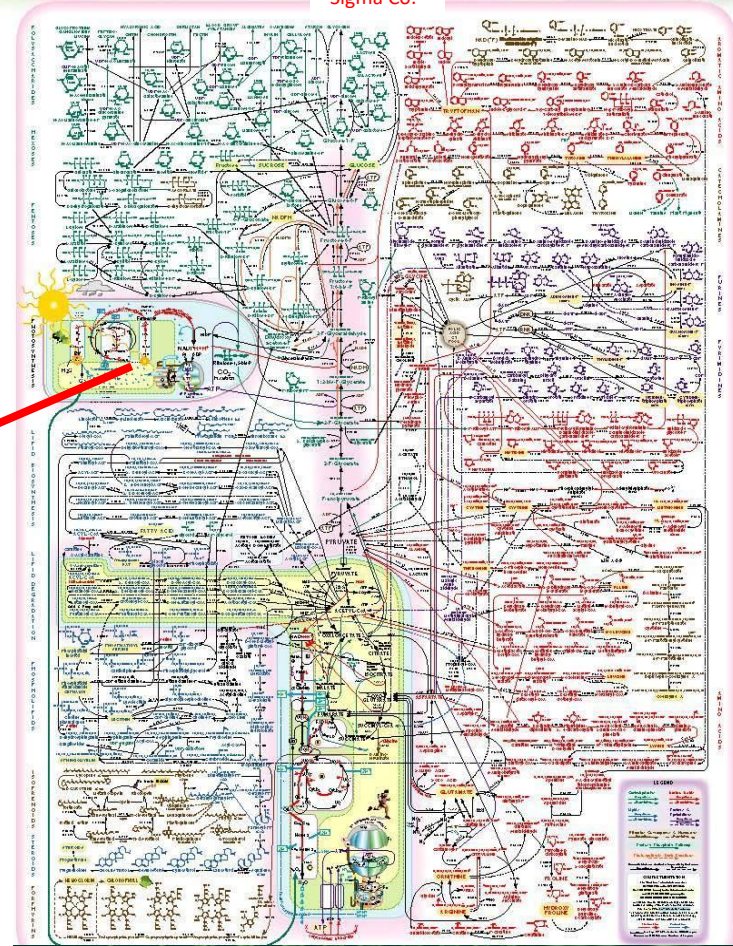


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Sigma Co.



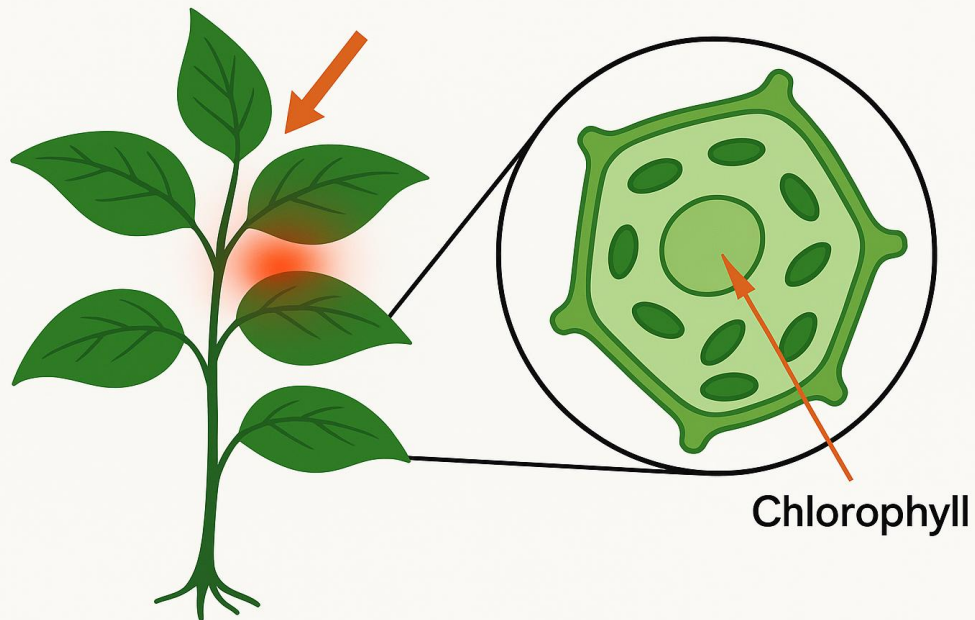
Photosynthesis





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Measurement of Chlorophyll Fluorescence



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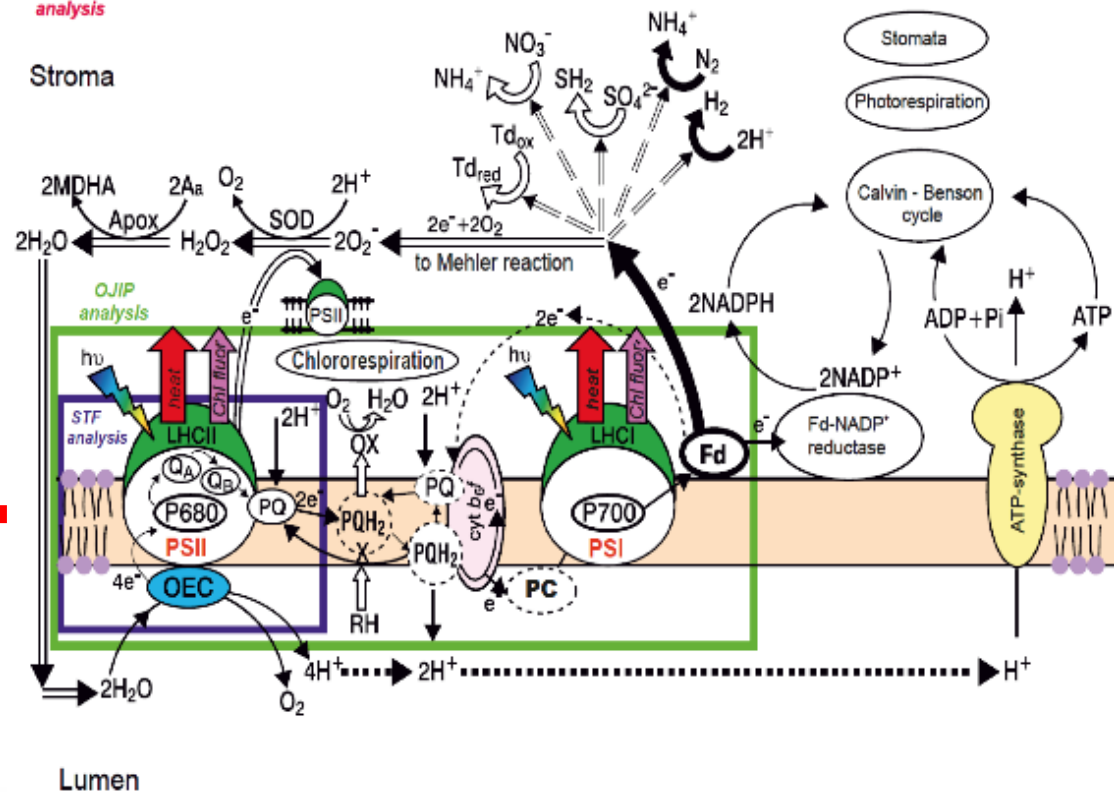
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David Walker, Hansatech Instruments Ltd., UK

Quenching analysis

Stroma



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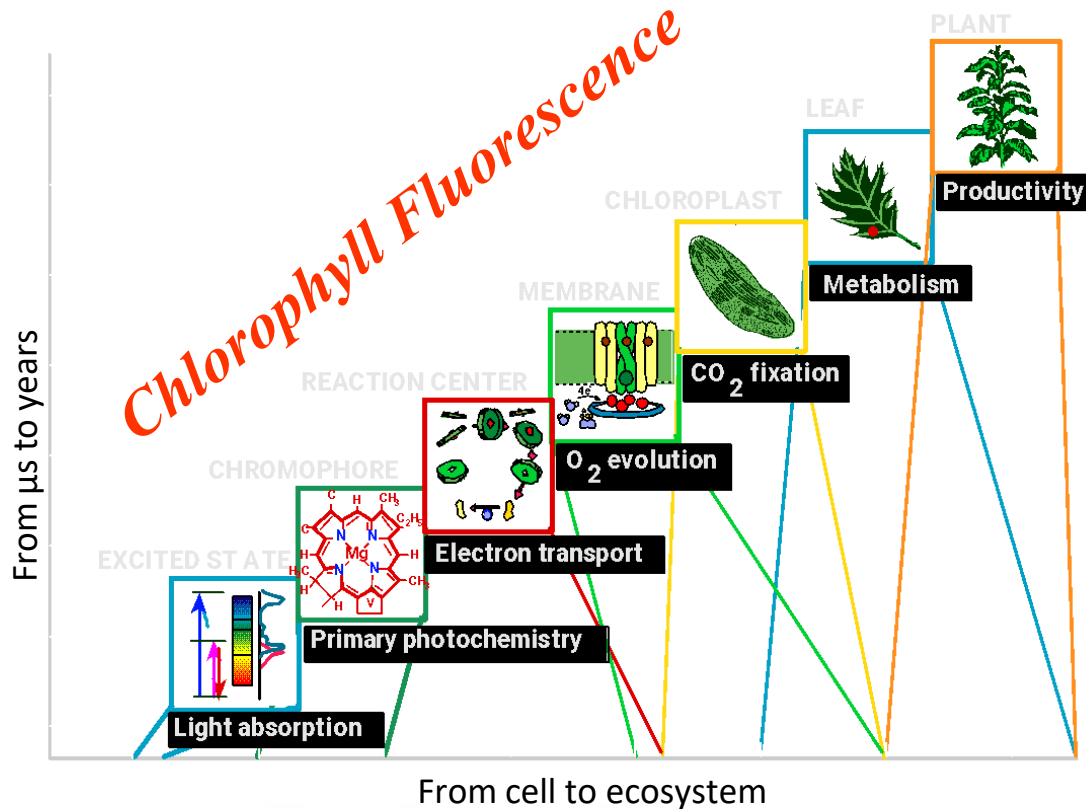


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Measurement of Chlorophyll Fluorescence

bioindicator, biomarker, biosensor

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



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© Goltsev, Dambov & Kalaji



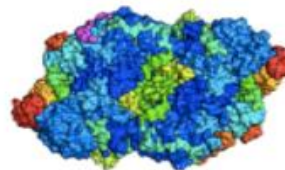
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Pulse = 60-80/minute

Maximal quantum yield
 $F_v/F_m = 0.83-0.85$ r.u.



Heart



PSII



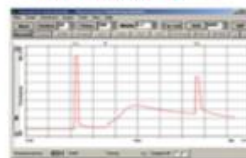
Stethoscope



Fluorometer



Electrocardiograph



Fluorescence curve



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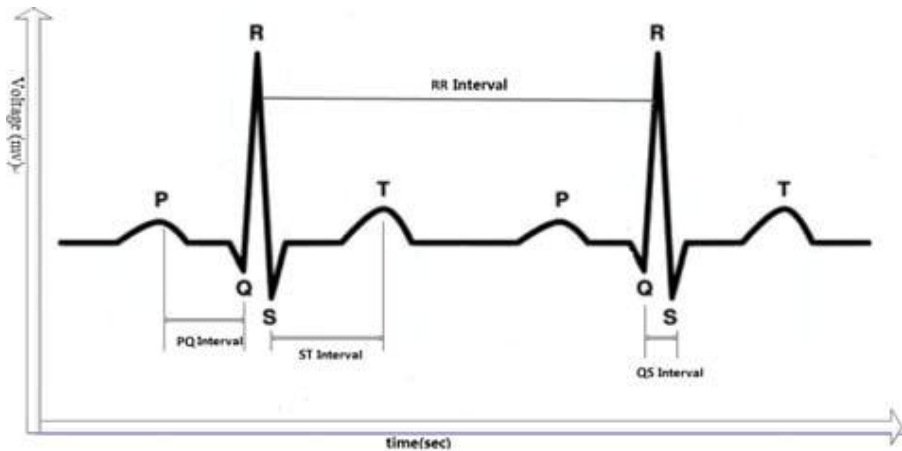


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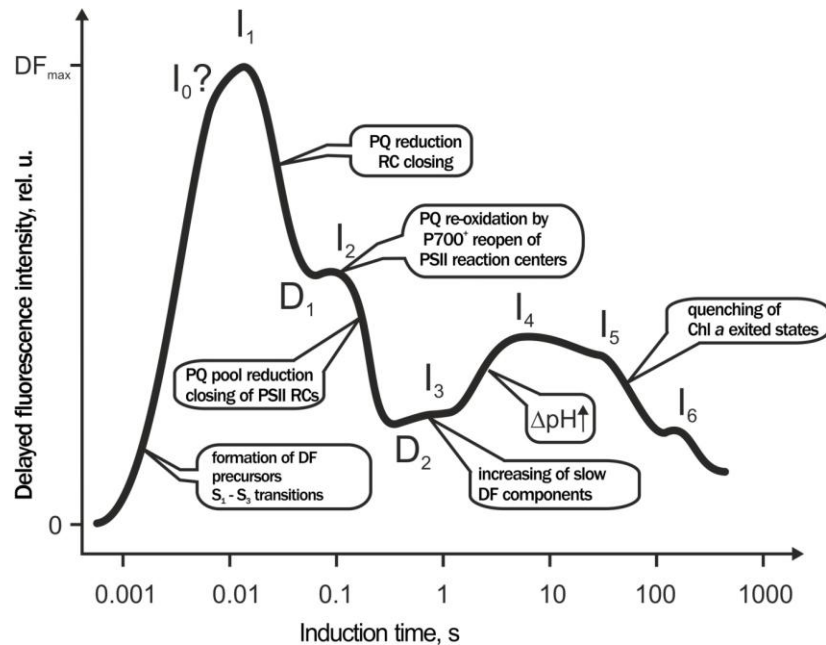


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HUMAN

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



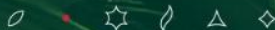
PLANT

Kalaji et al. 2017



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„Big Brother”



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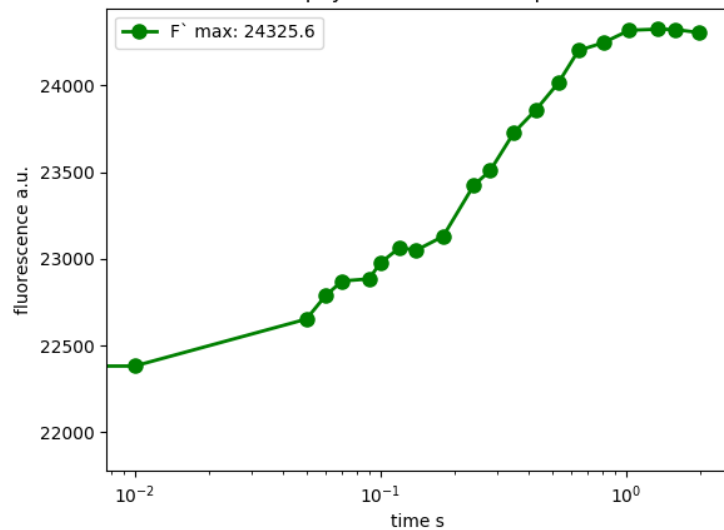
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Chlorophyll fluorescence response



Chart

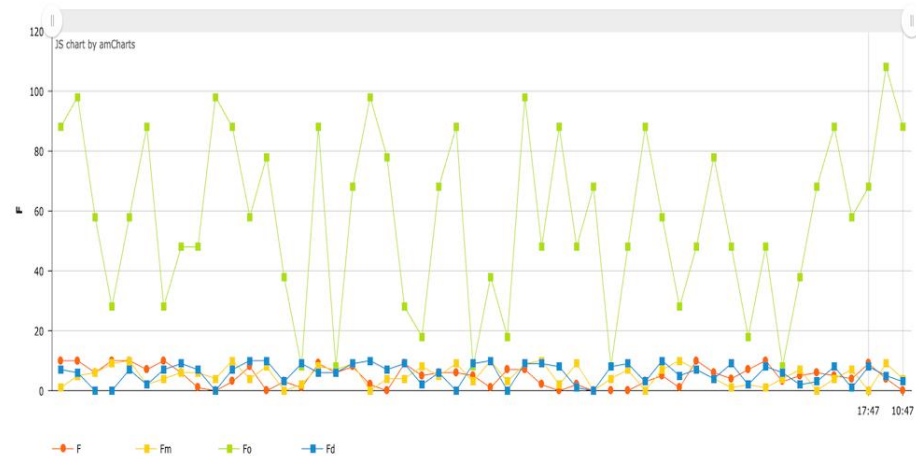


Chart refreshes every 10 seconds



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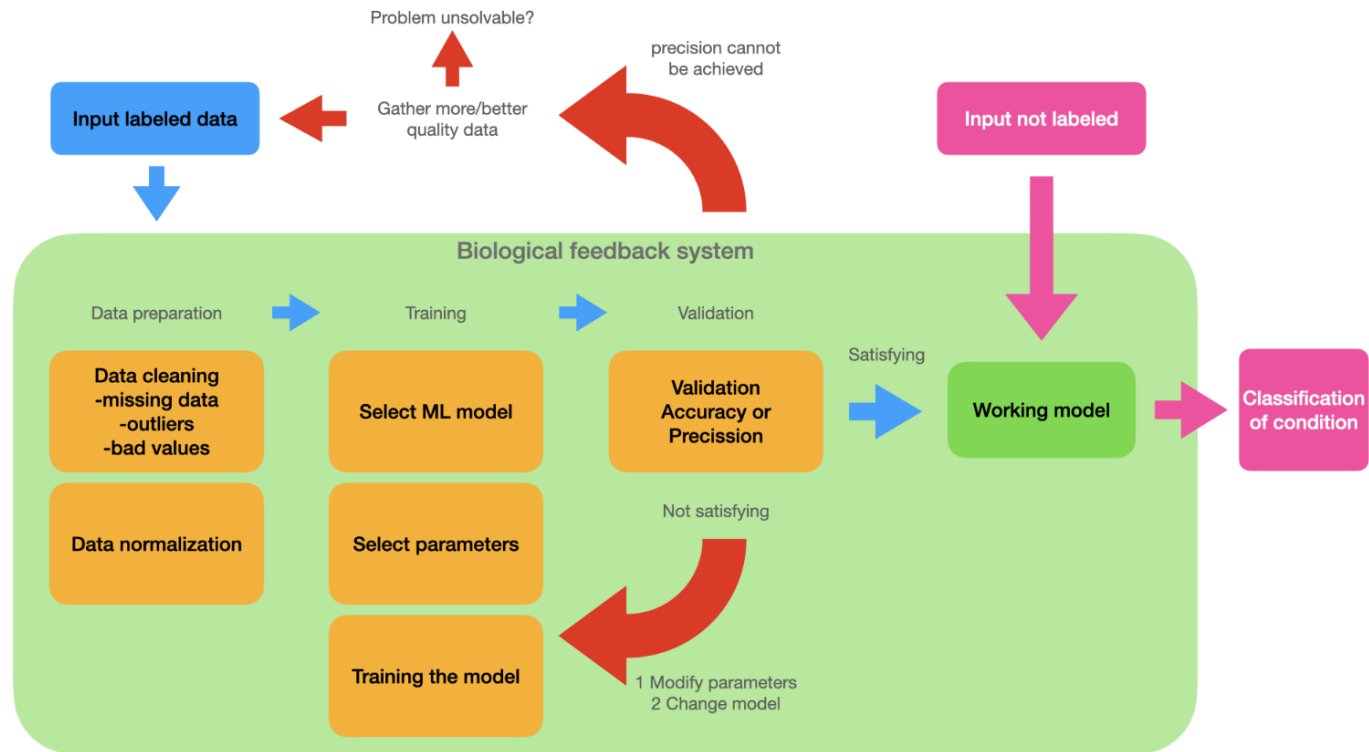
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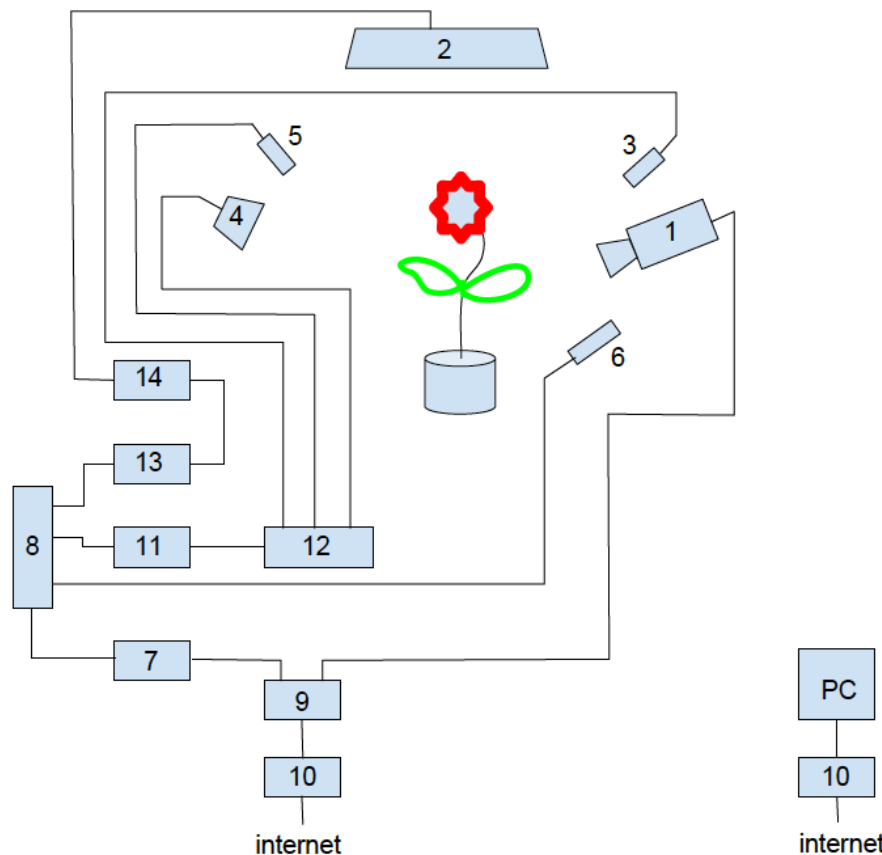
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1. fluorescence detector
 - radiometer CMOS camera
 2. greenhouse actinic light LED lamp
 3. fluorescence induction blue laser
 4. RGB measurement light LED lamp
 5. red laser
 6. light meter
 7. Raspberry pi microcomputer
Python libraries and scripts 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

Green house Silent Disco

Come si può fare un progetto considerando le reali esigenze dell'economia e trovando le informazioni direttamente da piante?

Il modo di vivere delle piante e i loro organi sono diversi da i tuttavia la loro abilità sensoriale così come la capacità di reagire a stimoli va ben oltre quanto possiamo immaginare. Sanno sentire e ve la forza-peso, l'intensità del campo elettromagnetico, il livello di umidità, la differenza di concentrazione sostanze chimiche, il accorgere della minima vibrazione. Comunque, all'interno delle proprie comunità, diverse specie, ma tutte con la loro silenziosa lingua.

Per comprendere essere l'osservazione della clorofilla, la trasmissione di dati nella fotosintesi, che permette di considerare i quali - similmente - hanno diritto di essere e ottimale.



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UNUgreen

MOSTRA
Polonia
Greenhouse Silent Disco
15 luglio – 11 dicembre 2022

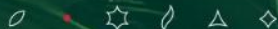


Triennale Muzeum, Milano,
Italy



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Mini Greenhouse Silent Disco



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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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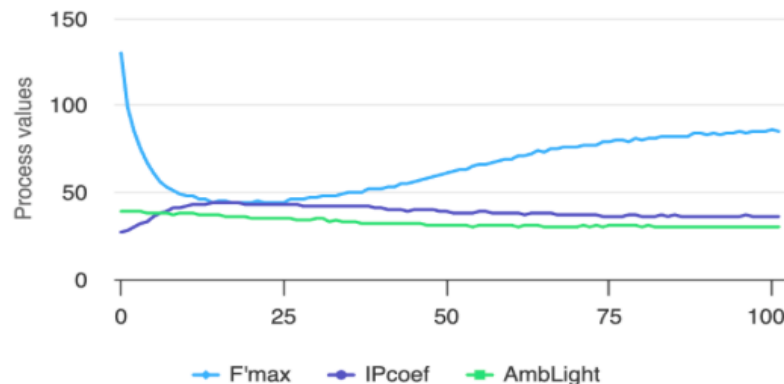


Light intensity controll based on IP-phase coefficient

Current data

F'max	IPcoef	AmbLight
85	36	30

Process Monitor



Highcharts.com

Light Intensity [%]

Mini Greenhouse Silent Disco





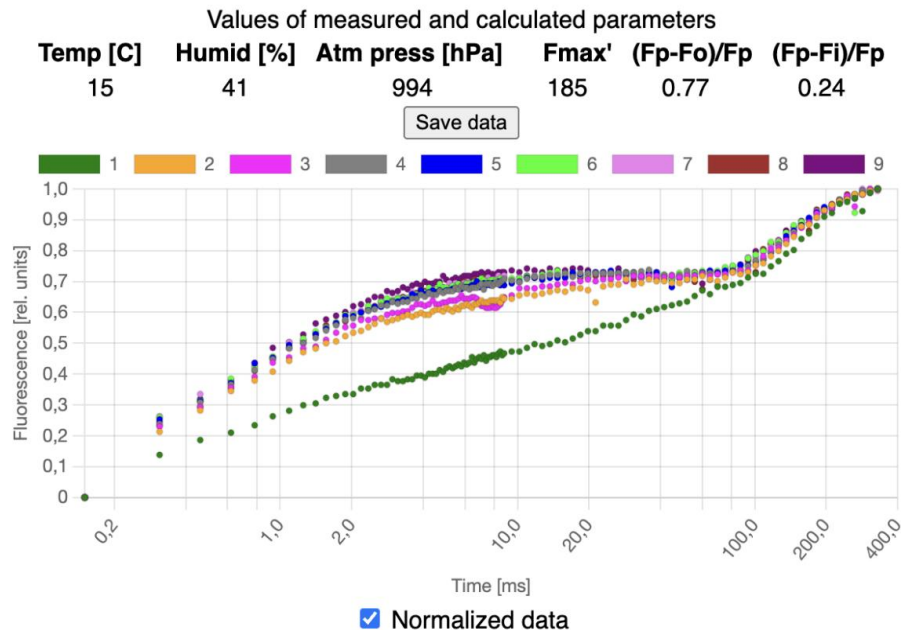
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First Polish Fluorometer



Blue (ca. 430 nm) 150 μ s—300 ms, 660 points (showing only 105 points)

Chlorophyll fluorescence induction curve



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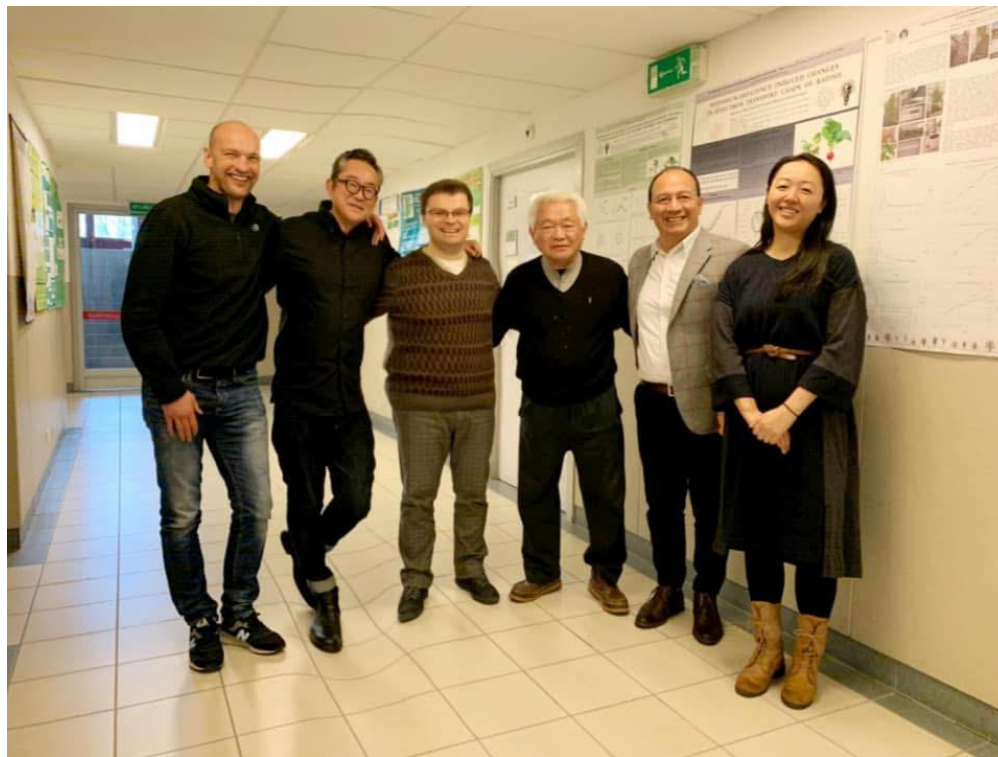
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Cooperation with Japan、2019



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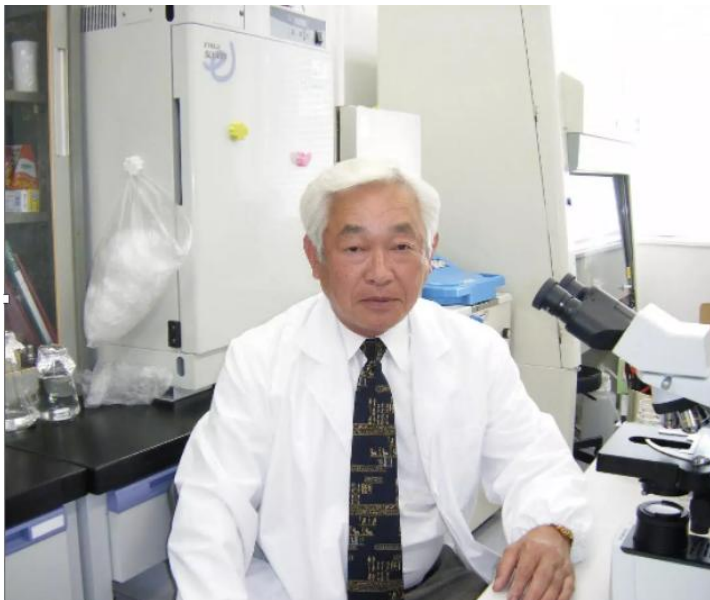
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Cooperation with **Dr. Seiya Sato**, Visiting Professor, University of Pharmacy and Applied Life Sciences, Niigata



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Moss-Based Antiviral Filters

1st Patent at Japanese Patent Office, 2021



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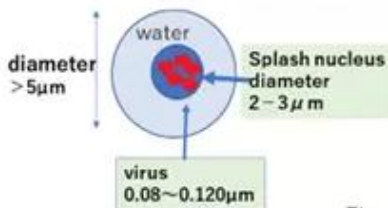




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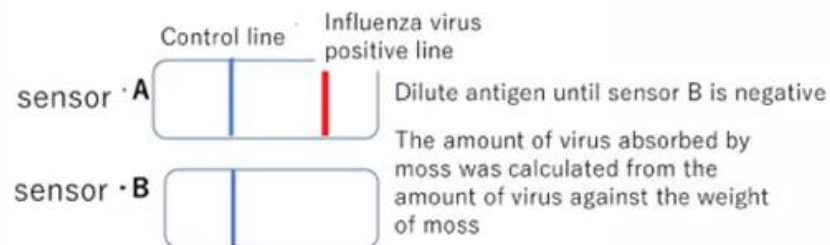
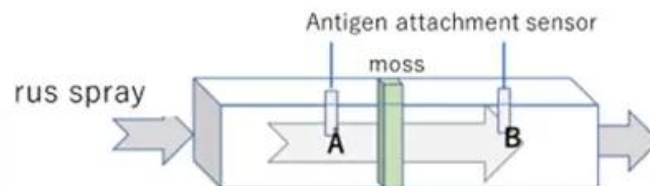


Enlarged view of splash



The monolayer cell membrane on the moss surface allows the passage of substances with a size of less than $\text{PM}_{2.5}$

After the splash nucleus is destroyed, the virus that has passed through the monolayer cell membrane on the surface of the moss leaf adsorbs to heavy metals and other absorbents



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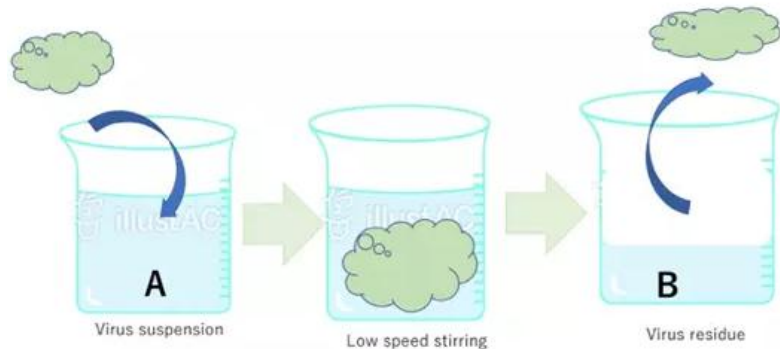


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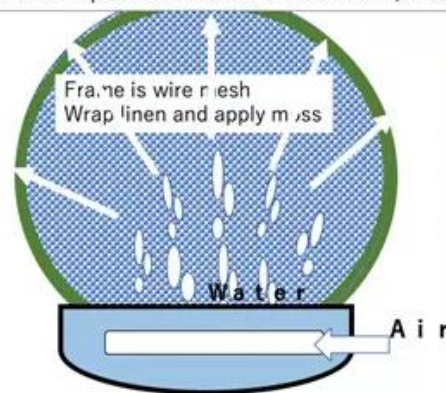
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Influenza virus antigen titer
Hemagglutination titer(HA)
A 128 B <4

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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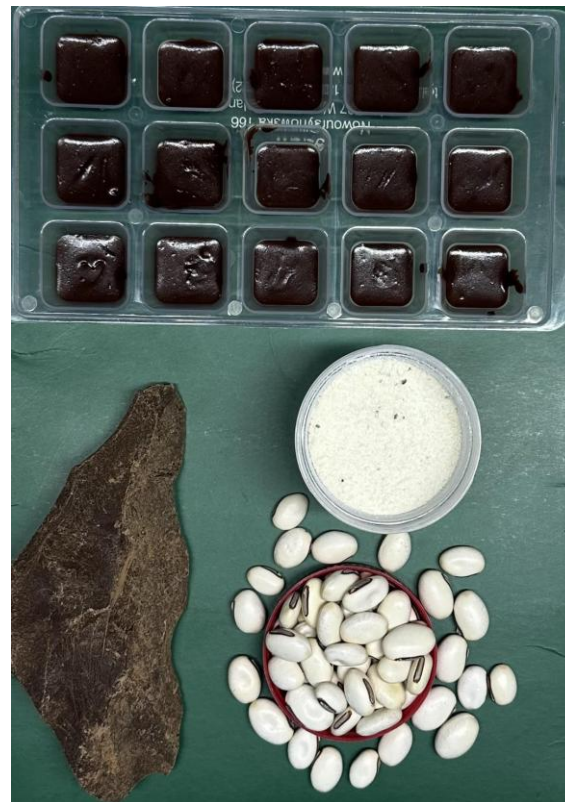
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ANTIVIRAL CANDIES (CONCANAVALIN A)



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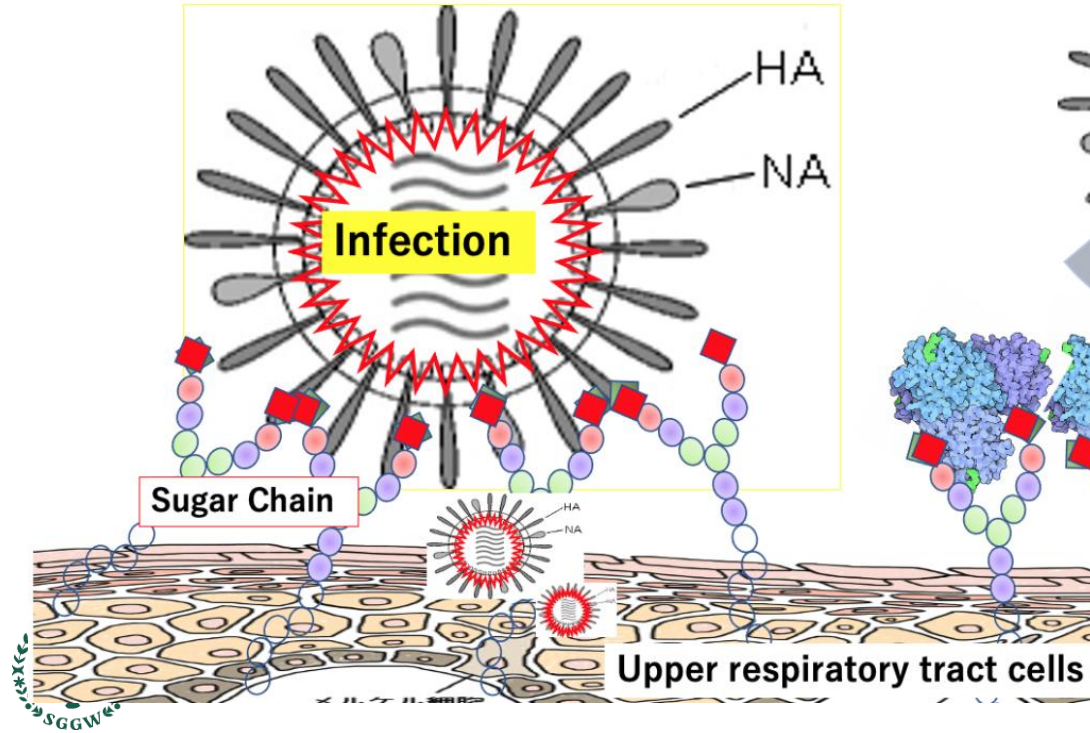
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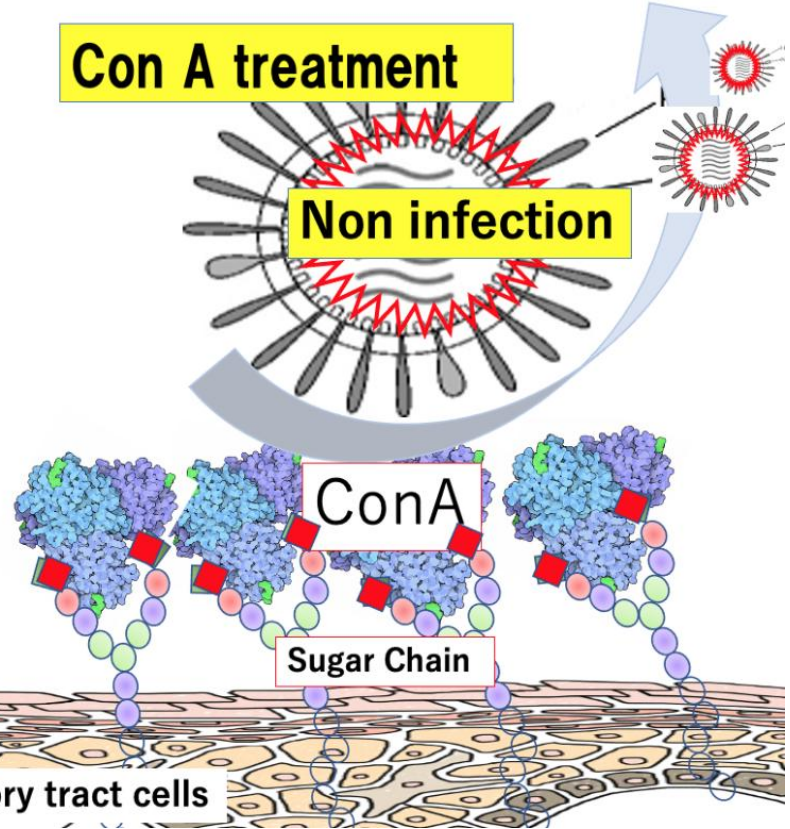
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Con A no treatment



Con A treatment

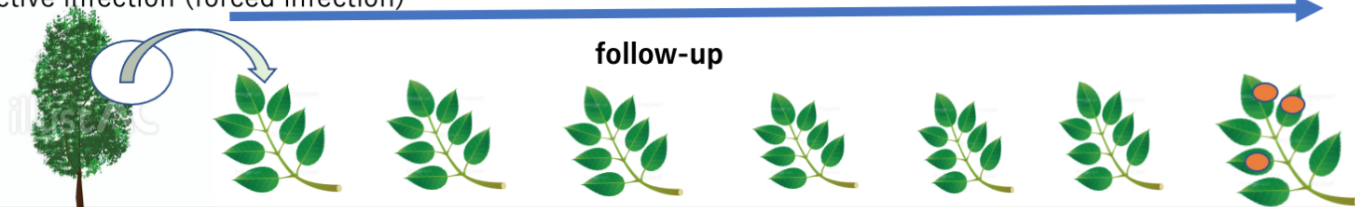




Confirmation of usefulness of chlorophyll method and rapid diagnostic method

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

Active infection (forced infection)



Visually monitoring

Negative

Negative

Negative

Negative

Negative

Negative

Positive

Chlorophyll Measurement (Stress detection ability)

1) Kalaji法

- +

+ + ++ +++ +++++

2) General commercial product

- - + ++ +++++

Rapid diagnostic measurement (ELISA)

-

-

+ + ++ +++ +++++

Available take action.



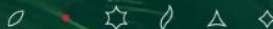
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Cooperation with **Mr. Yasunarii Sato**, Green's Green Company , Niigata



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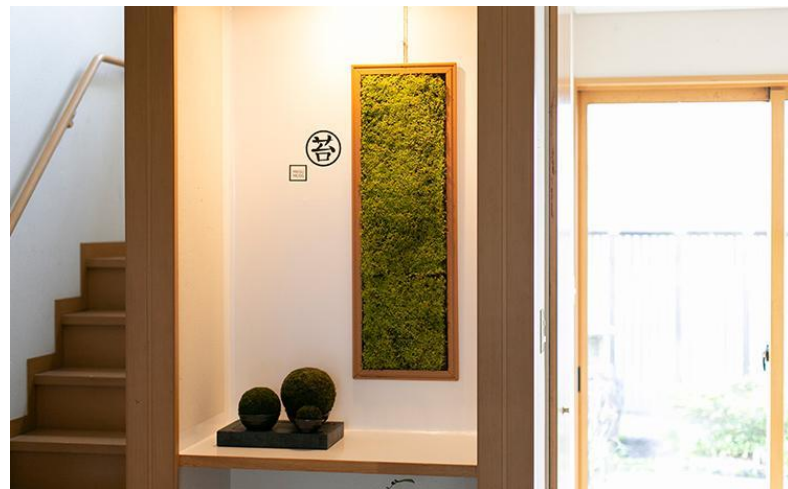




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SUNAGOKE moss mats



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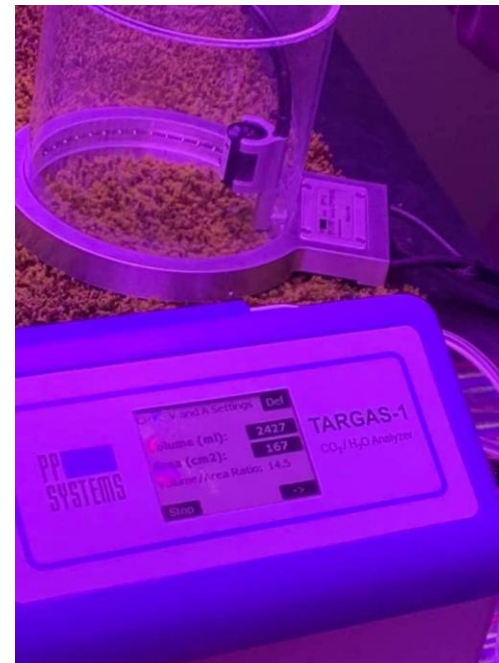


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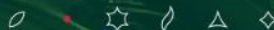
CO₂ credits

Photosynthetic potential of
Sungooke mosses to absorb CO₂



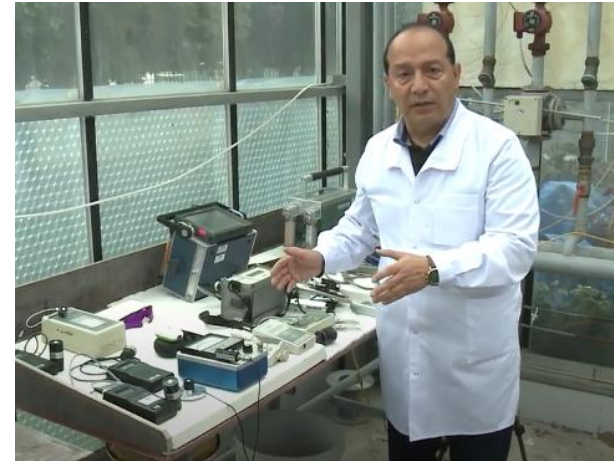
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Potential of Sunagoke for J-Credit Certification

- 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

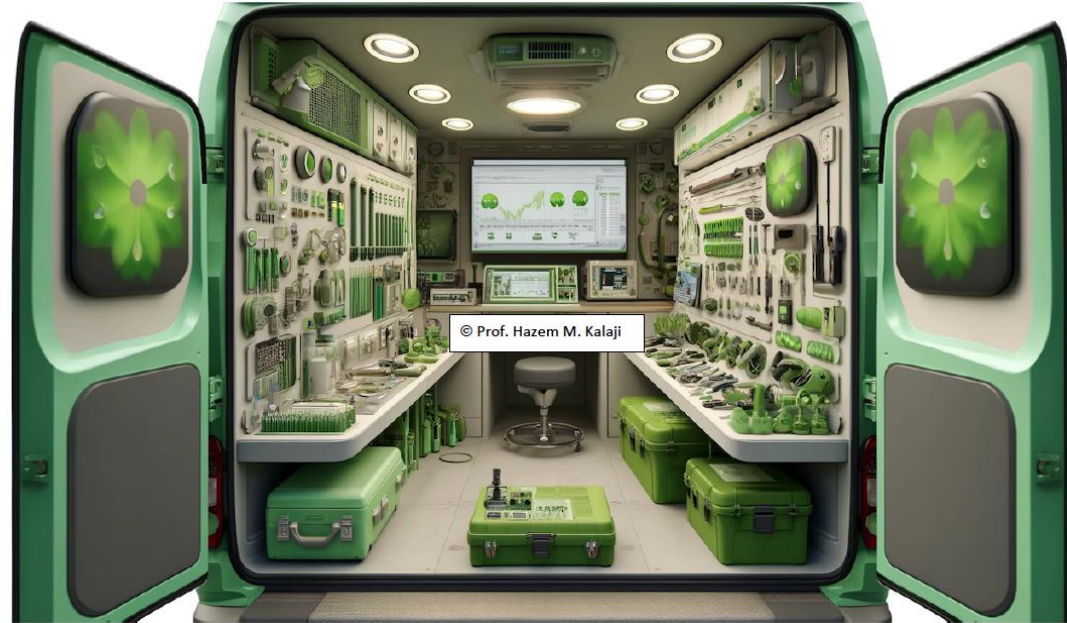


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Ecological Ambulance



Anesthetizing Plants Using Diethyl Ether and Study of Plant Reactions to Smoking



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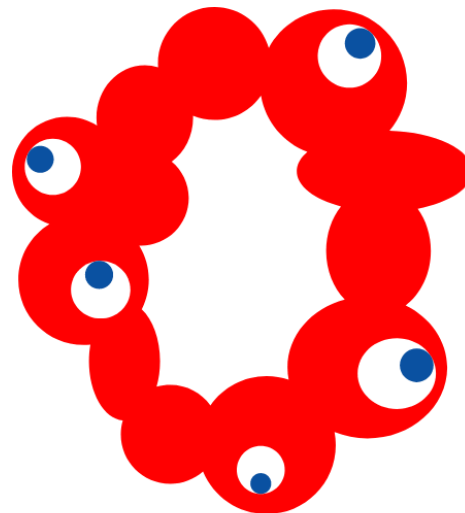




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OSAKA, KANSAI, JAPAN

EXPO
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