Water-volume measurement of plants by using itplanter

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The AeroGarden

1. Fluorescent lamp used as Grow Lights.
2. Few fixed cultivation programs are embedded.

http://www.aerogrow.com/

CLICK and GROW

http://www.clickandgrow.com/

LabBox Grower

http://pocketgrow.com/microgrow/

About the itplanter

- Indoor cultivation device at confortable space for human.

- For clarify the program kept secret in DNA of the plant.
- Conservation of energy, space-saving, and low price
  - Power 8.5W
  - Required space 900cm^2
  - Price 50,000 JP Yen

Examples

lettuce

mini tomato

mint

flowers

Pile up

Desktop Garden

Dimension

Width 290mm × Depth 290mm × Height 325mm

Water tank max. 2,000cc
Weight 2.5kg (without water)

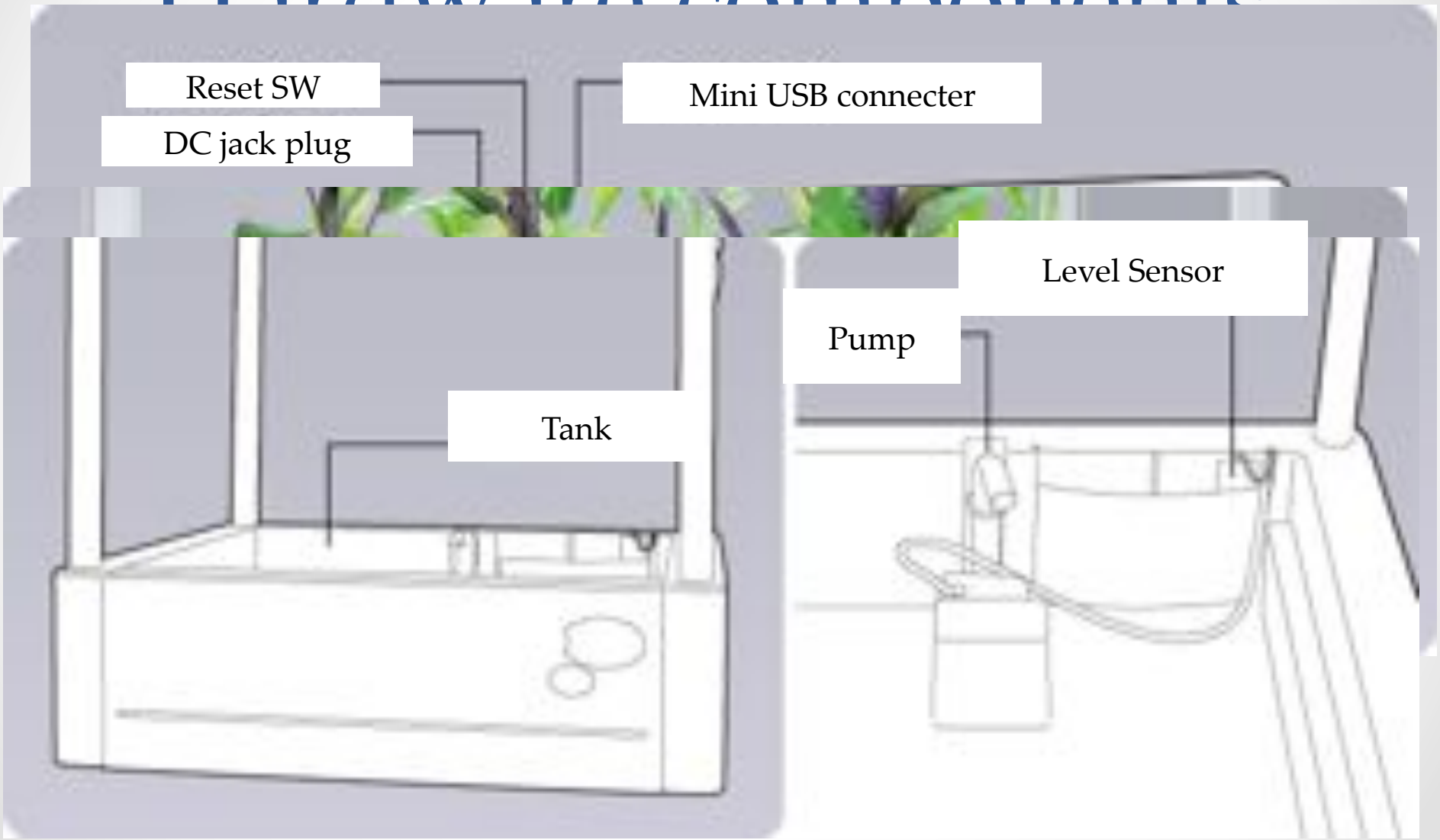
AC/DC adaptor DC12V 1A

USB B type mini connector.
Built in Real time clock.

96 canon ball type white LED, PWM control.

Cultivate 16 roots of plants.

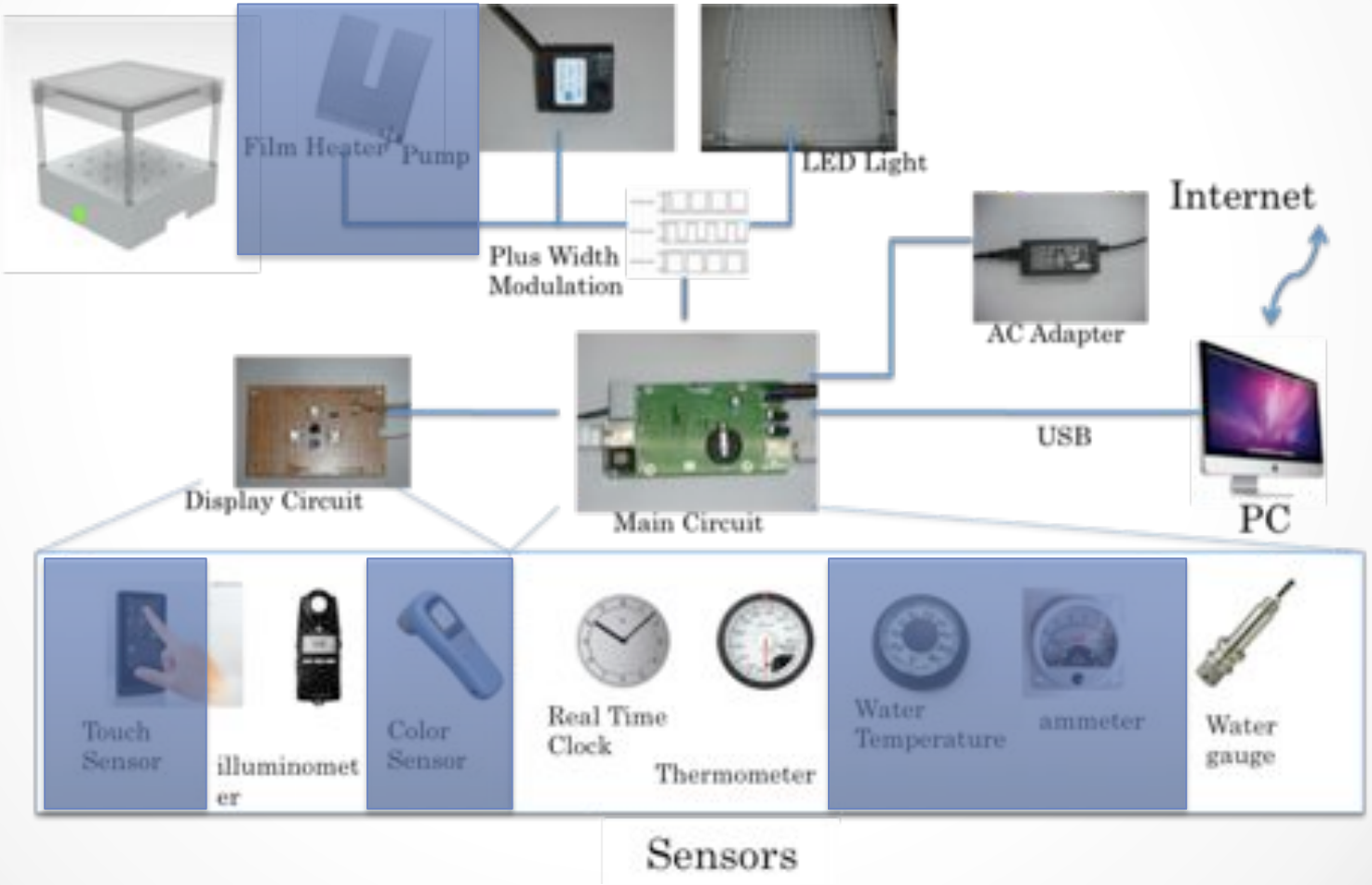
Hardware components



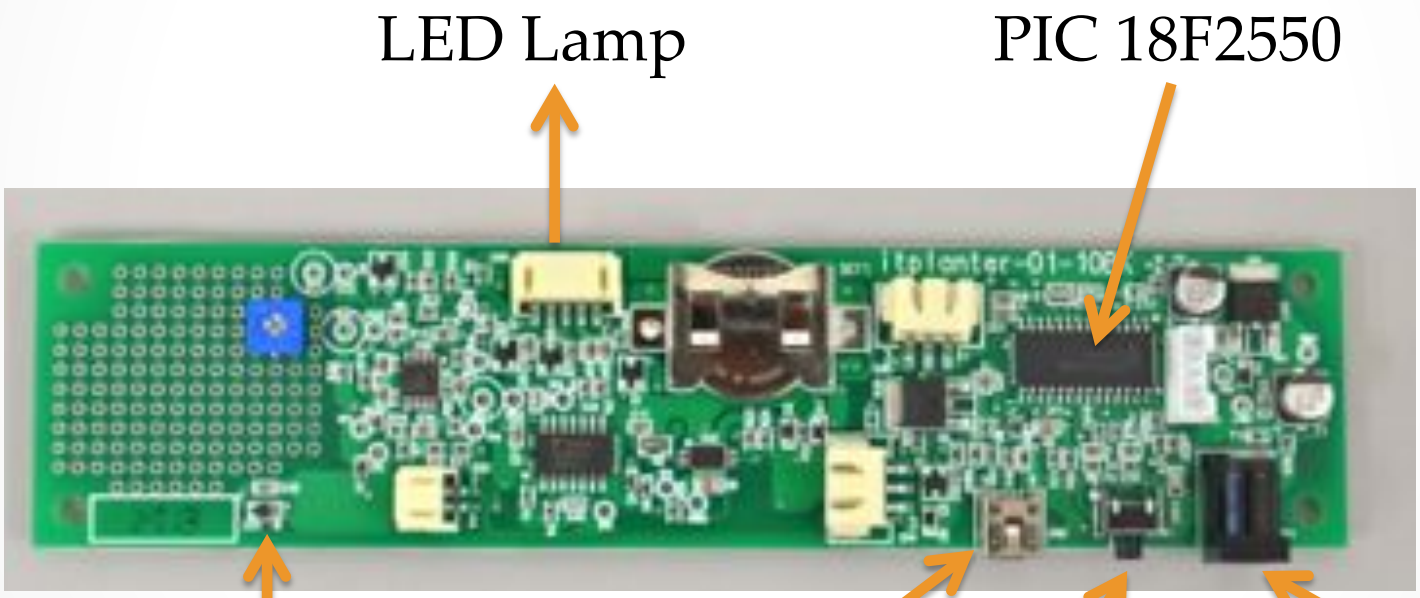
Aero-hydoroculture

- Supply water by 6 hours every day.
  - Given water return to tank quickly.
  - 2 litter water in tank will remain over two weeks. (default setting)

Components of the itplanter



Main Board



Cultivation program

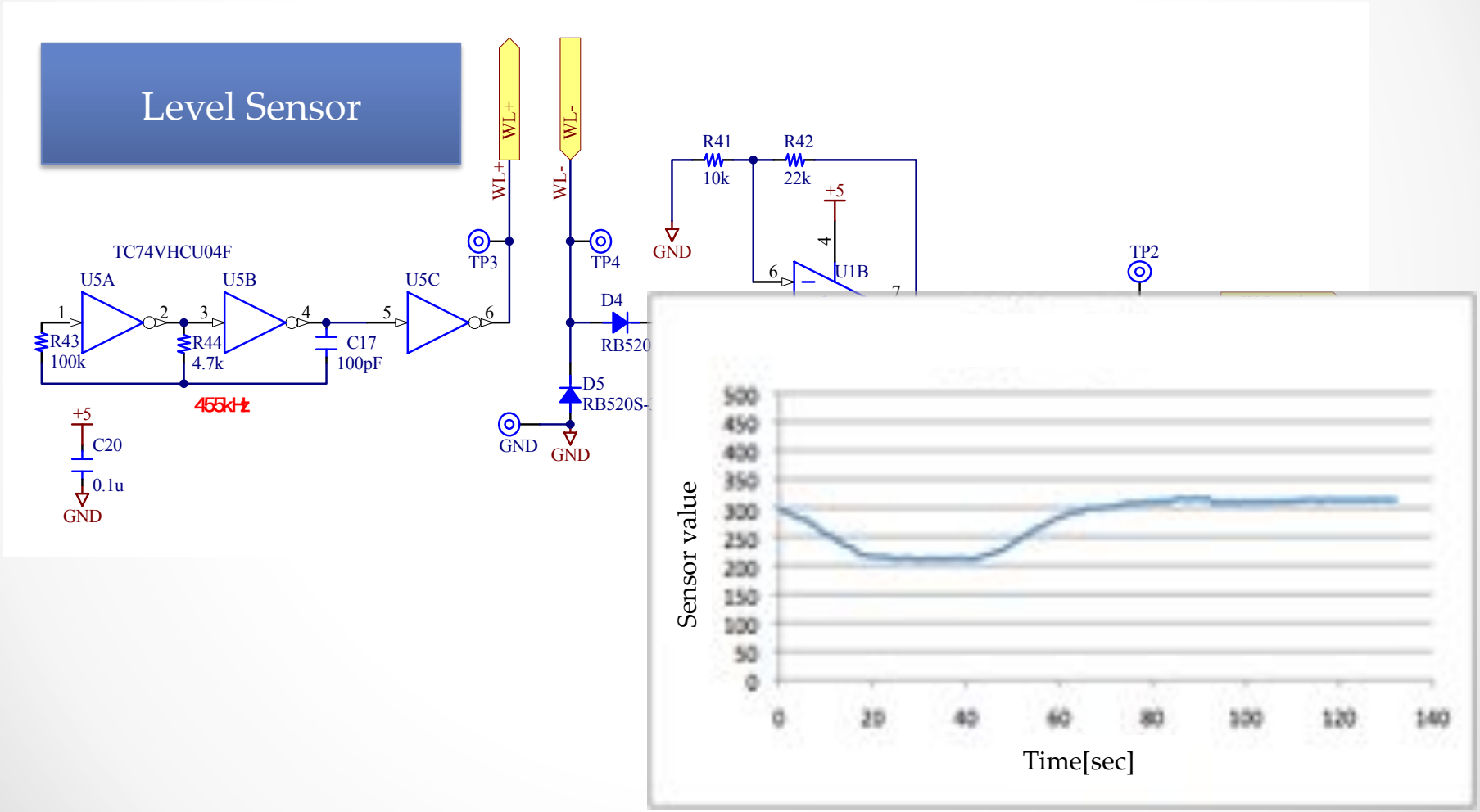
- Light time schedule
  - Maximum setting number 6
  - Set Light ON time and Light OFF time
  - Time resolution 1min
- Pump time schedule
  - Maximum setting number 12
  - Set Pump ON time max 255min
  - Time resolution 1min
- Others
  - Duty ratio, Frequency of Lamp and Warning level warnning, etc.

Command list

- ‘A’ Read Temperature
- ‘B’ Read Water level
- ‘F’ Read Photo sensor
- ‘L’ Lamp ON/OFF toggle SW
- ‘O’ Reset
- ‘P’ Pump ON
- ‘H’ Duty ratio setting
- ‘G’ Read/Set Real Time Clock

Send only command to get data from the itplanter.
Send with option data to set data to the itplanter.

Circuit diagram of water level sensor

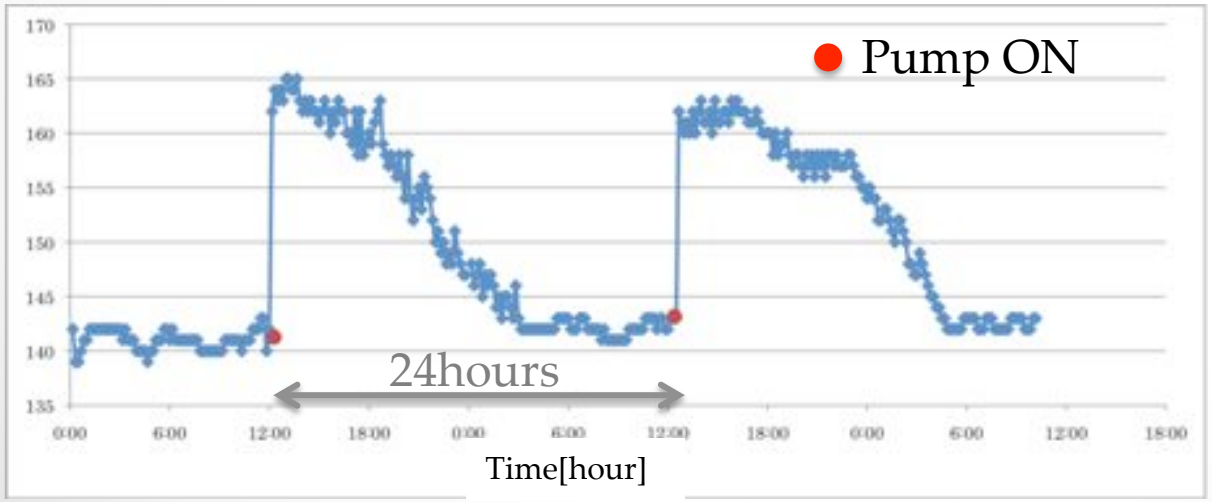


Water-volume measurement of plants by using itplanter

- Photosynthesis is performed using air, water, and light.
- Water in a plant is measured and the process of photosynthesis is presumed.
- The process of photosynthesis is observed and realizes most efficient cultivation by the minimum light input.

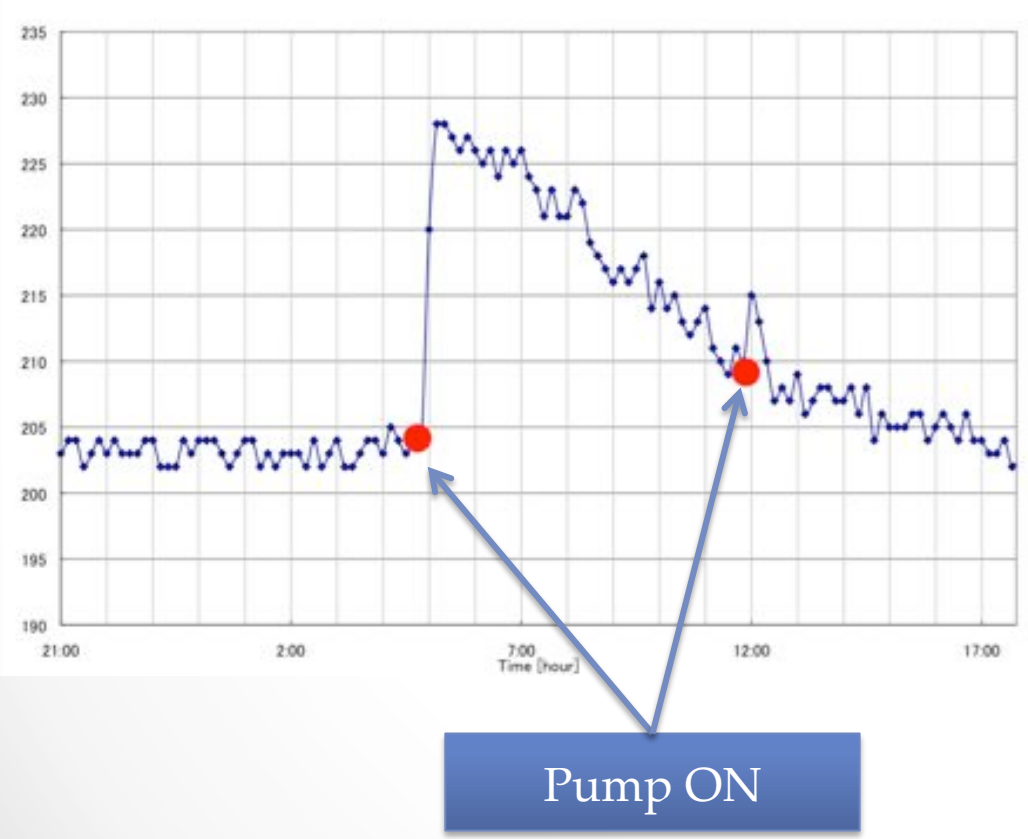
water-volume changes in a plant

- Disposal electrode set on a plant, and measurement result of water-volume changes in a plant .



24hours cycle can be found.

Measurement result of added water supply



Only in increasing of the volume of water at the moment even if water was supplied on the way, dramatic changes were not seen.

Duty Ratio Effect

Fig.2:Hayadori Komatsuna Cultivation (100% 75% 50% 25% from the left compared with duty)

Fig.3:Basil Cultivation (100% 75% 50% 25% from the left compared with duty)

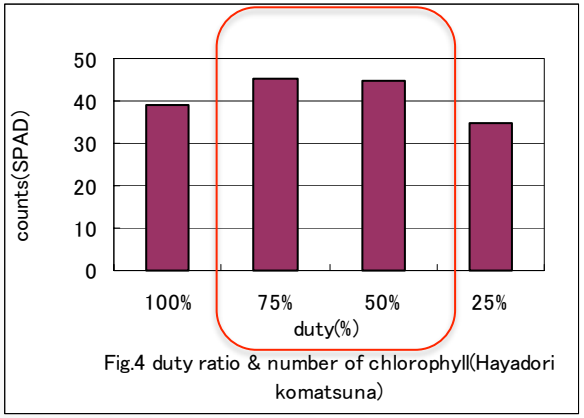


Fig.4 duty ratio & number of chlorophyll(Hayadori komatsuna)

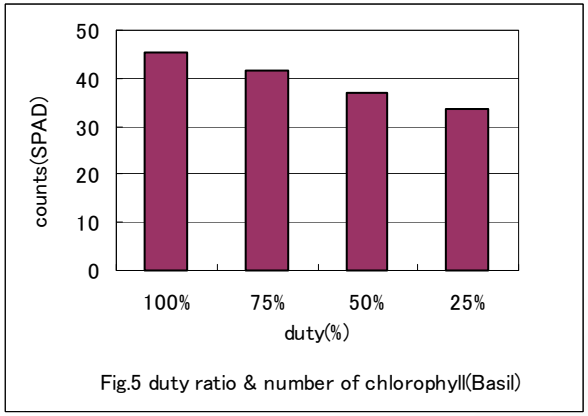
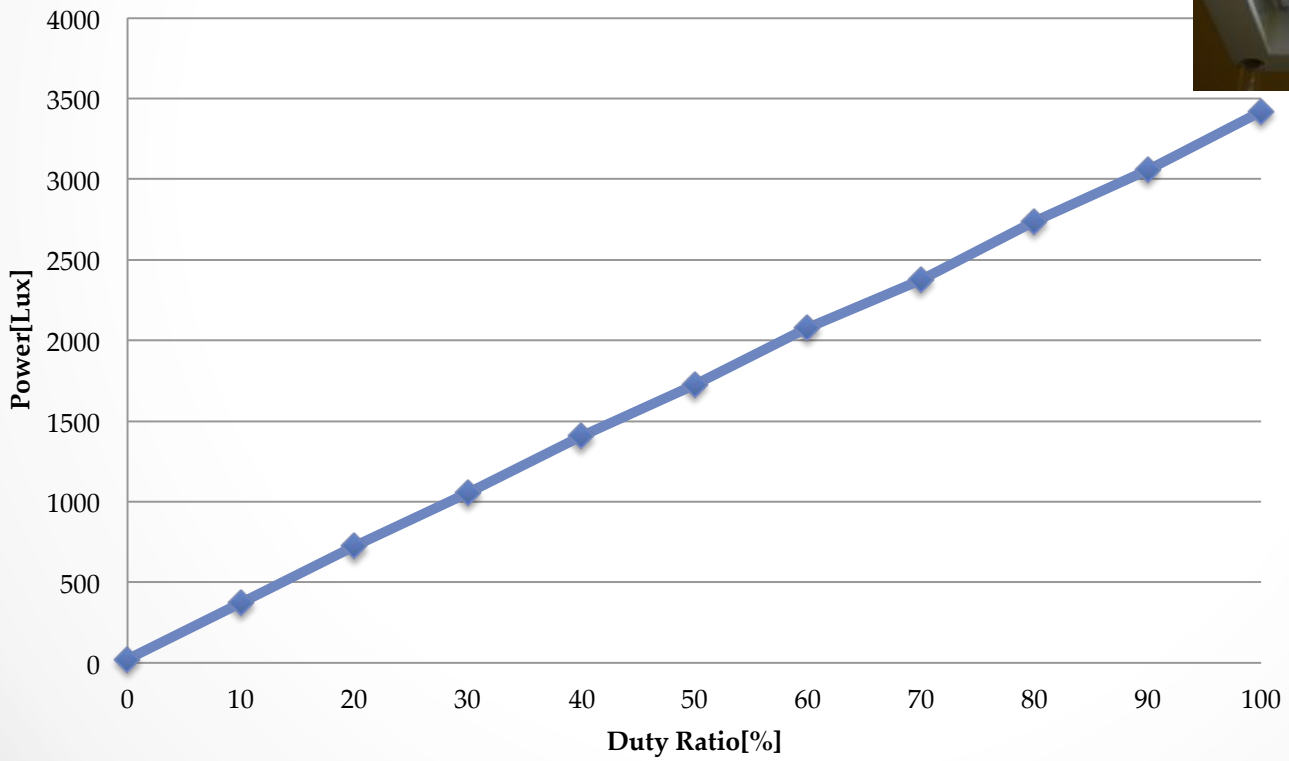


Fig.5 duty ratio & number of chlorophyll(Basil)

Kyoto Hajime1 Koresawa Seiji Noguchi Kazuo," Plant information and optical evaluation with LED pulsed light ", LRSJ,27thLSS,PD-25,2009.

Duty ratio and Light Power



Duty Ratio Effect

Start 25nd,Jully

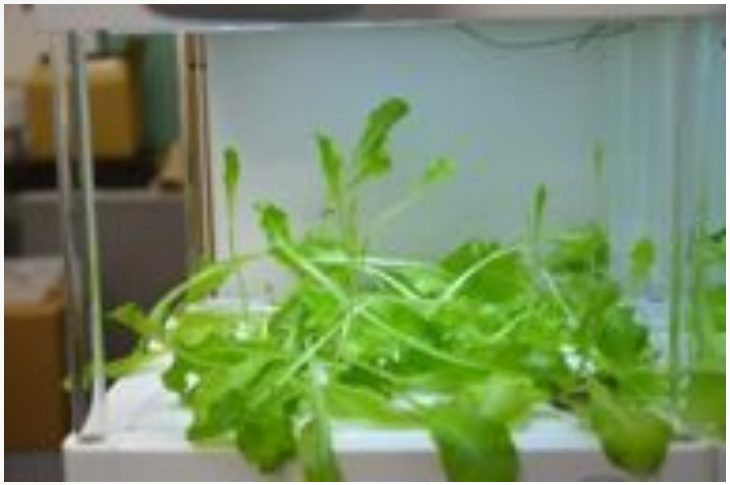
7th,Aug

11th,Aug

Start from 25nd,Jully, finish at 18th,Aug.

Results

18th,Aug



Duty Ratio 20%

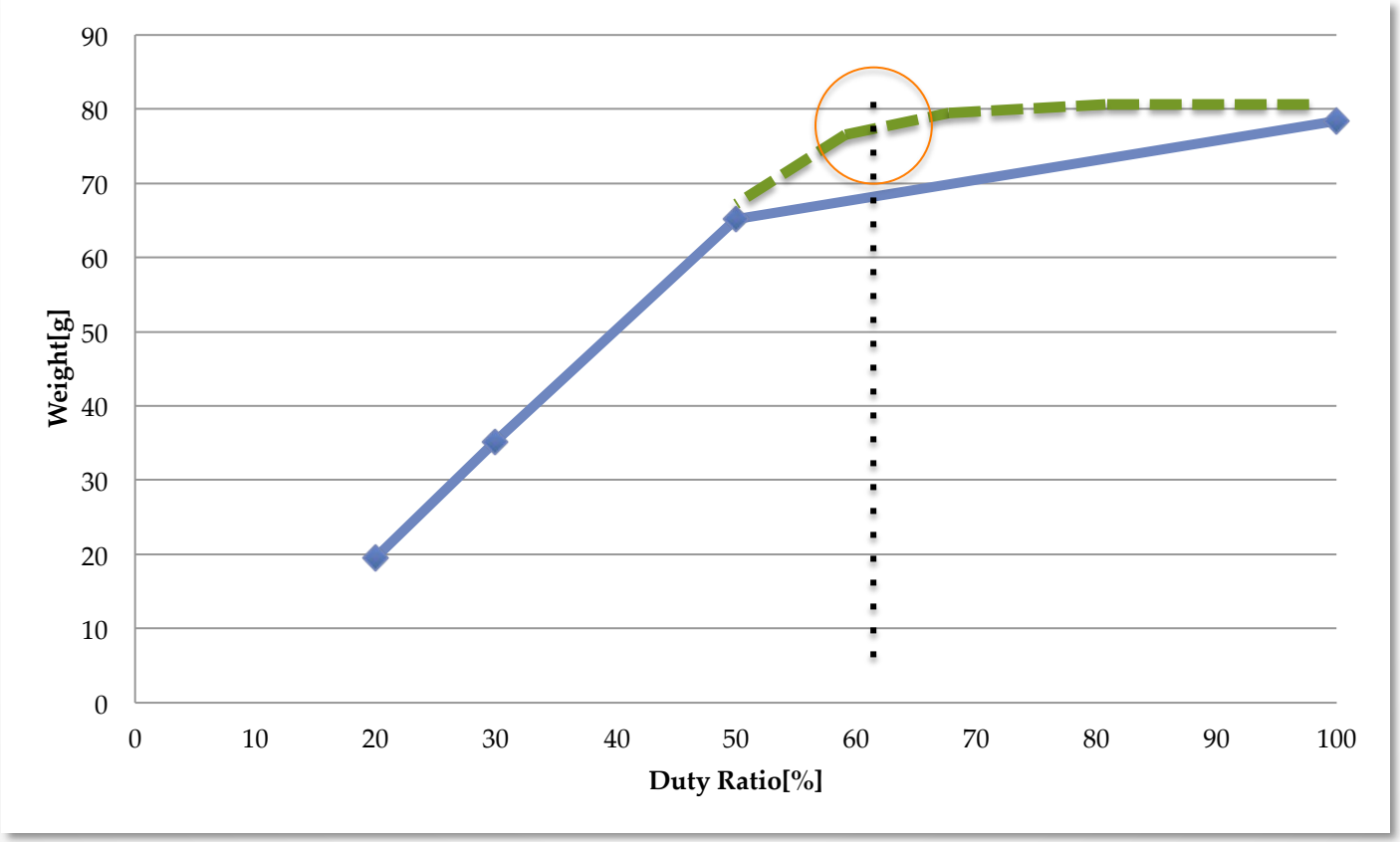
Duty Ratio 30%

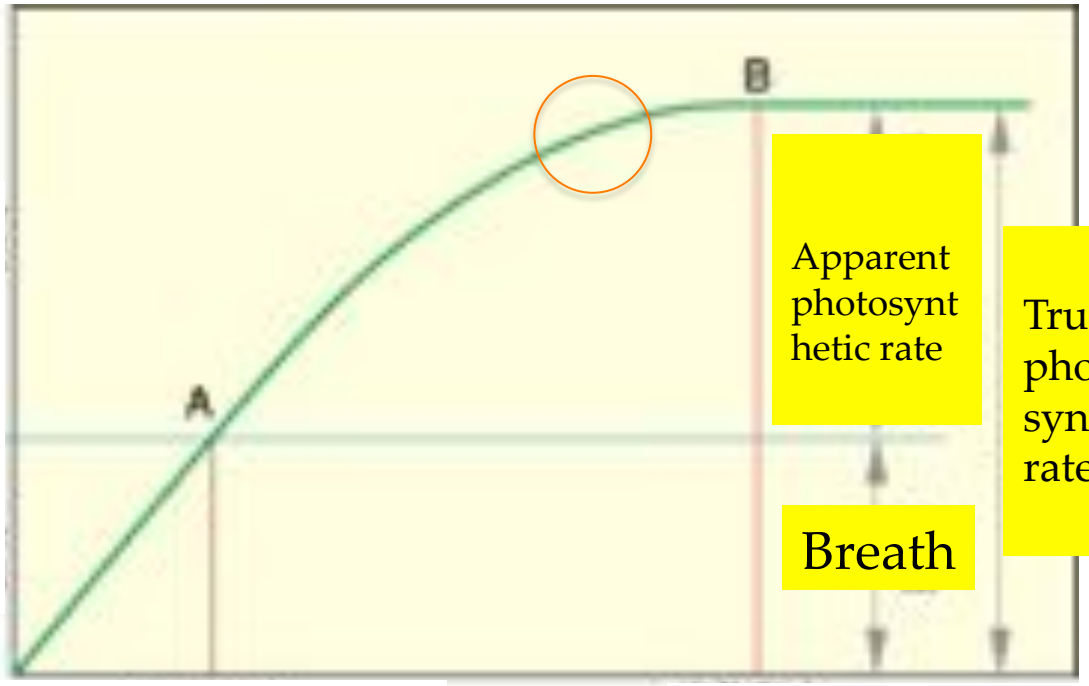
Duty Ratio 50%

Duty Ratio 100%

Flesh weight comparison

- Flesh weight graph





Photosynthetic rate

Light compensation point

Light saturation point

Light Power

Conclusion

1. Water-volume measurement result
   - Plant absorb water at once.

2. Duty Ratio of LED lamp
   - Although duty ratio 100% produce most flesh weight, flesh weight is not proportion to the duty ration.

Future work

- More experiments should be done.
- Research best cultivation program of each kind of plants.

www.itplants.com

itplanter is a product of itplants ltd.

Thank you for your kind attention.

References web.me.com/sakaguti3