-Dr. Doroemon Project-.
Educational Program
Using Agricultural Sensor Data
For Elementary School pupils

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Who is he ?

0. Doroemon Project

“Dora”emon and “Doro”emon

“Doro” means soil in Japanese

0. Outreach by soil scientist

- Outreach program from 2010
- Lecture about “wonder of soil”

Dr. Doroemon

TA Doromi

1. Background

1.1 General agricultural education in Japan

- Basic knowledge in Science and Social studies subject
- 79% of primary schools have “agricultural practice” time in Integrated studies subject [1]

[1] "Survey results regarding agricultural experience learning“ RYEDA (2009)

1.2 Agricultural practice lost objective

- Integrated studies objective
  - to learn and think on their own, to make proactive decisions, and to solve problems better

1.3 Thai pupils and a zest for life

- Seedling to harvest
- Sell crops and get money
- Get agricultural skill and economical sense

Grow a zest for life through agricultural practice

1.4 Japanese pupils and a zest for life

- A zest for life
  - to learn and think on their own, to make proactive decisions and to solve problems better

Necessary to extend these abilities through agricultural practice

2. Overview

2. Overview of Research

- Suggest scientific discussion through growing crops for primary pupils

Practice + Problem-solving learning

Objective

To extend the abilities
to think, make decision and express

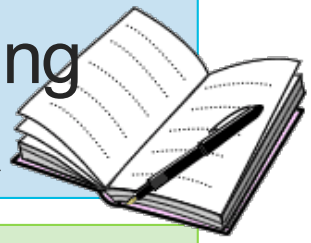
3. Methodology

3 Detail of the educational program

Practice + **Problem-solving learning**

Growing rice

Discussion using sensor data



- Growing rice by conventional and SRI method
- Pot rice

- Sensing 5 kinds of data
- Work on the graphs of soil moisture and temperature
- Worksheet
- Discussion

3.0 Practice and problem-solving learning

- Mission for pupils
  - Grow rice in SRI method and finding factor that SRI method succeed

SRI method

- New rice farming method
- It is said it can increase paddy yields usually by 20-50% and sometimes 100% or more

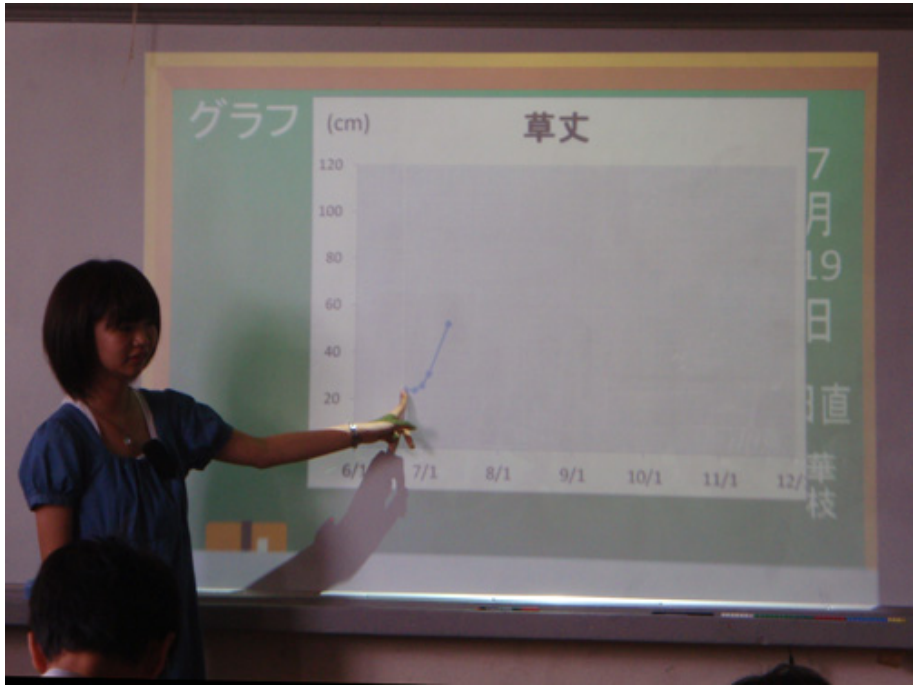
- Contribute to solve the food problem of the Earth

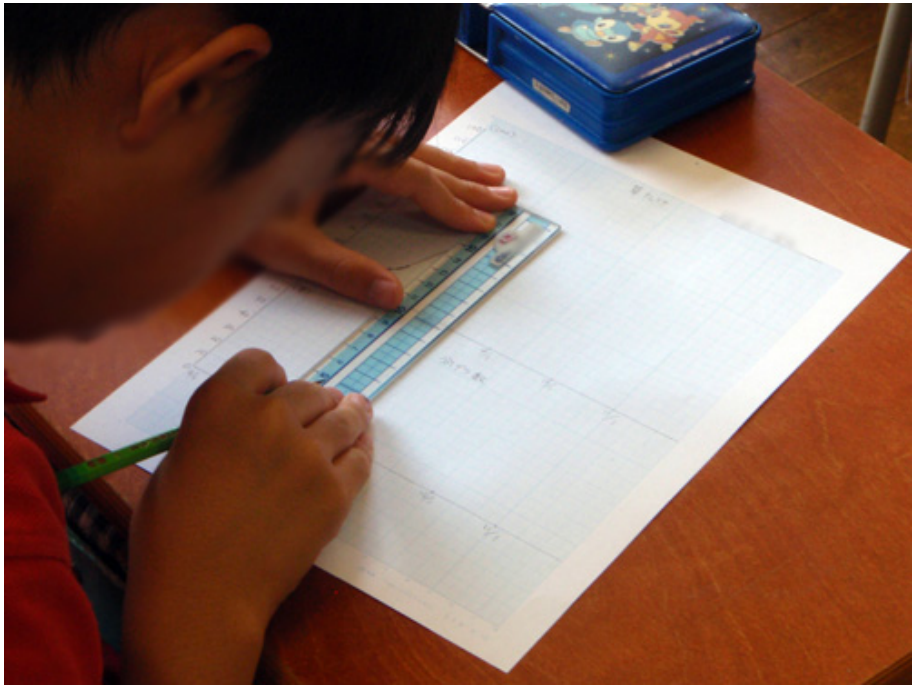
Jun. 2012 Jul. Aug. Sep. Oct. Dec. Nov.

Transplanting seedlings and guidance

Jun. 2012 Jul. Aug. Sep. Oct. Dec. Nov.

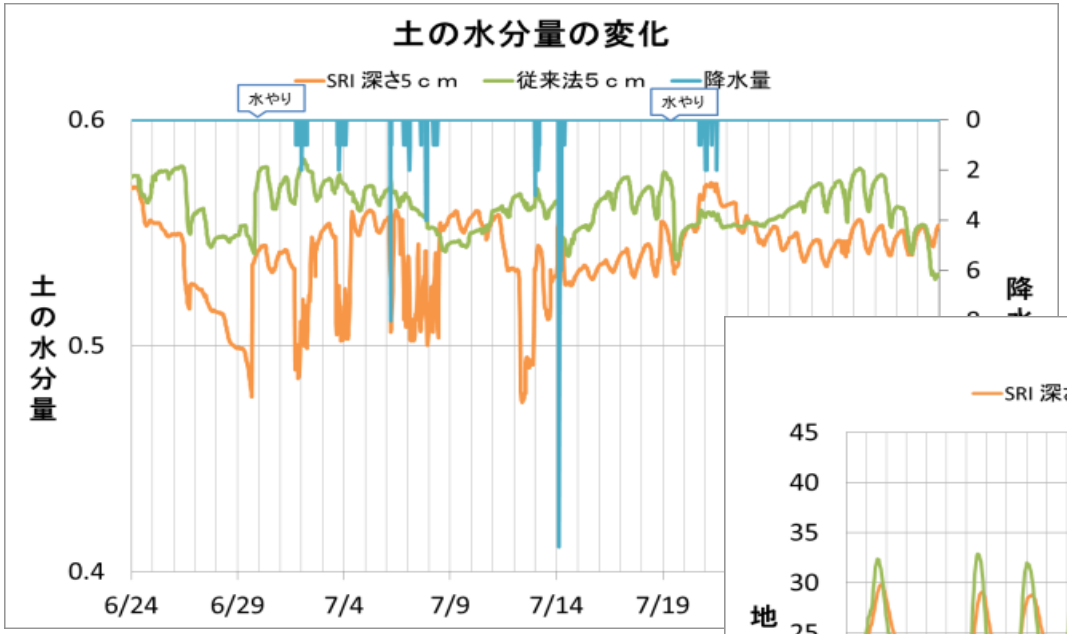
Class 1. How to record height and tiller of rice

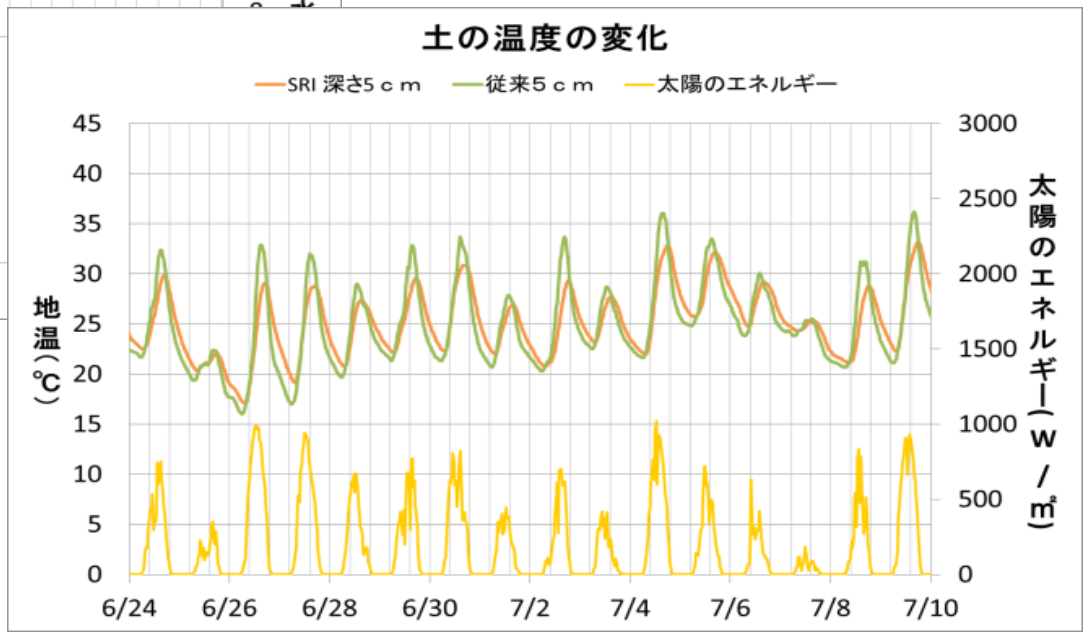




The observation record using iPad app and diary

Data logging of sensors





Jun. 2012 Jul. Aug. Sep. Oct. Dec. Nov.

Class 2. Playing game using soil and soil moisture senso

Jun. 2012 Jul. Aug. Sep. Oct. Dec. Nov.

Class 3. Individual work on sensor data graphs

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①収穫データ表

②土の水分量の変化

③地温の変化

工夫のヒント

①収穫データ表

・○○は○○より○○○である。　・○○をくらべると、○○は○○○である。

②土の水分量の変化

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③地温の変化

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Jun. 2012 Jul. Aug. Sep. Oct. Dec. Nov.

Class 4. Discussion based on the individual work

3.1 Growing rice method

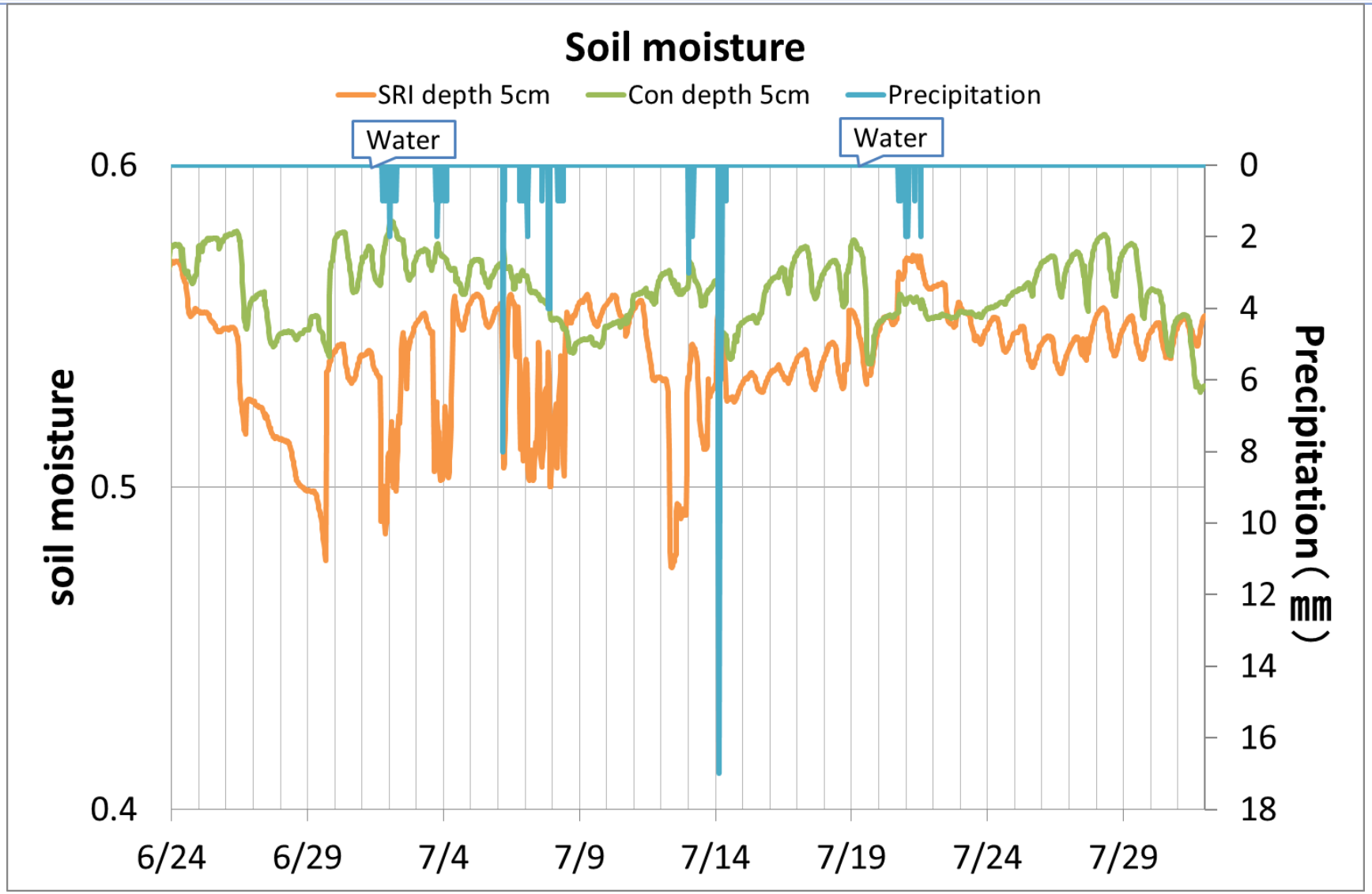
Conventional	SRI
Transplanting seedling 30 days old	Transplanting seedling 10 days old
Flooded Keep the depth of water about 5cm	Intermittent irrigation wet-dry cycle of soil moisture

3.2 Sensing method

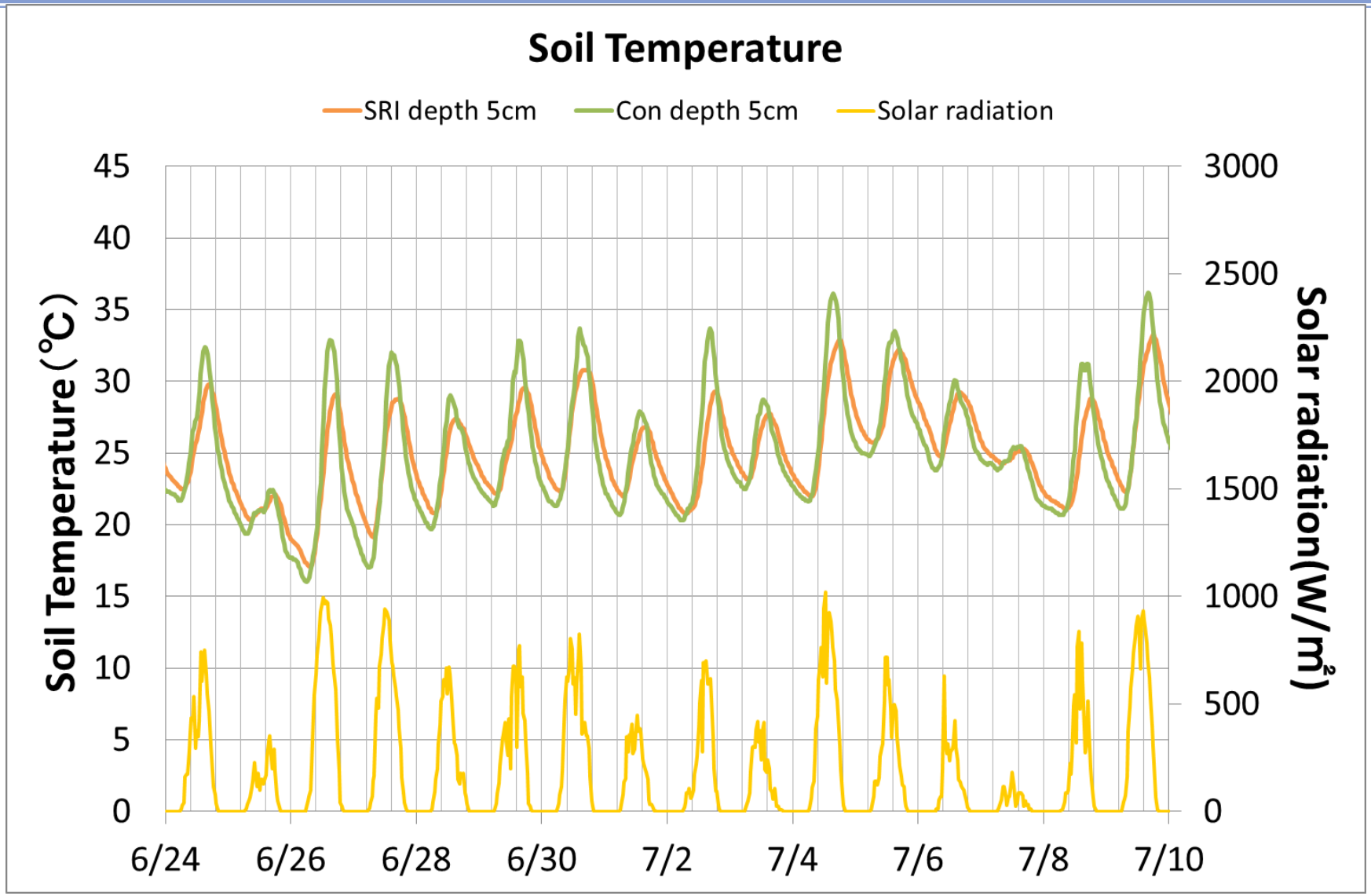
- **Sensors and data logger (Decagon Inc.)**

Temperature	ECT
Precipitation	ECRN-50
Solar radiation	PYR
Soil moisture	5TE
Soil temperature	5TE

3.3 Graphs for work 1:Soil moisture



3.3 Graphs for work 2: Soil Temperature



3.4 Worksheet

- Pupils write what they found about the graphs
- Open-ended style

- Tips
  - Compare two things
  - Focus on specific date or duration
  - Find rule in the graph

気づいたこと　　(　)年(　)組 (　　)

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3.5 Evaluation method

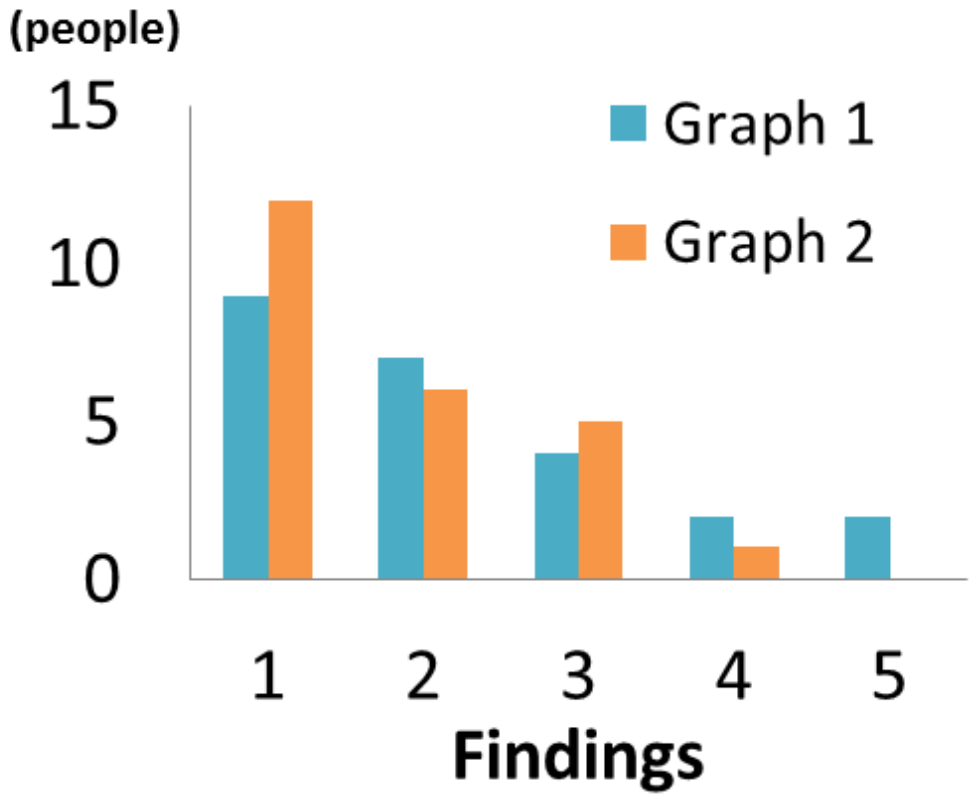
- Quantitative evaluation
  - How many findings the pupils got from the graphs.
- Qualitative evaluation

Compare	He/she can compare multiple elements
Correlate	He/she can correlate multiple elements
Objective	He/she can express findings in objective
Cause and effect	He/she can find cause and effect

4. Result and Discussion

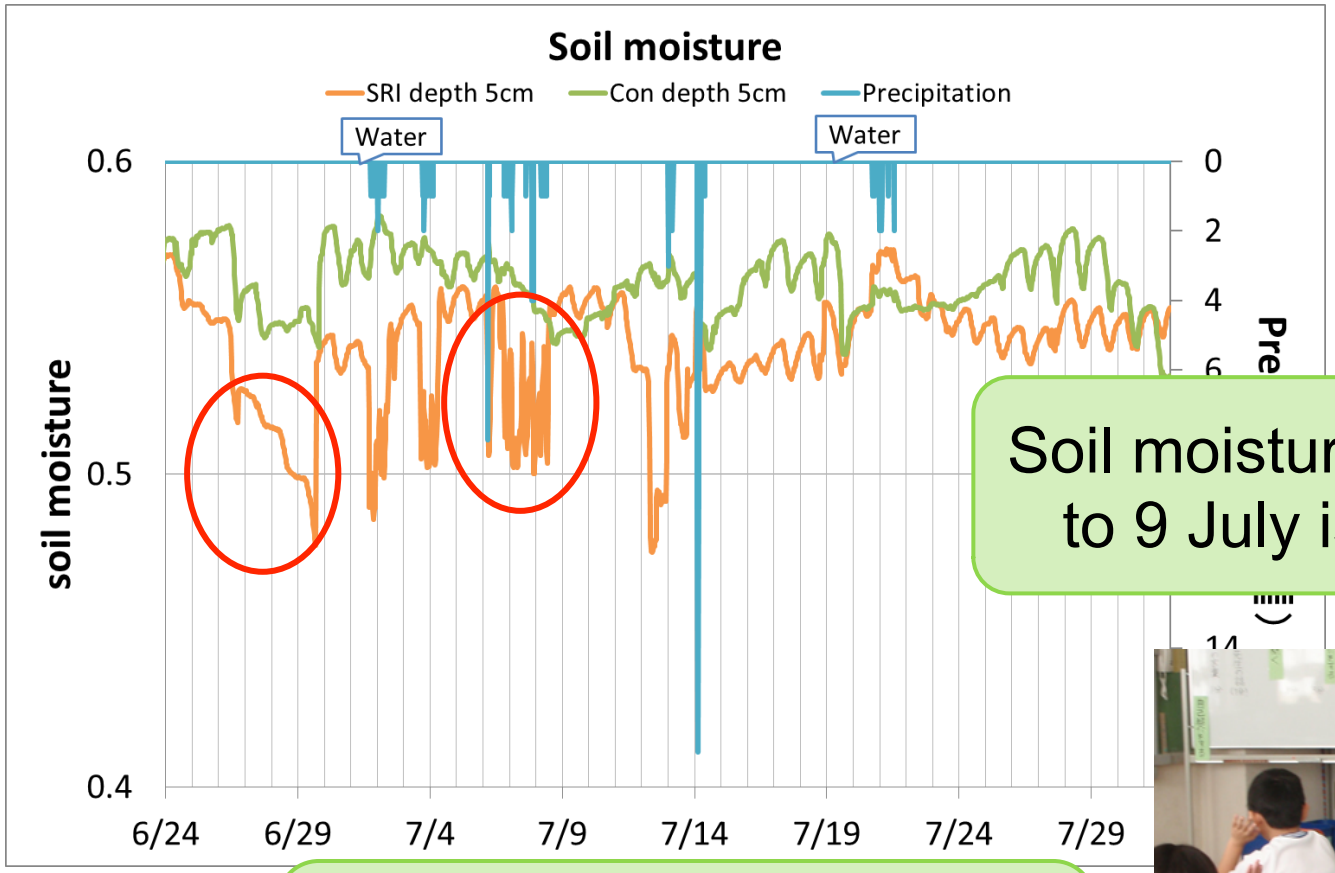
4.1 Result of quantitative evaluation

- Number of findings and number of pupils



- More than half of pupils could find more than two things
- It is suggested that pupils could get the opportunity to think flexibly on their own way

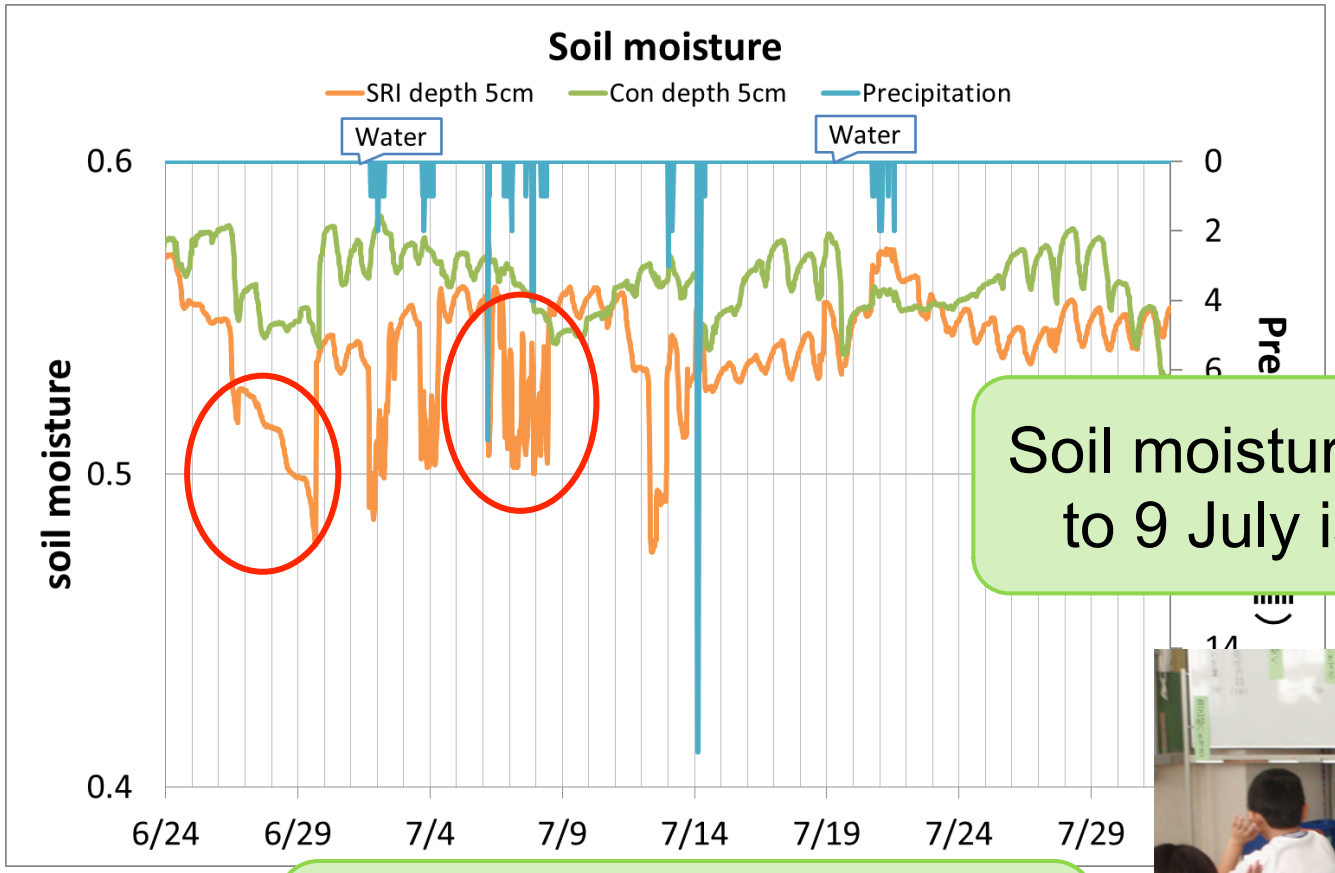
4.2 Result of qualitative evaluation



Soil moisture of SRI during 7 to 9 July is up and down.

It is the wavy line because water has decreased once a day.

4.2 Result of qualitative evaluation



Objective

Soil moisture of SRI during 7 to 9 July is up and down.

Cause and eff

It is the wavy line because water has decreased once a day.

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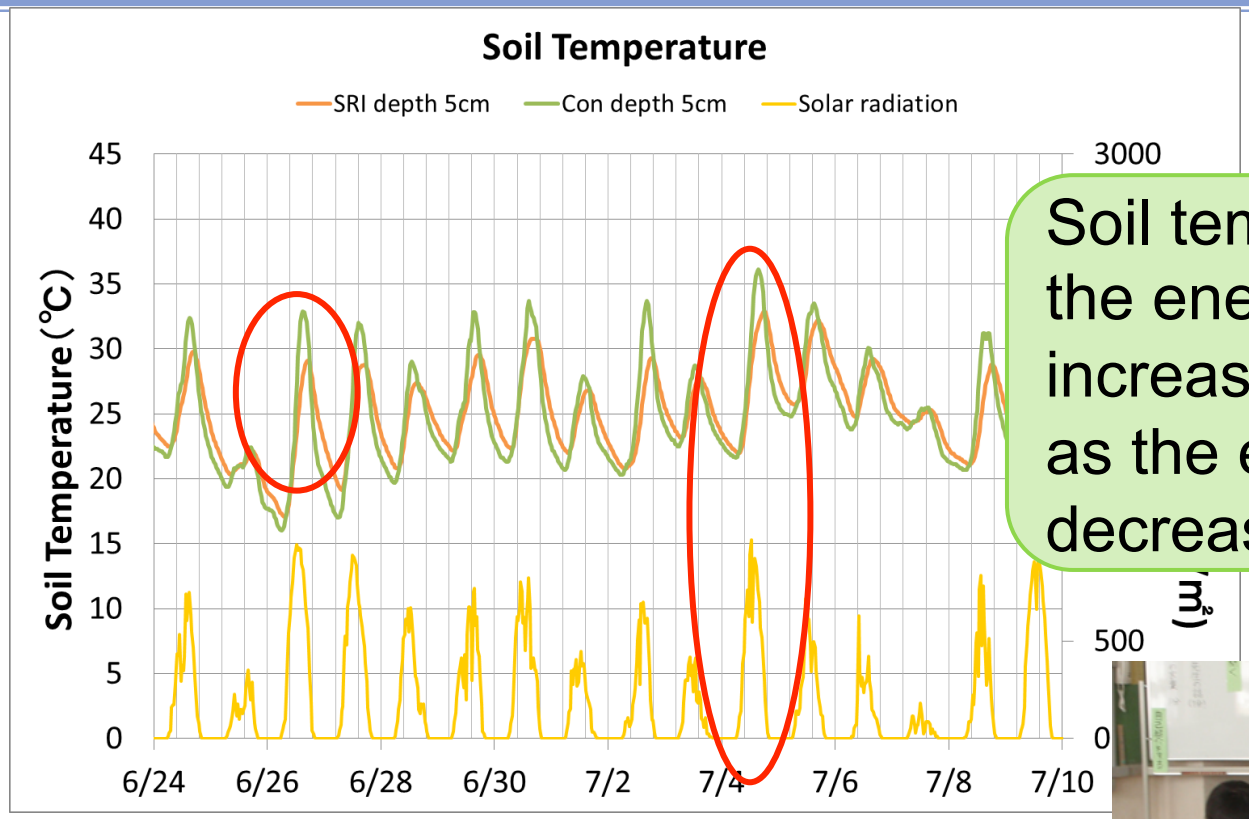
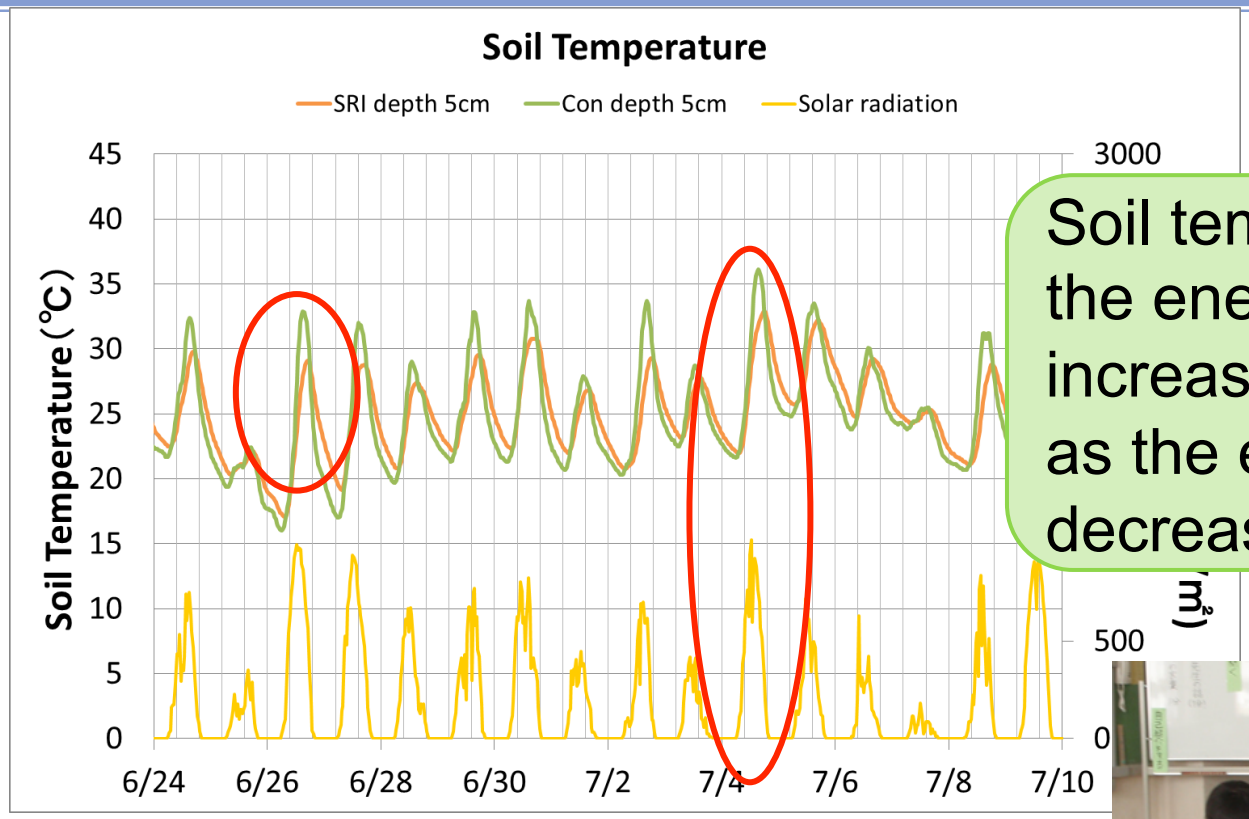


Soil temperature rises as the energy of the sun increases and it lowers as the energy of the sun decreases.

The range of temperature of conventional method is wider.

4.2 Result of qualitative evaluation



Correlate

Soil temperature rises as the energy of the sun increases and it lowers as the energy of the sun decreases.

Compare

The range of temperature of conventional method is wider.

4.2 Result of qualitative evaluation

- Number of findings that were classified from each point of view

Point	Graph 1	Graph 2
Compare	24	17
Correlate	6	7
Objective	18	3
Cause and effect	1	2
Sum	39	43

- pupils got the opportunities to compare, correlate, express in objective and find cause and effect in this activity

Conclusions

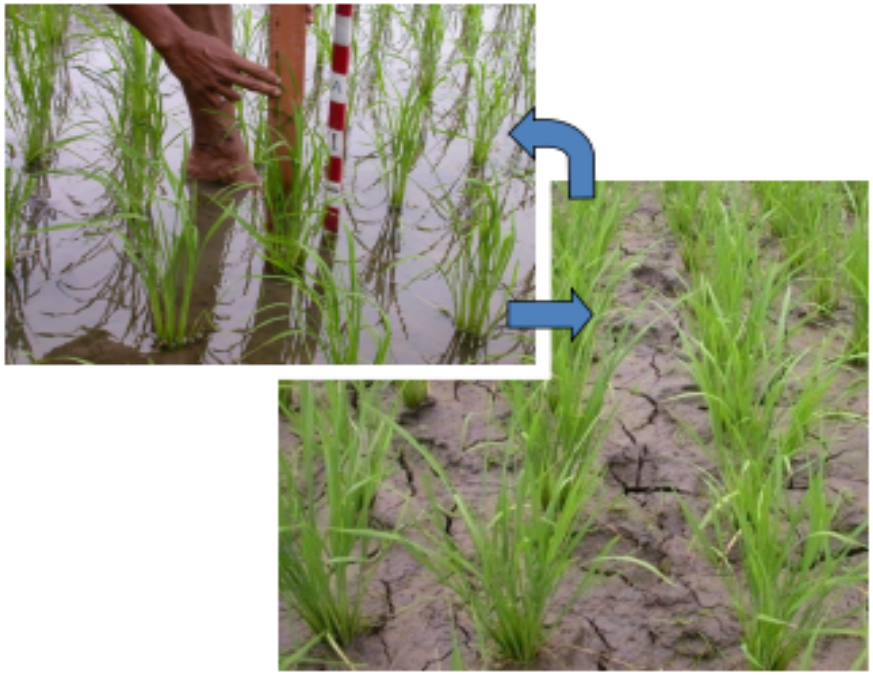
- We suggest educational program mixed agricultural practice and problem-solving learning
- It could give opportunities for pupils to think on their own through agricultural practice
- Integrated practice is the key point of agricultural practice

Thank you

Edogawa elementary school
Koyo Media
Agro-infomatics Lab.

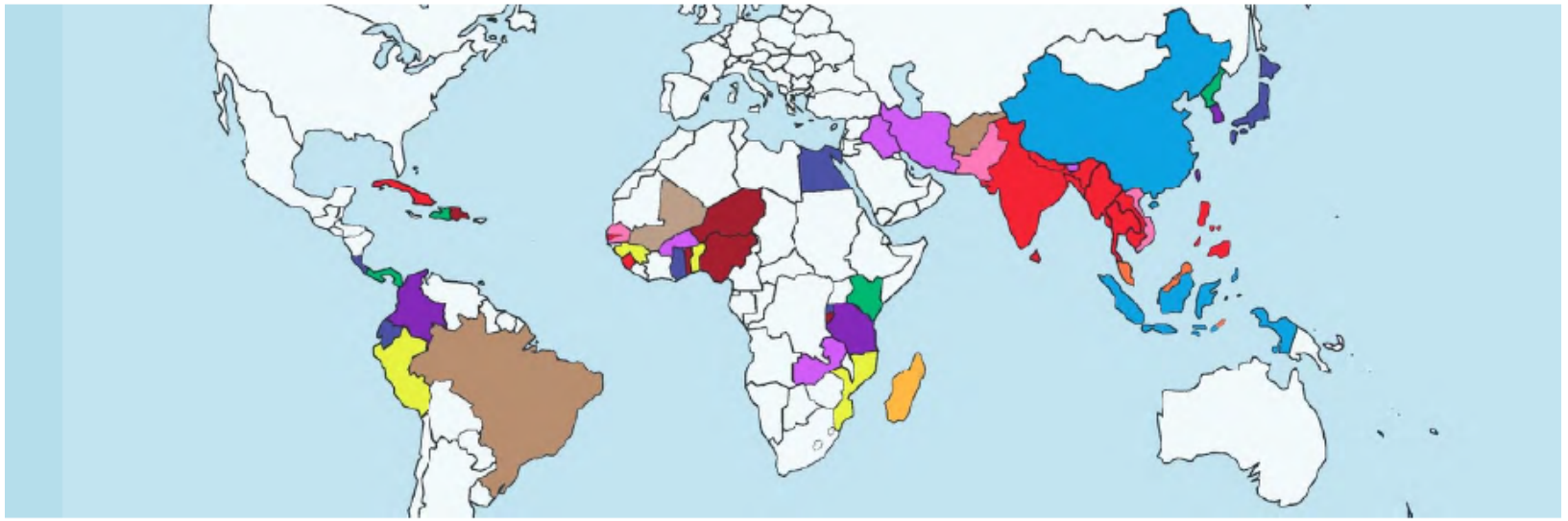
SRI method

- Transplant
  - Young seedlings (8-12 days old)
  - Transplant single seedling at a hill in very shallow (1-2 cm)
  - Transplant at wider spacing at least 25 x 25 cm distances
- Less use of chemicals (fertilizer, pesticide, insecticide, herbicide).
- Less water use by applying wet-dry cycle of soil moisture.



SRI method

2012: SRI benefits have now been seen in >50 countries of Asia, Africa, and Latin America



Before 1999: Madagascar
1999: China, Indonesia
2000-01: Bangladesh, Cuba, Laos, Cambodia, Gambia, India, Nepal, Myanmar, Philippines, Sierra Leone, Sri Lanka, Thailand
2002-03: Benin, Guinea, Moz., Peru
2004-05: Senegal, Pakistan, Vietnam
2006: Burkina Faso, Bhutan, Iran, Iraq, Zambia
2007: Afghanistan, Brazil, Mali
2008: Rwanda, Costa Rica, Ecuador, Egypt, Ghana, Japan
2009: Malaysia, Timor Leste
2010: Kenya, DPRK, Panama, Haiti
2011: Colombia, Korea, Taiwan, Tanzania
2012: Burundi, Dominican Republic, Niger, Nigeria, Togo