

Developing an early warning system to mitigate temperature stress on rice production



Japan Meteorological Agency (JMA) & National Agriculture and Food Research Organization / Tohoku Agricultural Research Center (NARO/TARC)

Introduction

Conduct a pilot project to find **best practices for climate risk management**, which targets agriculture. (<- Recommendation 1)

Developing Phase



1. Climatological factor

Tohoku region is frequently affected in summer by cold north-easterly winds (Yamase winds) or by high temperature, which have a great impact on rice crops.

2. Effective countermeasure

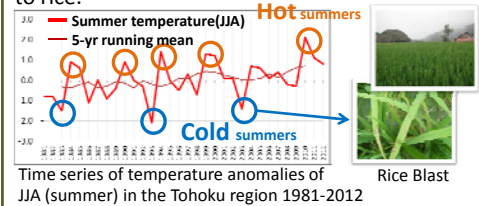
Controlling water temperatures in rice fields by adjusting water levels is an effective countermeasure to combat the adverse effects of extreme temperatures on rice crops.

3. Useful climate prediction

Climate prediction information is considered useful for water temperature control, as farmers require one to two weeks to prepare for the water level adjustment countermeasure.

Background

- Rice is an essential crop in Japan.
- Tohoku region produces it in large amount (28% of Japan's rice harvest) with high quality.
- Cold/hot summer conditions cause damages to rice.



Dialogue and Sharing knowledge

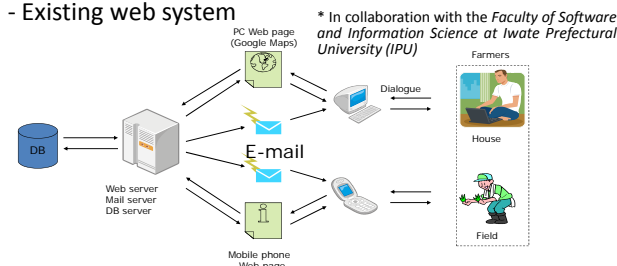
NARO/TARC has not only **agricultural knowledge** but also **a web system to provide agricultural information** based on temperature prediction up to one week.

- Alarming temperature and risk on rice crop

Period	Alarming T7d	Risk
From the middle of July to the beginning of August	20°C or below	Sterility
August	27°C or above	Poor grain filling

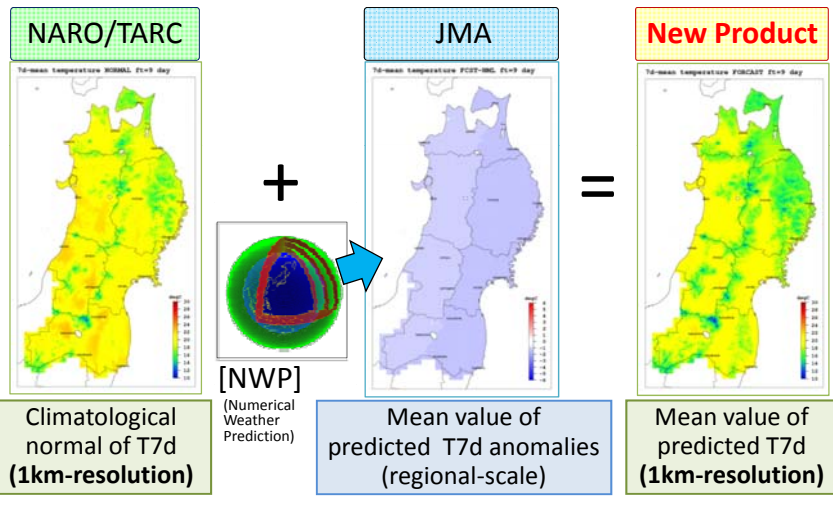
(T7d: seven-day mean temperature)

- Existing web system



Joint Development

Making seven-day mean temperature (T7d) prediction at a **1-km resolution** up to **two weeks ahead** and verifying its skill with hindcast (re-forecast) data



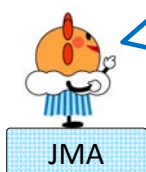
Dialogue

- Climate prediction information for **one to two weeks ahead** is considered useful for farmers to prepare for the countermeasure.
- Farmers need customized and **high-resolution** data.

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- Temperature prediction skill covering **the period up to two weeks ahead** has been improved.
- **High-resolution** data could be developed from Numerical Weather Prediction (NWP) data by using statistical downscaling method.



Tailoring and experimental provision of information

New products are made available the existing website by NARO/TARC*.

- Users can view **customized information** for their registered points.
- When the predicted probability of T7d reaching the alarming temperature is high at a registered point, **an alert is automatically sent to users.**



Issued on 14 August, 2011
Growth stage of rice:
The beginning of grain filling

<Management information of cultivation >
Caution for the high-temperature-related rice crop damage.
Period : From 15 to 21 August
Predicted 7-day mean temperature :28°C
(Criteria temperature is 26°C or more)
(Experimental provision)
High temperature condition is also predicted from 22 to 28 August.
Be careful of following information.

[Experimental provision]
<Predicted probability of high temperature up to two weeks ahead>
Attention for the high-temperature-related rice crop damage .
Period : Around from 22 to 28 August
Predicted probability of 7-day temperature at 27°C or above: 32%.
Probability of climatological occurrence: 8%.
Be careful of following information

E-mail

* In collaboration with the Faculty of Software and Information Science at Iwate Prefectural University (IPU)



NARO/TARC

Provision of tailored climate information
Feedback by questionnaire survey

Users