

# SUBSURFACE WATER LEVEL CONTROL SYSTEM "FOEAS" AND ITS DIFFUSION

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## Contents

- Background: Paddy field diversification
- Outline of FOEAS
- FOEAS features
- Effect of FOEAS on soybean yield
- Diffusion of FOEAS



1



2

## Background: Paddy Field Diversification

Rice production controls have been implemented in Japan since 1970, but Japan's food self-sufficiency has continued to be low.  
Overall food self-sufficiency ratio in 2017: 38%  
Rice: 97% Wheat: 14% Soybeans: 28% Vegetables: 75%

The use of paddy fields to produce upland crops (wheat and soybeans) is desirable.

## Background: Paddy Field Diversification

Challenge of Paddy Field Diversification:  
How to resolve the discrepancy between paddy fields (as artificial wetlands) and upland fields (as well-drained agricultural lands)?



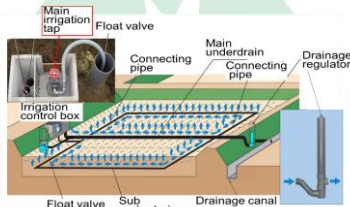
3



4

## Outline of the FOEAS

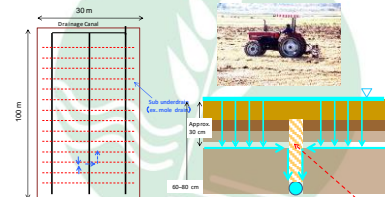
The FOEAS equipped for both subsurface irrigation and subsurface drainage



5

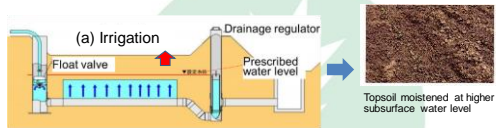
## FOEAS Features: High Drainage Capability

- Paddy-field-specific subsurface drainage technology: **combination underdrain**
- \*Crossing main underdrain with sub underdrain → Improved areal drainability



6

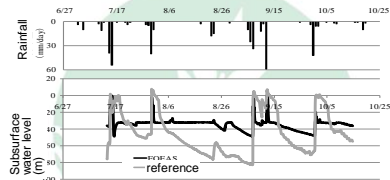
### FOEAS Features: Subsurface irrigation



- Germination and seedling emergence of soybean are very sensitive to soil moisture conditions—the soil cannot be too dry.
- FOEAS users can set subsurface water level higher than usual (e.g., -10 cm) to promote germination of soybean.

7

### FOEAS Features: Subsurface water level control



- The subsurface water level **with** FOEAS was maintained almost constant (-35 cm).  
→ Soil moisture content in the topsoil was maintained almost constant.
- The level **without** FOEAS varied widely from -80 cm to the soil surface.  
→ Soil moisture conditions varied widely, from very dry to very wet.

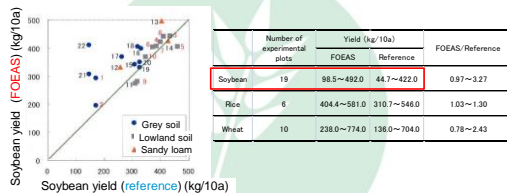
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### Effect of FOEAS on Soybean Yield



9

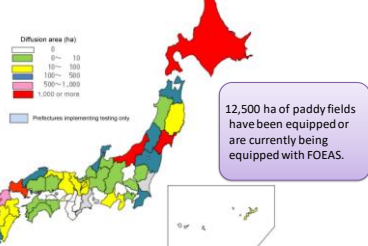
### Effect of FOEAS on Soybean Yield



- The effect of FOEAS on yield in poorly drained soil is evident.
- In some cases, the effect is not evident, probably owing to weather differences.

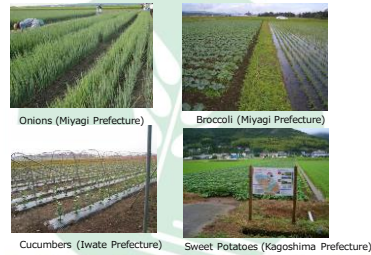
10

### Future Prospects: Diffusion of FOEAS in 2017



11

### Future Prospect: Use of FOEAS in vegetable production



12

Thank you



●FOEAS user's manual (in Japanese)  
can be download in NARO website.

