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The characteristics and effects  
of coated fertilizers in Japan

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# 1. Japanese coated fertilizers(CF) and rice cultivation

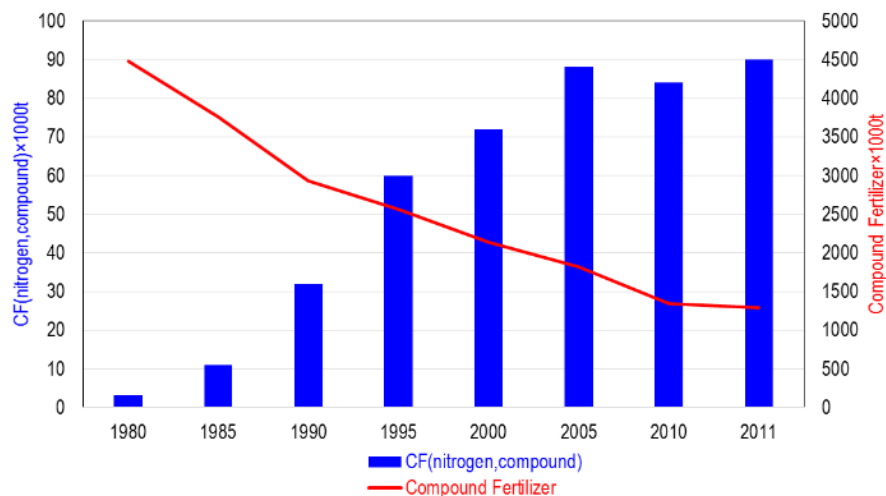
## The definition and kinds of CF in Japan

● The definition of CF(Fertilizers Regulation Act)  
Fertilizer granules are covered by coating materials. The initial release rate is prescribed to be 50% or less.

- The variety of CF in Japan
- Coated nitrogen fertilizers
  - Coated compound fertilizers
  - Others(Coated fertilizers of potash,phosphate,magnesia)

## Fertilizer production in Japan

Production rate of coated fertilizers and compound fertilizers in Japan

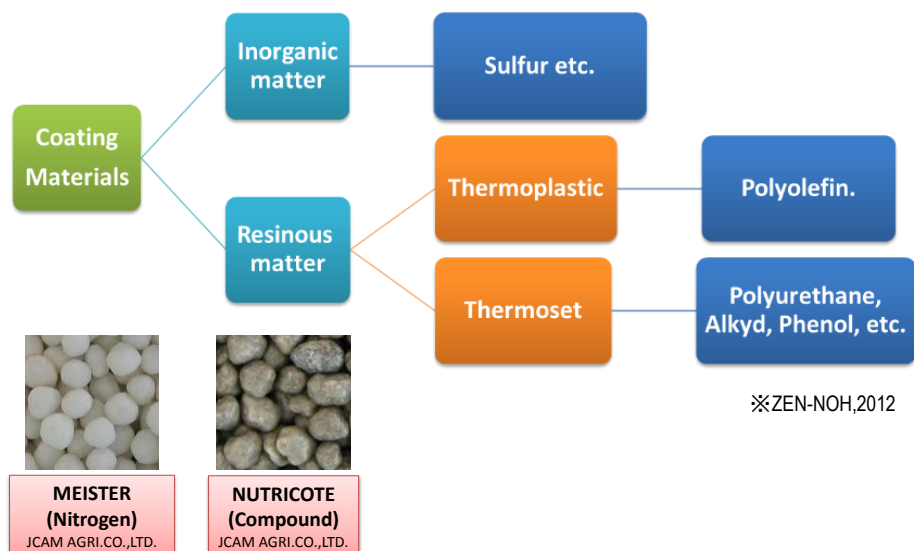


※Fertilizer production;MAFF, 2012

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## The variety of CF in JAPAN



※ZEN-NOH,2012

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## The characteristics of agriculture of Japan and cultivated area

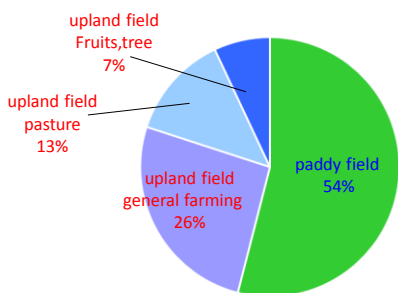
The characteristics of agriculture of Japan

- Rice cultivation basely(The Japanese staple : rice)

Japanese cultivated area

※Cultivated area;MAFF,2012

cultivated area(× 1,000ha)	ratio of the country are(%)
<b>4,550</b>	<b>12</b>



(e.g.) Japanese breakfast

## Time table of rice cultivation in Japan



**Harvesting**  
Aug. to Oct.



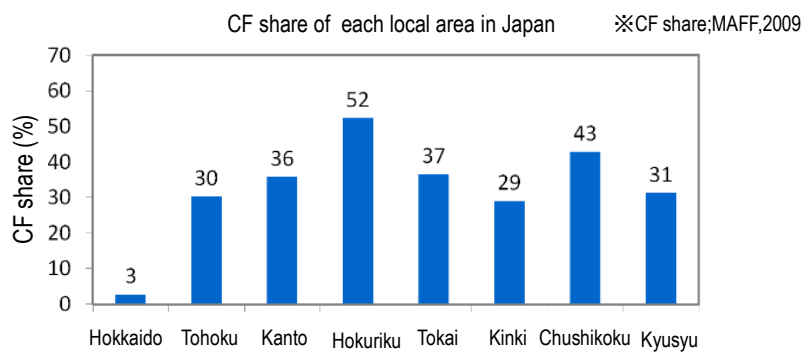
**Raising of seedling**  
Mar. to Apr.



**Transplanting**  
Apr. – May

※ZEN-NOH,2012

## CF share in Japan



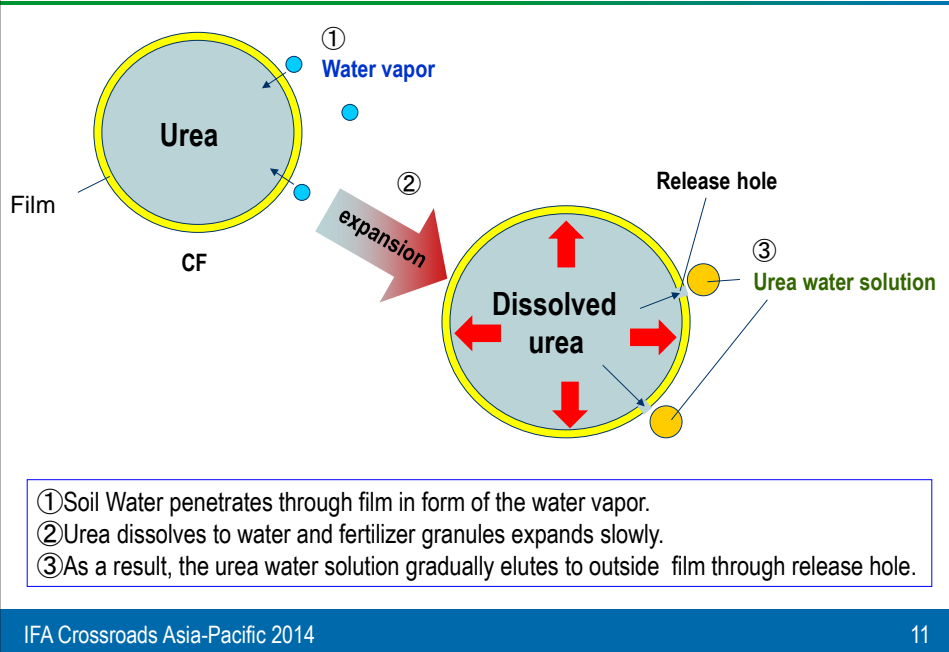
CF share is 34% in Japan.

- Part-time farm household is increasing.
- Aging of the farmer is proceeding.

⇒ CF can be useful in the present agriculture.

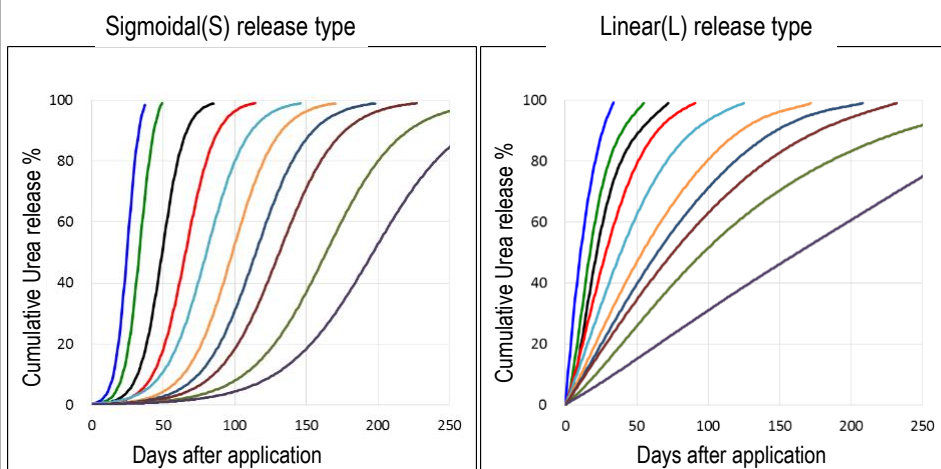
## 2. Characteristics and effects of CF

## Release mechanism of the CF(Urea)



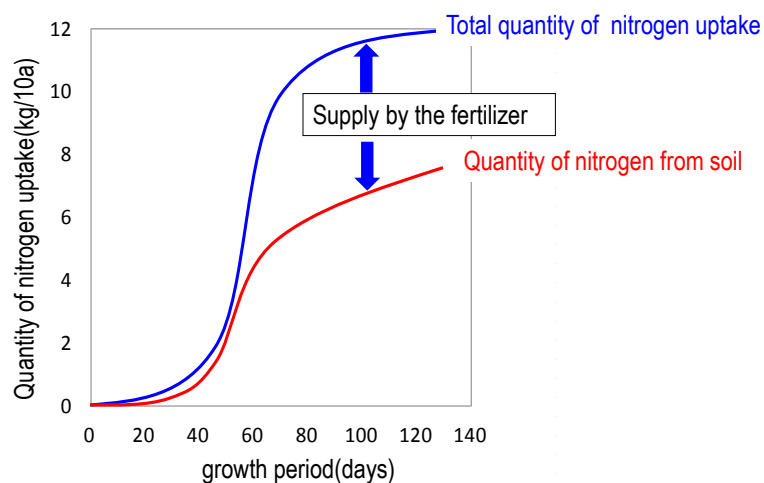
## Release curve of the CF(Urea) in water at 25°C

- JCAM AGRI can control release precisely and has many types of CF.



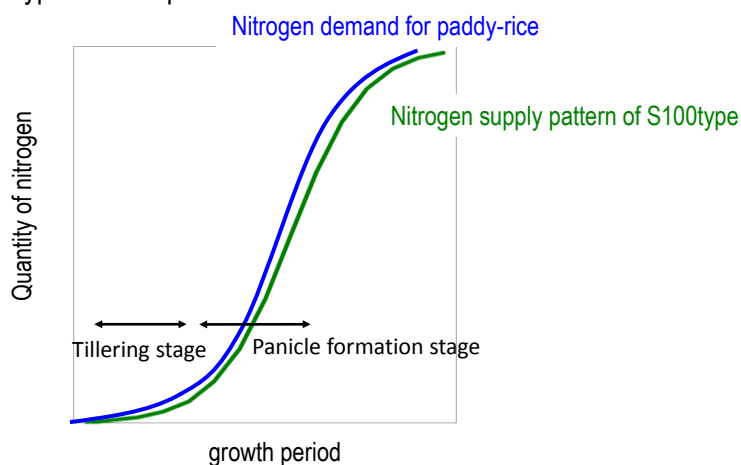
⇒ Users can select suitable type for nutrition uptake of crops.

### Nitrogen uptake pattern of the paddy-rice



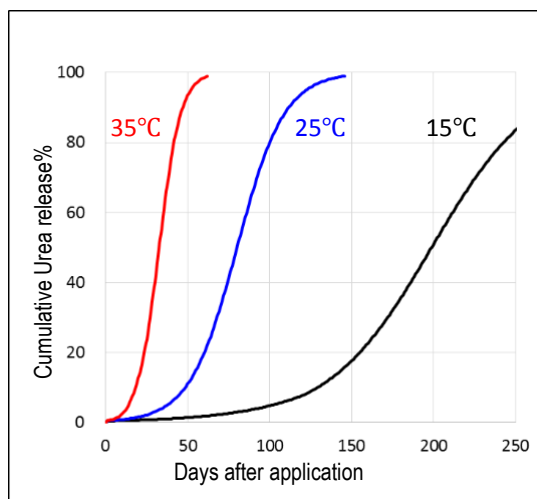
### Nitrogen demand for paddy-rice and supply pattern of MEISTER Stype

(e.g.) This figure shows that nitrogen demand for paddy-rice and supply pattern of S100type at Akita prefecture.



⇒ Stype is designed to be suitable for the paddy-rice growth pattern.

## Temperature influence on nutrition release



⇒ Release pattern is influenced by the temperature

## Release prediction

### Release prediction

The release pattern depends on the temperature in the soil. When soil temperature is high, release becomes fast, and when soil temperature is low, release becomes slow. Therefore we have to predict release in consideration of soil temperature, and select most suitable type.

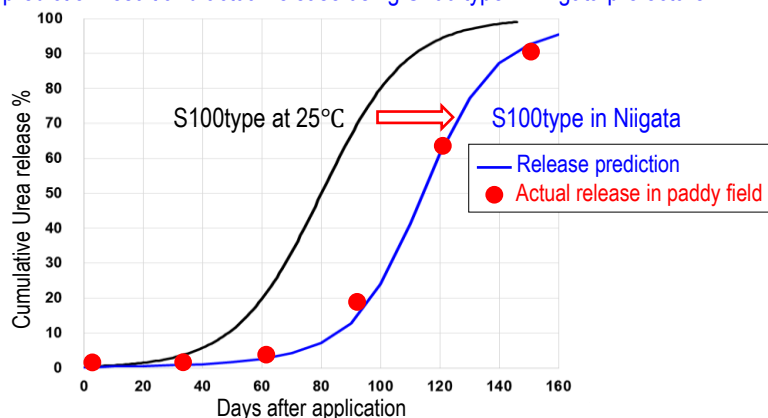
⇒ By the software called HIKOU-YOHOUSHI, release prediction becomes possible based on the soil temperature of the field.





## Release prediction

(e.g.)Release prediction result and actual release using S100 type in Niigata prefecture

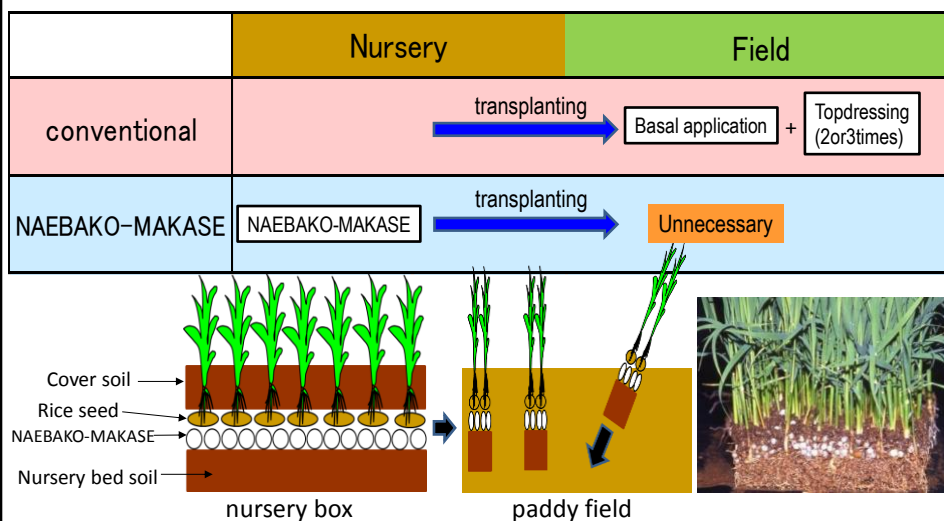


Temperature of Niigata prefecture is low. Therefore a release pattern gets longer from 100 days. But, we can predict release by the software.

⇒We can predict so accurate that release prediction becomes the same as actual release in paddy field.

## Topics1:NAEBAKO-MAKASE®

NAEBAKO-MAKASE(special coated urea) : The ultimate labor saving and environmental friendly fertilizer. There is no need to apply in paddy field by using NAEBAKO-MAKASE.



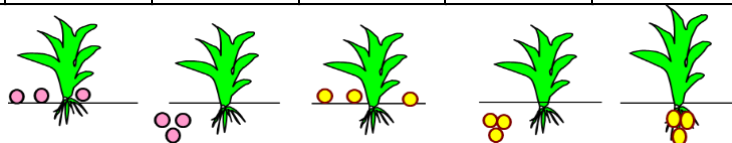
## Topics1:NAEBAKO-MAKASE<sup>®</sup>

Nitrogen use efficiency

⇒We can get high efficiency by using NAEBAKOMAKASE

※(kaneta,1992)

Method of application	Top dressing	Side dressing	Top dressing	Side dressing	Co-situs
Fertilizeer	Ammonium Sulfate	Ammonium Sulfate	MEISTER	MEISTER	NAEBAKO-MAKASE
N use efficiency(%)	9	33	61	78	83



## Advantage by the CF use

Advantage by using CF in paddy-rice cultivation

- Reduction of the application times and the labor

Conventional : 3 or 4 times

CF : only 1 time

- High nitrogen use efficiency

Reduction of the application rate is possible by using CF. It leads to reduce elution and flux to environment.

## Topics2:Nutricote®

Nutricote : Coated compound fertilizer.

⇒N,P,K and micronutrient release is controlled by coating film.

Nutricote was selected by NASA, after the severe cultivation test of the lettuce in a space station.

Letter from NASA to a distributor of Nutricote



Dear Mr. Rosenthal,  
 After several years of research the Veggie Vegetable Production System recently launched to the International Space Station, and plants are being grown on orbit in this hardware for the first time. We are growing lettuce plants in plant pillows, space "grow bags" which contain baked ceramic mixed with Nutricote 18-6-8 (Type 180, Florikan) controlled release fertilizer. Nutricote was selected after rigorous testing with different fertilizer and media combinations. In addition, tests in plant pillows have been conducted with numerous different plant types. Nutricote met our needs admirably and performed well in all Veggie pillow tests conducted. Some of these tests are published in articles describing the preliminary work that led to this microgravity testing, and future publications are in-work. Please see the following publications for more information about our testing:

## 3.The future of CF

## The future of CF

### Japanese Situation

● The number of the farmers decreases year by year, and aging will be proceeding. Then, cultivated area by each farmer goes spread.

⇒ CF is suitable to labor saving of the agriculture.

### World Situation

● The world population is increasing rapidly, and much food will be required. Population : 5 billion (1987) → 6.9(2010) → 9.1(2050)

● With increase in food demand, needed amount of fertilizer will increase. More and more efficient fertilizer use will be required to meet fast rising global food demand in a sustainable way.

⇒ CF contributes to the effective use of fertilizer resources.

## The future of CF

### Space Situation

● Japan Aerospace Exploration Agency (JAXA) is studying agriculture possibility on Mars.

⇒ CF may contribute to space farming, because it has high efficiency.

### Importance of CF

• ⇒ CF can contribute to solve agricultural problem (in Japan, World, and Space). Therefore the importance of CF will go up more.

