



INTERNATIONAL WORKSHOP ON KYUSEI NATURE FARMING WITH EM TECHNOLOGY WITH EMPHASIS ON NATURE FARMING

Noorhafizah Binti Rahim
Horticulture Division
Department of Agriculture

INTRODUCTION

Venue	: Kyusei Nature Farming Center, Saraburi, Thailand
Course Duration	: 13 th to 16 th March 2017
Number of Participants	: 40 person
Background of Participants	: from 8 countries (Thailand, Malaysia, Brunei, South Korea (Busan), Myanmar, Japan, Laos and Arizona)
Organizer	: Asia – Pacific Natural Agriculture Network (APNAN)
Cooperation with	: (1) International Nature Farming Research Center, Atami, Japan (INFRC) (2) EM Research Organization Okinawa, Japan (EMRO) (3) Sekai Kyuseikyo, Thailand (SKK)

INTRODUCTION

- ❑ Kyusei Nature Farming Center, Saraburi, Thailand (established in 1988), as a unit of Asia Agriculture Personnel Creation Institute of Thailand for focusing on the Nature Farming (method which was initially advocated by Mokichi Okada since 1935).
- ❑ In order to develop the cultivation technologies of Kyusei Nature Farming, EM technology (developed by Dr. Teruo Higa, professor emeritus from University of the Ryukyus, Okinawa, Japan) was used to emphasis the Nature Farming method through the technology social contribution by EMRO, which was established in 1994.
- ❑ The Nature Farming method blended effective microbes into a solution, that could enhance the fermentation processes of composting (organic farming), remove odor (waste/ livestock management), improve quality of water and helps to overcome the problems of intensive chemical farming and its impact on food, the environment and human health.

OBJECTIVE

- ❑ To understand the principles and philosophy of Kyusei Nature Farming and basic information on EM technology (including livestock and environment)
- ❑ Practically observe and implement the method



METHOD

- ☐ Lectures (concept of Ikudo in soil management, pest, disease and weed control)
- ☐ Field observations (composting center, livestock and fish pond)
- ☐ Hand's on (soil texture, soil profile and soil preparation for planting)
- ☐ Slideshows presentation from each country on activities related to Kyusei Nature Farming and EM technology
- ☐ Filed visit to Harmony Life Organic Farm (Kyusei Nature Farming Farm)
- ☐ Visited historical museum of Mokichi Okada

1st day – Explanation of Kyusei Nature Farming Practice in Saraburi Center



Kyusei Nature Farming Center Sekai Kyuseikyo Thai Headquarter



Kanit Muangnil
Senior managing Director
Kyusei Nature Farming Center – Saraburi
July 2016

Kyusei Nature Farming Center, Saraburi

A unit of Asia agriculture personnel creation institute of Thailand.

Established in 1988 focusing on the farming method which was initially advocated by Mokichi Okada since 1935



International workshop for the Asia and Pacific



INFRC
International
Nature Farming
Research Center
Atami, Japan



SKK Thailand
Saraburi
Center



EMRO
EM Research
Organization
Okinawa, Japan



" The Principle of Kyusei Nature Farming is to learn from the great power of nature which is beyond human understanding and to allow the power of the soil to be fully exhibited by taking good care of the soil "

Mokichi Okada
(1882-1955)

" Nature Farming its final purpose is to lead humankind to a life in accordance with the Laws of Nature and to create a new civilization based on true health, prosperity and peace "

Mokichi Okada



Chili from Saraburi farm



Onion from Saraburi farm



Cabbage from Saraburi farm



Sweet Potato from Saraburi farm



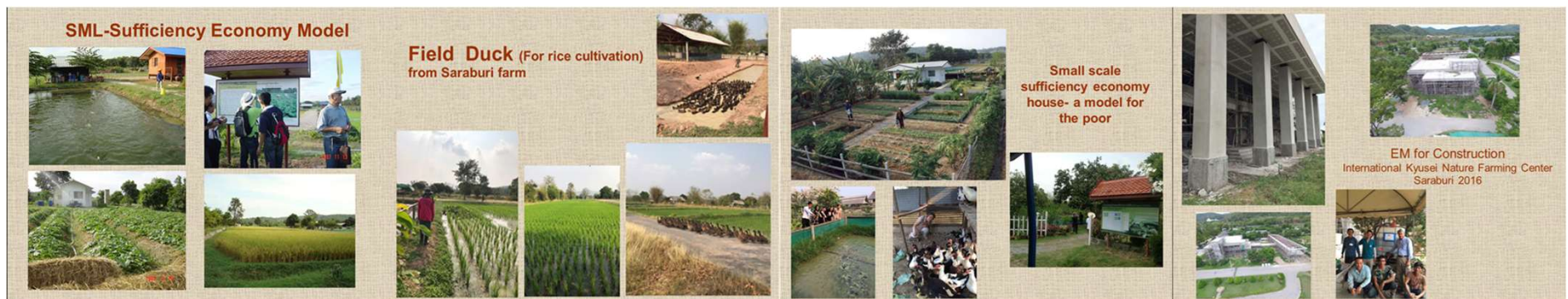
Tomato and Cucumber from Saraburi farm



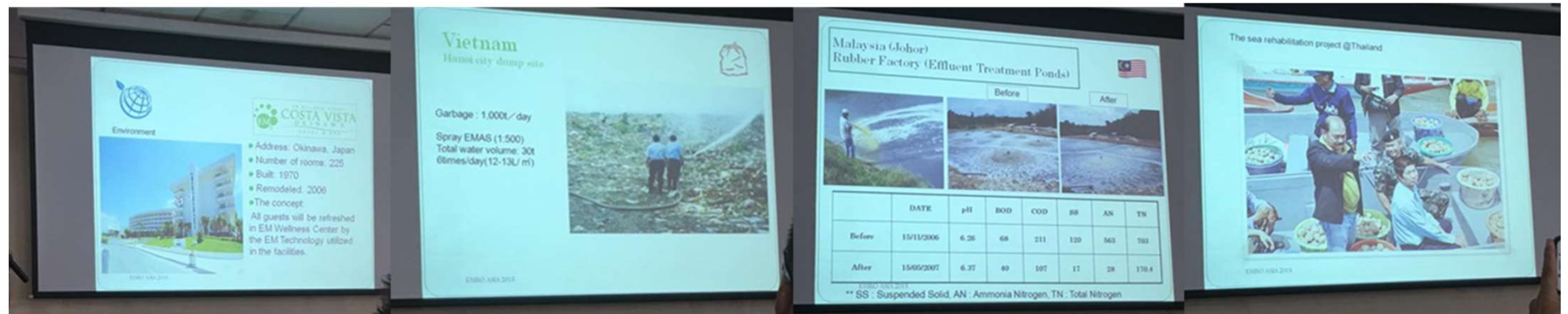
Fruits



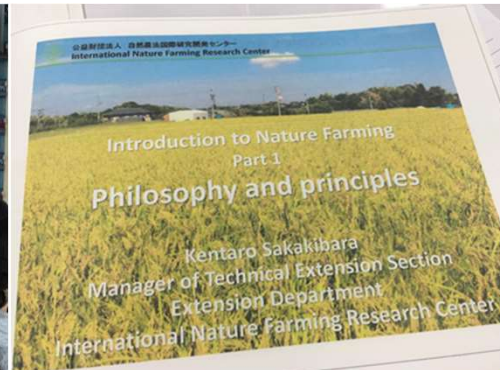
1st day – Explanation of Kyusei Nature Farming Practice in Saraburi Center



1st day – Nature Farming Network Around The World



1st day— Principles and Philosophy of Nature Farming



Principles and Philosophy

Nature Farming is the farming method based on the idea that "nature has an intention, and mankind can prosper by respecting nature and conforming to nature's laws."

Its principle of cultivation is "to allow the soil to exhibit its great power without polluting it," which was advocated by Mokichi Okada (1882 ~ 1955).

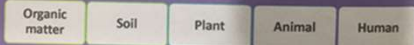
Breakdown of fertilizer superstition
Mistaken of fertilizers as the food of crops and the applications of various artificial fertilizers surprisingly weaken the original power of the soil.
→ Fertilizer poison
→ The cause of pests and diseases

Agro-ecosystem control technology: Ikudo

Nature

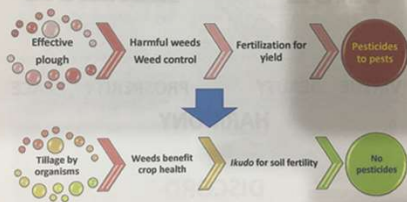
Ikudo (育土) "Soil-breeding, Nurturing soil"
Agro-ecosystem—Integration • Public benefit • Sustainance
Mottai, "It's helping each other that makes world go round."

Ecosystem • Cycle • Co-exist • Mutualism



Ms. Wangari Muta Maathai from Kenyan who was an internationally renowned Kenyan environmental political activist and Nobel laureate. She is spreading a concept "Mottai-nai" through of the world, which is called 3R+1: Reduce, Reuse, Recycle and added Respect to earth's natural resource.

The indulgence due to human convenience complicates the problem



- 5 -

Four major principles of Fukuoka's natural farming

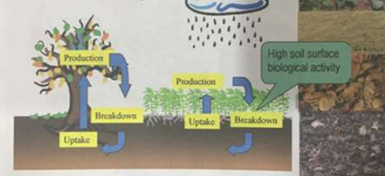
NO CULTIVATION

—No need to plough
NO CHEMICAL FERTILIZER OR PREPARED COMPOST
—No need to fertilize
NO WEEDING BY TILLAGE OR HERBICIDE
—No need for weed control
NO DEPENDENCE ON CHEMICALS
—No any need for agro-chemicals

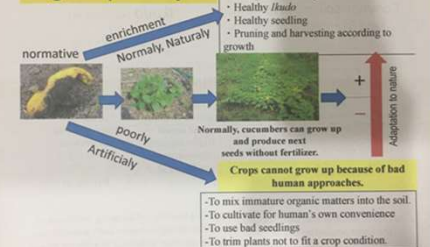
True Health! Pests and weeds harmless
To induce a healthy agricultural ecosystem

Nature-taught Ikudo

- Self reproduction of plants
- Organic fertilization with flesh and fallen leaves
- Soil surface is a factory

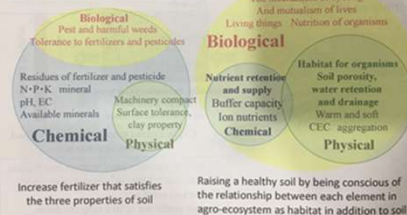


Normally, crops can grow up healthy



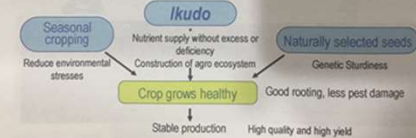
Key points of Ikudo in agro-ecosystem

Common soil improvement and 3 properties of Soil



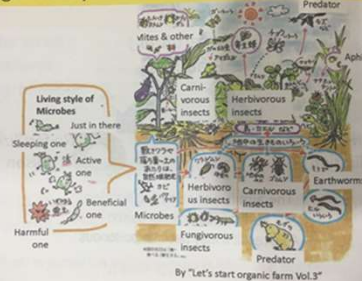
Cultivation Key points for stable production

- Seasonal cultivation suitable for local climate by appropriate cropping and timing.
- Natural selection of seeds, propagation techniques in accordance with traditional agriculture
- Ikudo = Construction of agroecosystem.
- Enhance the function to suppress pest damage without increasing the risk. Protect natural enemies and make them staying resident in the ecosystem.
- Build an environment where healthy crops grow. Avoid stress for young plants and young fruit.

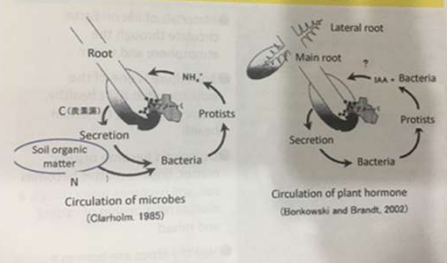


- 16 -

Agro-ecosystem — Biodiversity in the field



Natural mutual relationship Animals, plants and soil raise each other



1st day – Visit Saraburi Center



1st day – Visit Saraburi Center



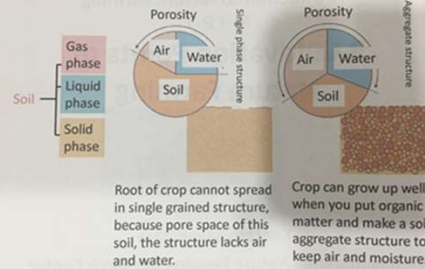
2nd day– Points of Cultivation for Stable Production (soil aggregate)

Soil

- What is soil?
Soil fauna and microbes help to mix sand and clay from rock mixed with humus
- Organic matter is an important component
- What are desirable soil conditions for cultivation of crops?



Component of Soil



Functions of Soil Microbes

- Mineralization of organic matter
- Decomposition and mineralization of organic matter by soil enzymes
- Decomposition and purification of harmful organic matter
- Endophytes : Symbiotic relationship with plants
(Symbiotic nitrogen fixation bacteria, Ectomycorrhizal fungi, Endogenous mycorrhiza, bacteria)



Function of Soil Fauna

- Crushing bulky organic matter
- Transferring organic matter into the soil

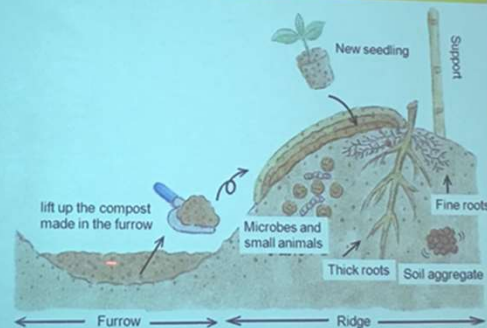


Functions of Soil Humus

1. Improvement of physical structure of soil = Enhance soil swelling and softening
2. Improvement of fertilizer retention capacity (CEC)
*CEC=Cation Exchange Capacity
3. Nutrient supply = Nutrition in itself
4. Dissolution of minor elements from rocks and minerals
5. Increase biological activity = As feed and home for microbes
6. Carbon dioxide donor

	me/100g
Good Clay (Mon harpoon night)	80~150
Bad Clay (Kaolinite)	3~15
Matured humus	600
Immature humus	20
Sand from river	0
Good soil	20 or more
Bad Soil	5 or less

A image of the desired soil



Agro-ecosystem



2nd day– Soil profile



2nd day– Points of Cultivation for Stable Production (soil aggregate)

Observe a Vertical Soil Section (Soil Profile)

- If the field has very poor drainage, observe a vertical section of the soil (soil profile) and find its cause. Determine the place for observation.
- Push a dry rod into the soil at several points in the field and select a place where the rod goes into the soil to an average depth.
- † If there is watery mud at the end of the rod when observed after pushing into a ridge, the level of groundwater is considered to be high.
- † If a rod goes into the soil easily, the soil is soft. If it does not go deep into the soil, it is presumed that there is a plow pan or a gravel layer.



1. Observation in the Field -Moisture Condition into Soil-

It depends on plowing technique to keep physical condition of the soil.
Physical properties are going down by kneading the soil.

Check points of soil condition after ducking it by scoop (Fukui prefecture)

Classify by moisture condition	Soil condition after dug it by scoop	Classify level of plowing
Extremely high	It is soft & flowing condition	Impossible
High	The soil solidifies & does not leave scoop	Difficult
Optimum	The soil is easily breakdown & unattached on scoop	Easy

2. Observation in the Field -Groundwater level, Grain size & Hardness of soil-



Groundwater level
Layer filled with water under 60cm



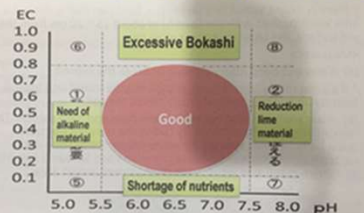
A harrowing rate in cultivation layer, which scale is under 2 cm
Over 70% is good.
Harrowing rate = Weight of the soil passed 2mm scale sieve / Weight of whole soil × 100

Ideal hardness of soil : First finger joint can put into the soil.

How to Get along with Nature (Priority Ranking)



Indication of Chemical Properties of Soil



pH indicates soil acidity and mineral contents, EC indicates amount of nitrogen.
As a guide, pH value of soil is 5.5~6.5, EC value of soil is 0.2~0.5mS/cm, but EC value can be changed easily during cultivation.

Finding the Microbial Character of the Field

- The microbial character of the field can be judged by the odor and the color of hyphae of cultured microorganisms of the soil.
- † Use soil taken from the plow layer for diagnosis.
- 1) Place semidry soil taken from the field in a polyethylene bag and mix in it oil cake in the amount of about 5% of the soil weight.
- 2) Seal the bag and allow it to ferment in the shade at temperatures of 20 ~ 25° C for 3 ~ 7 days.
- 3) Check the color of hyphae and the odor of the soil, and find the microbial character according to the table below Microorganisms

Color of hyphae of mold fungi	Odor	Soil type
Black, red, yellow, etc.	A putrid or sewage-like odor	Disease-inducing soil
White	A putrid or foul odor	Disease-inducing soil
White	No odor	Disease-suppressive soil
White	A good fermentative odor like aspergilli	Zymogenic soil

Quality of Aggregate Structure



2nd day– Soil profile



2nd day– Crop cultivation on Nature Farming

Management of Soil Surface

- Management is done by farmer
- Options are
 - Bare land, Polyethylene mulch, Cover with organic matter (i.e. organic mulch)

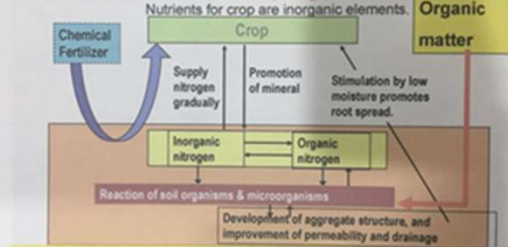


- 13 -

Characteristics of Nature Farming : Ikudo

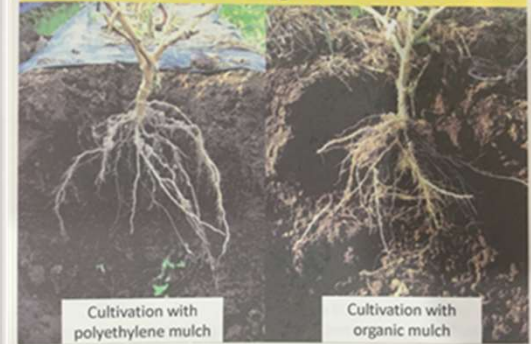
Why apply organic matter?

Mechanism to increase the quality of crops
: ex) Nitrogen

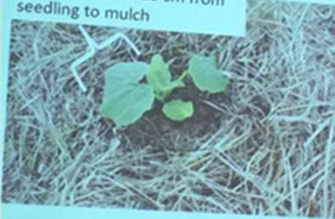


Cultivation with rich soil organisms : The soil has automatic control system to supply nutrient according to requirements of crops.

Impact of Mulching on Plant Growth



Keep away over 10 cm from seedling to mulch



Green manure

- Produces organic matter and humus within the field.
- Prevents diseases and insects.
- Develops soil aggregates and improves the soil structure.
- Increase porosity with roots.
- Fixes nitrogen (leguminous green manure)
- Serves as mulch



https://www.ikudo.or.jp/en/green_manure

14

Field observation – mulching & green manure

Living much → crops
Living much ← crops



Green manure



Living mulch

Field observation – mulching & green manure



2nd day– EM Basic Information

Developer of EM

Effective Microorganisms Technology was developed at the University of the Ryukyus, Okinawa Japan in the early 1980s by Professor Dr. Teruo Higa.

•Emeritus Professor of University of the Ryukyus
•Chief Director of International Institute of EM Technology, Meio University



EM creates Revitalizing Phenomenon

We were driven by necessity to explain the phenomenon at the functional level and confirm the

Antioxidation Effect

De-ionized Effect

Renders harmful energy harmless, converts them to useful energy

EM works as a catalyst to transform the harmful energies such as electromagnetic rays, UV rays, and radiation into useful energies

Animal Husbandry EM Application

1. Drinking EM (1:500-1,000)
2. Feeding EM Bokashi (1-3%)
3. Spraying within shed EMAS (1:100)



Dairy cow

Teruo's Farm Hokkaido Japan

<Detail>
70 Cows (Shokubun)
Land: 17.5ha
EM Use 10 years

EM application
Drinking EM 1:500 twice (fresh water)
Feeding EM Bokashi made of beer lees, 1-2.5kg twice daily
Spraying EMAS 1:100 every day



Integrated farming system with EM



The diagram shows a cycle where EM is used in various stages of farming, from feed production to waste management, leading to improved health and productivity.

What is EM-Bokashi:

- Fermented mix of:
 - wheat bran 36%
 - herbs 15%
 - dried apple 9%
 - unbroken linseed 5%
 - dextrose 4%
 - EM1 2%
 - molasses 2%
 - water 27%
- Fermented at least 30 days
- at 34 °C



- Sows: 100 – 200 g EM-Bokashi per sow per day during farrowing
- Piglets: 100 – 300 g EM-Bokashi per 10 piglets per day or 1 - 3 % in the complete feed
- Fattening pigs: 1 – 2 % EM-Bokashi in complete feed



1. Spray EMAS to clean floor
2. Apply EM (1:500) in the water
3. Spray EMAS in house 1-2times/week



<Result>

1. Decreased death rate
2. No unpleasant odor
3. Decreased number of flies
4. Chickens became healthier
5. Self compost using chicken dropping



Images showing the practical application of EM for cleaning in a domestic or institutional setting.

Tohoku Shinkansen uses EM for cleaning



The images show the interior of a Shinkansen train and the process of using EM for cleaning, highlighting its effectiveness in maintaining hygiene.

Soil Preparation “Kuratsuki”



Soil Preparation “Kuratsuki”



Kitchen waste



EM Solution



After 2 weeks

Field observation - paddy field



Pest control



No weed




Hardpan



3rd day– Rice cultivation on Nature Farming (weed & pest control)


If rice roots are damaged, weeds are easy to grow
It is important not to make a field where you must do weeding.



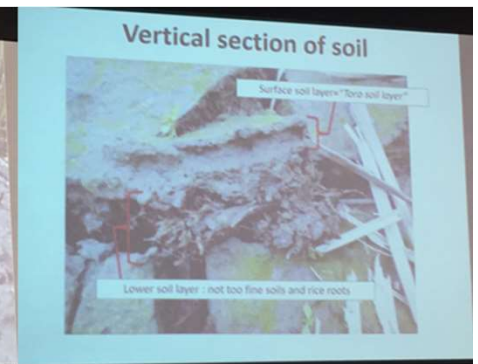
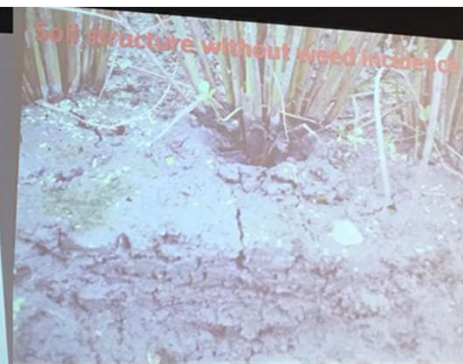
The plot where the organic matter such as rice straw was incorporated into soil immediately before rice seedling transplanting.

The plot where organic matter such as rice straw was applied on the soil surface after transplantation.

Puddling · Transplanting and Weed incidence (2009)



In the field where the rice plants are lately transplanted than the case of normal transplantation, weeds are fewer when puddling is done again after weeds grow up.



To prevent diseases and pests


Don't plant crops right after mixing immature organic matter in the soil.

It is recommended that you apply organic matter at least 1 month before even in summer.

Apply immature organic matter on the soil, If you don't have enough time to transplant.

The basic concepts of diseases and pests control in Nature Farming

- The most important thing is to create the environment where plant can grow strong and healthy.
- It's too late to take actions after disease outbreaks.
- Thus, prevention should be emphasized.
- And determination of the source of outbreaks is very important.




Companion plants

- The plant families Compositae and Brassica
- Soy beans and carrots · Fruit vegetables and green onions
- Spinaches and chives

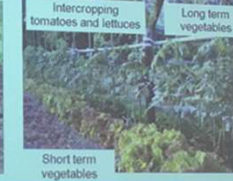
Considering fitness between vegetables

Companion plants tomatoes and leeks



Utilization of space

Intercropping tomatoes and lettuces



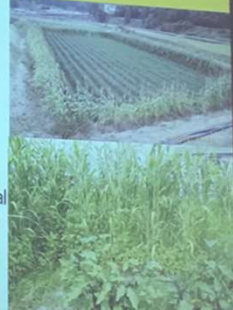
Long term vegetables

Short term vegetables

Preparing field-developing a proper soil for the crops

Banker plants

- Sorghums: as a habitat of natural enemies against aphids.
- Oats: Increases natural enemies such as spiders.
- Dutch clovers: Increases natural enemy against cutworms.
- Mugworts: Increases natural enemies against aphids and spider mites.
- Sun flowers: Reduces damage of beetles.



Field observation – Plant hormone & insect repellent



NOTES

Plant hormone & insect Repellent

Water	100 litre	} covered & soak for 3 days.
Emas	1 litre	
Rice bran	1 litre	
Acacia pennata leaves + stem.		

use: Direct [no need to dilute] spray on
leaves of plants.



Thailand



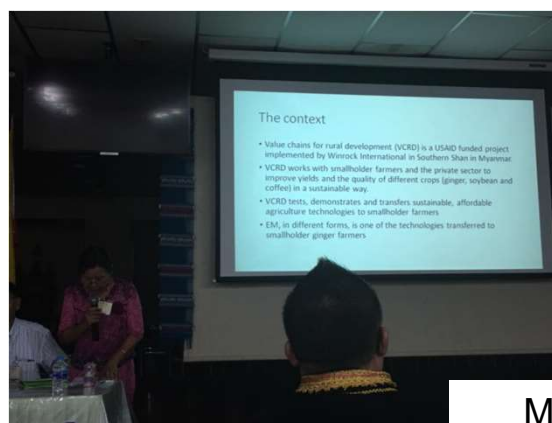
Malaysia



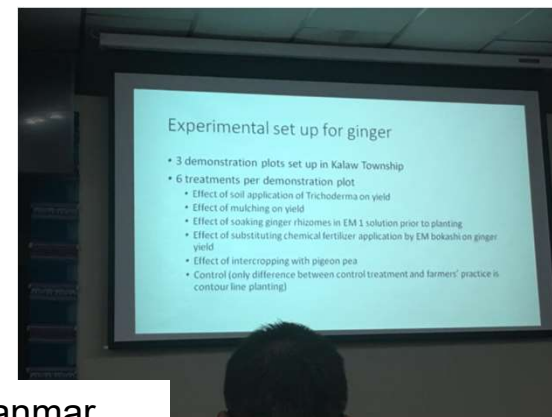
Busan



Arizona

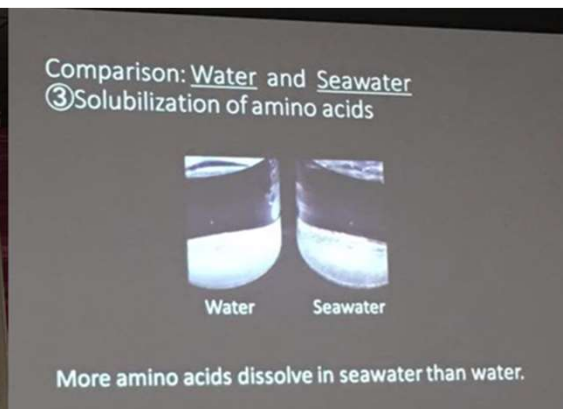
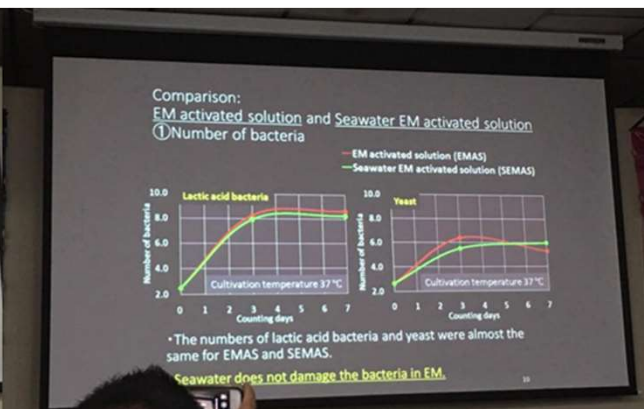
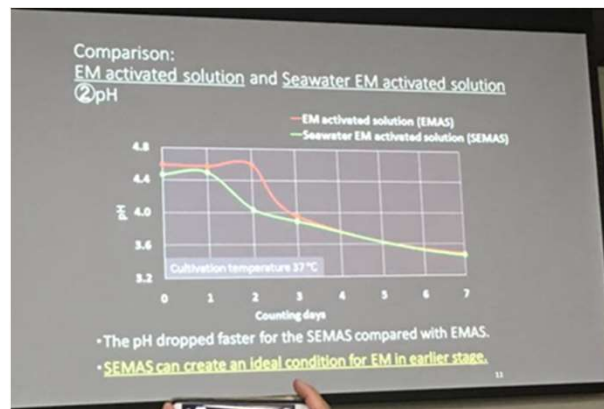
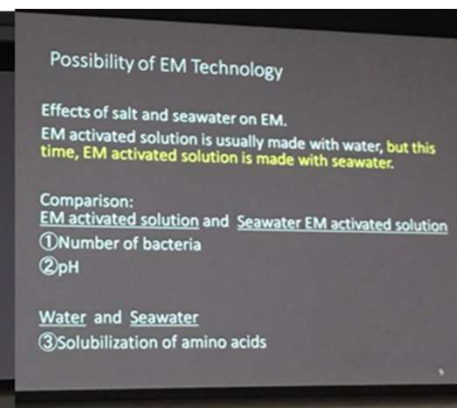
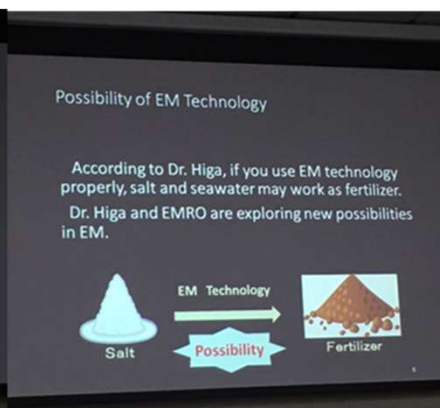
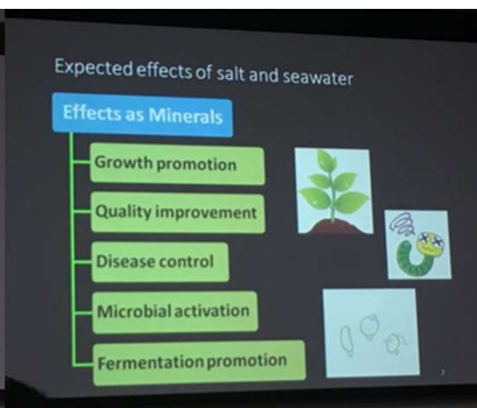
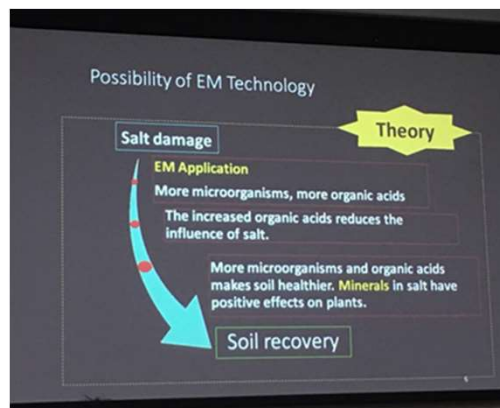
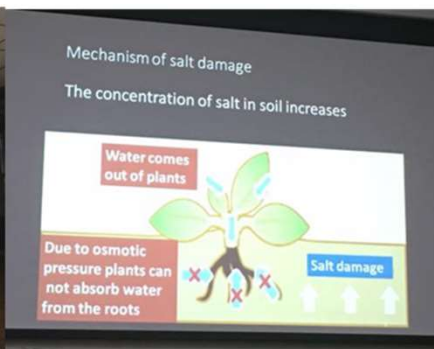


Myanmar





Japan



Field trip – Harmony Life Organic Farm



Field trip – Harmony Life Organic Farm



Field trip – historical museum of Mokichi Okada



FINDINGS

- ❑ The workshop was conducted in informal session and all participants have chances to shared their experiences, views on issues relating to nature farming technology application especially in Asia-Pacific region.
- ❑ Participants have fully benefitted from this workshop on how to managing soil, controlling weed and pests in a natural way through theory and practical.
- ❑ This technology it is important for member countries in the way to respect nature, allow the living soil exhibit it's great potential and helps to build up a good condition for agro-ecosystem.

CONCLUSION

- ❑ Kyusei Nature Farming is a non-destructive method in which it relies largely on soil health in order to balance the insects, plants and microorganisms in ecosystem naturally.
- ❑ It also uses available (chemical-free) resources in producing quality crop yields.
- ❑ By using EM technology as an emphasis, it can help expedite the decomposition of various types of organic matter to potential compost and help enrich the soil with microbes and nutrients.
- ❑ It is also safe to use, can reduce the cost of agricultural inputs, and solve environmental problems such as eliminating stench odor in livestock and improving water quality.



THANK
YOU

