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# Regenerative Agriculture

Our changing climate is increasingly threatening our food supplies, with unpredictable weather patterns and new pests affecting yields and productivity. Conventional farms are the most vulnerable as they rely on synthetic fertilizers and pesticides, neglect soil health, and rely on just one crop.

Fortunately, there are alternative farming practices, which help make farms more resilient and sustainable, known as “Regenerative Agriculture”. This way of farming offers climate friendly solutions to ongoing problems such as rebuilding the health of soils to reduce soil erosion, strengthening the resiliency of farms through diversification, and reusing agricultural waste to make organic compost. It is a holistic way of farming that restores the resources it uses, rather than exhausting them.

Agriculture is paradoxically one of the biggest contributors to climate change and one of the most exposed sectors to the impacts of climate change. Regenerative Agriculture can support farmers in reducing the former whilst improving the latter in the long run.





# Regenerative Coconuts Agriculture Project (ReCAP)

Nam Hom coconuts, or aromatic coconuts, are a special coconut variety from Thailand known for their exceptionally fragrant water. The demand for these fruits from across the world has surged over the past few years. In order to develop and incentivise sustainable practices of coconut farming, the idea of the Regenerative Coconuts Agriculture Project (ReCAP) was born.



## COMMISSIONED BY

- Harmless Harvest & its Fair for Life Premium Fund
- Danone Ecosystem

## IMPLEMENTED BY

- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
- Harmless Harvest Thailand

## COOPERATION PARTNERS

- Department of Agriculture
- Department of Agricultural Extension

## OVERALL TERM

1 June 2020 – 31 August 2023

## PROJECT REGION

- Thailand
- Nakhon Pathom | Ratchaburi | Samut Sakhon | Samut Songkhram

## Main Outcomes



More than 400 farmers were supported in growing coconuts according to regenerative organic agricultural practices



Farmers were equipped with basic business skills to diversify and thereby increase their income



Training materials on regenerative coconut agriculture have been developed for trainers and farmers



3 compost formulas for farmers were developed using coconut waste



30 Master Trainers have been trained to teach farmers about regenerative coconut agriculture



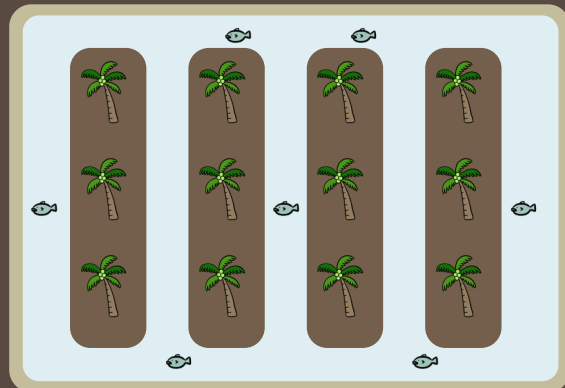
Scan here to watch a video about ReCAP.



Scan here to download training materials on regenerative coconut agriculture

# Conventional Coconut Farm

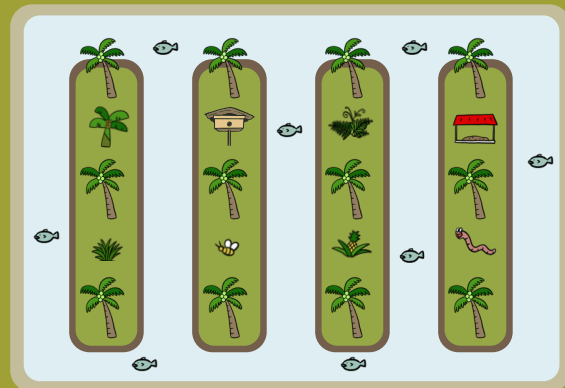
Most conventional coconut farms practice monocropping and use synthetic fertilizers and pesticides. Soil erosion is often noticeable on these farms. This farmer relies on only one source of income.



- Intercrop (Banana)
- Intercrop (Pandan leaves)
- Intercrop (Pineapple)
- Intercrop (Vegetable fern)
- Beehive house
- Bee
- Fish
- Compost station
- Vermicompost

# Regenerative Coconut Farm

A regenerative farm integrates measures that increase biodiversity on the farm and improve its soil health. Here you can see that the farmer grows cover crops and intercroops alongside coconuts, rears bees and fish, and makes their own organic compost. This farmer has several sources of income.



# Cover crops

## Cover cropping

A cover crop is a plant grown to prevent soil erosion, and manage soil fertility, weeds, and pests. Some crops can also have additional value like fixing nitrogen into the soil.

## Benefits of cover cropping

- Reduces soil erosion and the need to rebuild the soil surface
- Reduces water run-off, increases soil water infiltration, increases soil moisture, and reduces need for irrigation for greater drought resilience
- Eliminates need for herbicides
- Reduces fertilizer application
- Stores nutrients from organic fertilizer reducing nutrient leaching
- Reduces soil compaction, increases aeration and drainage
- Reduces labour costs for weeding and watering for farmers

## examples of cover crops that can be grown on coconut farms



Roundleaf bindweed



Three-flower beggarweed



Pinto peanut



Caeruleum calopo



Chickenweed






# Soil Health

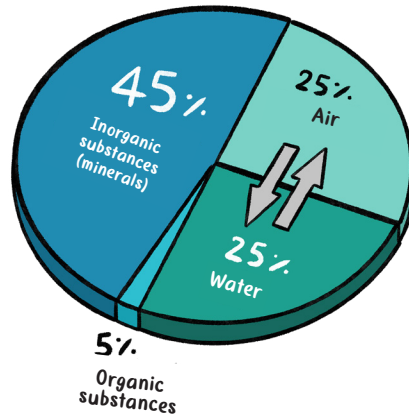
Taking care of the soil on a farm is at the heart of regenerative agriculture. Regenerative practices help to protect soil health and increase soil organic matter. There are four soil health principles that help maintain and improve soil health:

- 1 Minimise soil disturbance to enhance organic matter accumulation and increase soil organism diversity.
- 2 Maximise soil cover to protect the soil surface from erosion, reduce the impact of temperature fluctuation on plants and microorganisms, and increase soil carbon sequestration.
- 3 Maximise biodiversity to maintain the chain of food, energy and water among different plants and organisms, break disease cycles, and provide habitats for pollinators.
- 4 Maximise continuous living roots to better support soil microbes and soil food webs.

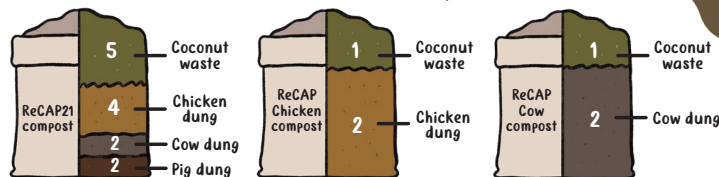
 If you observe nature, there is no bare soil. This was invented by humans!

## What is good soil?

Healthy soil has a good and stable structure, which has optimal porosity to hold enough moisture and allow excess water to drain out. It should have the optimal soil pH, no salinity, and not contain heavy metals or any toxic substances. Additionally, it should be fertile and provide enough plant food.



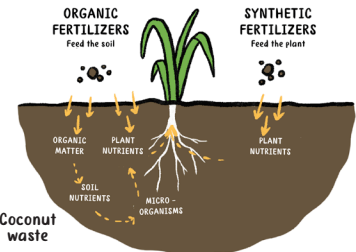
### 3 Compost Formulas by ReCAP



# Organic Compost






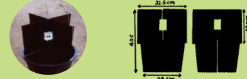


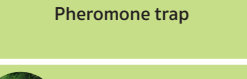



Coconut trees require a continuous supply of plant nutrients, otherwise they will show abnormal symptoms, poor growth, low fruit yield and poor fruit quality. Fertilizers can be applied to feed the soil when plant nutrient levels are low, or the soil cannot release enough nutrients to match plants' demand. While synthetic fertilizers only provide plant nutrients to feed plants, organic fertilizers feed the soil by providing plant nutrients and organic matter.

A variety of organic fertilizer can be purchased. However, farmers can make their own organic fertilizer. ReCAP has developed 3 formulas, which farmers can use to recycle their coconut waste and turn it into good quality, organic compost.



# Integrated Pest Management

A plant pest is any organism that can cause significant damage to plants or plant products. The major insect pests found on coconut farms are black-headed caterpillar, coconut rhinoceros beetle, red palm weevil, and coconut eriophyid mite, which can have significant economic consequences for farmers. In order to control pests without using chemical pesticides farmers can identify pests by the damage characteristics that appear on coconut trees, understand the life cycle of pests, know favourable conditions for their distribution, recognise their natural enemies, and learn about biological pest control methods. Here are a few methods for how farmers can deal with pests:


Damage characteristics	Plant pest	Control methods
 <p>Larvae feed and tunnel on the tissue of the coconut leaf, which live there until pupal stage.</p>	 <p>Black-headed caterpillar</p>	 <p>Bracon</p>
 <p>Symmetrical cuts on leaves, as well as holes on fronds and trunks.</p>	 <p>Coconut rhinoceros beetle</p>	 <p>Pheromone trap</p>
 <p>Drooping leaves and palm death. The weevil enter the holes that the coconut rhinoceros beetle initially create.</p>	 <p>Red palm weevil</p>	 <p>Pheromone trap</p>
 <p>The damage becomes apparent as the fruit develops corky brown, fissured patches on the fruit surface. Fruit becomes distorted if the damage is on only one side of the fruit.</p>	 <p>Coconut eriophyid mite</p>	 <p>Get rid of infested fruit and bury them.</p>




## Pollinators

Stingless bees can pollinate coconut flowers. This natural behaviour increases pollination and fruiting rates. Introducing bees to coconut farms not only increases the farms' biodiversity, enhanced fruit yield and productivity, and a reduction in fruit fall, thereby increasing the incomes of farmers. Farmers can also benefit from their by-products: honey and wax.

Both stingless bees and Asian honeybees are effective coconut flower pollinators, but since they have different behaviours, farmers may choose the species suitable for their style of farm management.



Bees are sensitive to chemicals, so they are only suitable for organic farms.



# Intercrops

Intercropping is the practice of growing two or more crops together in the same row or in different rows in a beneficial manner and for efficient use of light, nutrients, and water.

## Benefits of intercropping for soil health

- Increases soil cover
- Increases quantity and variation of root exudates to enhance soil fauna
- Increases water infiltration and moisture retention
- Reduces soil erosion
- Improves soil nutrient cycling and plant nutrient uptakes

## Economic benefits of intercropping

- Increases and diversifies farm income
- Reduces dependence upon coconut products
- Source of income during non-productive period of young coconut trees

What intercrops to grow? This depends on the age of your coconut trees:



Banana



Rose apple



Basil



Guava



Lime/  
Kaffir lime



Fingerroot



Papaya



Chili



Ginger



Lemon grass



Vegetable  
fern



Pandan



Pepper



Long pepper



Wild betel  
leaf



Pineapple



Vanilla



Vegetable  
fern



Pandan



Pepper



Long pepper



Wild betel  
leaf



Coffee



Vanilla



Cocoa



During the first 3-4 years

4-12 years old

12 years old and up