土と、緑で、未来を彩る。

TOWING

トーイング

The CEFIA Flagship Biochar Webinar

Jan 15, 2024

Introduction

Shogo Okishio
Overseas Business Development, Business Development Department

Interest： Agriculture, Space, Overseas

“Realizing sustainable agriculture both on earth and in space”
Joined TOWING in 2022

Making original Japanese Sake from rice (Since 2021~)




Who we are

TOWING

We solve world's climate and food problem
by improving soil health with power of microorganisms

Global focus on soil

"Without soil, the only thing that can grow is hunger"

opening words of 2022 GFFA

Source; https://4p1000.org/
https://www.foodfortransformation.org/full-article/gffa-advocates-for-new-approach-to-soils.html
https://www.fao.org/global-soil-partnership/en/

TOWING Company Introduction

We are a ag/bio-tech company tackling the issue of climate and food security

土と、緑で、未来を彩る。

TOWING

トーイング

- Spin-off from **Nagoya university** in Japan founded in 2020, comprised of 50 members of soil scientists and project developers
- Creating a soil amendment material based on **microorganism and biochar technology** for agriculture
- Our vision is to create a **circular and sustainable agricultural practice** in the earth and in the space, in order tackle imminent climate and food security issue
- Raised **7 mil USD in series A**
- Awarded from several accelerators/pitch program including Plug & Play (Top 5 startups in the 2023 pitch competition), Google accelerator and EQT (2nd place in the impact pitch night competition in 2023)

NAGOYA UNIVERSITY

Beyond Next Ventures

MUFG 三菱UFJキャピタル

PLUG AND PLAY

Google

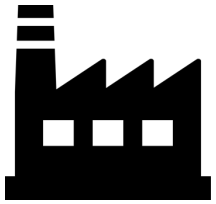
Problems of conventional agriculture

Seeding

Growing/Harvesting

Crop Sales

Problems of conventional agriculture



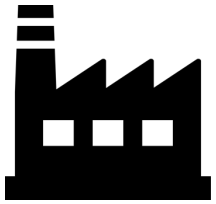
①Chemical Fertilizer
- Cost / Shortage
- Soil degradation

Seeding

Growing/Harvesting

Crop Sales

Problems of conventional agriculture



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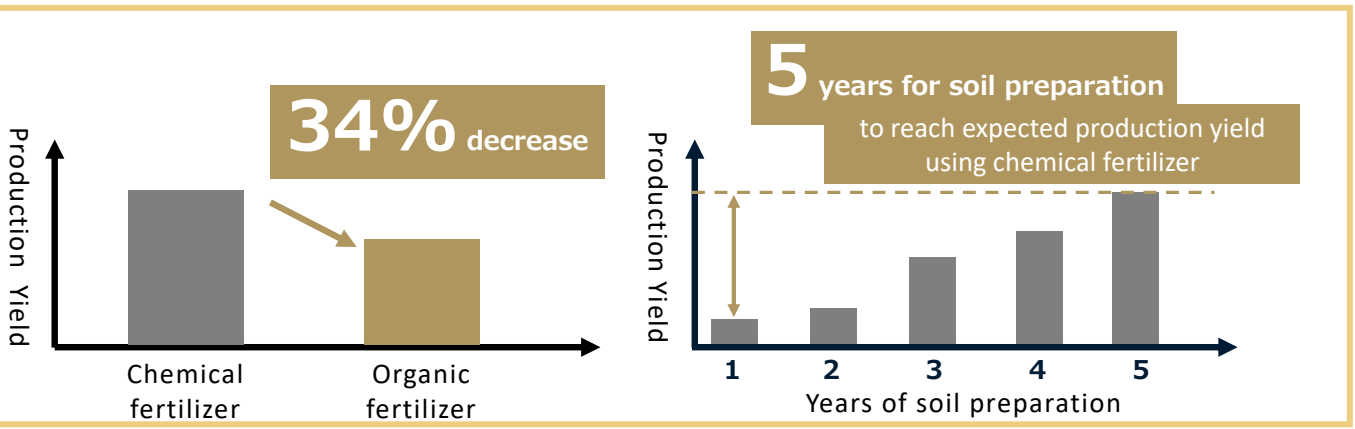
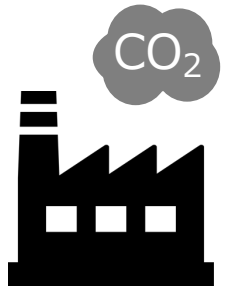
Crop Sales

Try organic conversion...



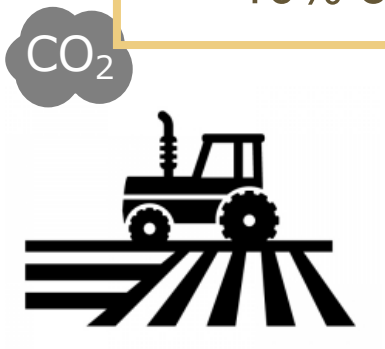
Problems of conventional agriculture



①Chemical Fertilizer
- Cost / Shortage
- Soil degradation

②CO2 emissions
- 10% of all industries

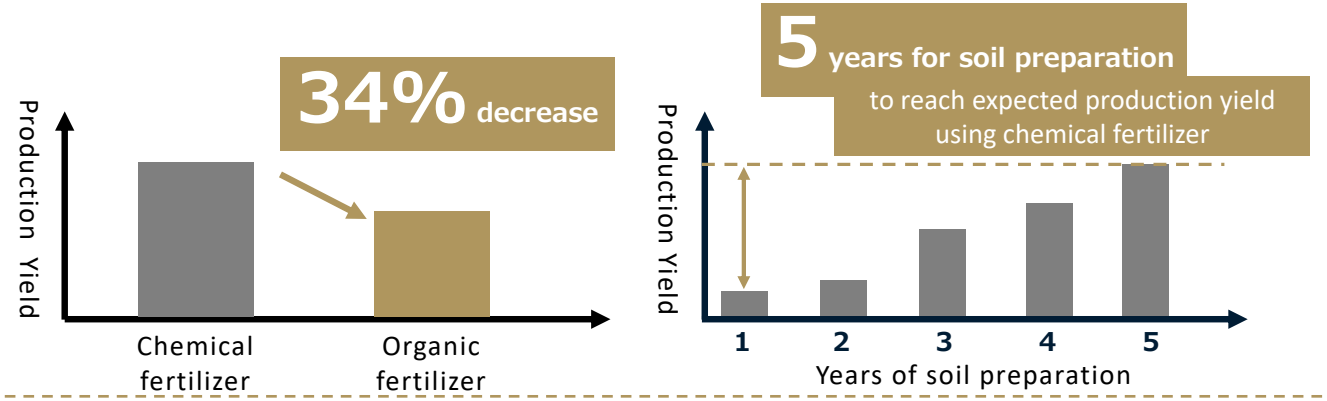
Seeding



Growing/Harvesting

Crop Sales

Try organic conversion...



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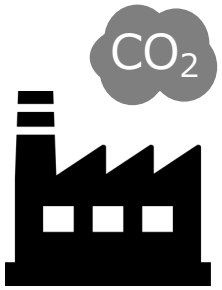

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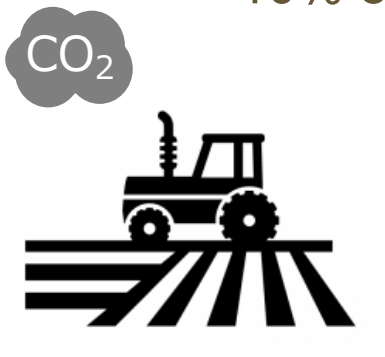

Growing/Harvesting

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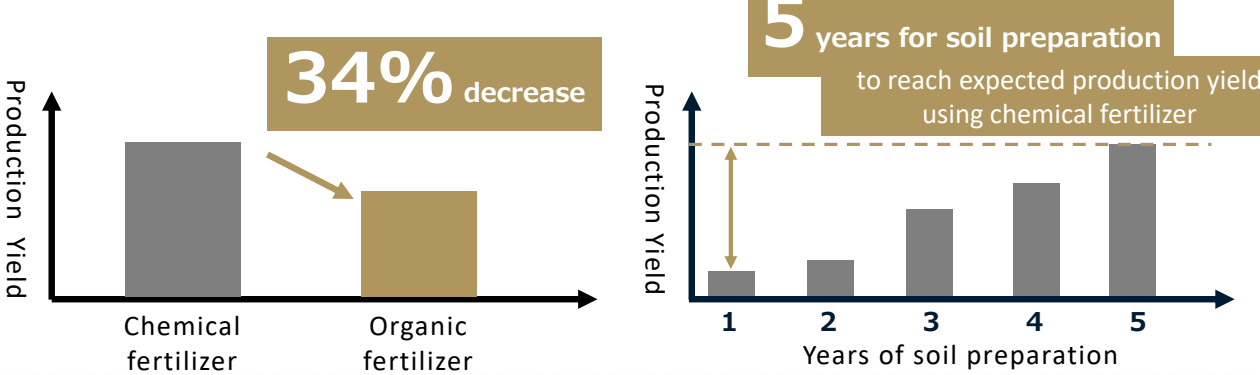
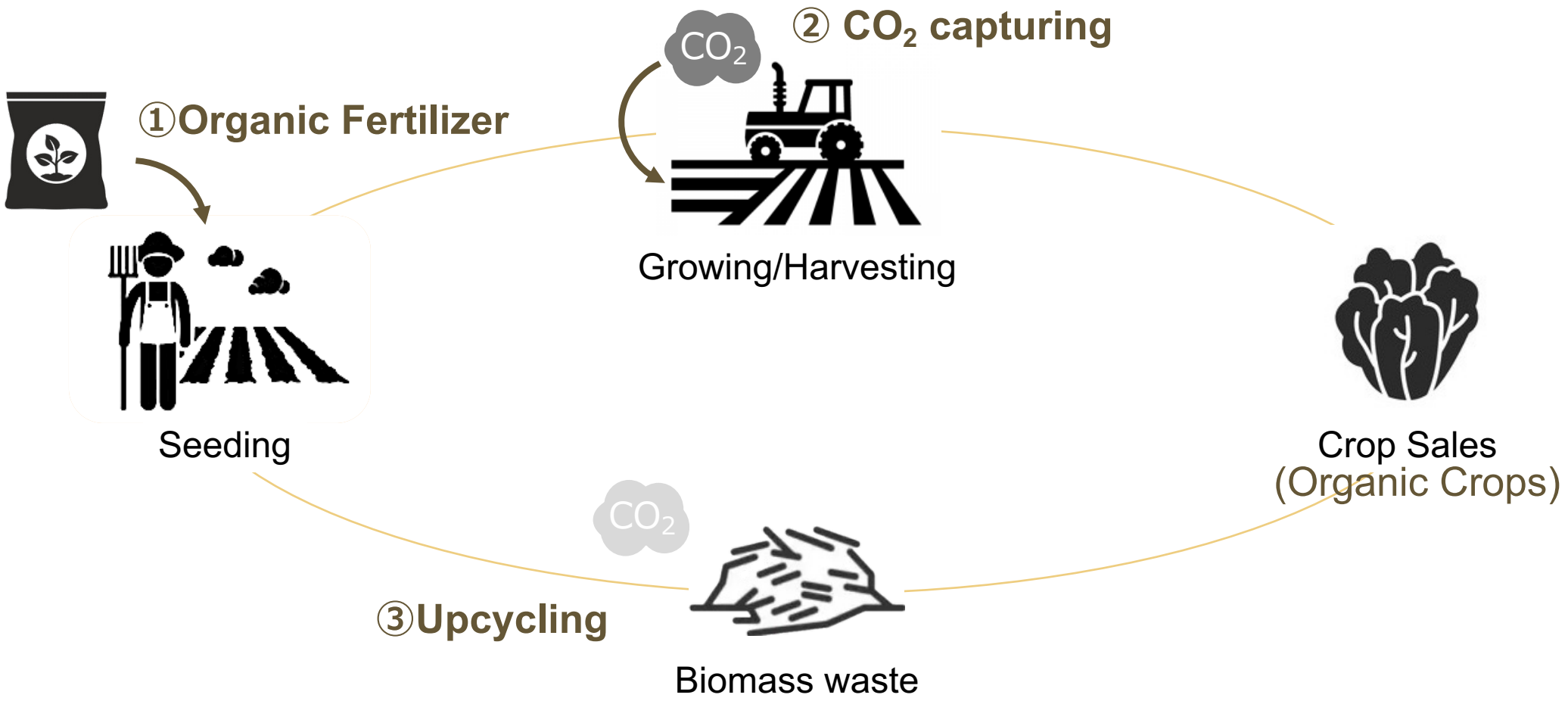


③Unused biomass

Dispose / Incinarate

Our concept

"Chemical, CO_2 emitting, linear" → "Organic, CO_2 capturing, circular"



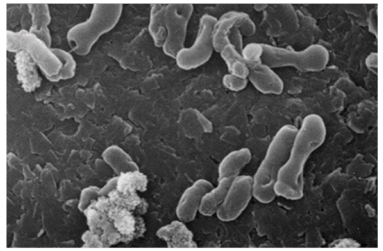
Our product; high performance biochar “SORATAN”

SORATAN

宙炭

Our product; high performing biochar “SORATAN”

Organic material made by mix of microorganism, biochar, and organic fertilizer



Soil derived microorganism

(Nitrifying, ammonification bacteria)

Biochar

(e.g. Rice husk, livestock manure)

Organic fertilizer

(e.g. Chicken manure, fish powder)

SORATAN

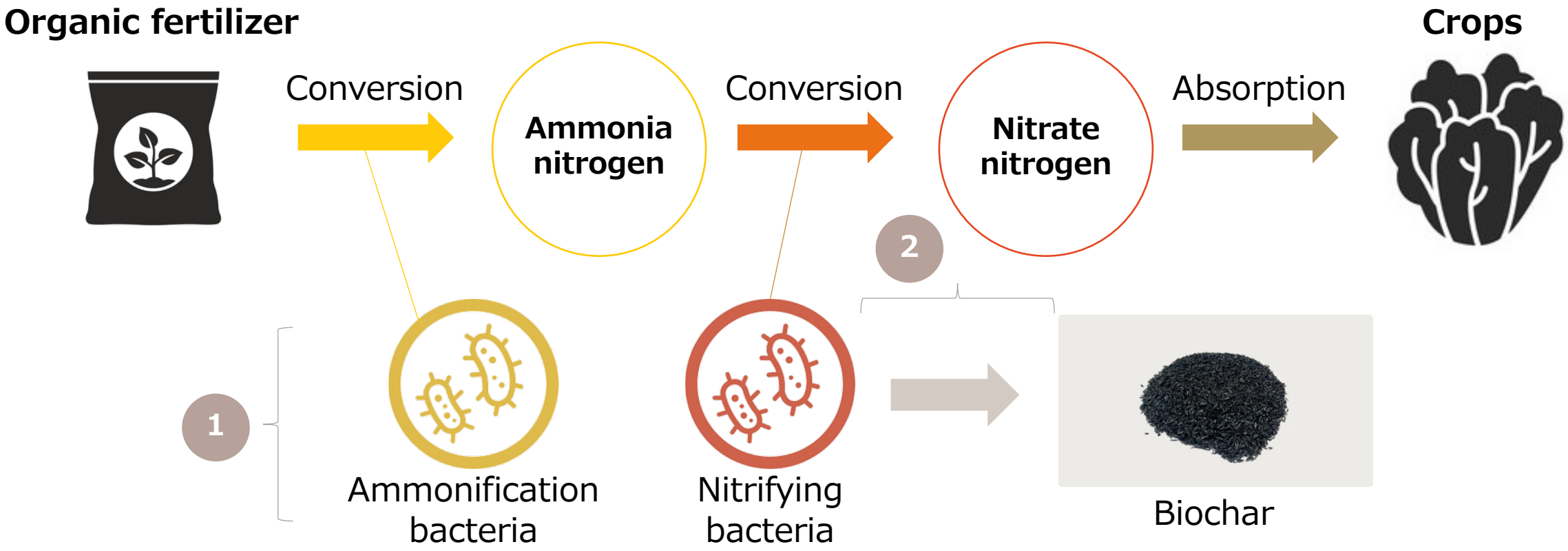
Approved in “Green Food System Strategy” by the Japanese Ministry of Agriculture, Forestry and Fisheries

Core technology; microorganism cultivation technology

Combining several patented technologies to maintain the balance of certain bacteria within a soil, and to attach them into biochar

1 **Key Technology One** — To maintain the balance of microorganism portfolio

2 **Key Technology Two** — Attach the microorganism into the biochar



Merits achieved by SORATAN

SORATAN contains multiple functions within single product

1. **Super fast soil preparation**

2. **Yield increase**

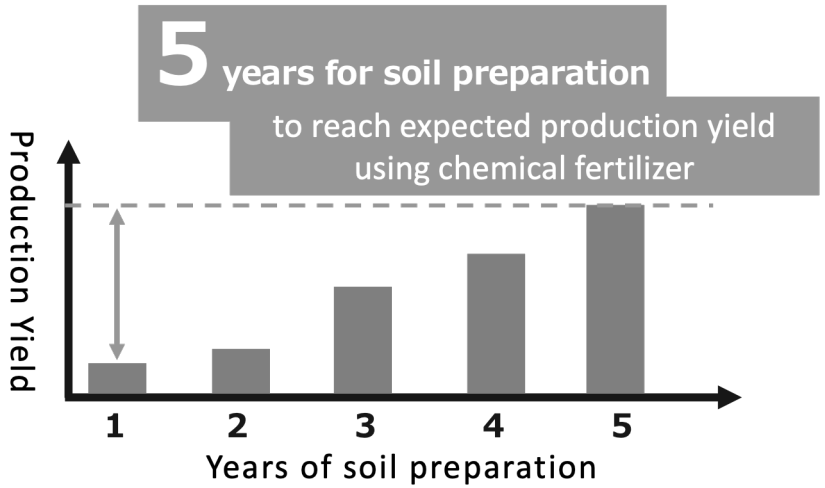
3. **Suppress disease**

4. **Upcycle biomass waste**

5. **Store CO_2**

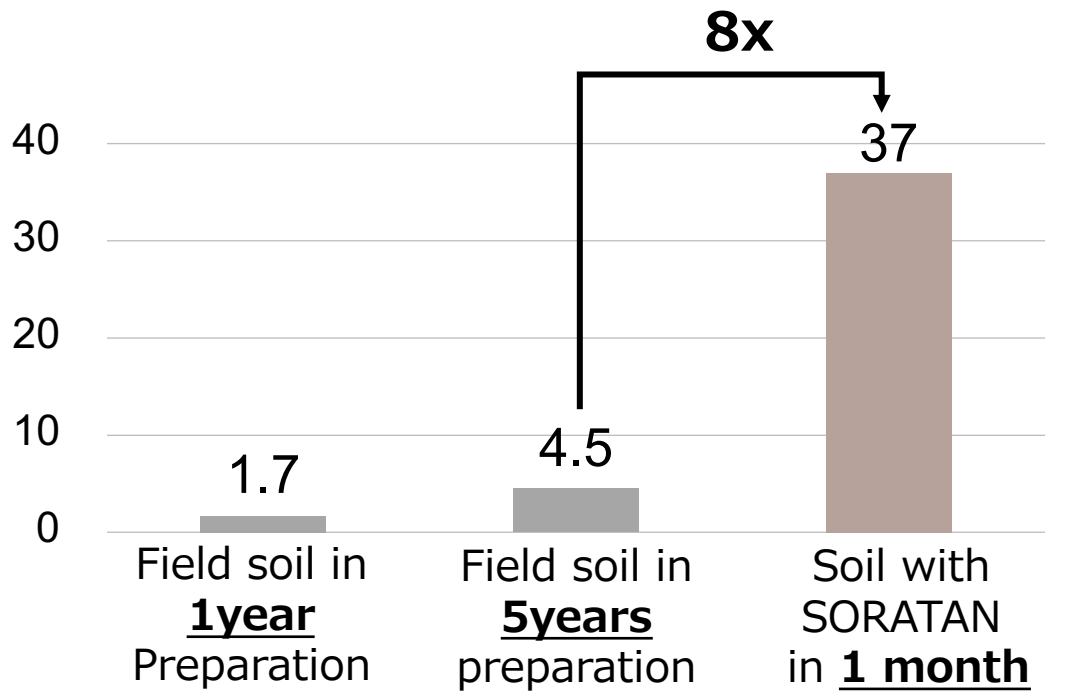
Merits achieved by SORATAN; ① Super fast soil preparation

1 month soil preparation (60x faster than conventional method)



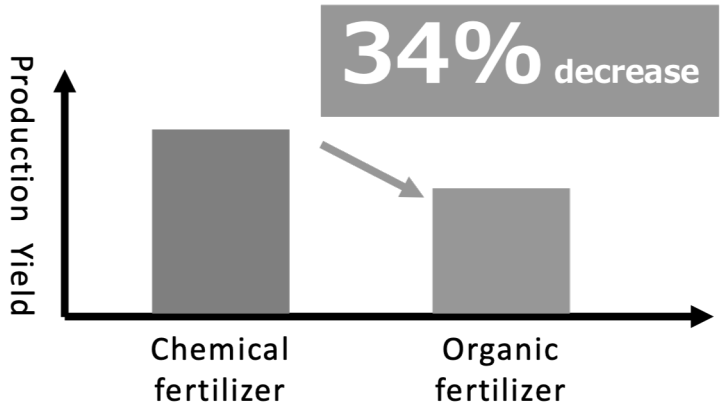
Accelerates soil preparation

5year → 1month

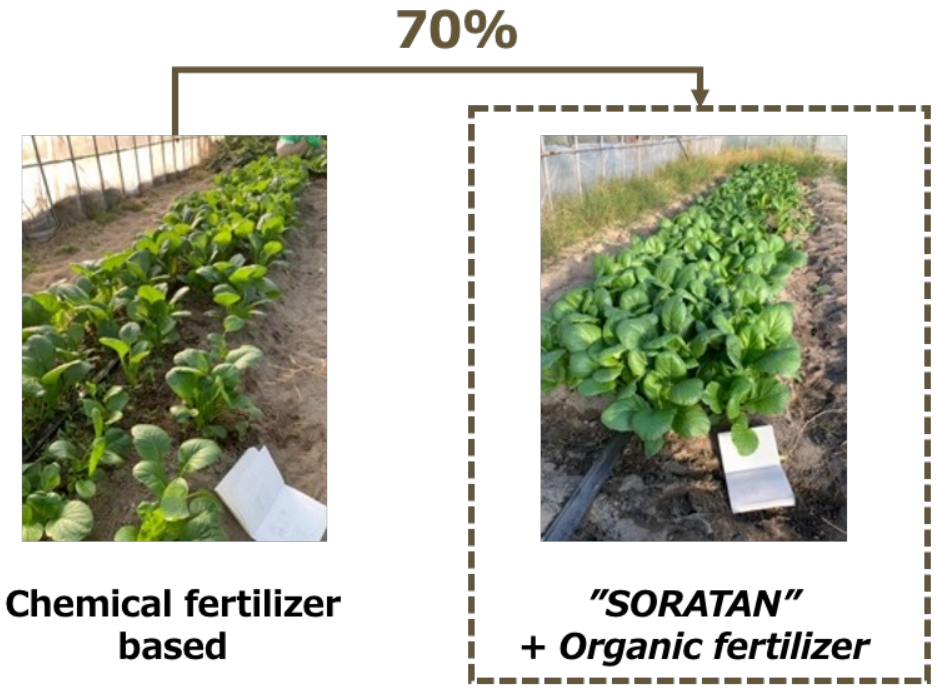


Merits achieved by SORATAN; ② Yield increase

+10~70% yield increase compared to chemical fertilizer



Together with organic fertilizer,
+10~70% increase the yield



Merits achieved by SORATAN; ② Yield increase

Gathering data from around 200 farmers in Japan and observing +10~70% yield increase

Potato (+11%)[1)]

Onion (+18%)[2)]

Watermelon (+37%)[1)]

Eggplant (+57%)[1)]

188 farmers

30+ Crop types

- Green pepper
- Tomato
- Strawberries
- Rice
- Sorghum
- Cabbage
- Snap peas
- Wild Rocket
- Ginger
- Soybeans
- Okura
- Zucchini
- Mary Gold
- Chamomile
- Others…

1. Compared with chemical fertilizer. Substituted 100% of it with organic fertilizer
2. Compared with incumbent organic fertilizer

Merits achieved by SORATAN; ③ Suppress disease

By specific microorganisms inoculated in biochar, generation of antibiotics suppress the occurrence of certain diseases

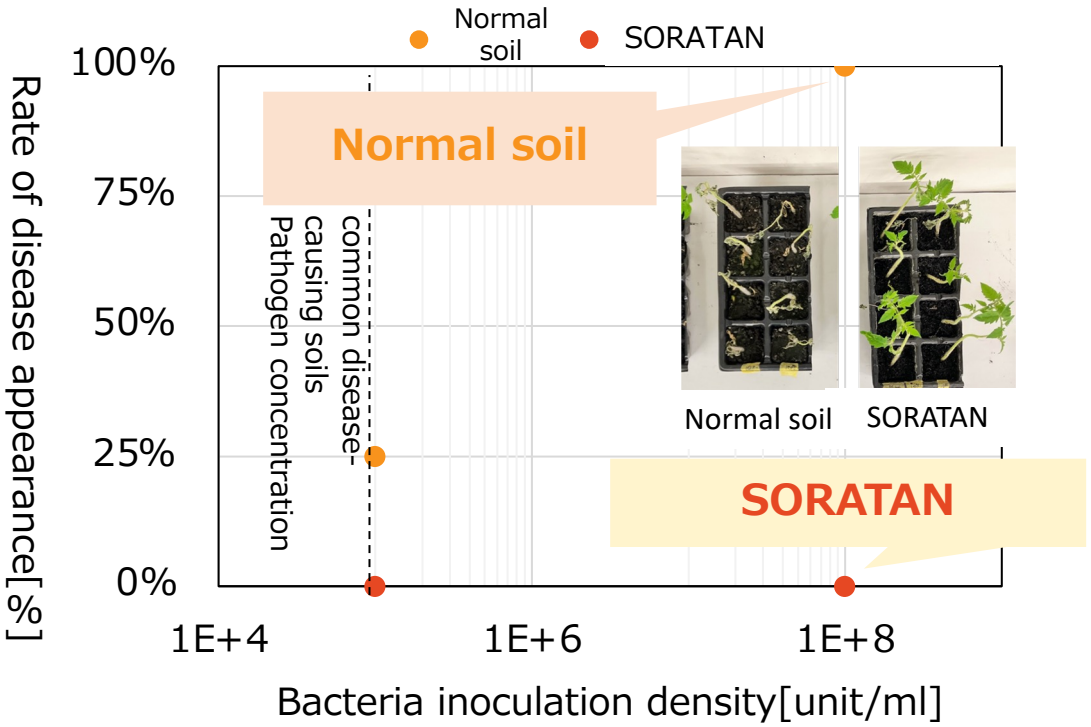
suppression of root rot disease by Fusarium oxysporum f. sp.*

A : No inoculation

B : Inoculation (w microorganism)

C : Inoculation (w/o microorganism)

suppression of bacterial wilt disease by Ralstonia solanacearum**



*Meeboon, J.*et al.* Generation of *Fusarium oxysporum*-suppressive soil with non-soil carriers using a multiple-parallel-mineralization technique. *Sci Rep* **12**, 7968 (2022).

**Test result by TOWING lab

Merits achieved by SORATAN; ④ Upcycle biomass waste

Testing more than hundred of biomass to be used as a high performance biochar

Tested
More than 100 types of biomass

Major use for SORATAN in Japan

Plant related

Food process related


Rice husk


Chicken manure


Vegetable stem


Sugarcane bagasse

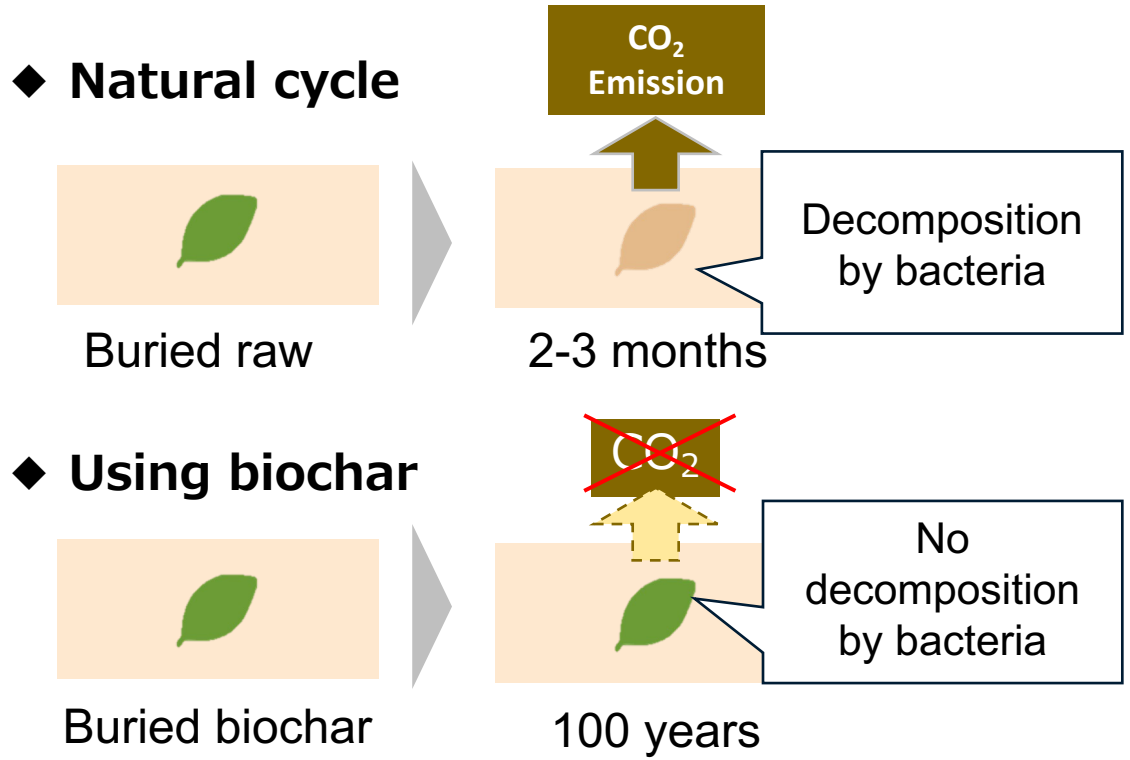

Tea residue


Coffee residue

Merits achieved by SORATAN; ⑤ Store CO_2

Biochar can sequester and store 10 ton-CO_2e for 1ha of farmland

Mechanism of CO_2



Prevents supposed CO_2 emission

Carbon credit methodology for biochar

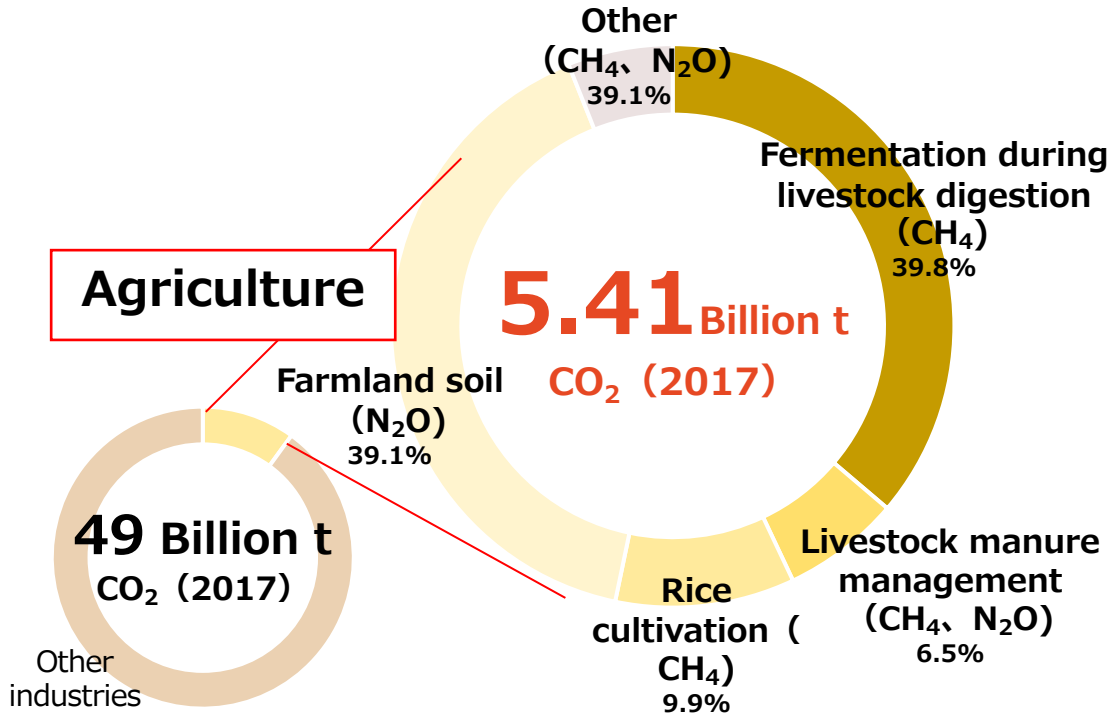
	Methodology	Our Projects
J-Credit	• Exists	• Registered • Issuance; Mid 2024
Verra	• Exists	• TBD
Puro Earth	• Exists	• TBD

Biochar is registered

Merits achieved by SORATAN; ⑤ Store CO_2

Potential to store 7 billion ton-CO_2e globally

Global CO_2 emissions of agriculture



Amount of carbon credits generated by biochar

Global farmland area (Mha)	1,244
	×
Biochar input amount (t/ha)	10
	×
CO_2 fixation amount (CO_2-t/t)	1.14
	×
Biochar input frequency (times/year)	0.5 (Once in two years)
	=
Total CO_2 reduction	**7 Billion t/year**

Source: Ministry of Agriculture, Forestry and Fisheries、JIRCUS

Practical application of SORATAN in a farmland

10t/ha

Farmland (1ha)

CO_2 **10t**/ha

After 1month…

Ready for seeding

Farmland (1ha)

Reduce input to
2t/ha/yr for following year

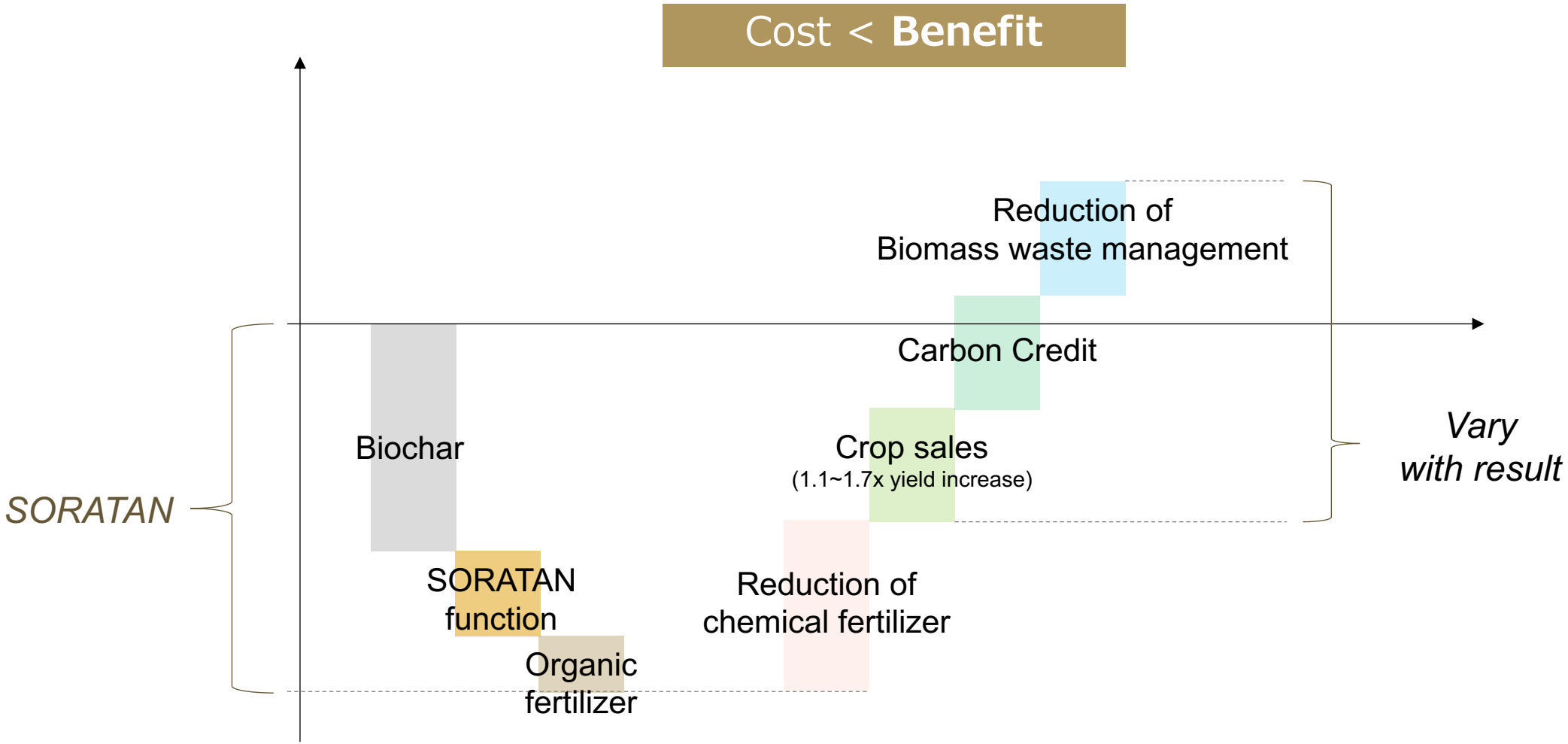
Practical application can be customized based on local farming operation
(the images below is the application in Japan)

①Spray SORATAN manually or with equipment (manure spreader etc)

②Till the biochar into the soil to make it blend

Typical use case

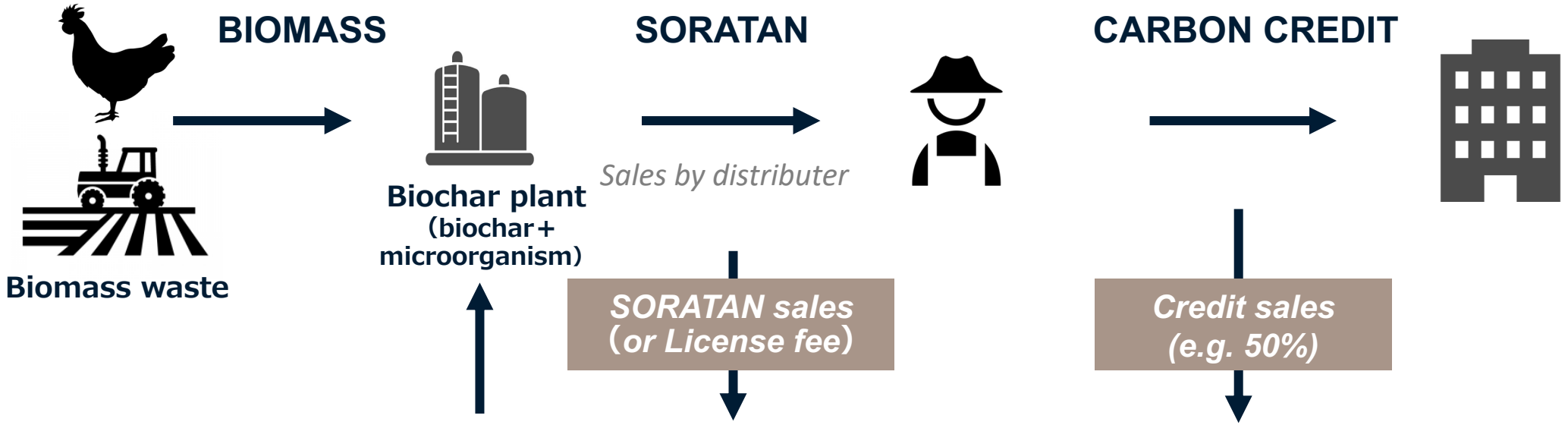
➢ *Cost overview*



Overview of our business model

We assume three variation of revenue; (1) Sales of SORATAN, (2) Licensing of our technology, and (3) Carbon credit generation

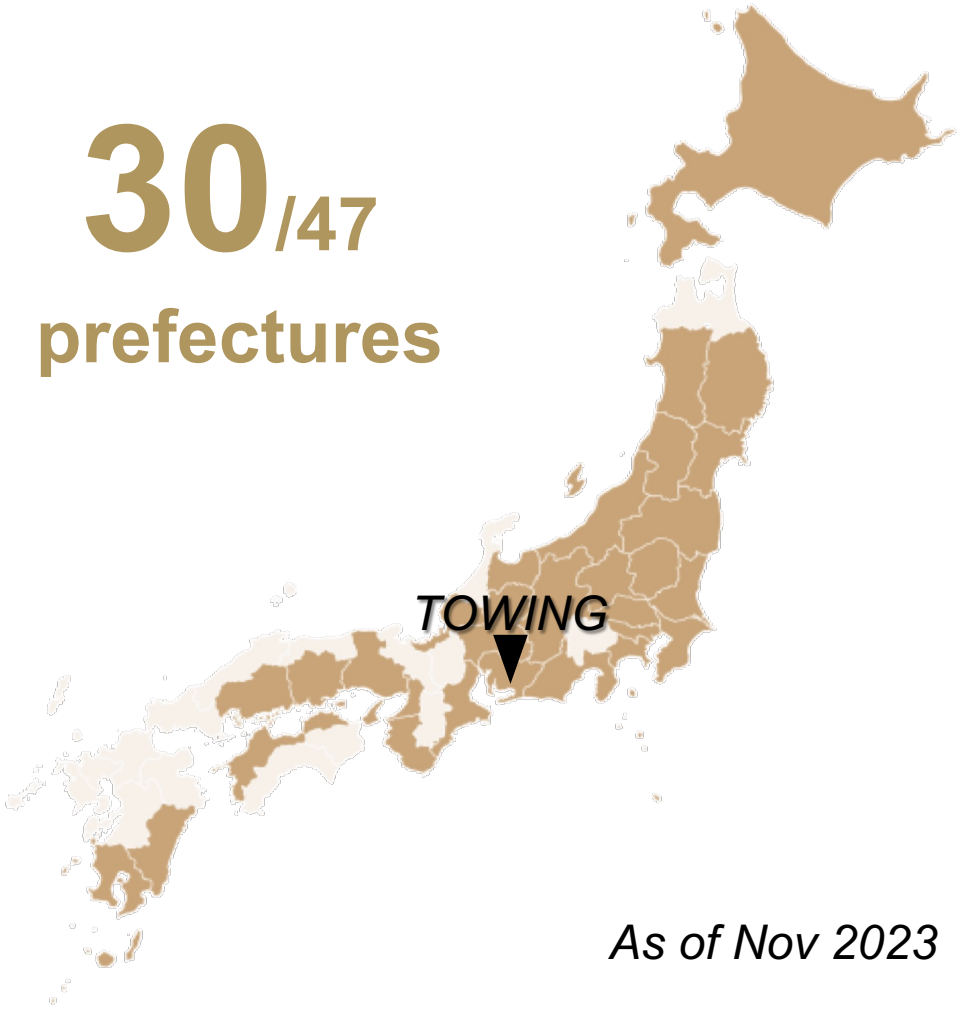
Biomass procurement and SORATAN production → ***SORATAN application*** → **Carbon Credit Generation**



Traction

Creating revenue, receiving positive feedback from our customers all over Japan

30/47
prefectures

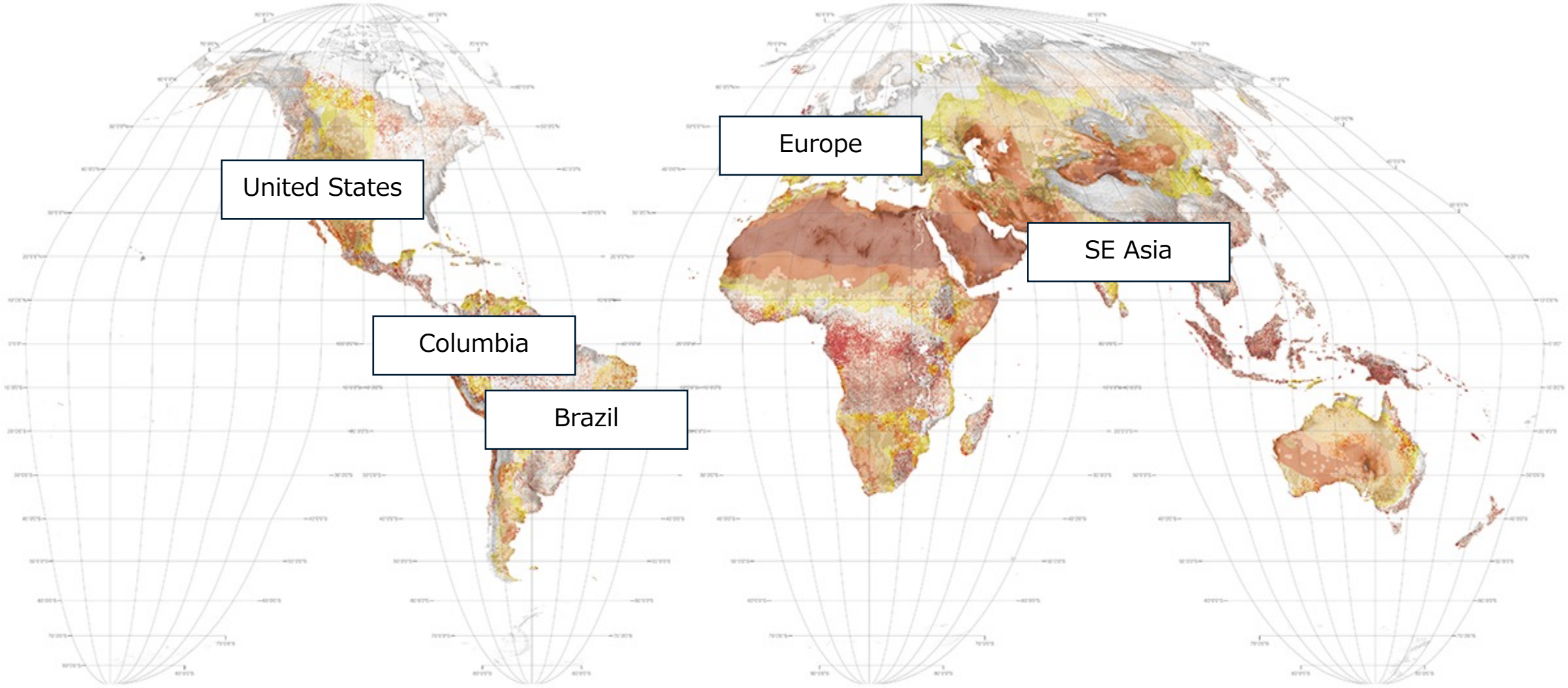


As of Nov 2023

Over 180
Customers

Global implementation

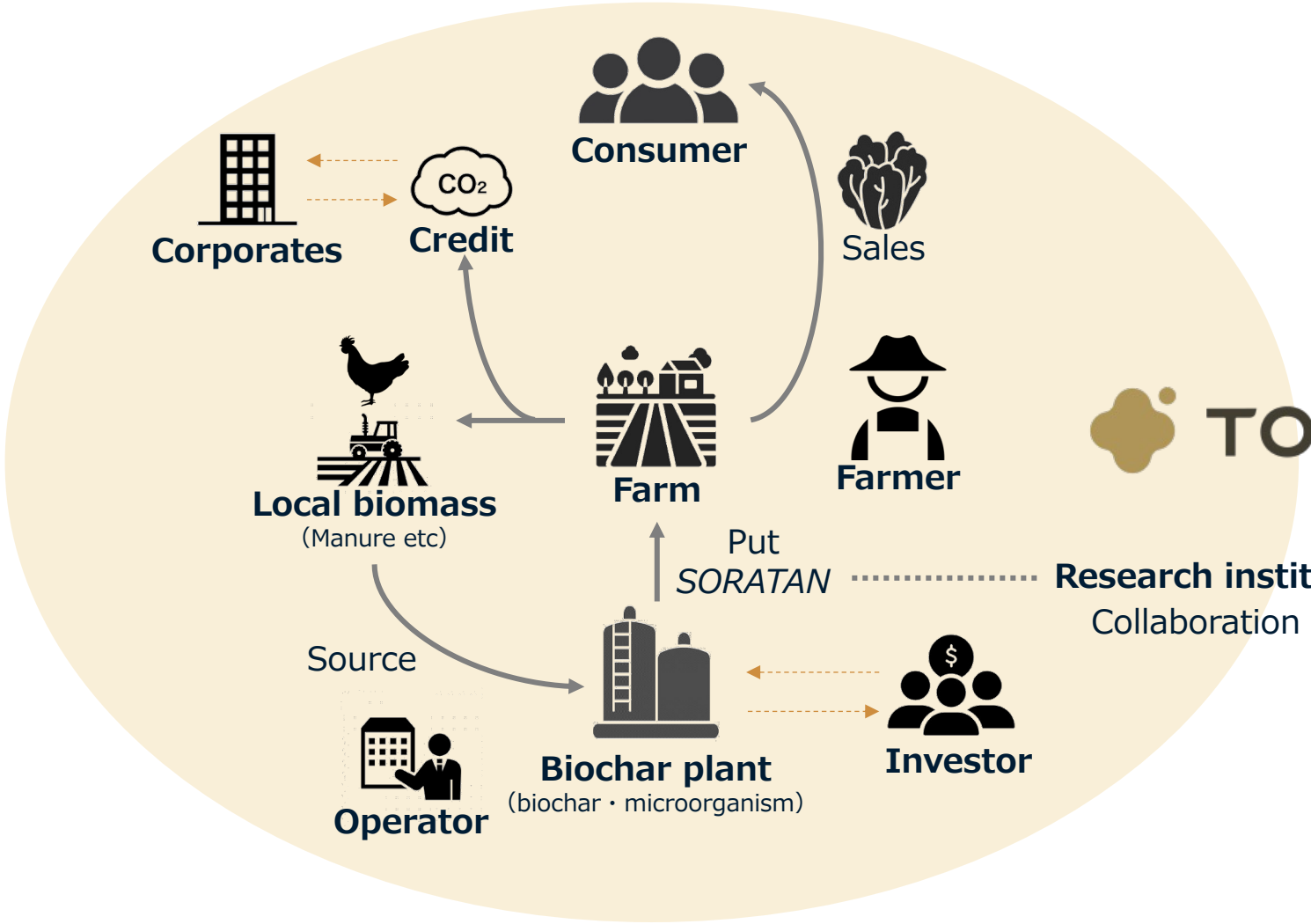
We are in initial discussion with multiple countries



Source) Atlas for the end of the world

Potential of ASEAN

Biochar has not been industrialized yet, but has huge potential



TOWING

Potential of ASEAN

Huge potential in ASEAN; Amount of biomass waste (Input)

<Accessible agri-biomass>
e.g. Biomass in Thailand

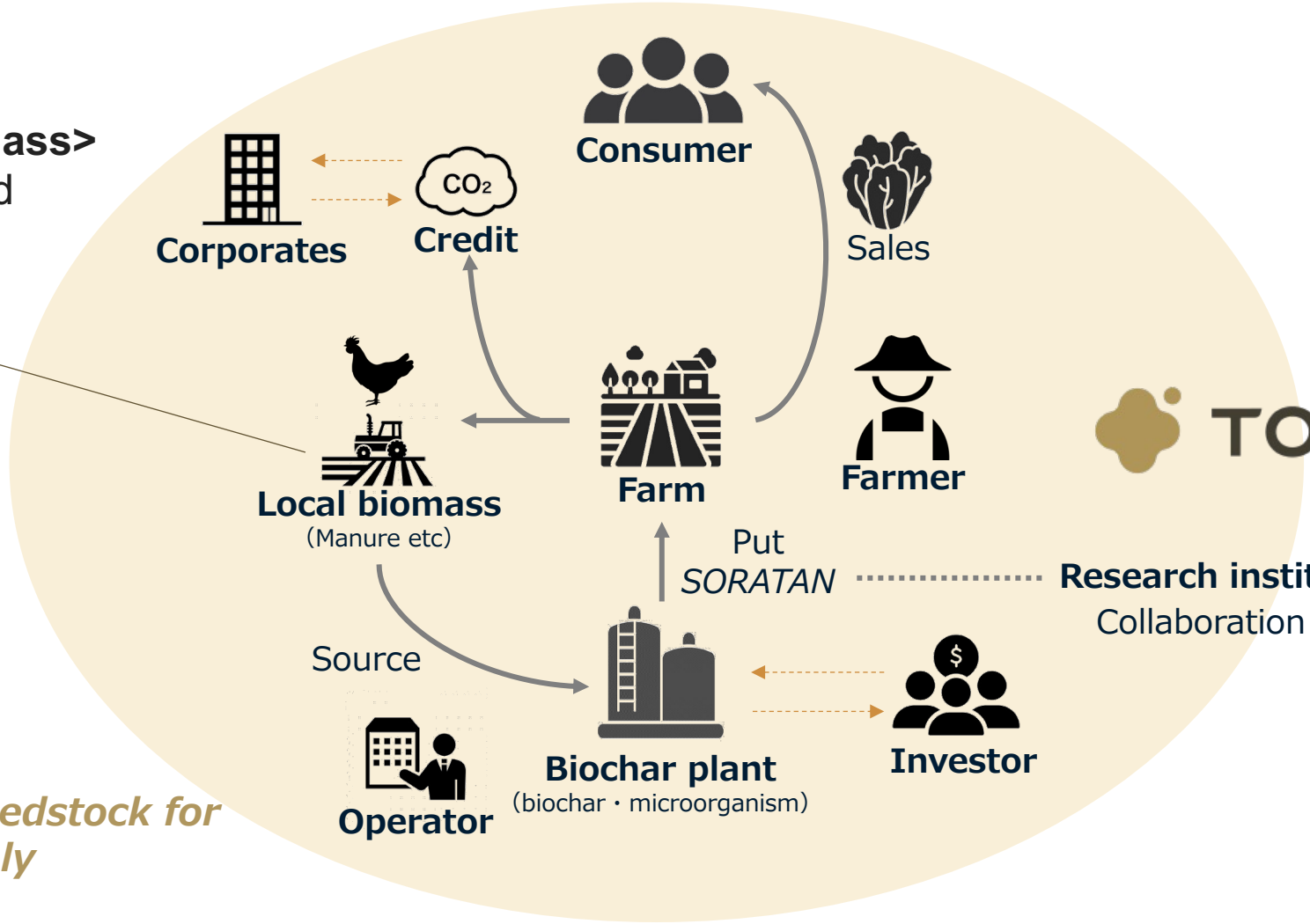
Sugarcane waste
→ 40,000 t/day

Cassava rhizome
→ 18,700 t/day

Rice husk
→ 21,000 t/day

Oil palm EFB
→ 14,800 t/day

Maize stem
→ 24,400 t/day



TOWING

Need to find suitable feedstock for constant supply

Potential of ASEAN

Huge potential in ASEAN; Area to use (Output)

<Accessible agri-biomass>
e.g. Biomass in Thailand
Sugarcane waste
→ 40,000 t/day
Cassava rhizome
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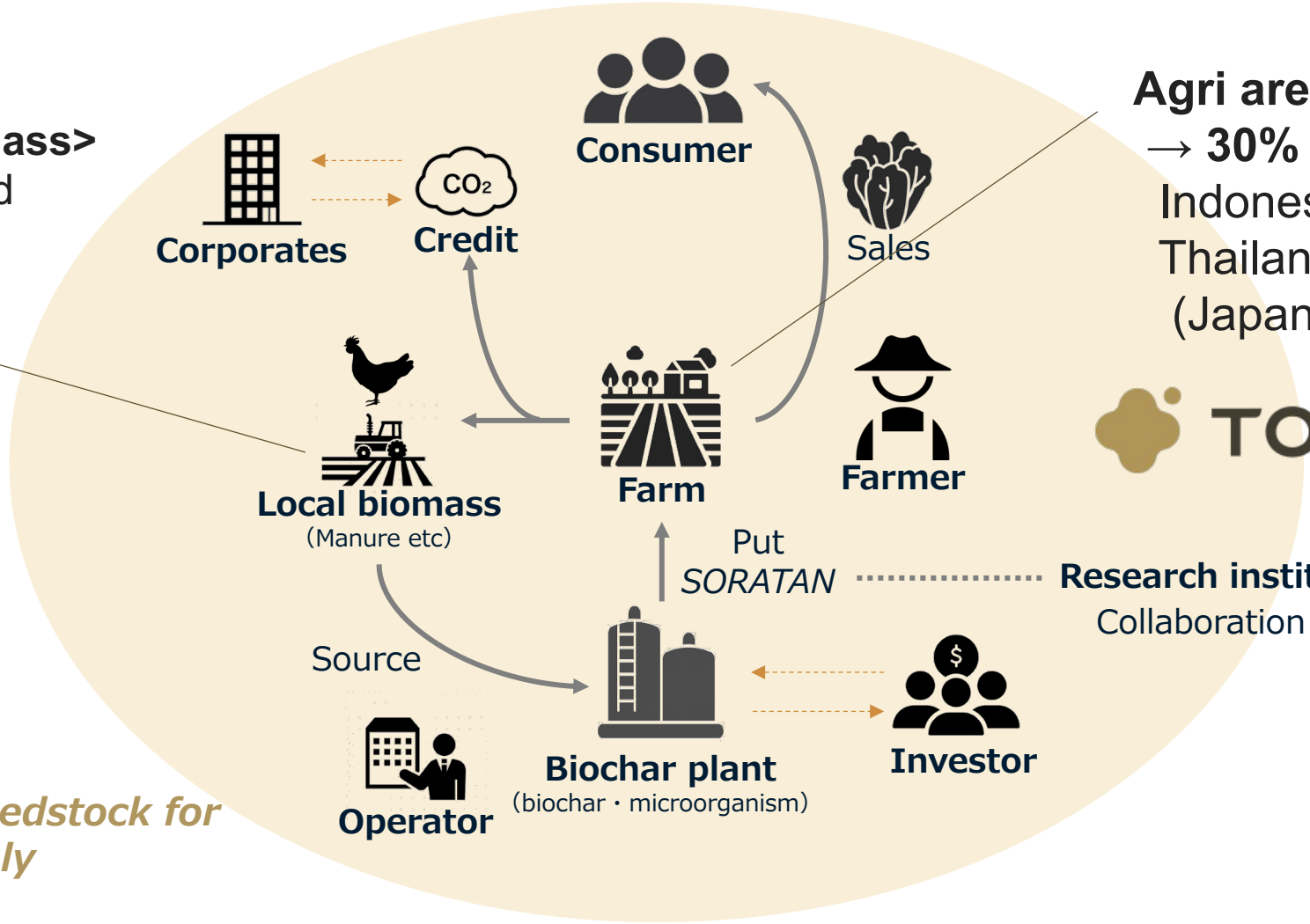


Agri area in ASEAN
→ 30% of land area
Indonesia : 57 mil ha
Thailand : 22 mil ha
(Japan: 2 mil ha)

TOWING

Need to find suitable feedstock for constant supply

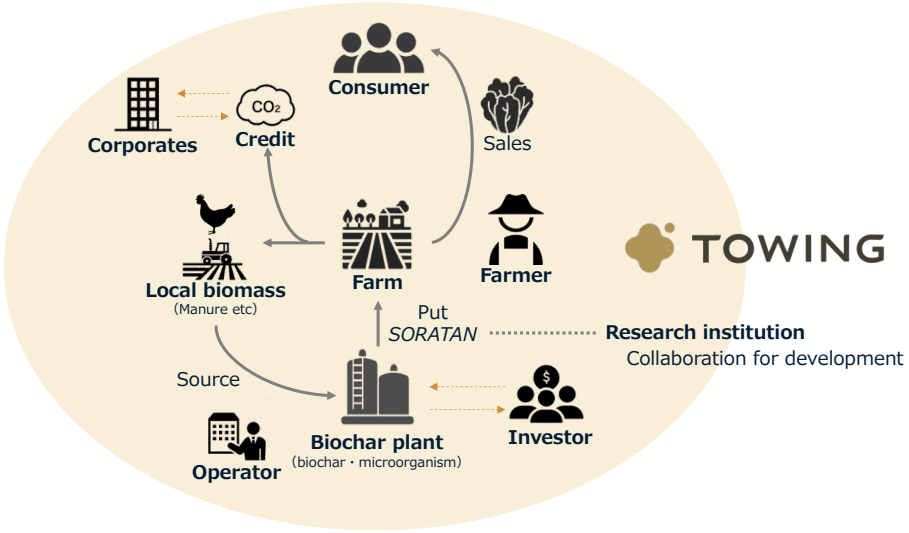
Our status in ASEAN

Planning PoC in 2024. Looking for local partners to collaborate.

- PoC
  - ・Cambodia : 2024/3~ (Crop: Maize)
  - ・Thailand : 2024/10~ (Crop: Maize, Chili)

- ASEAN basement
  - ・Selecting facility for R&D and microorganism cultivation

- In talk with **potential partners in each region**
  - Customers (e.g. farmers, factories, distributers)
  - Producers (e.g. biochar makers, factories)
  - Investors
  - Researchers (e.g. universities, research institution)
  - Biomass waste holders for constant supply



Impact on SDGs goal

SORATAN can make impact on various aspects of SDGs goals

- SORATAN enhances the usage of organic fertilizer, which has positive impact on food health and well being

- SORATAN increases the soil fertility by putting back microorganism into the soil

- Utilizing unused local biomass will reduce unnecessary use of resources

- Excess nutrition from farming derived by chemical fertilizer lands to the ocean in the end, and creates a pollution there. By reducing the usage of chemical fertilizer, we believe there is a positive impact on ocean also

- CO2 capture in the agricultural farmland has huge potential of carbon sequestration, potentially sequester 7 billion tons of CO2e per year

Source; United Nations

Team

We are a team of soil scientists, professionals, and project developers, with around 50 people

CEO : Kohei Nishida

Established TOWING to achieve development of agriculture in the Earth and the Universe

Forbes JAPAN UNDER 30 JAPAN 2023

CHRO : Kae Fujimori

Sustaining business operation by the past experience of HR and PR head in IT industry

CTO : Ryoya Nishida

Developing technology of SORATAN D3 of Graduate school of Nagoya University.

MIT Technology Review Innovators Under 35 Japan

Forbes JAPAN UNDER 30 JAPAN 2023

Head of Overseas Biz Dev : Takuto Nagata

Developing and implementing overseas go to market strategy and partnership.
MBA, IESE

COO : Shunsuke Kimura

Developing and implementing business strategy utilizing the experience of new business launch and research.

Overseas Biz Dev : Shogo Okishio

Developing and implementing overseas go to market strategy and partnership.

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トーイング

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