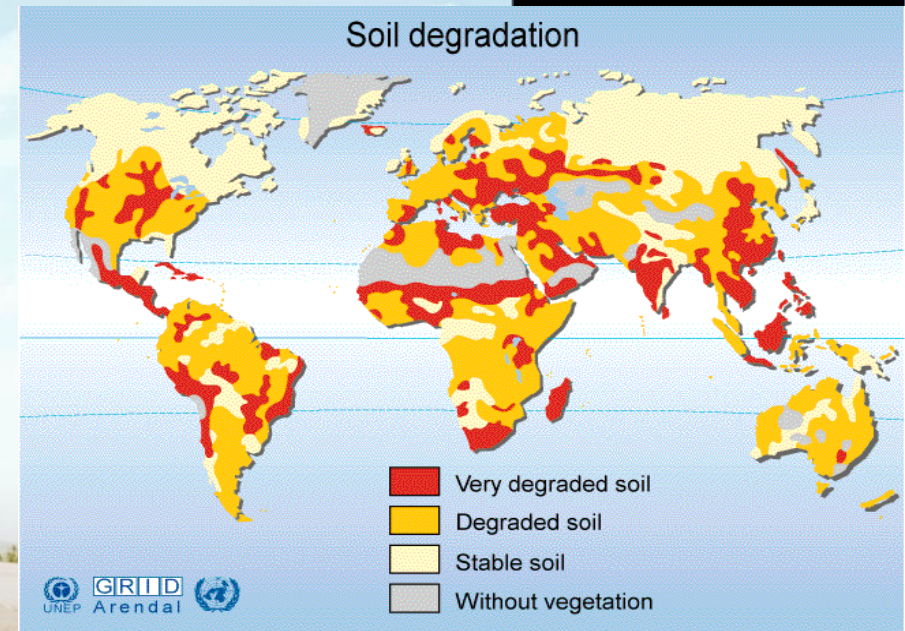


HUSK

building soil – sinking carbon - improving lives
ADB Circular Economy Webinar Series
7th June 2022



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One football pitch (of soil) lost every 5 seconds.

FAO, 2015

Intensive agriculture has depleted soil organic matter.

INTERGOVERNMENTAL TECHNICAL PANEL ON SOILS, 2015

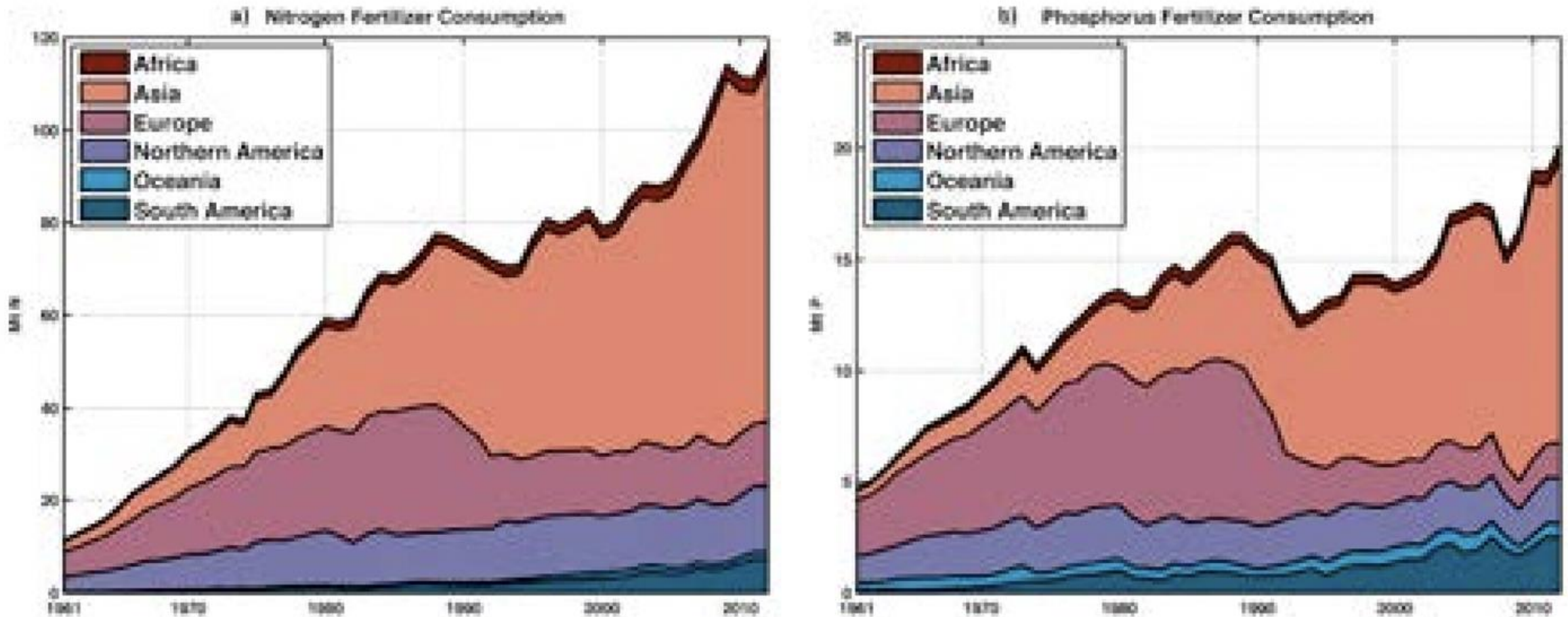


Figure 2.3 | Global (a) nitrogen (N) and (b) phosphorus (P) fertilizer use between 1961 and 2012 split for the different continents in Mt P per year. Source: FAO, 2015.



Ukraine crisis threatens global food security, over 50% of sunflower oil and 30% of global wheat production from Russia & Ukraine.

Record-high fertilizer prices and unstable supply chains further threats

Fertilizer prices

US\$/mt

— DAP — Urea — MOP



Note: DAP = diammonium phosphate. MOP = muriate of potash. Last observation is April 2022.

Source: Bloomberg; World Bank. • [Embed this chart](#) • [Download image](#)



350 million smallholder farmers across Asia produce around 80% of the food consumed in the region.

Circular economy solution



At HUSK we transform rice husk into biochar products to regenerate soils, boost yields and remove carbon from the atmosphere.

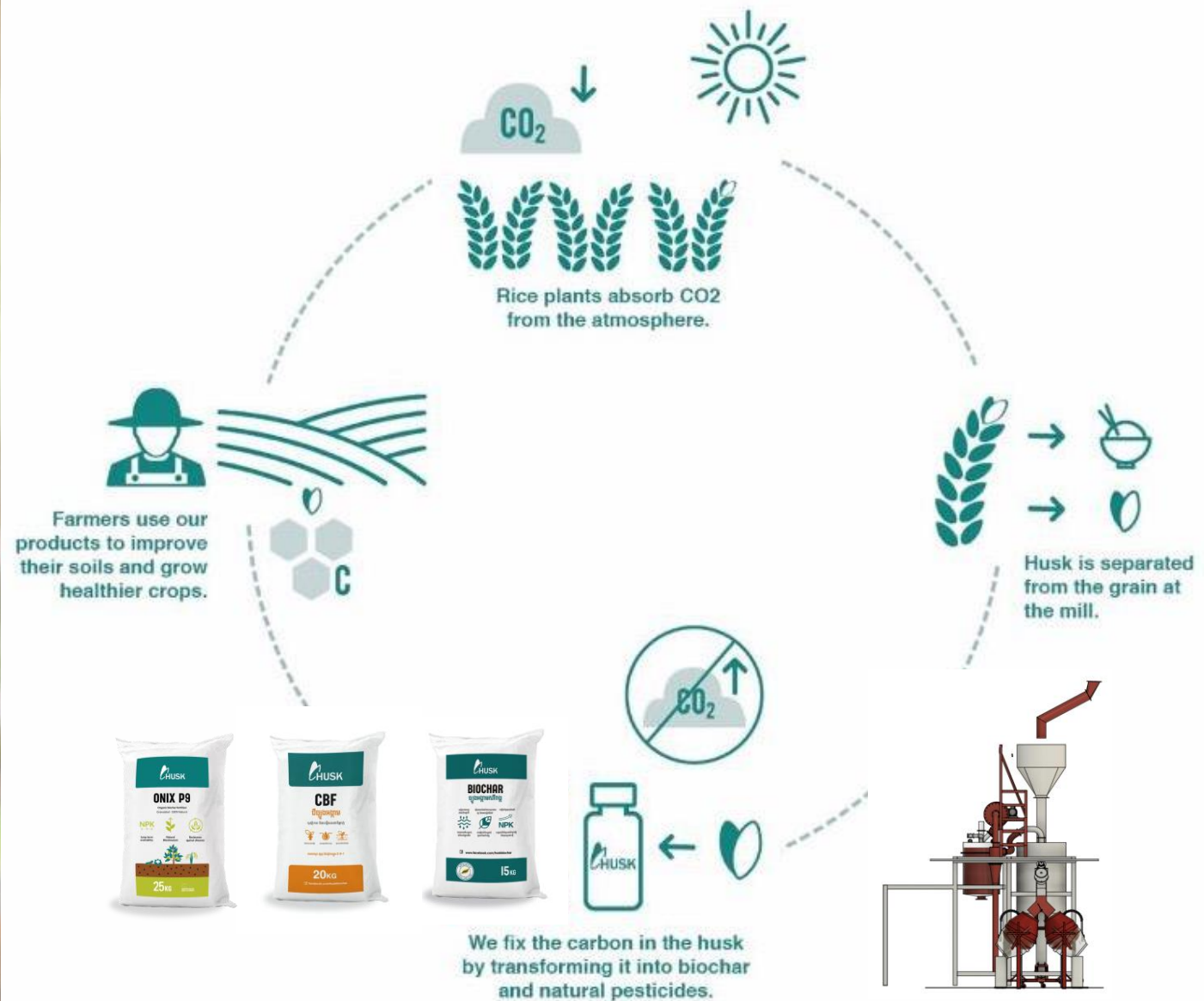


HUSK production site
AMRU Organic Rice Mill, Cambodia





Len Neang, Amarak Farm,
Cambodia



Soil enhancement from seed to harvest



100% organic biochar to regenerate soils and maximise water retention



High impact blend of granulated carbon based biofertilizer to boost yields

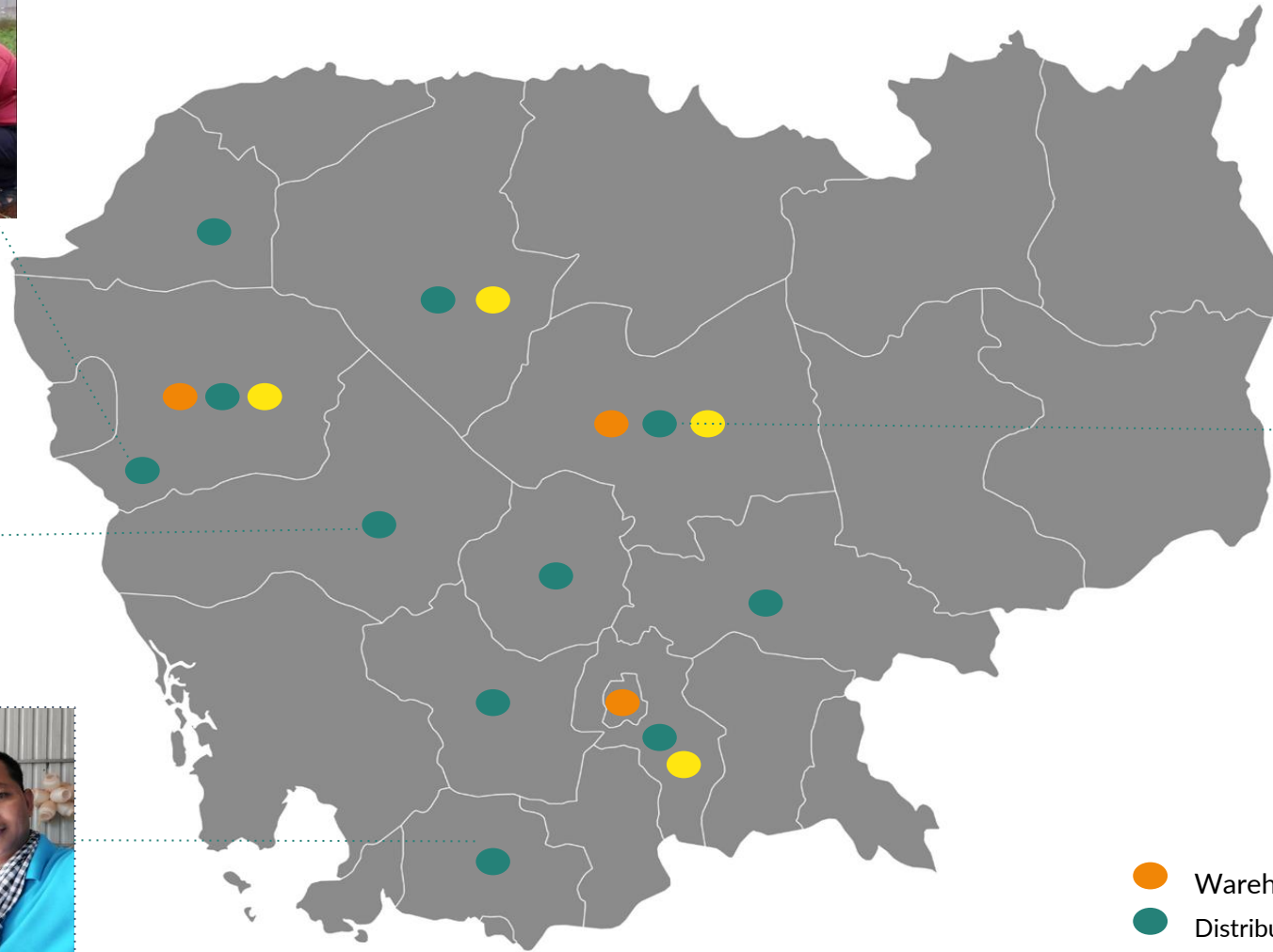


Quality seedling mix for effective germination and water management

DISTRIBUTION



Distribution strategy



- Warehouse
- Distributor
- Women Superfarmer Pilot

SE Asia Markets



58.902 Tn
Total Addressable Market



47.500 Tn
Service Available Market

Laos

7.668
Ha Organic Agriculture

Vietnam

238.000
Ha Organic Agriculture



264.737 Tn
Total Addressable Market

119.000 Tn
Service Available Market

Thailand

95.000
Ha Organic Agriculture

Cambodia

11.042
Ha Organic Agriculture

43.308,51 Tn
Total Addressable Market

5.521 Tn
Service Available Market

IMPACT



Field Trials Context

Farm trials have been carried out since 2018 to test HUSK's biochar and vinegar with on 220 different farms in 13 provinces and with 8 different collaborating partners, including three international development organisations (iDE, SNV and USAID).

34 different types of crops grown in trials.

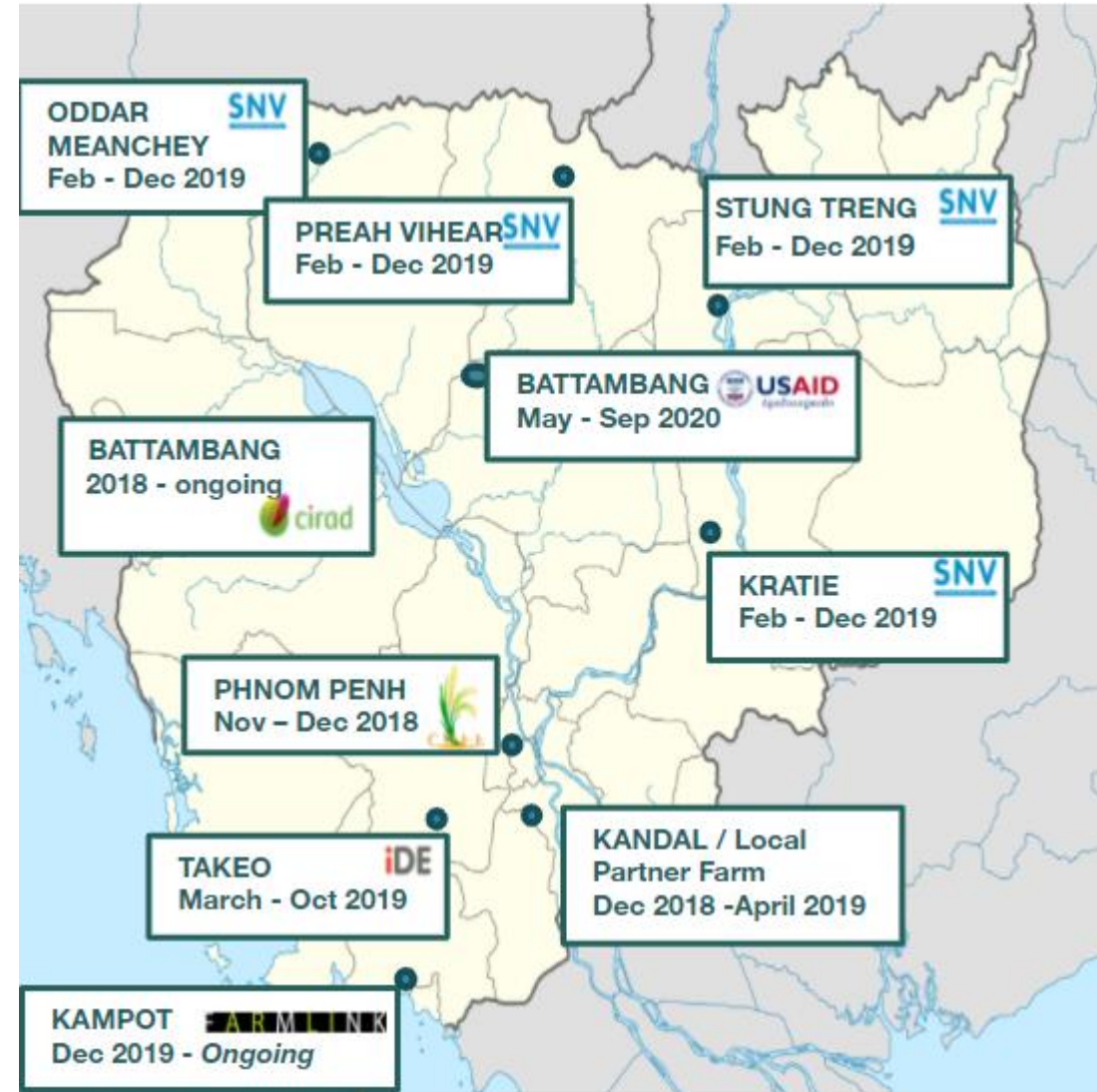
All HUSK products trialed: HUSK organic biochar (157 farms), HUSK Natural Insect Repellent (46 farms) and Carbon Based Fertiliser (56 farms).

Field Trials Methodology

Trial plots were divided into:

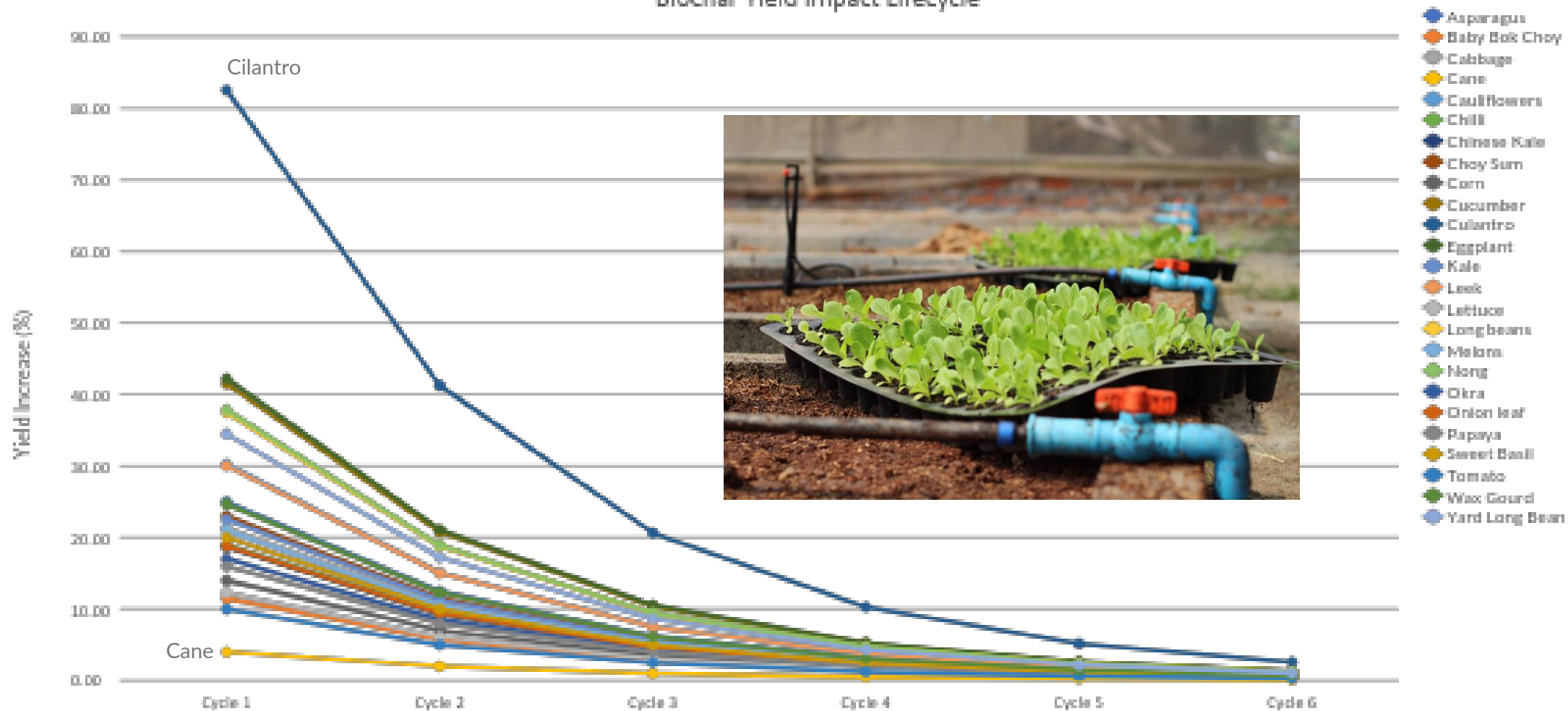
- Control blocks : standard practices followed
- Treated blocks: prepared in the same way as control blocks with the addition of biochar or CBF + vinegar

Crop yield data was collected at harvest and yields between control and treated plots were compared.



30% average yield increase

Biochar Yield Impact Lifecycle



*Application rate 1kg/m² once every 2 years .



Income improvement compared to traditional method

Only positive improvement cases

23%

Case	% change in income
1	0.00%
2	10.00%
3	12.00%
4	30.00%
5	10.00%
6	22.00%
7	18.00%
8	10.00%
9	12.00%
10	15.00%
11	38.00%
12	5.00%
13	10.00%
14	8.00%
15	15.00%
16	70.00%
17	75.00%
18	5.00%
19	48.00%
20	10.00%
21	8.00%
22	2.00%
23	85.00%
24	115.00%
25	25.00%
26	23.00%
27	10.00%
28	60.00%
29	12.00%
30	2.00%
31	2.00%
32	32.00%
33	0.00%

Average income improvement compared to traditional method.

Income for both control and trial plots was extrapolated to a per farmer, per hectare, per year income and then compared to determine percent income improvement by farmer for an estimated year income (2-3 crop cycles).

Serch Sokun - Kale



80% yield increase



\$7.288 estimated annual income improvement after Year 2



49% annual income improvement compared to traditional method



ROI 1,89

Driving success factor: Significant increase in crop yield combined with top crop market price of \$1,50/kg.

*All numbers reported per hectare



Serch Sokun - Kale

1,89

ROI for NIR

\$7.288

Total income improvement
per Ha

49%

Income improvement
compared to traditional
method

80%

Yield Increase

Driving success factor: Significant increase in crop yield combined with top crop market price of \$1,50/kg.

*All numbers reported per hectare

Lettuce – Crop Case



29% yield increase



\$965 estimated annual income improvement after Year 2



51% annual income improvement compared to traditional method



ROI ,72

*All numbers reported per hectare



Cucumber – Crop Case



23% yield increase



\$1.503 estimated annual income improvement after Year 2



13% annual income improvement compared to traditional method



ROI 3,37

*All numbers reported per hectare

ONIX P9

Our new product ONIX P9 is priced competitively with traditional fertilizers + repellents.

Farmers participating in the trials of ONIX P9 prototypes reported:

100% improvement in plant and crop quality: less insects, sweeter and good looking fruits, healthy and green plant

90% increased yields

44%

Average Yield Increase
for all crops

200%
Max Yield
Improvement

6%
Min Yield
Improvement

9% of farmers saw no yield change but improvement regarding insects and crop quality

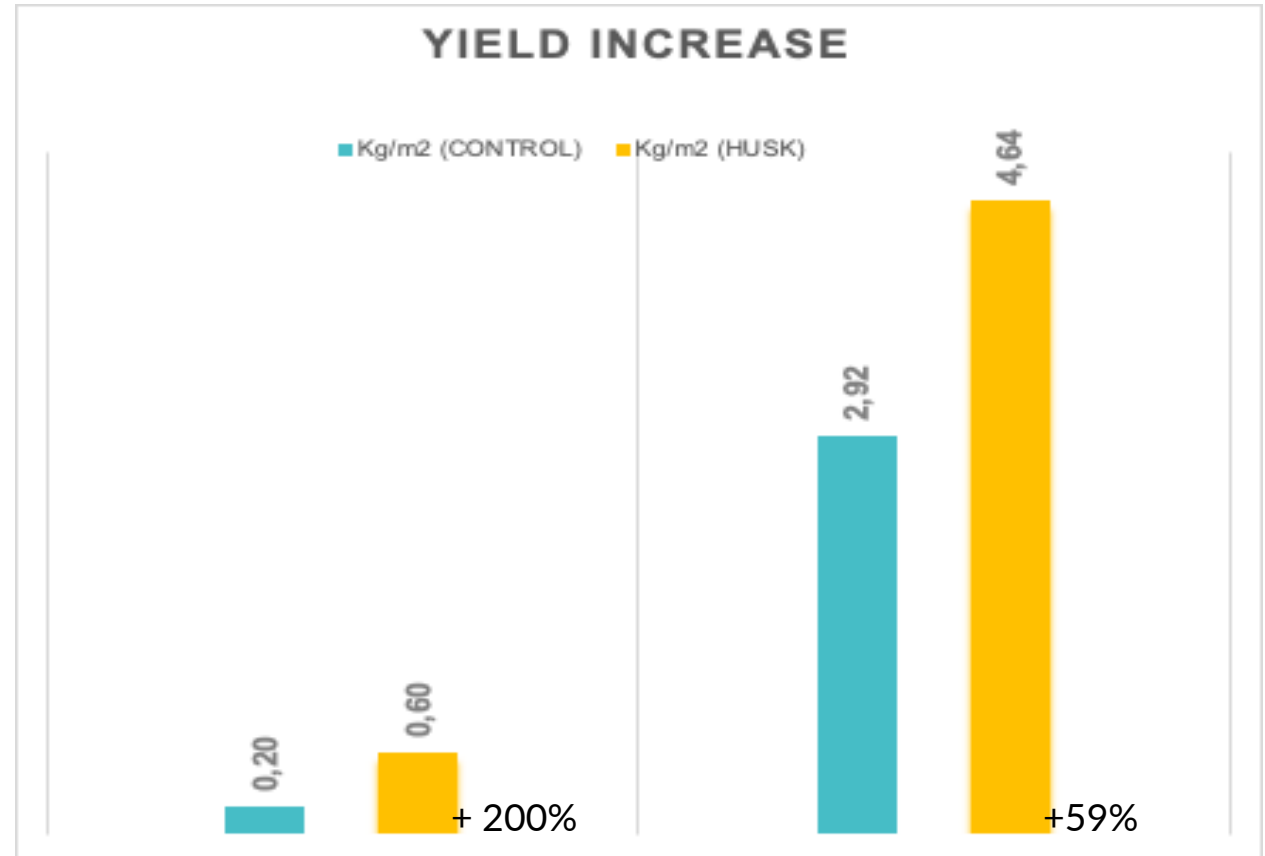
Muskmelon – Crop Case



Farm 1 had a
production
accident



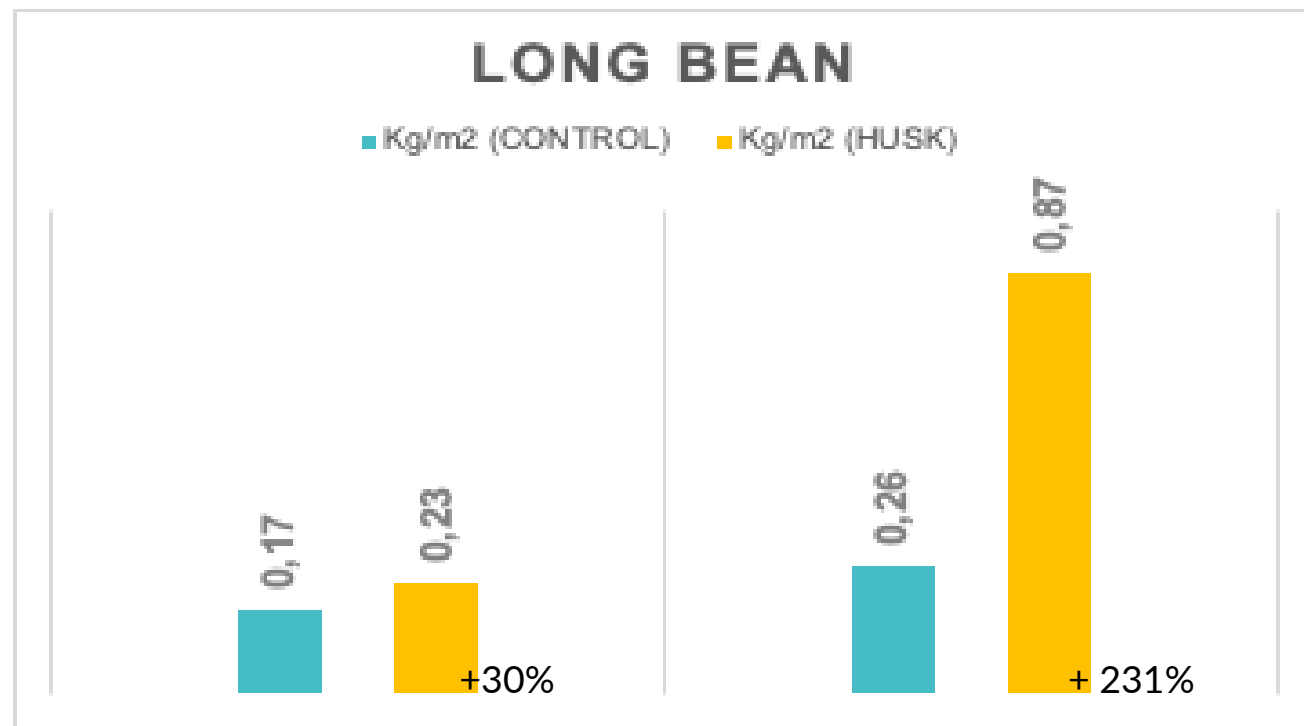
FARMERS COMMENTS:
LESS INSECTS
SWEET FRUITS



MEAN INCREASE 68%

*Farms in Siem Reap province

Long bean – Crop Case



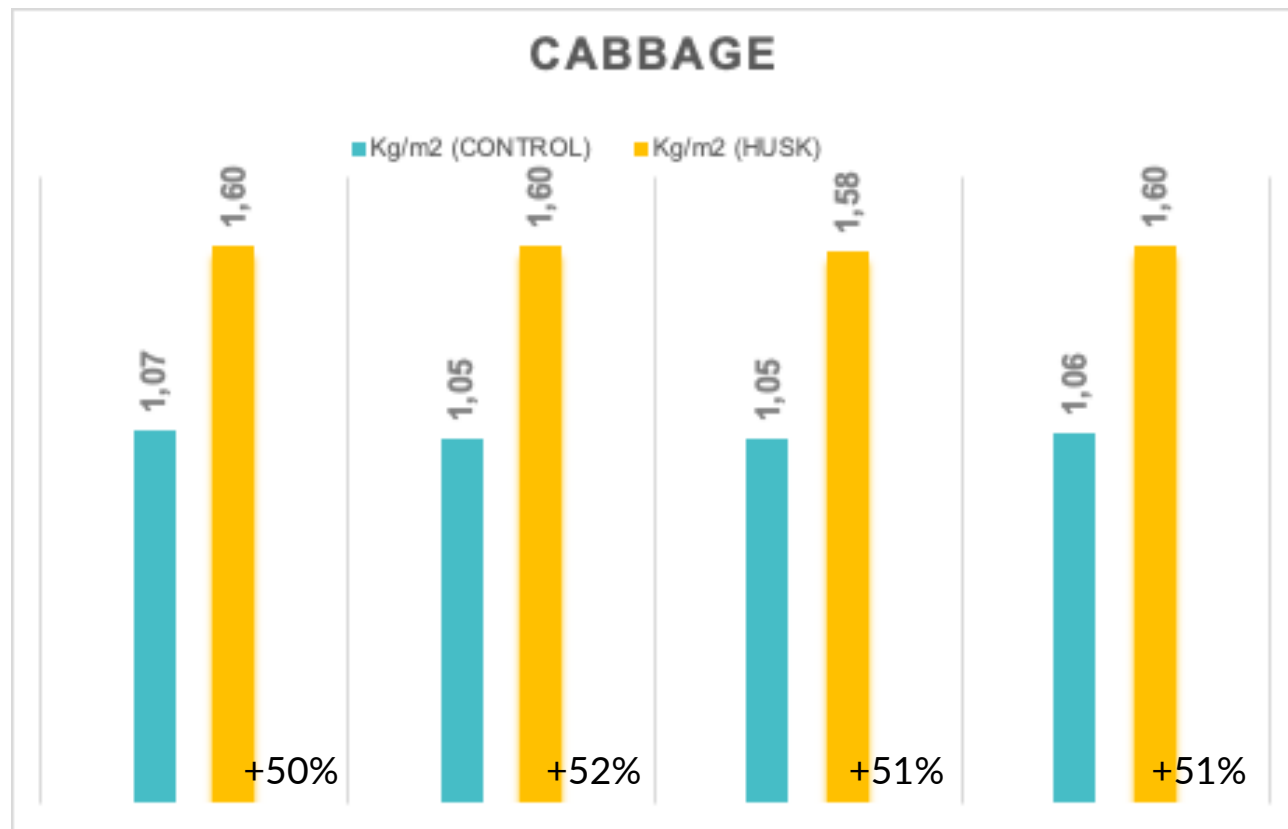
MEAN INCREASE 151%



FARMERS COMMENTS:
GREEN LEAVES
SWEET FRUITS

*Farms in Siem Reap province

Cabbage – Crop Case



FARMERS COMMENTS:
KEEPS SOIL MOISTURE
BIGGER GREEN CABBAGES

MEAN INCREASE 51%

*Farms in Battambang province

SCIENTIFIC PUBLICATION:

Effect of adding biochar with wood vinegar on the growth of cucumber

Xin Pan, Yipeng Zhang, Xiao Wang, and Guocheng Liu*

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College of Environmental Science and Engineering, Ocean University of China,
Qingdao 266100, China
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Abstract. The chemical fertilizers are abused to improve crop yields, which cause lots of soil problems (e.g., soil compaction and native nutrient loss). We thus investigated the potential of the combination of biochar and wood vinegar as a new type of fertilizer to replace the traditional fertilizer. The results in this study showed that the combined addition of biochar with wood vinegar had the greatest promotion effect on the plant growth of cucumber. Compared to the control treatment, the biochar addition with wood vinegar significantly increased the plant height, root length, root volume and root tips by 29.7%, 117%, 121% and 76.1%, respectively. These positive effects could be attributed to the benefits of the addition of biochar with wood vinegar treatment on improving soil fertility, increasing nutrient supply, and further stimulating plant growth. Overall, the combination of biochar and wood vinegar could be a promising fertilizer to promote plants growth and enhance crop yields.

SUMMARY:

BIOCHAR +
WOOD VINEGAR

PLANT HEIGHT:
29.7%

ROOT LENGTH:
117%

ROOT VOLUME:
121%

ROOT TIPS:
76.1%

Social benefits

- Affordable, organic inputs in emerging markets
- Improved revenues for rural communities (+ ROI)
- Increased resilience against climate change
- Improved waste management system for rice sector



30%

Average
Yield Increase



Environmental benefits

- Regeneration of degraded soils
- Enhanced diversity in soil biome, increased organic matter and resistance to soil pathogens
- Reduction in chemical pesticides & fertilizers
- Reduction in fossil fuels for water pumping
- Long term carbon sequestration

213

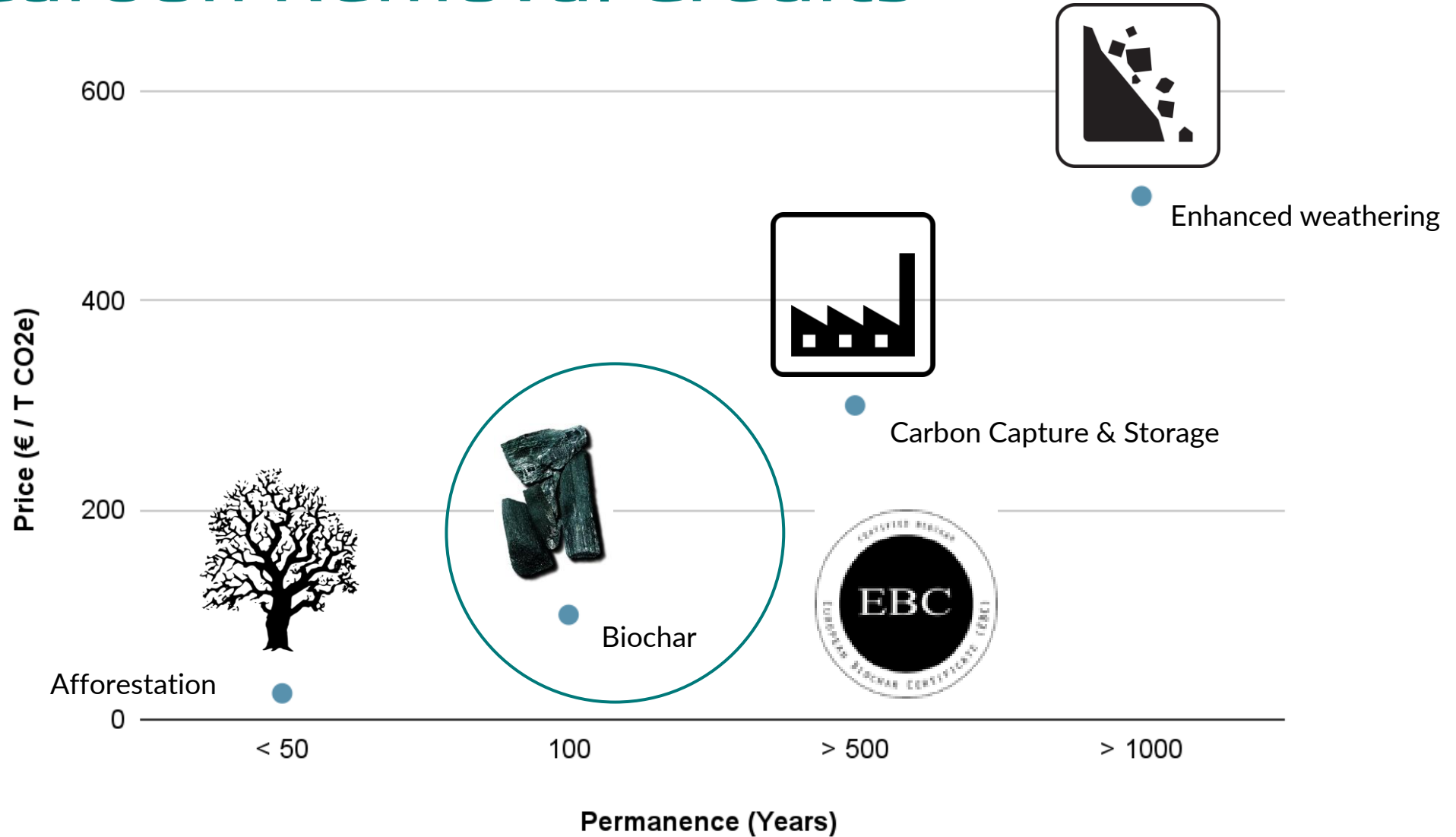
Hectares of Land
Improved



CARBON REMOVAL



Carbon Removal Credits



Impact so far



Progress

Goal

Building Soil

Hectares of soil regenerated

1 kg/m² biochar every 2 years

0,5kg/m² CBF per cycle

247

150,000

Sinking Carbon

Tonnes of CO₂ removed

1.34 Tn of CO₂ / Tn Biochar

522

1M

Improving Lives

No. households who benefit

25% revenue increase for farming households

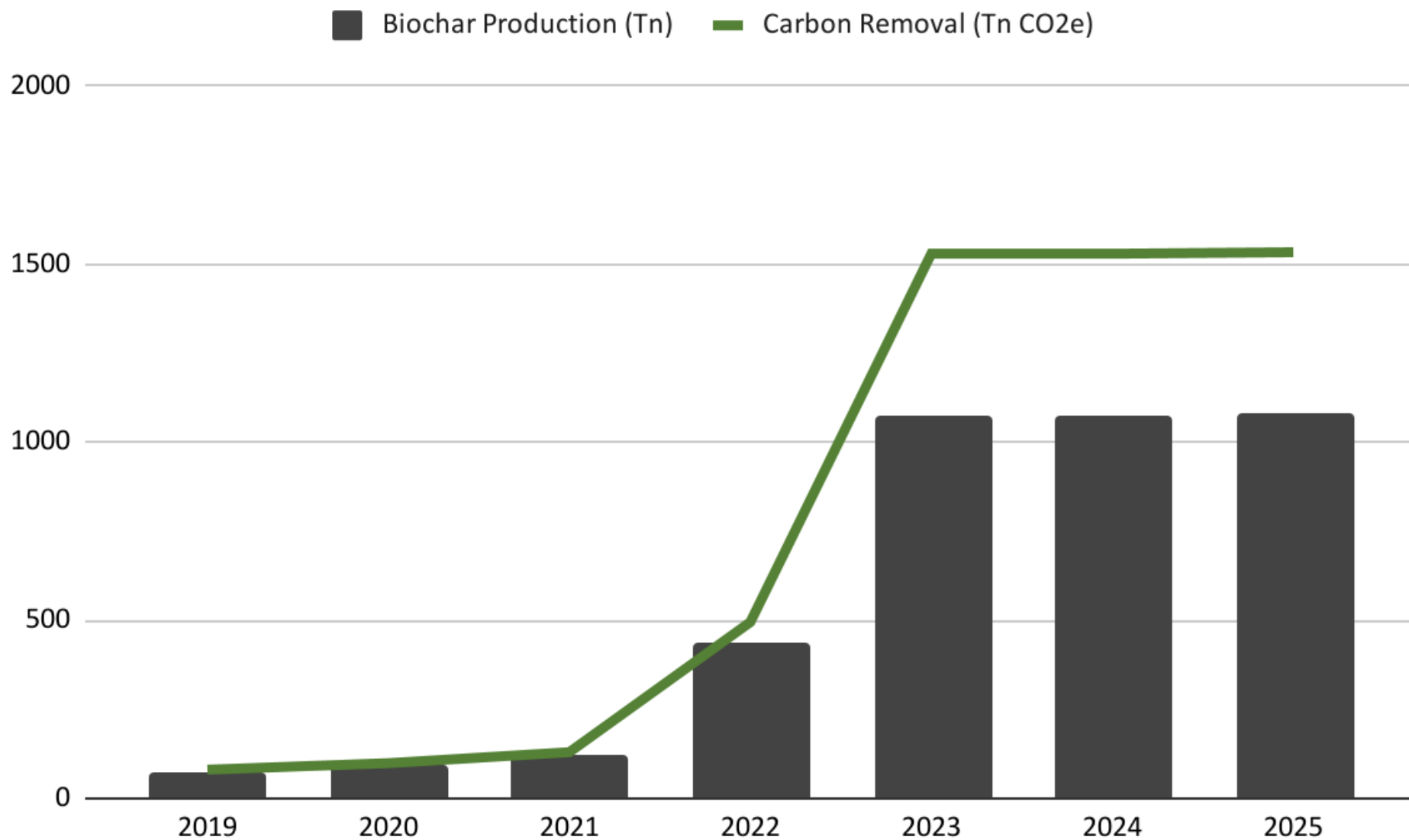
345

900,000

SCALE



Production volumes



1M tonnes of carbon back in the soil



Horizon 1 (2020-2023)

CAMBODIA



Horizon 2 (2024-2026)

SE ASIA (2 COUNTRIES)

+ MEDITERRANEAN

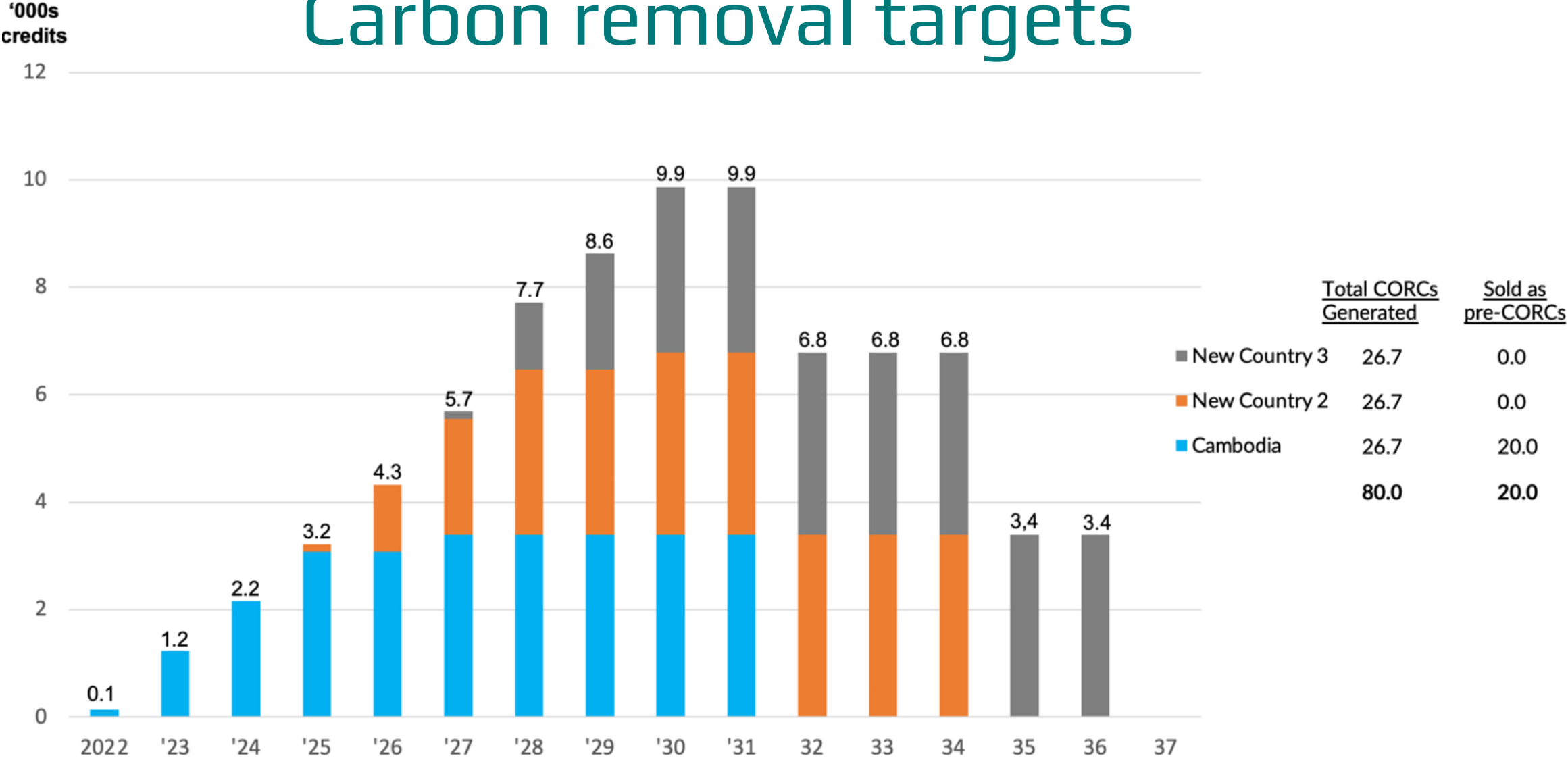


Horizon 3 (2027-2035)

SE ASIA (3 COUNTRIES)

+ MEDITERRANEAN
+ LATIN AMERICA

Carbon removal targets



Note: *each pyrolysis installation produces biochar & credits for 10 year before the equipment needs replacing. We are assuming not to replace the equipment for the above analysis



Thank you to our partners!

We are hugely grateful to all of the organisations who continue to support us in our journey.



HELP US SCALE!

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