

A sustainable future for pepper with
aGROWforests



FAIRFOOD
case
study 



aGROWforests at a glance

A farmer-centric approach to agroforestry is set to safeguard traditional pepper cultivation, preparing farmers for the challenges of the climate crisis while securing better incomes. The foundation of this transformation? A value chain approach to support a transition to agroforestry.

What

A 3-year project championed by Fairfood and funded by GIZ that aims to help smallholder pepper farmers increase their productivity and profitability through climate-smart agriculture (CSA). This case study analyses the collaborative effort through the aGROWforests programme, aiming to assess the under-explored social benefits of agroforestry.



Scan for project video

Who

- 2,300 pepper farmers transitioning to agroforestry
- 11 Indonesian 'Change-makers'
- The Dutch NGO Fairfood
- The Indonesian spices exporter PT Can
- Dutch brand Verstegen Spices & Sauces
- GIZ, the German Agency for International Cooperation
- The funder behind this 1.8 million programme

When

January 2022 ~ December 2025

Where

The provinces of Lampung
and Bangka, Indonesia





Background

Vietnam, Brazil, and Indonesia are the world's largest pepper-growing countries; Europe and the USA are the largest importers of pepper. Of the total 115,000 tons imported each year, around 80,000 tons come to the European continent – and imports are expected to rise. The company Verstegen has been trading Indonesian pepper for more than 130 years.

Challenges

The pepper landscape is changing. With a reputation for high-quality white pepper, the Indonesian province of Bangka Belitung is home to over 41,000 pepper farmers, who represent a significant portion of the island's population. These farmers are spread across four districts: Bangka, Bangka Barat, Bangka Tengah, and Bangka Selatan. In Bangka Selatan alone, pepper farmers constitute 48% of the population! Yet, declining production and major shifts in land use are changing the landscape:

- Economic factors, exacerbated by the COVID-19 pandemic, are pushing farmers to seek alternative livelihoods like [palm oil and rubber plantations](#), and [tin mining](#).
- Intensive agriculture is taking a toll. The reduced biodiversity in the area is contributing to soil degradation, which results in a need for larger quantities of fertiliser, and the reliance on monoculture means diseases spread more quickly. In good *agronomy-sm*: pathogens spread rapidly to surrounding fields and farms.
- Extreme weather events caused by climate change are challenging productivity. Unforeseen, excessive rain is causing stem rot and other diseases, while prolonged droughts stress the plants, making them more susceptible to disease.
- Food insecurity and poverty among farmers and their families are collateral effects of poor harvests.

Sustainable pepper farming: how agroforestry can accommodate the needs of nature and farmers

Supporting farmers' transition to more sustainable farming practices is urgently needed; if the current trends continue, there will soon no longer be enough quality pepper. But can farmers earn enough from pepper to make a living?

To ensure the future of the pepper trade, Verstegen, Indonesian exporter PT CAN, and Fairfood launched the 'aGROWforests' project as part of GIZ's 'Initiative for Climate Smart Supply Chains'.

Agroforestry is a land management system that intersperses trees or shrubs with agricultural crops and livestock. By combining different plant species that serve different purposes, farmers can increase overall food production, diversify sources of income, and contribute to conservation and soil improvement. Agroforestry helps to optimise available space, sunlight and water, to gradually increase soil and plant health, and plant productivity.

‘ It’s different, in the past it was more predictable...

For example, despite being the dry season, it changes into rain season. If we use the Arabic calendar, during Rewah it already started raining. At times, it continued to rain until fasting month, but now, the rainy season has many dry days... ’

~ Pepper farmer Sapauni

Pepper is a climbing vine and a great addition to agroforestry systems, such as coffee, cocoa and oil palm. It benefits from the shade that is also needed to protect these crops, ensuring a variety of income sources throughout the year. Our joint effort aims to increase the knowledge of climate-smart pepper farming among farmers in both Bangka Islands and the province of Lampung. The system can help rural communities:

- Maintain agricultural productivity
- Diversify income
- Increase food security
- Increase on-farm biodiversity
- Become more resilient to climate change

But to ensure that this win-win approach can survive in the long run, alignment with farmers’ needs and goals is fundamental; agroforestry should truly improve their livelihoods and sustainability.

‘ Pepper prices have dropped dramatically over the past years, leading farmers to switch to more profitable and less labour-intensive crops, such as palm or rubber trees. To make cultivation profitable at all, most pepper farmers produce in monocultures. However, this has many disadvantages. ’

~ Fairfood project manager Josje Spierings



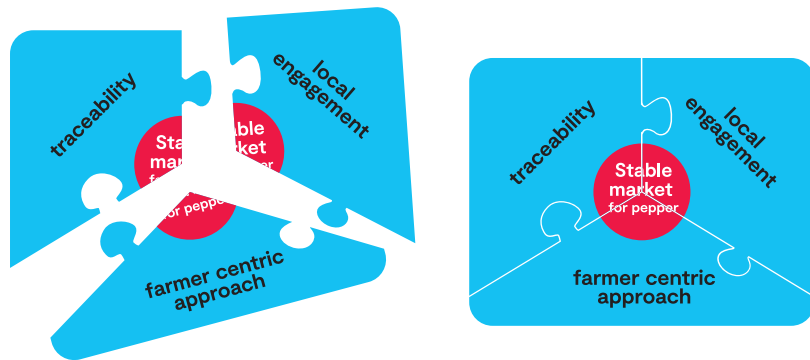
‘ In the past it was balanced: dry seasons arrived on schedule, and so did the rainy season. So the peppers are never infected by disease. But what happens now... Current rain comes unpredictably, the dry season is also not on time, so in the end... Farming pepper is a mess. Quite a mess. ’

~ Pepper farmer Umar

The project: supporting agroforestry, fostering transparency

Findings

Long-term, transparent commercial relationships are the foundation of a stable market for pepper. Below, we introduce the pillars of this transition and the first findings of the project that launched in 2022.



Traceability ~ Fostering a market for truly sustainable pepper

To make their pepper supply chain transparent and entirely regenerative by 2035, Verstegen Spices & Sauces established traceability as a pillar of their journey towards true sustainability. The Dutch company first used Fairfood's traceability platform Trace, to make their nutmeg supply chain transparent. This transparency gives the farmer greater involvement with supply chain partners – all the way to the consumer. The farmer strengthens her or his position by gaining new knowledge about the value chain, while the entire chain gains insight into price agreements and quality claims. Now Verstegen is taking it a step further, extending the approach to new spices in Indonesia.

Forest-rich Indonesia is on the radar of European regulations aimed at tackling deforestation, making traceability a pillar for compliance with new environmental standards. Verstegen's vision goes beyond risk assessments, aiming to have 100% of their pepper produced using regenerative agricultural practices by 2035.

Agroforestry initiatives in the country can be found in shade-grown coffee, oil palm and rubber. In spice cultivation systems of nutmeg and mace, cloves and even pepper, agroforestry can also be deeply integrated. However, in regions where monoculture prevails, such as Bangka Belitung, support is needed, including training, and more importantly, a stable market, for the new products harvested on agroforestry plots.

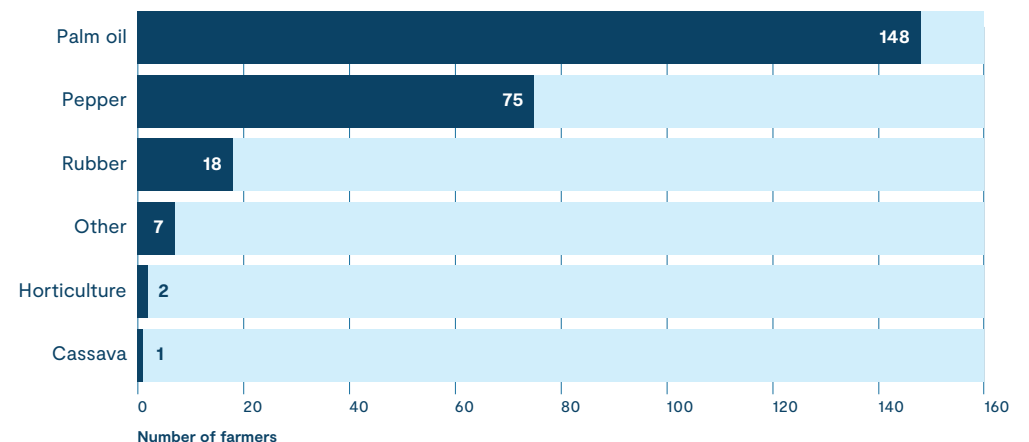
The aGROWforests project targets 2,300 smallholder pepper farmers in the Bangka Belitung and Lampung provinces, within communities where Verstegen currently sources pepper. Through training modules evolved over three years, the company has engaged different stakeholders to support the implementation of climate-smart agriculture among smallholders. The project includes:

- **Comprehensive training:** Engaging farmers through training on climate-smart agriculture, soil and crop management, and water and livestock management.
- **Financial literacy:** Verified traceable payments realised together with Fairfood allow the programme to provide partners with crucial information to negotiate prices.
- **Premium pricing:** Paying a premium price for sustainably produced pepper, that is traceable and can be verified by all stakeholders.
- **Continuous sourcing engagement:** With traceability implemented, a continuous review of operations is initiated, laying the foundation for sustainable relationships.

Opportunity: Reverting to the secondary status of pepper farming

Pepper is no longer the primary crop for most farmers in our project. With a trend toward palm oil, supply chain partners have an opportunity to revalidate the importance of pepper cultivation.

Most important crops for sampled households



Farmer Sapauni brings a long wooden stick to install a pepper pole at her garden in Keretak Atas village, Bangka Belitung province, Indonesia.



A farmer-centric transition

Meet the Bangka Islands pepper farmers:

- 2,300 pepper farmers in Bangka, Indonesia.
- Most farmers (72.5%) own less than one hectare of land, while the remaining 27.5% have land areas that exceed 1 hectare.
- Nearly 93% of farmers engage in both pepper farming and other agricultural activities. Among those involved in pepper farming, nearly 10% exclusively cultivate white pepper varieties.
- As the project kicked off, pepper farming primarily contributes less than 30% of a farmers' total income.
- Labour costs dominate the expense structure, followed by seedling purchases and living-support trees.
- Besides labour, the high costs of primary farming inputs, fertiliser and chemicals, are a significant burden for 53% of farmers to invest in pepper.

‘ My parents taught me to work as a farmer with them. And even now, farming is etched in my heart. My hope for the future from PT CAN is that we keep communicating to keep sharing knowledge with each other, so the development of pepper can remain in high quality. ’

~ Pepper farmer Arofiq

The project utilises a farmer-centric approach to ensure transparency and align agroforestry models with farmers' needs, to create benefits rather than burdens. From training to traceability, all stakeholders are set to speak a common language.

‘ Agroforestry is not a one-size-fits-all solution; its effectiveness depends on the specific context, the types of crops and trees used, and most importantly, the level of support provided to farmers ’

~ Hatami Nugraha, CEO of PT CAN

Making a different scenario tangible: Inside the Spice Hubs

To demonstrate the benefits of training and support for farmers in meeting programme criteria, learning centres were created across Bangka. These so-called Spice Hubs ensure that agroforestry systems lead to environmental improvement, resilient crops, and sustainable productivity levels. Each Hub is equipped with facilities to engage with farmers and communities.



Change-maker Silvi Dewi (left) practices making natural pesticides from papaya leaves as farmer Arofiq watches the process at Arofiq's pepper garden in Lubuk Lingku village, Bangka Belitung province, Indonesia.

One Hub received local government support to become Bangka's first demonstration plot for regenerative agriculture and agroforestry, offering practical training in pepper cultivation. This community-driven model ensures that farmers receive the necessary tools and knowledge, and contribute to the ongoing development of the Spice Hubs, shifting Bangka's agricultural landscape towards a sustainable future.

More than learning centres, the Spice Hubs are the heart of a farmer-centric approach. They provide resources, such as plant seedlings, agroforestry designs, plant and soil health assessments, and post-harvest support, all of which empowers farmers to adopt sustainable practices.

‘ I want to learn how to care for pepper plants so they don't turn yellow. I want to know the cure for pepper disease... Look for methods to get good pepper. Like the pepper on the demo plot in Namang. I said to my child, 'that pepper is really good.' ’

~ Pepper farmer Sapauni

Streamlining internal processes for financial sustainability

Access to finance and inputs are major barriers for smallholders supplying PT CAN and Verstegen in Bangka. Most farmers rely on savings for unforeseen expenses and lack confidence in their financial knowledge. At the same time, few of them maintain financial records. This makes financial record-keeping and expense tracking essential to the programme. Fairfood supports farmers to streamline internal processes. The project is piloting technology solutions and integrations to test the benefits of traceability for farmers, measure access to financing. At the same time, It helps supply chain partners further up the chain to stay ahead of legislation, making the farmers attractive partners to work with. Listing the functionalities:

- **Interoperability:** Fairfood integrates technology with partners' systems, using APIs to connect data from Indonesia to European supermarkets through Trace, Fairfood's traceability platform.
- **Traceability Systems Integration:** Fairfood's Connect, an open-source feature of Trace, facilitates data uploading into the platform. This can be done through a application available for download on Google Play or via spreadsheet uploads. The tools will be piloted with 50 farmers and expand to 400 using Fairfood's Farmer Cards - see below.
- **Low tech Farmer Cards:** These Cards ensure that no phones or internet access are needed by farmers during pepper collection. Equipped with the Trace mobile app, pepper collectors scan the Cards to record transactions in Trace's system, which are verifiable by all stakeholders. When they later connect with the internet, all the data is uploaded to the system.
- **Supporting digitisation:** Farmers will access digital statements of sales and transactions, integrating this data into their business operations.
- **Internal adoption:** PT CAN plans to use the app for record-keeping for all farmers in the Trace system, including those not supplying Verstegen. Discussions are ongoing to support this integration.

With a traceable storyline in place, the flow of white pepper from the Bangka Islands through the supply chain can support compliance reporting and substantiate claims.

Change-makers: local engagement and an active role for farmers

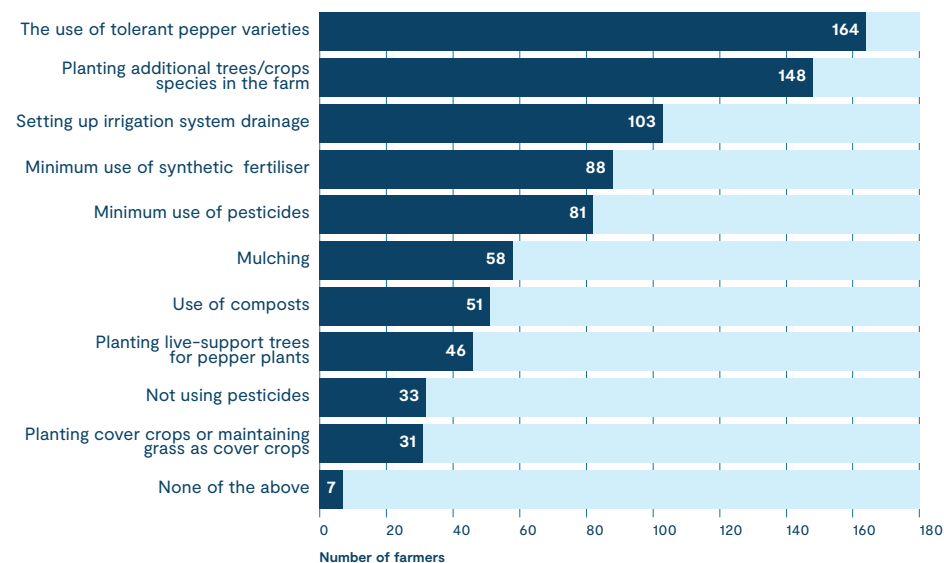
To ensure that agroforestry practices are integrated by smallholders beyond the boundaries of the Spice Hubs, the Indonesian exporter PT CAN trained 11 experienced agronomists or 'Change-makers' to disseminate this expertise to smallholders across the country. These Change-makers helped us to:

1. **Solve the resistance to change:** Hesitancy to adopting new practices that could help farmers improve production and income can hinder programme objectives. This manifested itself in two ways.
 - a. **Misplaced confidence:** Self-perceived strengths in farming practices are often not substantiated by actual knowledge, leading to potential inefficiencies and errors.

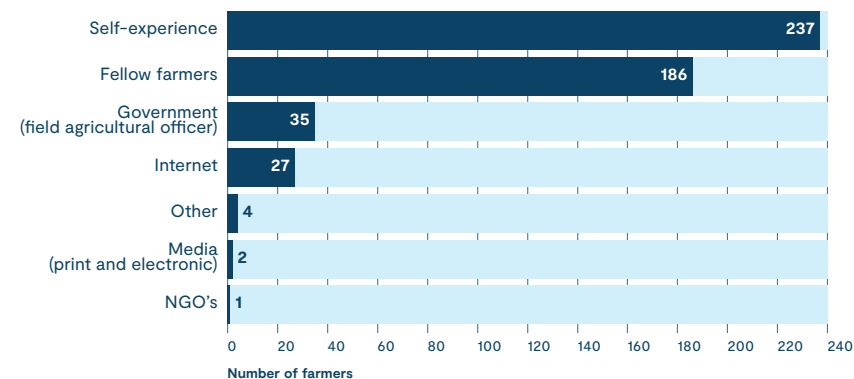
b. **Inaccurate or outdated farming information:** Although internet access is available, most farmers rely on their own experience, farmer peers, or government officials, and prefer these mediums over the internet.

2. **Close the knowledge gap:** From a survey that was conducted, it appeared farmers largely rely on peer-to-peer sharing and their own experience, which can lead to misinformation or confusion on best practices. The Change-makers' focus is on identifying gaps, and providing formal training, like pest control, irrigation, and tree planting.

Farmer's knowledge per topic



Where do they get their information from?

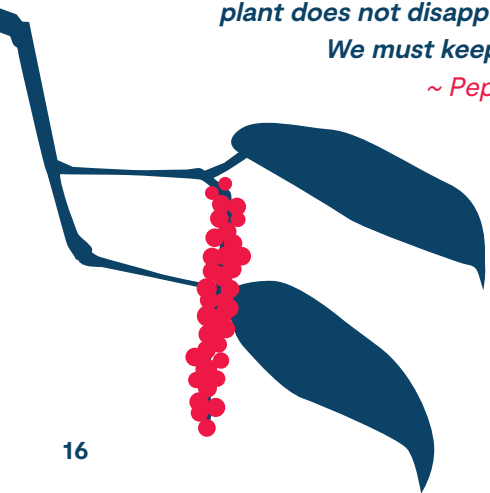


3. **Increase trust with farmers:** Past negative experiences with technical support have made farmers hesitant to engage and explore business opportunities, which limits market access and potential revenue streams. The three-year training programme aims to build trusting relationships among farmers and project partners.
4. **Address financial constraints:** High input costs, especially for fertilisers, pose a financial burden on farmers, just as a reliance on savings indicates limited financial resilience. Ensuring a stable market for sustainable pepper can help farmers gain insights, build creditworthiness, and access finance options. Moreover, in the before mentioned survey, the farmers indicated a need for:
 - a. Information on pest and disease control, and fertiliser usage: this was pointed out as much needed to improve financial management, but difficult to obtain
 - b. Market and price information

Training sessions, led by the Change-makers, impart practical skills and knowledge, empowering farmers to embrace regenerative practices and increase the resilience of their farming systems. While only a portion of the smallholders receiving training will end up supplying Verstegen, all participants contribute to a more sustainable local market. Ongoing pilots and collaborations seek to refine the agroforestry business model, demonstrating the viability and benefits of sustainable production and sourcing. Interest in the aGROWforests training programme is high, particularly in integrated pest and disease management, plant nutrition and soil management. Despite trainings not being mandatory, farmer participation was high, even among farmers who sell their products locally. This underscores a growing acknowledgement of the importance of sustainable practices.

‘ Originally, we planted... I have planted one, two thousand plants. Now, there are only four hundred, two hundred plants left. One of the reasons we plant is so that the ancestor plant does not disappear. We must preserve the seeds. We must keep preserving the seeds. ’

~ Pepper farmer Umar



Farmers practice the application of bordeaux mixture to prevent the spread of disease during the training at PT CAN's demp plot in Bangka Belitung province, Indonesia.



Farmer Umar at the training at PT CAN demo plot. During the training, the farmers are taught to manage crop pests and diseases, among other things.

Change-maker Silvi Dewi and farmer Sapauni plant durian trees as companion plants for pepper at Sapauni's garden in Keretak Atas village, Bangka Belitung province, Indonesia.



What's next?

In **2025**, we will measure the success of aGROWforests through 5 lenses:



Climate adaptation

Assessing if and how farmers and their family members benefit from more sustainable farms.



Increased income

Measuring if farmers actually reached a higher income from higher quality pepper and from selling new agroforestry commodities, plus how much.



Productivity

Evaluating the percentage of pepper farmers who have increased their yields per unit of land (kg/ha).



Access to services and inputs

Measuring the percentage of farmers reporting improved access to services and inputs.



Access to finance

Measuring the percentage of farmers reporting improved access to finance.

In the face of economic challenges and environmental threats, the aGROWforests programme's first years saw farmers embracing agroforestry and climate-smart practices. In 2024, traceable white pepper sourced from trained farmers who have received premium payments for sustainable production will reach Dutch supermarkets, which could provide important market signals to farmers that agroforestry practices work environmentally and financially. This marks a significant leap towards a greener supply chain, transforming our vision into a tangible reality.

‘ I can consider it to have a lot of changes.

In the past, when I saw weeds around, it already made me feel uncomfortable. But now I take it easy.

Even if the weeds are tall, my heart is still calm. ’

~ Pepper farmer Arofiq

Contact

Want to learn more?

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Grade A pepper

Grade B pepper

Grade C pepper

Grade D pepper



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