PRISMA

Climate spotlight

Fertiliser

Getting the dose right for plants and the planet

Chemical fertilisers from Indonesia alone make up 1.9 per cent of global agricultural emissions. Switching to a balanced use of chemical, organic, and organic mineral-based fertilisers can produce less emissions while still providing plants with essential nutrients and smallholder farmers with the productivity boost they need. With only 5 per cent of farmers in Indonesia using organic mineral-based fertilisers, there's significant growth potential.

Kementerian PPN/ Bappenas

Australian Government

A fertiliser from the earth

Organic mineral-based fertilisers are produced from naturally occurring mineral deposits. They generally contain high concentrations of plant nutrients and have the advantage of producing less nitrous oxide than chemical fertilisers.

Agricultural businesses can play a vital role in commercialising organic mineral-based fertilisers and encouraging practices (through customer-centric marketing, continuous education, and inclusive outreach) that reduce emissions and improve productivity.

Currently, only around **5 per cent** of Indonesia's **28 million** smallholder farmers use organic mineral-based fertilisers,[1] representing a huge growth potential.

When chemical fertilisers hit the soil, they have a faster microbial reaction, creating nitrous oxide. Nitrous oxide is 300 times more potent at warming the atmosphere than carbon dioxide and can stay in the atmosphere for 100 years. The microbial reaction for organic mineral fertiliser is much slower than chemical fertilisers.[2]

Approximately 70 per cent of agricultural land in Indonesia is in a degraded or unhealthy state,[3] primarily due to farmers' reliance on chemical fertilisers.

New wave farming

We want the best results for farmers

Eddyko,
ATS Director

PRISMA is partnering with ATS, an organic mineral-based fertiliser company operating out of Medan in North Sumatra, with networks across Indonesia. ATS markets organic mineral-based fertilisers, such as gypsum and silica.

"Gypsum helps reduce nitrous oxide emissions, improve soil carbon retention, and reduce erosion. Silica improves water use and plant performance while improving productivity," explains Eddyko.

"Nevertheless, encouraging farmers to embrace these products is our greatest challenge, especially in shifting their long-standing habits and rigid mindsets that have endured for years."

The partnership with PRISMA supports ATS in tackling the challenges of behaviour change.

ATS is adopting a customer-centric approach and training its field staff in marketing and customer relations. The aim is to better communicate the product's benefits in a way that makes sense to farmers at important farmer meetings and harvest days.

[1] ATS' calculation comparing their sales in tonnes with the total market size in Indonesia

[2] Wozniacka, Gosia (19 September 2019). The Greenhouse Gas No One's Talking About: Nitrous Oxide on Farms, Explained. https://civileats.com/2019/09/19/the-greenhouse-gas-no-ones-talking-about-nitrous-oxide-on-farms-explained/#:~:text=In%20essence%2C%20both%20synthetic%20and,on%20N2O%20emissions.

[3] Arnas, Iswandi. (27 May 2022). 72 Persen lahan pertanian RI alami degdradasi. https://www.kabarbisnis.com/read/28113473/72-persen-lahan-pertanian-ri-alami-degdradasi

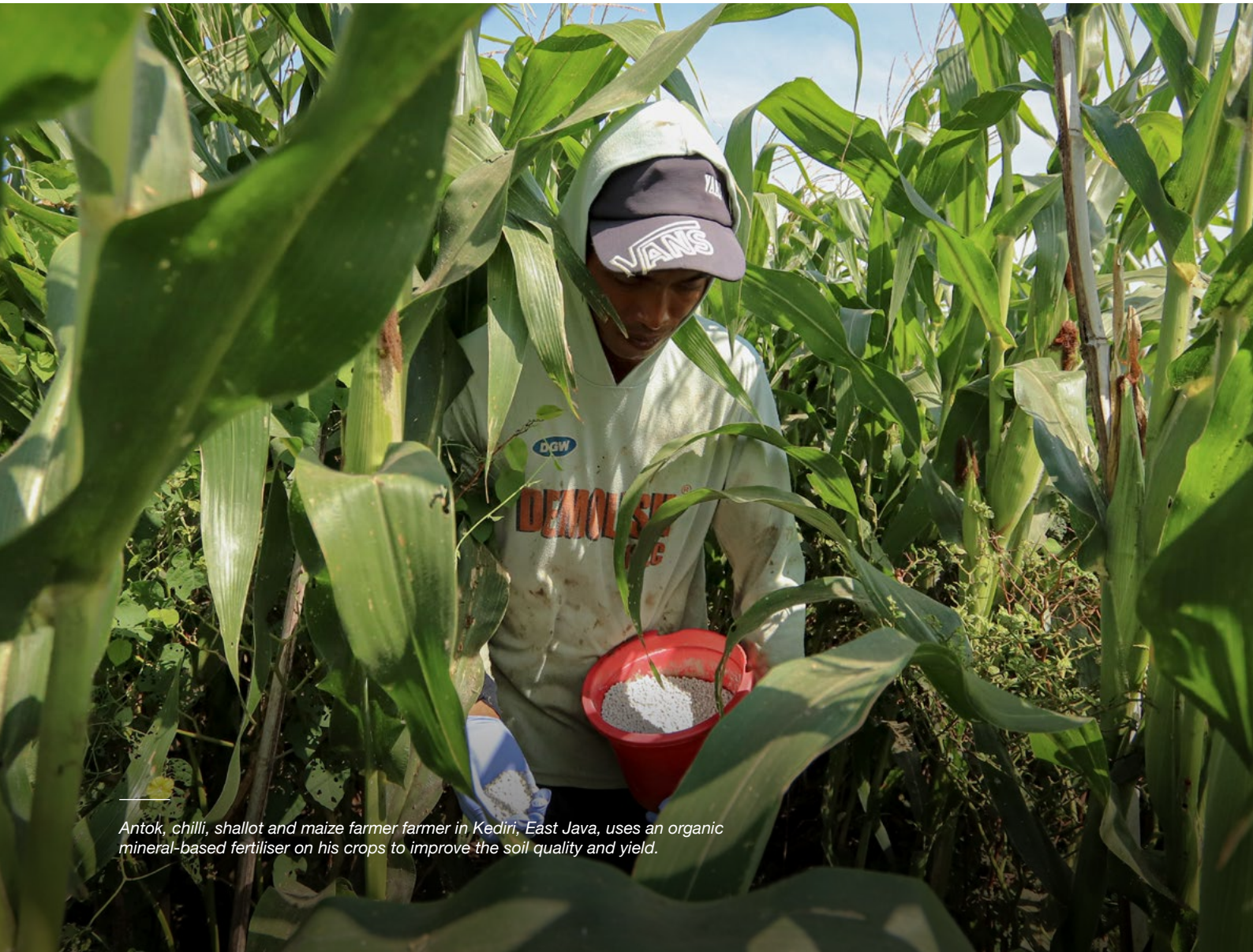
ATS's agronomists are active in the field, building relationships with their distributors (agri kiosks) and with their champion farmers who are influencers in their community.

Antok a chilli, shallot and maize farmer from Kediri is a an ATS champion. Antok's land was used by ATS as a demo plot for his community and he received free fertilisers for the first harvest. Antok has gone on to use ATS products for the last 3 years.

> *The use of ATS' GPS products (Gypblend, Polysulphate, Starsil) strengthens my crops and increases the PH of the soil. This helps to keep my crops green as the crops more easily absorb the nutrients.*
>
> **Antok**,
> Farmer

ATS has also driven up the frequency of farmer interactions to support continuous learning. It has increased promotion activities in East and Central Java to more than 200 farmer meetings, 24 key farmer meetings, 43 farmer field trips and 5 harvest days. Each interaction is a chance to further build farmers' awareness of the products, brand, and benefits.

As a result, more than 11,000 farmers have reduced their use of chemical fertilisers (9.16 kg N-based fertilisers per farmer or a 5 per cent reduction) by switching to organic mineral-based fertilisers. Overall, 120 kg (1,320 tonnes in total) of CO_2 emissions have been reduced.



Antok, chilli, shallot and maize farmer farmer in Kediri, East Java, uses an organic mineral-based fertiliser on his crops to improve the soil quality and yield.

We aim to encourage sustainable farming to ensure that crops remain undamaged, stay healthy, and become more fertile.

Mr Eddyko, Director of fertiliser company PT Agrotama Tunas Sarana

Impact of PRISMA partnership with ATS

11,000

Smallholder farming households benefited

120kg (1,320 tonnes in total)

Of average CO_2 emissions reduced

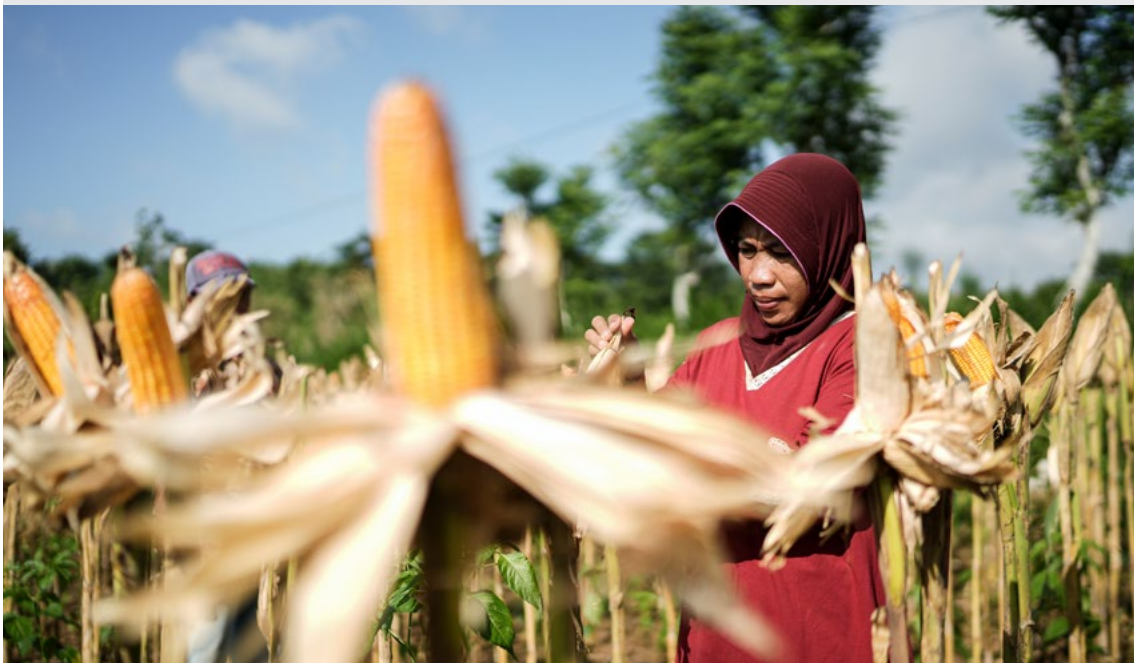
From 0.5 ha of farmland thanks to lowering the use of chemical fertilisers (9.16 N-based fertilisers/farmer or 5% reduction) and switching to organic mineral fertilisers

±1,085 tonnes

ATS increase in sales of fertiliser products in Java

20% and 30%

Boost in yield of maize and shallots, respectively



Mineral influencers

For Mrs Sunarsih, a shallot farmer and mother of two children from Kediri, East Java, her interest in organic mineral-based fertilisers came from a farmer's meeting with her peers.

“I met women farmers from other villages with more experience cultivating shallots, and I learned a lot from them, including their use of organic mineral-based fertilisers. I have passed on this knowledge to other farmers,’ says Sunarsih.

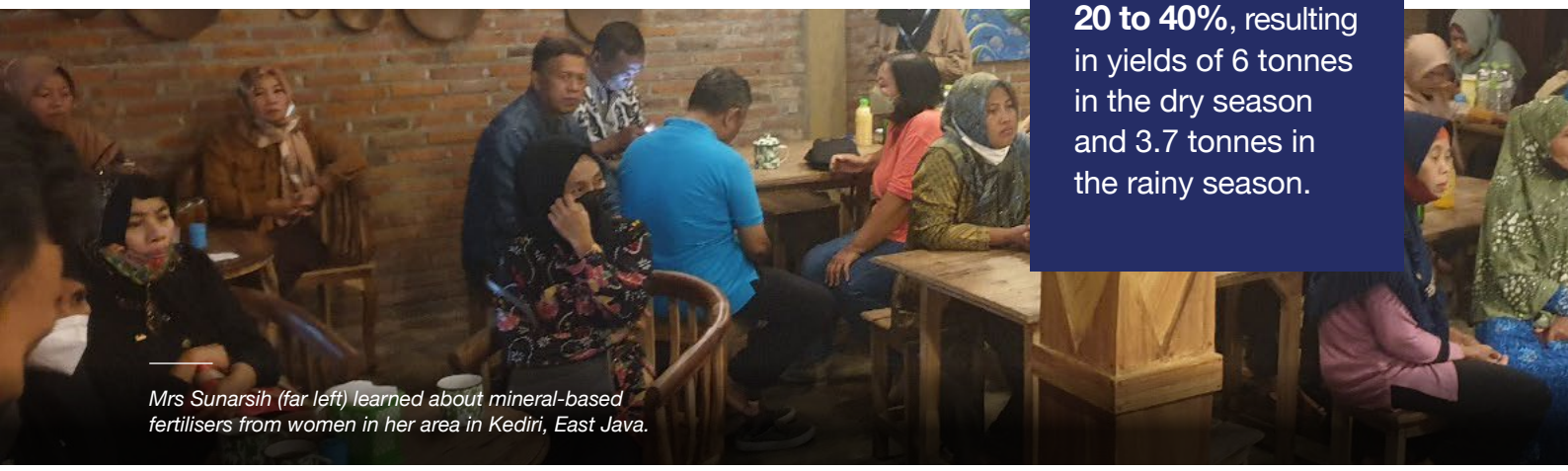
“I used only chemical fertilisers such as Urea and NPK, which made my soil hard, and I could produce about 5 tonnes from my land. When the rainy season arrived, my shallot plants were also more likely to get moler[4] disease, and I’ve had seasons where I only produce 2.5 tonnes from my land," explains Mrs Sunarsih.

In the next 5 years, ATS believes a younger generation of farmers will influence the agricultural industry.

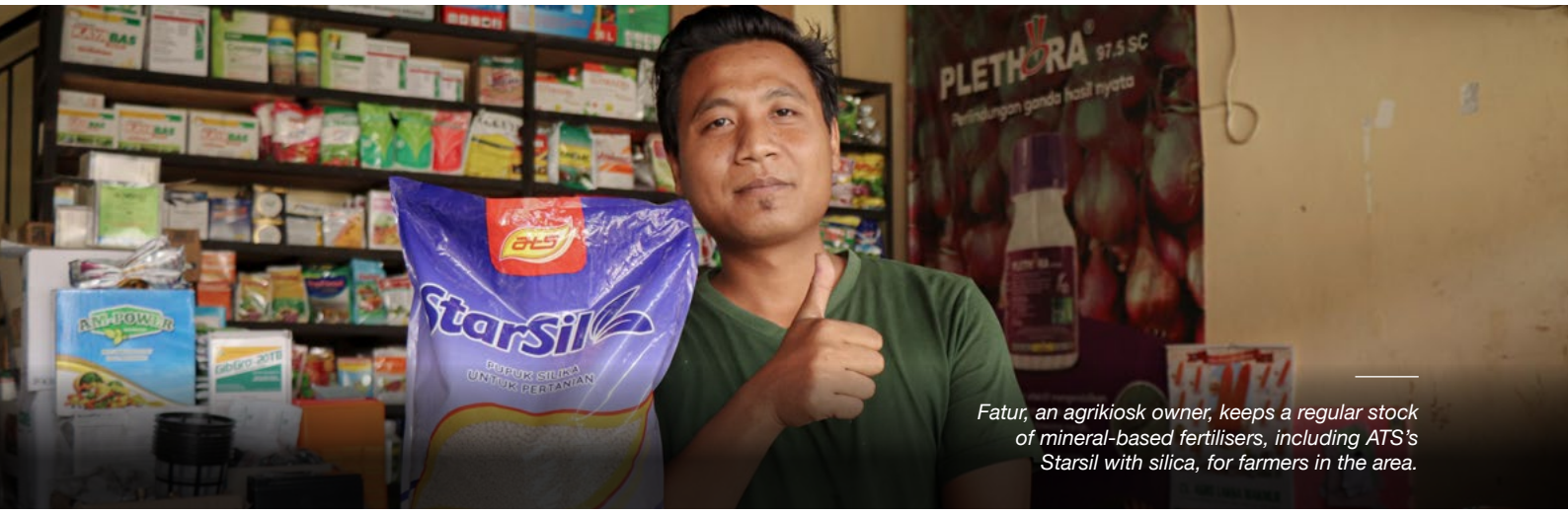
“Millennials accept new ideas and innovations. We’re keen to target them with our products – they have a large potential,” said Eddyko, Director of ATS.

ATS is actively pursuing a digital transformation across its business, starting with digital marketing and increased video production to reach younger audiences on social media.

Since the introduction of organic mineral-based fertilisers, shallot production on Sunarsih's land has increased by **20 to 40%**, resulting in yields of 6 tonnes in the dry season and 3.7 tonnes in the rainy season.



Mrs Sunarsih (far left) learned about mineral-based fertilisers from women in her area in Kediri, East Java.



Fatur, an agrikiosk owner, keeps a regular stock of mineral-based fertilisers, including ATS’s Starsil with silica, for farmers in the area.

[4] Shallots root and tuber disease caused by the fungus Fusarium oxysporum. Usually appears during the rainy season.

Fertilisers explained

Organic plant and animal-based[5]

Organic fertilisers are derived from plant matter, animal excrement, sewage, and food waste, generally in animal manure, green manure, and biosolids. Organic fertilisers provide essential nutrients crops need, usually containing a wide variety in low concentrations. They also play a crucial role in improving soil health.

Example product: Compost, Green Manure.

Advantages:

- Increase physical, biological and chemical soil fertility (soil amendment).
- Do not release harmful chemicals or salts that are deadly to plants.
- Contain macro and micronutrients.

Disadvantages:

- Low nutrient content.
- Slow impact on the crops and soil.
- Bulky and needs more effort to apply.

Emissions' impact:

- The use of organic fertiliser can reduce the amount of chemical fertiliser usage.

[5] IFA. 2023. Organic and Mineral Fertilizers. https://www.fertilizer.org/about-fertilizers/organic-and-mineral-fertilizers/

Organic mineral-based fertilisers

Organic mineral fertilisers are produced without chemical processes from materials mined from naturally occurring nutrient deposits. They generally contain high concentrations of a single, or two or more, plant nutrients.

Example product: Gypsum, Polysulphate, Silica.

Advantages:

- Increase physical and chemical soil fertility (soil amendment).
- Less harmful to the environment: minimum residue and can reduce the use of chemical NPK fertilisers.
- Increased productivity due to high nutrient content (usually secondary micronutrients like Ca, Mg, S, and micronutrients).

Disadvantages:

- A limited amount of primary macronutrients (N and P) still need to be complemented by chemical NPK fertiliser.

Emissions' impact:

- The use of organic mineral-based fertiliser can reduce the amount of Nitrogen chemical fertiliser usage by up to 25%.

Chemical[6]

Chemical fertilisers are made artificially from minerals and gasses. Simple fertilisers contain a single nutrient, such as nitrogen, potassium or phosphorus. They are used when only one nutrient is to be added, or a higher concentration of another is required.

Example product:

- Mineral mined: Potassium (KCL), Phosporus.
- Gass: Urea or nitrogenous.

Advantages:

- Quick solution to crop nutrient deficiency.
- Increased productivity due to high nutrient content (N, P, K).

Disadvantages:

- Acceleration of climate change due to nitrous oxide emissions.
- Environment contamination: Increase acidity level of soil and water contamination.
- Potentially burning of plants if over-apply chemical fertilisers.

Emissions' impact:

- Application of nitrogen-based chemical fertiliser will produce and enhance N_2O and CO_2 production and emission.
- (1 kg N fertiliser produces 13 kg CO_2 emission).

[6] ISAM. 2023. Advantages and disadvantages of chemical fertilizers. https://isam.education/en/advantages-and-disadvantages-of-chemical-fertilizers/

About PRISMA

PRISMA is a partnership between the Government of Indonesia and the Government of Australia to increase the productivity and income of smallholder farmers. Increased productivity contributes to food security and builds farmer resilience to market and agricultural shocks, including climate change.

PRISMA is supported by the Governments of Australia and Indonesia and implemented by Palladium, with Technical Assistance from Swisscontact, Zurich.

Find out more:
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