Reintroducing and Scaling Sorghum in East Nusa Tenggara Province, Indonesia

Retracing and Learning from the Change Processes Triggered by Mama Tata of Adonara Island

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The amazing story of Maria Loretha ('Mama Tata') shows that innovations, such as the reintroduction of sorghum on the semi-arid Adonara island in Indonesia, can start with local entrepreneurs and informal agents of change. This article goes back to 2007 and retraces the processes leading to the successful reintroduction of sorghum and other local crops. Initiatives were taken in many different activity domains: seed collection, multiplication and sharing; finetuning agricultural practices; community meetings and group formation; sorghum processing and food product development; marketing and transport and transport to advocacy for revaluing sorghum in farming systems and diets. Results were scaled largely via informal networks of Mama Tata and the groups and associations she is part of. The process of change was gradual, with strong local ownership. The achievements are therefore robust and sustainable. This case learns that development actors, both public, non-governmental or private, can align to local initiatives and change agents. The experiences also learn that, rather than one silver bullet, it is the combined effect of Mama Tata's initiatives and activities that led to sustainable change.

The context

Food system context: East Nusa Tenggara Timur Province and Adonara island

In Eastern Indonesia lies East Nusa Tenggara (Nusa Tenggara Timur, NTT), an archipelagic province. It consists of hundreds of islands, spread over 1300 kilometres. Only 42 islands are inhabited; the major ones being Timor, Flores, Sumba, Alor, and Lembata. The current population is 5.6 million people. Under the influence of winds from Australia, the climate is relatively dry. The short rainy season is intense, with torrential rains causing erosion in the hilly and mountainous landscapes. Anticipating the limited planting space and a short rainy season, farmers developed an intercropping system known as 'Salome' in which different species of crops are planted in the same hole. Compared to the rest of the Indonesian archipelago, only a small proportion of the land area is suitable for agricultural production, resulting in the dependency of NTT on other provinces for food supplies. This situation is exacerbated by climate change, which causes the weather to change quickly. The further shortening of the rainy season, makes it difficult for farmers to determine the right time to plant. NTT is among the Indonesian provinces with the highest prevalence of under-five children stunting and underweight. Many poor people receive rice assistance.

Figure 1: East Nusa Tenggara Province. Source: W. Adiningtyas; prepared with QGIS.

With a land area of some 500 km², Adonara is one of the small islands of NTT province (see map to the right). It has eight sub-districts and a population of more than 125,000 people (BPS, 2021). Most of them work as farmers and fishermen. The main crops are rice, corn, tubers and beans, for home consumption and sales.

Generally, existing crop lands have fairly steep slopes and related erosion and landslide risks. The soil tends to be sandy and rocky (East Flores Regency, 2017).

Sorghum in Indonesia

Sorghum (*Sorghum bicolor* (L)) it is not a staple food in Indonesia. It is known in Java but hardly grown there. It used to be relatively well known in NTT, as witnessed by many different local names. In previous times, sorghum was often planted at the edge of corn or rice fields to help ward off pests and serve as animal feed.

As from the 1970s, Government policies and support concentrated on rice, which caused people to abandon various staple crops such as corn, sorghum, barley and tubers (Hestiawan 2016). Until now, people consider rice as a symbol of a prosperous family, while corn, sorghum and tubers are considered as food for the poor and backward.

Currently, sorghum is perceived as one of the crops and foods that can help to overcome food insecurity in NTT, as it would be more suitable for planting in the NTT agro-ecological conditions, better resistant to pests and diseases and having a higher nutritional value than rice and corn (Ariningsih et al., 2023; Winarti et al., 2023).

> *"People in NTT knew sorghum as a food crop, but it largely disappeared from the fields and the diets since the green revolution."*

Figure 2: Sorghum field in Likotuden, Flores, East Nusa Tenggara.

Figure 3: Sorghum harvesting in Kota Baru, Ende, East Nusa Tenggara.

Mrs. Maria Loretha, an innovative woman with good networking skills, locally known as Mama Tata, has played a very significant role in putting sorghum back into the attention of both farmers and policy makers. In the next chapters we retrace her steps to unravel the innovation and scaling process.

Figure 4: Mama Tata with farmers of Likotuden Sorghum cooperative.

Mama Tata – the early years (2007–2011)

From radio announcer to farmer

Mama Tata was born in Ketapang, West Kalimantan. After graduating from Universitas Merdeka Malang, she was a radio announcer in Malang, East Java. She and her husband, Jeremias Letor, a native from East Flores, decided to return to her husband's homeland, after the monetary crisis of 1998–99.

Initially, they lived in Larantuka, the capital regency of East Flores. Mama Tata worked freelance and was active in a women's local crafts group. Realizing that income would not be sufficient to raise their children, they both moved to Pajinian, a village in West Adonara. On the family land of her husband, they started a six hectare farm, located at the edge of a beach. After the name of the hamlet, the farm would later become known as Sorghum Waiotan Farm (M. Loretha, personal communication, 2011).

How it started in 2007

It was in 2007 that Mama Tata discovered sorghum with her neighbour, Mama Maria Helan, who offered her a plate of steamed sorghum. It was from that moment, that Mama Tata started thinking about developing local crops, especially sorghum. She got half a glass of sorghum seed from her neighbour, who earlier got it from her older brother in another Adonara village. During this period, she was worried that her husband would not allow her to plant sorghum, which was often dubbed as inferior. However, her husband supported the initiative, which doubled her motivation.

Failing to obtain sorghum seed from supplier companies, Mama Tata asked farmers about local crops and varieties and then learned from farmers how to select the best corn, rice, sesame, barley and sorghum seeds from available local seeds. She also discovered what local plants existed in her village and how to cultivate the seed. She gathered information regarding local food processing and nutritional content from local food processing books, the internet, magazines, and her colleagues at the East Flores Regency Food Security Agency. To better understand the planting process, she lived on her farming land, not in the village (M. Loretha, personal communication, 2011).

In search for seeds of local crops and varieties (2008)

In 2008, Mama Tata and her husband began cultivating sorghum and (foxtail) millet. Before that time, they planted cowpeas and red rice. Even though sorghum and barley were only intercrops between the main crops, the yield was good. Based on this success, Mama Tata started thinking about other crops, such as local corn, barley, sesame and black rice. She searched for local seeds, which would be adapted to the dry conditions and to pests and diseases on the island. It was however not easy to find local seeds. She found brown sorghum varieties from a farmer in the village. She looked for local seeds in neighbouring villages and managed to get good sorghum seeds and foxtail millet seed from a farmer in Nabo Kie village. Not satisfied with what she found at Adonara Island, Mama Tata then crossed the sea to nearby Flores island where she visited Larantuka and Maumere. She obtained seed of red and black sorghum from a farmer in Waisete village (Maumere regency) and sorghum, barley and sesame seeds from a Father and farmer in in Larantuka. Mama Tata and her husband used their farming income for the seed searching trips. Some farmers did not accept to get money for seeds and just shared for free. Often Mama Tata gave other seeds in return.

Piloting and experimenting (2009–2011)

Once the local seeds were collected, she tried to cultivate them all. After several trials, she decided to focus on sorghum that she thought had the best future prospects. Close observation of field performance learned that (i) sorghum does well on sandy and rocky soils, preferably in lower parts of the island (<500 m above sea level); (ii) has good potential on drylands, with prospect of 2 or 3 harvests per year; (iii) does not require much maintenance and (iv) is more fibrous and nutritious than corn and rice. During this period, Mama Tata also began to study how to choose the best sorghum seeds to cultivate. One of the four sorghum varieties she collected caught the attention of the Bogor Agricultural Institute (Institut Pertanian Bogor, IPB) because the variety was outside IPB's sorghum catalogue.

Mama Tata and her husband usually started planting crops in October, at the start of the rainy season. In 2010, they piloted growing sorghum outside the rainy season, with planting starting in July during the dry season. This yielded around 1,300 kg of sorghum, sold for IDR 5,000 (Indonesian Rupiahs) per kg. Mama Tata calculated: *"If you have a one hectare of land and have two sorghum harvests per year, it will produce about 4 tons per ha. Seed requirements are 8 kg per ha. Based on this, you will earn at least IDR 40 million per year. This is four times the minimum wage in East Flores Regency, which in 2010 was IDR 850,000 or IDR 10,200,000 per year."* (M. Loretha, personal communication, 2011). The experiences of the first growing seasons fuelled Mama Tata's dreams to build the first sorghum flour factory in East Nusa Tenggara.

Figure 5: Mama Tata with farmer group members.

> *"Sorghum is nutritious; Sorghum is Profitable"* *(Maria Loretha ['Mama Tata'])*

Exposure and organisation development (2011–2015)

Based on the positive experiences, Mama Tata started inviting other farmers and communities of Adonara island to visit her farm and to start planting sorghum themselves. She distributed sorghum seeds to interested farmers through a signed contract to ensure that the receiver would not sell the seeds. Whereas the initial focus was on the development of the family farm business, Mama Tata became a more exposed promoter of sorghum as from 2011.

This started when she was profiled as a champion of change by the PIKUL foundation, a national NGO with offices in Kupang. The aim of the profiling was to establish a learning and innovation network for East NT. In the same year, the Bakti Foundation (NGO with HQ in Sulawesi) asked the PIKUL Foundation to recommend active organisations or individuals making changes in East Nusa Tenggara. Based on the PIKUL recommendation, the Bakti Foundation invited Mama Tata to present her work at the Eastern Indonesia Region Forum, which focused on "Adaptation to Climate Change for Small Islands in the Eastern Region."

Figure 6: Mama Tata presenting at Forum Kawasan Timur Indonesia (FKTI) in 2011.

Awards
Her profile and FKTI presentation, which were shared on websites, attracted national media (such as the Jakarta Post and Kompas), which made her story about sorghum in NTT more widely known. As a result she started to receive awards at provincial and national levels: the NTT Academia Award (2011), the Kehati Award of the Indonesian Biodiversity Foundation (2012) and the Ashoka Fellowship for social entrepreneurs (2013). The fellowship came with a stipend allowing Mama Tata to further implement her ideas, such as sorghum cultivation in nearby areas, processing sorghum and marketing.

Collaboration with existing farmer groups
Mama Tata's consistency for planting sorghum made her well-known among farmer groups. In 2011, the interest of the chairwoman of the Lembor Rice Farmers Association (APPEL), led to the opening of four sorghum demonstration plots. The invitation of the chairman of the Ende Regency association of farmer groups (*Gapoktan*) led to community awareness meetings focusing on the message that staple food is not always related to rice. *Gapoktan* agreed to demonstrate and develop sorghum in three sub-districts. Both APPEL and *Gapoktan* are comprised of smaller farmer groups (poktan), each with 20-30 members, which are units for skill development, among others by the Regency Agriculture Office.

Own foundation and many initiatives for promoting sorghum and local foods (2014)
Because of all exposure, the requests for collaboration (NGOs, governments, universities, and research centres) increased. In 2014, Mama Tata founded her **Sorghum Flores Foundation** (Yayasan Argo Sorghum Flores, **Yasores**) to have a legal institution for collaboration. In the same year, this fuelled next steps in the promotion of local foods, through different means and initiatives.

Local food farmers / Sorghum Farmers Association
In the same year 2014, Mama Tata joined the NTT Local Food Farmers Association (*Asosiasi Perhimpunan Petani Pangan Lokal*, P3L) and was appointed chairperson. The aim of P3L is to promote local foods, such as sorghum and local corn. P3L members are mostly farmers from Flores and the surrounding small islands. In 2018, this group became the Sorghum Farmers Association for Food Sovereignty, with explicit focus on developing sorghum in the province of East Nusa Tenggara.

Yaspensel Socio-Economic Development Foundation
Also in 2014, the Bishop of Larantuka asked Mama Tata to help develop sorghum in his Diocese (Eastern Flores) and to join the Larantuka Socio-Economic Development Foundation (*Yayasan Pembangunan Sosial Ekonomi Larantuka*, Yaspensel). At Yaspensel, Mama Tata became a Program Director, developing programs related to sorghum and other local foods (production, climate adaptation, food and nutrition).

First sorghum cooperative
Together with Yaspensel, Mama Tata supported a group of farmers in Likotuden, who first started with savings and credit services to members. This farmer group then got support from the Kehati Foundation to transform into a sorghum cooperative. The young cooperative approached various parties to support establishing a start-up company. The Agricultural Research and Development Agency of the Ministry of Agriculture provided sorghum seeds and machinery for threshing, flour milling and stem squeezing. The cooperative provided services to members and non-members (with non-members paying 50% more). The Kehati foundation supported the training of farmers in sorghum production and post-harvest handling, business management and marketing, packaging and promotion.

Using national government transfers, the village authorities in the Likotuden area allocated funds for promoting sorghum cultivation. is remarkable that the village authorities overlooked or did not want to collaborate with farmer groups already planting sorghum. The budget use was only 40%. According to the Likotuden Sorghum Farmers' Cooperative, the additional sorghum acreage would have be much more than the realized 45 hectares.

The Sorghum cooperative members agreed that farmer families must allocate at least one hectare for planting sorghum. Expecting a production of 2 tons per hectare, 60% would be used for home consumption and 40% for selling to the cooperative. The cooperative set the purchase price and defined that the moisture content should be below 9%, which is ideal for processing sorghum into other food ingredients, such as flour or ready-to-process cereals. When sorghum prices were rising, the cooperative maintained the family nutrition requirement. The cooperative also expected member farmers to plant other local crops like corn, black paddy, and tubers, for a balanced family diet and to produce and conserve local seeds.

Figure 7: Likotuden farmers planting sorghum.

First sorghum processing unit in Likotuden, the 'sorghum centre'
The cooperative started developing various sorghum-based products (sorghum rice, sorghum flour, ready-to-eat cereals and sugar). Farmers used the dregs from sorghum processing as fertilizer. Even though the processing unit is not that large, it made Mama Tata's dream come through for developing a sorghum flour factory in East Nusa Tenggara. Likotuden Village is currently known as the sorghum centre (*Sentra Sorgum*).

Sorghum value chains

Marketing channels
In the early years, Mama Tata directly sold sorghum to final consumers, in the community and to nearby villages. Later, she responded to demand from her growing network, also from outside Adonara Island. Marketing was based on word-of-mouth promotion. After the collaboration with Yaspensel and the establishment of the Likotuden Sorghum Cooperative, marketing patterns further developed. Three marketing channels can be distinguished: (i) Farmers selling directly to final consumers; (ii) Farmers selling to Yaspensel, then to final consumers (including consumers outside East Flores) and (iii) Farmers selling to local traders, who sell to final consumers at local markets or from small stalls where sorghum is stocked. The development of this third marketing channel is an indication that sorghum became a more or less established value chain (Miten et al. (2022)).

Sorghum for health centres and schools
After the East Flores Regency Government made it mandatory for sorghum to be a supplementary meals for stunted children, another marketing channel was established, namely from farmers to Yaspensel, then to the East Flores regency office for Cooperatives and SMEs Office, and then to Village Health Centres (*Posyandu*) and/or to schools. Village Health Centres and schools processed sorghum into supplementary meals to prevent stunting among children under five.

Promotion with churches and NGO's
Persons from local churches and NGOs regularly helped Mama Tata and Yaspensel to display products in their offices and premises. They sometimes delivered sorghum to clients in different cities, for free or for a small fee.

Transport with returning trucks and pick-ups
In an island Province like East Nusa Tenggara, marketing and distribution is hindered by high transport costs between islands. Renting unloaded trucks or pick-ups that return to their place of origin after delivery is a widespread strategy. It is beneficial for the transporter, who can avoid to go back empty, and for the sender, as costs are lower than official expedition costs. Islanders have used this 'entrustment service' for a long time to send food to families outside their village or regency. Farmers have used it to deliver sold farming products to clients. Mama Tata and Yaspensel also used this strategy using information about informal transport options from their networks. Because this transport system has been around for a long time, truck or pick-up owners know about the practice. They do not object that drivers receive a payment, which they consider as a small incentive for them.

Supply to high-end markets proved to be difficult
Between 2017 and 2020, East Flores farmers, assisted by Mama Tata, supplied sorghum flour to the Unis Bakery in Bogor. This bakery was interested in sorghum because it is gluten free. The sales stopped because the transport to West-Java became too cumbersome when the bakery truck did not come to NTT anymore (between 2017 and 2020, the bakery transported machinery from Jakarta to NTT and could take sorghum on the way back). The supply to Javara, a premium food brand that sells in high-end supermarkets (Susetyo 2015), stopped for the same reason.

The informal entrustment service – how does it work?

- Senders look for information about unloaded and returning trucks or pick-ups.
- They contact the truck or pick-up driver and agree on a price.
- The recipient must pick up the goods at the agreed place when the truck or pickups arrive.
- Both the sender and the recipient take and accept the risk that the load is not guaranteed if an accident occurs.

Scaling, networking and policies

Further expansion in other NTT regencies
Mama Tata continued to promote sorghum and local crops and assisted farmers in other NTT regencies, such as Lembata and Ende. Sorghum acreages increased in several regencies and villages. In 2020, the total area under sorghum reached 217 hectares, in 11 sub-districts in East Flores, West Manggarai, Ende and Lembata.

Policy influence
Both national and local government policies have been focusing on expanding monocultures in lowlands. Mama Tata promoted local crops and their cultivation on more marginal lands, which farmers did not use for rice or corn. The Government orientation is also changing. In recent years the Indonesian government has issued several policies to support food diversity programs and increase local food consumption. The following table shares some of the highlights of the past 12 years:

Year	Policies
2012	The NTT regional government issued Law No. 18 concerning Food. Article 60 states that the Government at National and Regional levels is obliged to realise food consumption diversity by cultivating diverse, nutritionally balanced and safe foods. The regional government issued the NTT Governor Regulation No. 6 concerning the '*Regional Action Plan for Accelerating Food and Nutrition Fulfilment for East Nusa Tenggara Province*' for the operations in 2012–2015.
2013	The NTT provincial Government adopted Law No. 19/2013 concerning the Protection and Empowerment of Farmers.
2015	The Governor of NTT and the Archbishop of Larantuka attended the Likotuden Grand Harvest of Sorghum. This led to exposure via television stations.
2016	The regional government issued the NTT Governor Regulation No. 46 concerning the *Regional Action Plan for Accelerating Food and Nutrition Fulfillment for East Nusa Tenggara Province* for the new period of 2016–2020.
2017–2018	The East Flores Regency Government launched the Gempur Stunting Declaration, with policies and regulations to reduce stunting, amongst others via the promotion of Village Health Centres and schools. Specific attention was given for sorghum and moringa leaves, for the provision of supplementary meals to stunted children and children with stunting risks.
2019	The East Flores Regency Government issued Regulation No. 27/2019 concerning the Prevention and Handling of Stunting in Villages. Using sorghum as a meal to reduce stunting rates in children under five was mentioned.
2020	East Flores Regency Government issued the Road Map Food Diversification (Non Rice).
2023	Mama Tata's foundation (Yasores) established the Flores Agro Sorghum School.
2022–2024	The Government of Indonesia launches the Sorghum Roadmap 2022–2024. The indicated objective was to expand the sorghum planting area in Indonesia to reach 40.000 hectares in 2024, spread across 17 provinces in Indonesia, including East Nusa Tenggara, where a private sector driven sorghum centre at Sumba Island is proposed to expand sorghum. The war in Ukraine, which led to the scarcity of wheat and high import costs, triggered the Government to promote sorghum as an alternative for wheat.

Conclusions: progressive change and network building led to sustainable outcomes

Changes processes
From the story of Mama Tata, it is clear that personal dedication, commitment and perseverance can make a change. But it takes time. From the early years of Mama Tata, we can learn that innovation starts with entrepreneurship, curiosity, piloting, testing and networking. It is therefore very relevant to scope for innovative people and give them a chance to share their experiences and further develop the innovation process.

The sorghum reintroduction process initiated by Mama Tata has been gradual and progressive. The detailed retracing of the process, from 2007 to 2024, shows how individual motivation and piloting started with seed collection, multiplication and sharing and with the finetuning agricultural practices, with a focus on her own farm and Adonara island. It then evolved to community meetings and collaboration with farmer groups, establishment of associations, support to farmer cooperatives, processing and sorghum food product development, marketing and advocacy for local crops and the diversification of food and nutrition.

The actor network around Mama Tata
The figure below shows the network of actors that gradually emerged around Mama Tata's initiatives and efforts. Results were scaled largely via informal networks of Mama Tata and the groups and associations she is part of.

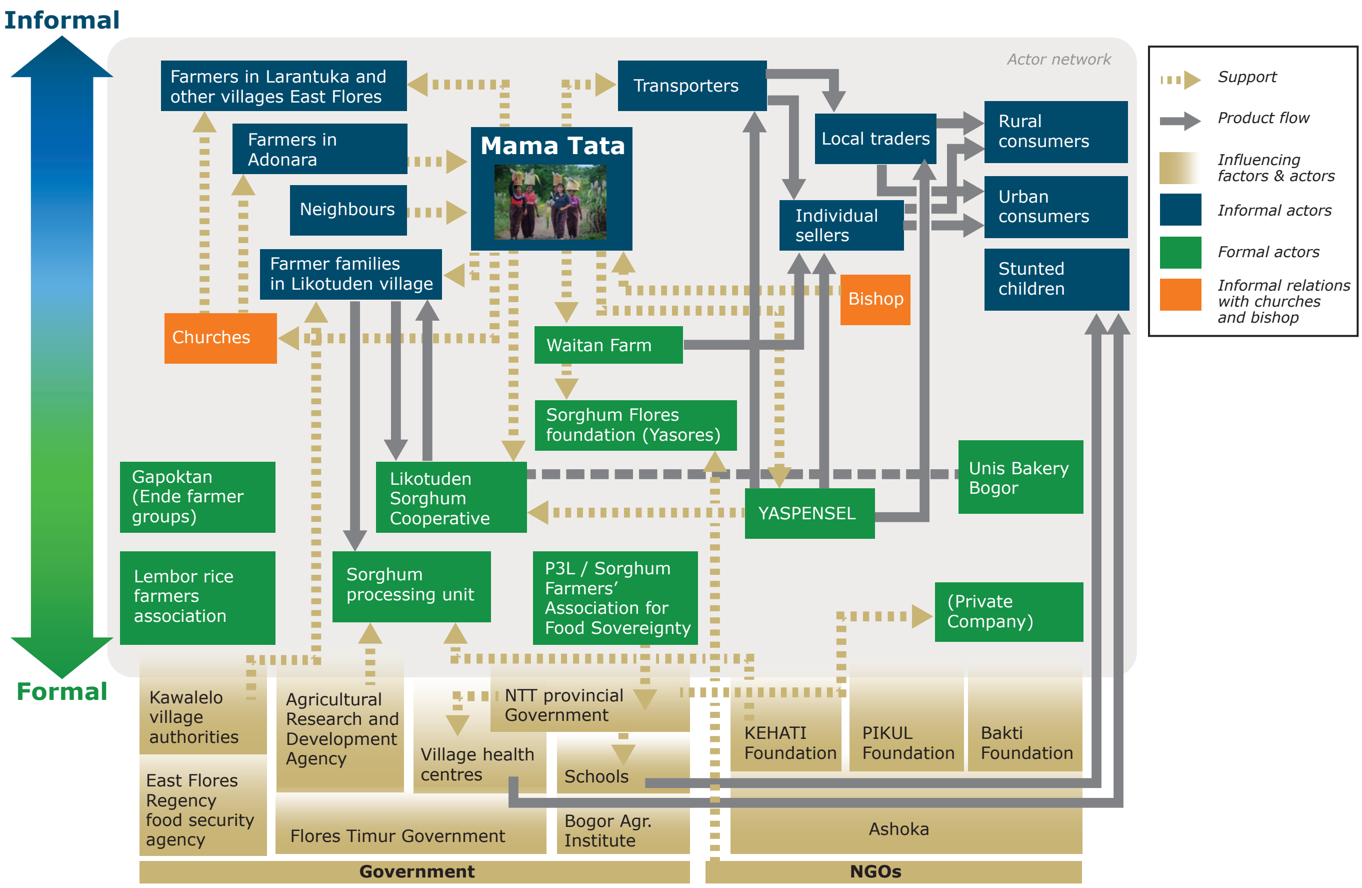

Figure 8: Mama Tata – Gradual network building over the years.

The process of change was gradual, with strong local ownership. It is remarkable that this network was first based on personal relations on Adonara island and then expanded to nearby (yet overseas) East Flores. The gradual network building was supported by the church network of Mama Tata and some NGOs, who recognised the efforts and results of Mama Tata after her first years of piloting and testing. Support from NGO's has been relatively small in monetary terms and proved to be encouraging and not disruptive.

Main results

Making up the balance of 17 years of reintroducing sorghum, the main results are the following:

- Sorghum has proved to be well adapted to Adonara's relatively harsh climate, and can be harvested two times per year, resulting in 4 tons of sorghum per hectare per year.
- It was shown that sorghum can be grown with minimal inputs on poor soils, abandoned lands and on rocky and sandy slopes, which increased overall land productivity.
- A network of farmers collect, exchange and cultivate seeds of local crops and varieties, which are generally better adapted to local circumstances.
- Sorghum is likely to be more resilient to climate change. This was observed when El Nino occurred and when the tropical cyclone 'Seroja' hit the province of East Nusa Tenggara in 2021.
- The successful cultivation of sorghum and availability of seeds attracted farmers on Adonara Island and Eastern Flores to plant sorghum too. There are some 40 hectares of sorghum fields spread across Adonara Island and many more in Eastern Flores. As indicated, 60% of the total Indonesian sorghum acreage is in East Nusa Tenggara (2600 ha).
- The farmers' perception of local food crops has changed and the capacity to grow these crops increased. Farmers get income from crops like sorghum, local corn and cashew nuts. This is a big change, as farmers used to look down on these crops as being for poor people, as animal feed or as intercrop to prevent birds from eating the main (rice/maize) crop.
- The efforts and success of Mama Tata, amplified by Mama Tata's media exposure, attracted various government and non-profit organisations to support the promotion of sorghum and other food crops with farmer training and exchange visits (seed selection, conservation and exchange, good agricultural practices for sorghum cultivation, post-harvest processing and marketing).
- Establishment and development of farmer groups and cooperatives, supporting farmer-to-farmer extension and the transformation of sorghum in various food products.
- Use of the 'entrustment service' for transporting sorghum and food products (avoiding that pick-ups or trucks go back empty) as an informal solution that is quite helpful in the distribution process, as transport costs between islands are high.
- In the past 10–12 years, national, provincial and local government levels got more attention for promoting the production and consumption of local crops, also under the influence of climate change and the Russia-Ukruain war. Mama Tata and the organisations she started and joined, had an influence on policies and regulations that were developed.
- The food diversification campaign landed quite well in East Nusa Tenggara, mainly because of the long informal exposure to new (re-introduced) crops and varieties.
- Sorghum played an important role in the government '*Gempur*' programme aiming at reducing the prevalence of stunting among children under five through supplementary meals at village health centres and schools. According to data from the Flores District Health service, stunting prevalence went from 31% in 2019 to 21% in 2021 (Pemkab Flores Timur, 2022).

Lessons learned, challenges and opportunities

Lessons learned

- There is not one silver bullet, it is the combined effect of initiatives and activities (seeds, agricultural practices, community meetings, group formation, processing, marketing, transport, communication and exposure and advocacy for local crops) that led to sustainable change.
- The change process takes time. Results were scaled largely via informal networks of Mama Tata and the groups and associations she is part of. The process of change was gradual, with strong local ownership. Most probably, it is because the process has taken time and local ownership has progressively grown, that the achieved results seem to be robust and sustainable.
- The dynamics of change are via a diverse range of informal and formal actors: neighbours, villages, family members, churches, local governments and farmers organisations. We learn from this that it is important to communicate via different, yet complementary communication and promotion channels and not just one or a few.

These three lessons imply a lesson for development actors (public, non-governmental and private): try to align to local initiatives and change agents, tailor (modest) support to their needs, and have a longer time horizon than the normal project duration of only 3-4 years.

- Development actors should have keen attention for local seed collection, multiplication, storage and exchange. Local seeds are the basis of local breeding, for instance for varieties that are better adapted to local agro-ecological conditions and climate change.
- The expansion of sorghum cultivation should be accompanied by processing and marketing strategies, taking transport costs, market demand and processing options and costs into account.
- If local farmer groups and cooperatives significantly invest themselves, some Government of NGO support can lead to sustainable results.

Practical challenges and opportunities

- Farmers in Adonara and East Flores traditionally worked together to carry out labour-intensive farming activities such land preparation. This collaboration is under pressure, as more youth move to cities. The labour challenge is something to keep a keen eye on.
- Local markets may not be able to absorb the local sorghum production. Mama Tata, Yaspensel and the Likotuden Cooperative should therefore continue mapping the market demand and identify options to improve value chains (production, quality, processing, transport, collective marketing).
- Many laws and regulations for promoting local crops, improving food and nutrition and preventing and handling stunting have been adopted, but implementation is rather weak.
- Further development of farmers' organisations is a challenge. The law on the protection and empowerment of farmers could be a trigger. Partners could (modestly) support training, exchange visits and facilitate access to investments.
- Farmer cooperatives could better collaborate with village-owned enterprises, locally known as BUMDES. This requires collaboration with village governments.
- Improved cooperation of government agencies is needed to address bottlenecks that hinder community agricultural businesses. The departments of agriculture, cooperatives and SMEs and transportation could for instance better collaborate to overcome the challenge of high transport costs in the Province of East Nusa Tenggara.

Strategic challenge and opportunity

A Sorghum Road map could possibly lead to the further scaling of sorghum in Indonesia. The target of the Sorghum Road map is to move to 40,000 hectares of sorghum in 17 provinces. This target is quite ambitious as the area for sorghum planting in Indonesia in 2022 was only 4,355 ha, spread across six provinces, including East Nusa Tenggara (which accounted for 60% of the total planted area in Indonesia, e.g. some 2,600 hectares). The Road map strategy is top-down, working via private sorghum centres that carry out government projects to promote and develop sorghum in East Nusa Tenggara. This strategy is fundamentally different from the practical people-centred approach taken by Mama Tata, Yaspensel and the Likotuden Sorghum Cooperative, which focused on farmer ownership, diversification of food production and nutrition, and the strengthening of community economies and livelihoods. It is highly recommended that the government, if indeed eager to strengthen sorghum production and consumption, grafts the Sorghum Roadmap to what is already achieved and collaborates with existing farmer groups, associations and processing units. This is a major opportunity.

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