

## ILC2018 Poster and Producer Paper\*

# Leucaena in West Timor, Indonesia: A case study of successful adoption of cv. Tarramba

## *Leucaena en Timor Occidental, Indonesia: Un estudio de caso de adopción exitosa del cv. Tarramba*

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### Introduction

Between 2013 and 2016 the sub-districts Fatuleu and Central Fatuleu in Kupang District of West Timor, Indonesia were selected to study the opportunities for and barriers to adoption of leucaena (*Leucaena leucocephala* cv. Tarramba) for growing and fattening cattle. These were sub-districts where the cultivation and use of leucaena was not normal practice such as has been reported for the sub-district of Amarasi (Nulik 1998; Piggin and Nulik 2005).

In collaboration with Dinas Peternakan (District and Provincial Livestock Service) and BPTP (National Assessment Institute for Agricultural Technology) in West Timor and with the support of ACIAR (Australian Centre for International Agricultural Research), a project was initiated to encourage farmers to adopt the growing of the psyllid-tolerant leucaena cv. Tarramba for feeding and fattening cattle. The selection of farmer groups to participate in the program was the result of collaboration between these agencies.

### Description of villages

The study was conducted in 3 villages in Kupang District (sub-districts Fatuleu and Central Fatuleu), West Timor, Indonesia (Figure 1). Some details are presented in Table 1. Oebola Dalam village was selected in the initial phase of the adoption study, while the remaining 2 (Camplong II and Nunsauen) were selected in the second phase (Kana Hau and Nulik 2017). All 3 villages, comprising 7 farmer groups, have their own adoption stories, which have enriched our understanding of the opportunities for and barriers to successful adoption of leucaena in the District of Kupang.

### History of leucaena in the region

Fatuleu and Central Fatuleu sub-districts were new to growing and using leucaena as fodder for cattle feeding. Prior to the introduction of Tarramba leucaena in 2001–2003, the communities free-grazed their cattle on communal lands, mainly for breeding, and sold bulls only when they needed cash.

At that time, only farmers in the sub-district of Amarasi, also in Kupang District, were known to feed up to 100% leucaena after the Indonesian Government's Livestock Services introduced a cattle-fattening program in the 1970s (Nulik 1998). However, there had been very little adoption of the concept in other areas. This approach has now changed following the introduction of Tarramba leucaena. The Bersaudara, Setetes Madu and Amtoas Farmer groups now concentrate mainly on fattening of Bali bulls, although some farmers still retain some cows for breeding on the free-grazing communal lands.

As grazing lands had been heavily grazed, they were invaded by *Chromolaena odorata* with the result that very little palatable forage was available for grazing. Animals would reach market live weight of 250–300 kg at 4–5 years of age or older and sometimes even failed to reach the target weight before sale. With the introduction of Tarramba leucaena forage, farmers now fatten bulls to reach market weight in 2–3 years. Some of our collaborating farmers were awarded championship medals during the 2017 yearly beef cattle competition in Kupang District (Annex 1a).

In terms of toxicity management, many farmers now understand that, when naïve cattle are first fed leucaena, they initially show symptoms of salivation plus loss of hair and appetite but adapt and recover in 1–2 months. As

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**Figure 1.** Map of eastern Indonesia, showing the three study villages (● Oebola Dalam, ● Camplong II and ● Nunsaen) in the west of Timor Island, East Nusa Tenggara Province. Source: Wikipedia/ Ewesewes.

a result, farmers now gradually increase the amount of leucaena fed to animals initially until their health has recovered.

**Table 1.** Description of villages in adoption study.

Village	Participating farmer group	Tarramba area planted	Cattle operation
Oebola Dalam (Fatuleu)	Bersaudara	125 ha	Fattening and breeding
Camplong II (Fatuleu)	Setetes Madu Talekomonit Tunas Muda Sabu Bani Sanam Tuan	250 ha	Fattening and breeding
Nunsaen (Central Fatuleu)	Amtoas	150 ha	Fattening and breeding

### Progress of adoption, early challenges and successes

The program began in the rainy season of 2012/13, following commencement of the ACIAR project in 2011. Progress with the farmer groups is described below and illustrated in Annexes 1a–1h.

### *Oebola Dalam village*

The Bersaudara Farmer Group in Oebola Dalam consisted of individually-owned and clan-owned lands. The group started with no leucaena, relying on free-grazing, and at times during the dry season, the stealing of forages from the protected forestry area near the village. With our support, they planted 6 ha of Tarramba leucaena in the first year (2013) and approximately 25 ha in 2014.

Initially, the research team worked with just 5–6 innovators from the group of 20 farmers who were willing to participate in planting pre-grown poly-bag seedlings. At the beginning, some participating farmers doubted the wisdom of growing leucaena; wives protested that the family does not have cattle, and “we don’t eat leucaena but corn”. However, the participating members agreed to continue planting leucaena. As plants became established, farmers found that there was demand for fresh leucaena forage from the nearby weekly cattle market at Lili. This provided an opportunity for farmers to earn some cash for their daily needs and for cultural ceremony purposes. Farmers increased the area planted to Tarramba leucaena, selling fresh leucaena even during the dry season, when there was no other production from their dry land.

Free-ranging animals belonging to non-participating farmers were initially a serious concern for participating farmers at Oebola Dalam, and this discouraged some

farmers from growing leucaena. Some participating farmers even abandoned their plots of leucaena when they were prematurely grazed by the free-ranging animals. However, during the next wet season, when they fenced their plots for planting corn, the grazed leucaena plants recovered and became well established.

Farmers found they could integrate corn cultivation with the establishment of Tarramba leucaena, thus affording protection to establishing leucaena seedlings. No fertilizer was applied to the leucaena other than that applied to the corn plants. This encouraged farmers to plant more leucaena.

Plant height was kept to about 1.5–2 m by regular pruning for cattle feeding. Pruning frequency was every 2–3 months during the rainy season and every 3–4 months during the dry season. Number of trees cut per day would depend on the number and weight of animals to feed and the production of forage per tree. Farmers used cut-and-carry feeding methods, as it gave better cattle daily liveweight gains.

Most farmers in the village now have established their own leucaena. They have continued to increase their area planted even after project activities terminated and currently the village has ~125 ha established. The head of the farmer group informed us that another 5 ha was being prepared for the 2018/19 planting season. The technology of planting and feeding Tarramba leucaena was spreading to the bordering villages and farmers.

#### *Camplong II village*

The Setetes Madu Farmer Group in Camplong II consisted of only clan-owned land (more than 100 ha) managed by the clan elders. The land was sparsely planted with cashew nut trees on the more fertile soils, while the majority of the land consisted of less fertile coral soils (Black Mollisols) invaded by *Chromolaena odorata* due to over-grazing by community cattle.

Planting of leucaena began in Camplong II in 2014/15. In general, adoption was faster in Camplong II, where 4 farmer groups were involved. Initially, the group planted 20,000 seedlings of Tarramba leucaena on 20 ha and found that leucaena grew well on the coralline soils.

The Setetes Madu group increased the area planted to leucaena each year to a current total of >50 ha. Currently all farmer groups (Setetes Madu, Tunas Muda, Talekomonit, Sabu Bani and Sanam Tuan) in the village of Camplong II, who have adopted the

technology, have established ~250 ha of Tarramba leucaena. The area is increasing annually.

Setetes Madu farmers initially planted their 20 ha with the intention of producing and selling Tarramba seed and resisted harvesting their mature leucaena trees to concentrate on harvesting seed. The research team encouraged some participating farmers to establish a feeding demonstration using available weaned calves (5 calves) obtained from their free-grazing herd. This demonstration was successful and convinced them to expand cattle feeding with leucaena as they noticed the improved weight gain of their calves. Outside investors were attracted to establish a share-fattening cattle business with the group. The investor has contributed to the installation of a deep bore well to supply watering facilities (water tower tank, some on-ground tanks and solar panel pumping system) costing 1 billion IDR. These investments now support up to 60–70 bulls being fattened in each fattening period.

#### *Nunsaen village*

The Amtoas farmer group in Nunsaen village initially planted about 75 ha of *Sesbania grandiflora*. Their first plantings of Tarramba leucaena seedlings (pre-grown in a nursery) occurred under the existing *Sesbania grandiflora* plants with some direct seeding on newly cleared land. This created a problem with plant competition for leucaena at the outset. The farmer group of Nunsaen (Amtoas) has now established ~150 ha of Tarramba for cattle fattening, and for providing a high quality supplementary forage for their free-grazing animals.

### **Limitations/challenges and benefits to leucaena production**

#### *Biophysical – climate, soils*

On sites with marginal soils such as on Sumba Island, Tarramba leucaena has not performed well. However in Timor, Tarramba leucaena is well adapted to the highly alkaline coralline soils (Mollisols and Alfisols) encountered in many areas, such as in Camplong II and Oebola Dalam villages. With the long dry seasons experienced, farmers have difficulty finding water for watering seedlings in nurseries; thus seedling preparation is often conducted in the early wet season (November–December–January) with transplanting of

seedlings occurring in February-March-April, before the beginning of the dry season in May.

### *Economic benefits*

The economic conditions of participating farmers and villages have improved significantly as a result of leucaena-based cattle fattening. When the project commenced at Oebola Dalam village, most farmers had houses with dirt floors and a palm-leafed roof; currently most farmers have constructed brick-walled houses with corrugated iron roofs. Using earnings from sale of seed and fattened cattle, some individual farmers were able to buy a motor cycle, or a pick-up utility (previously rented in the village) for cattle transportation to the market and for selling leucaena forage at the nearby cattle market. Farmers continue to look for economic opportunities.

The new economic opportunities being generated from leucaena plantings in the village include: (i) sale of fattened cattle; (ii) sale of Tarramba forage and seed; (iii) sale of bare-stem cuttings to neighboring farmers; (iv) plans to develop tall trees to harvest wooden poles for supporting cement floor construction for multi-storey buildings [5,000 Rupiah (AU\$ 0.5) for each pole], or for housing construction (roofing, door and window frames etc.); and (v) other business opportunities such as car and motor cycle rentals.

At Setetes Madu site, when the project commenced, the meeting place was under the shade of a Kesambi tree (*Schleichera oleosa*). The co-operating farmers have now established an iron-roofed meeting house and some farmers own hand-tractors, while some have purchased motor cycles. Successful farms have become demonstration sites for many visitors, including Bupatis (Mayors), Provincial Governor and farmer groups who wish to learn about the successful conversion from free-grazing practices to intensive fattening with leucaena.

### **Future of leucaena development options**

More research is needed on using leucaena leaf for supplementary feeding of calves during the dry season to reduce calf mortality, and on a comparison of the different techniques for plant establishment (poly-bag seedlings vs. 2–3 year plantlets from under or between mother trees). Combination plantings of leucaena with grass and herbaceous legumes as a conservation

practice to improve food crop productivity and soil quality in the region should be investigated.

### **Conclusions and implications**

The success of the farmer groups in Fatuleu and Central Fatuleu sub-districts in Kupang District of West Timor, Indonesia has changed agricultural practices and has improved economic conditions and livelihoods, land quality and thus farming conditions generally.

The success of adoption of Tarramba leucaena has encouraged and inspired many individual farmers, farmer groups, non-government organizations, Government staff and Bupatis (Mayors), including the Governor of the Province, to support and introduce the use of Tarramba leucaena for cattle feeding into their development programs and livestock development plans and practices.

The new Governor of NTT (2018–2023), after visiting the sites of Setetes Madu, Talekomonit and Sabu Bani farms, said that:

*Last night when we discussed cattle farming in NTT, I had no courage to develop plans for a livestock development program; but today, you have showed me the improvement that is possible with lamtoro (leucaena), even on this marginal land. Now I have confidence that NTT can be significantly improved in cattle production if we can adopt these practices.*

He immediately asked to purchase 1,000 kg of Tarramba leucaena seed from the farmer groups (Setetes Madu, Sabu Bani and Talekomonit) as a start to his beef cattle development program.

In conclusion, it is especially pleasing that, following the many benefits from the introduction of Tarramba leucaena, planting of this valuable forage source is being promoted by Indonesian Government agencies at National, Provincial and District levels after the ACIAR project ended in 2016.

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(Note of the editors: All hyperlinks were verified 21 August 2019.)

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### Annex 1



a. Bali bull fed leucaena wins bull-fattening prize.



b. Oebola Dalam village in wet season.



c. Oebola Dalam village in dry season.



d. Farmers seeding poly-bags with Tarramba leucaena.





**e.** Tarramba leucaena being cut-and-carried for feeding.



**f.** Bali bulls being fattened on Tarramba leucaena in Oebola village.



**g.** Newly elected Governor to Province of Nusa Tenggara Timor (white shirt) visiting Camplong II village.



**h.** Camplong II village in front of 9-month-old Tarramba leucaena.