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Tarramba leucaena: A success story for smallholder bull fattening in eastern Indonesia

Leucaena Tarramba: Un caso de éxito para el engorde de toros en el este de Indonesia

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Abstract

Leucaena (Leucaena leucocephala) cv. Tarramba was first introduced to eastern Indonesia (East and West Nusa Tenggara Provinces) as part of an ACIAR project in 2001–2003. Its superior value was recognized immediately as it: was preferred by cattle over local leucaena; was less affected by psyllids; provided better dry season growth; and produced poles suitable for construction. In on-farm Bali bull feeding demonstrations, Tarramba leucaena doubled weight gains compared with traditional practices, enabling the most progressive farmers to win local bull-fattening competitions. Owing to strong demand for seed, the East Nusa Tenggara Assessment Institute for Agriculture Technology, in collaboration with the Provincial Livestock Department, assisted smallholders to establish seed orchards to ensure that professionally produced and packaged Tarramba seed was available for commercial sale. By the end of the ACIAR involvement, approximately 2,000 kg of Tarramba seed had been distributed to farmers, in addition to farmer-to-farmer seed sales. Approximately 800,000 ha of land in East Nusa Tenggara Province is suitable for Tarramba leucaena so the potential for this legume to contribute to beef production in the region is huge. Tarramba is now contributing to forage development in other parts of Indonesia as well as in Timor-Leste.

Keywords: Liveweight gains, seed production, tree legumes.

Resumen

Leucaena (Leucaena leucocephala) cv. Tarramba se introdujo por primera vez en el este de Indonesia (provincias de Nusa Tenggara Oriental y Nusa Tenggara Occidental) como parte de un proyecto de ACIAR en 2001–2003. Inmediatamente se reconoció el valor superior de este cultivar, debido a: fue preferido por el ganado en comparación con la leucaena local; fue menos afectada por psílidos (insectos de la familia Psyllidae); creció mejor en la época seca; y produjo postes de madera para la construcción. En demostraciones de engorde de toros de la raza Bali (*Bos javanicus*), se duplicaron las ganancias de peso vivo de los animales con el cv. Tarramba en comparación con las prácticas tradicionales, lo que les permitió a algunos agricultores innovadores ganar concursos locales de engorde de toros. Debido a la fuerte demanda de semilla, East Nusa Tenggara Assessment Institute for Agriculture Technology, en colaboración con Provincial Livestock Department, trabajó con pequeños agricultores para establecer semilleros con el fin de asegurar que la semilla de Tarramba sea producida y empacada profesionalmente, y estuviera disponible en el mercado. Finalizado el proyecto de ACIAR, se habían distribuido aproximadamente 2,000 kg de semilla de Tarramba, además de las ventas de semilla de agricultor a agricultor. Solo en la provincia Nusa Tenggara Oriental existen aproximadamente 800,000 ha de tierra apta para la leucaena cv. Tarramba; por tanto su potencial para contribuir a la producción de carne en la región es muy alto. El éxito de Tarramba en el este de Indonesia está ahora contribuyendo al desarrollo de leucaena en otras partes del país, así como en Timor-Leste.

Palabras clave: Árboles leguminosos, ganancia de peso, producción de semilla.

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Introduction

Leucaena leucocephala or ‘Lamtoro’ has been well known for decades in eastern Indonesia. However, until the early 2000s, apart from limited usage of what was termed ‘local’ leucaena for feeding cattle in Sumbawa and Timor (Nulik 1998; Piggitt and Nulik 2005; Panjaitan et al. 2014), there was minimal on-going interest in the species. This resulted from inadequate knowledge by many farmers of the value of the species as fodder for cattle as well as to the availability of relatively large areas of native grassland for free grazing (Kana Hau et al. 2014). Many farmers in Indonesia believed that the ‘local’ variety of leucaena was unpalatable to cattle. Finally, the arrival of the psyllid insect (*Heteropsylla cubana*) in the late 1980s devastated existing stands of leucaena and put an end to further plantings.

The introduction of Tarramba leucaena to Indonesia

Leucaena leucocephala cv. Tarramba (syn. accession K636) was released for commercial use in 1995. It was described as more cold- and frost-tolerant than other varieties of *L. leucocephala* available at the time, but not competitive with other *Leucaena* spp., such as *L. diversifolia* and *L. pallida*, known for their cool tolerance at high elevations in Hawaii. However, it was known to display some tolerance of the leaf-sucking insect *Heteropsylla cubana*, largely due to its ability to continue growth through lateral branching while under psyllid pressure. Trials in Hawaii and Australia showed it to be superior in growth and yield to other accessions of *L. leucocephala* available at the time, when infested by the psyllid (Dalzell et al. 2006). It also displayed less branching than cv. Cunningham, being quite arboreal in growth habit.

It was not until 2001–2003 that cultivar Tarramba was introduced to eastern Indonesia (East and West Nusa Tenggara Provinces), as a component of the ACIAR project ‘Leucaena management in West Timor and Cape York’. There was immediate recognition of the superior value of Tarramba leucaena, which was found to be preferred by cattle over other available cultivars/varieties, less affected by psyllids, leafier and lasting longer into the dry season, thus providing better growth through to the peak of the dry season, and to produce suitable poles for door and window frames, house construction and other uses (Kana Hau and Nulik 2012). Understanding the barriers to adoption of leucaena (Kana Hau et al. 2014) was the major achievement of the ACIAR project, as cv. Tarramba now has a huge reputation among Government officials and farmers alike; it is widely accepted as vastly superior to ‘local’ varieties and cv. Cunningham.

Success with smallholder cattle fattening enterprises

Apart from the improved characteristics of the cultivar outlined above, Tarramba leucaena demonstrated excellent results in on-farm trials with smallholders (Shelton 2017).

A one-year feeding experiment to study growth of Bali cattle (*Bos javanicus*) from weaning to market weight during the first phase of the ACIAR project demonstrated to farmers that feeding Tarramba leucaena to cattle doubled weight gains compared with their traditional practices (Figure 1). In particular, a ration comprised of a mixture of Tarramba leucaena with grasses and fresh cassava tubers was among the most popular adopted by collaborating farmers. Using this method of feeding, yearling weaned calves increased weight from an initial average of 90–100 kg to 250–300 kg within 12 months. Conventionally, this market weight is achieved at 3 years of age after intensive stall feeding or at 4–5 years of age from traditional free grazing on native grasslands.



Figure 1. Bali bulls fed Tarramba leucaena.

The most efficient farmer participant in this feeding demonstration won a beef cattle fattening competition with his Bali bull that had reached 400 kg at 2 years (Figure 2). The achievement was published in the local newspaper with a statement from the farmer concerning the benefits of the feeding ration he had applied. Other participating farmers from the new areas developed with Tarramba in the Fatuleu Region of Kupang district also started to win championship awards in the 2018 local beef cattle competitions.

There is now strong demand for seed of Tarramba leucaena in these regions. Accordingly, much effort has been devoted to both the technical aspects of seed production and the logistics of establishing an on-going seed supply network.



Figure 2. Bali bull fed leucaena wins fattening competition.

How smallholders grow, manage and feed Tarramba leucaena

The East Nusa Tenggara Assessment Institute for Agriculture Technology, in collaboration with the Provincial Livestock Department, worked with smallholders to increase the number of seed orchards of this cultivar.

The village of Kuenheun in Timor was initially chosen due to lack of contamination with local naturalized leucaena and the enthusiastic support of the local authority. Procedures were introduced to ensure that a professionally produced and packaged product was available for commercial sale (Figures 3–4).

Tarramba seed was distributed to farmers and propagated in a variety of ways to produce seedlings, including in polybags (Figure 5) and from bare-stem gardens (Figure 6), for transplanting in the field when seedlings were >50 cm tall. They were protected from grazing until they reached a height of >4 m.



Figure 3. Mature seed of Tarramba leucaena.



Figure 4. Tarramba leucaena seed produced by smallholders.



Figure 5. Seedlings grown in polybags ready for transplanting.

Encouraged by the good price for seed due to the high demand, in the second phase of the ACIAR project new village areas were developed and contributed to the supply of seeds.



Figure 6. Bare-stem seedling showing where it is to be cut prior to transplanting.

Some farmers independently produced and sold Tarramba seed, while others marketed Tarramba foliage (Figure 7), as a secondary product, to other farmers in the nearby villages and to the nearby cattle market at Lili in West Timor. Farmers adopted a practice of preserving those branches that produced pods, while cutting branches that did not produce seeds to feed to their animals or to sell to other farmers. Other farmers intercropped their Tarramba leucaena with horticultural crops (Figure 8).



Figure 7. Tarramba leucaena cut-and-carried for feeding.



Figure 8. Regrowth of Tarramba leucaena after cutting intercropped with dragon fruit.

Farmers obtained excellent prices for good quality Tarramba seed, e.g. farmers from Oebola Dalam received up to A\$ 4,500 for 600 kg of Tarramba seed in 2015. During the life of the project, almost 3,000 kg of Tarramba seed were collected and approximately 2,000 kg seed were re-distributed to various locations within and outside the Provinces of East and West Nusa Tenggara. Seed production has continued to increase and by November 2018, almost 5,000 kg of seed were sold for distribution to various places in Indonesia and to Timor-Leste (Kana Hau and Nulik unpublished data).

The most acceptable seed production system resulted when farmers grew their own trees on their own land, as farmer group plantings encountered problems in effectively sharing the proceeds from sale of seed.

Conclusions and Recommendations

Tarramba leucaena has been successfully introduced and developed in eastern Indonesia, where it provides not only good quality forage for smallholder cattle fatteners, but also cash income from the sale of seed, which is in strong demand.

The success of Tarramba is contributing to forage development in other parts of Indonesia (Sumatra, Kalimantan and Java) and in Timor-Leste.

The demand for Tarramba seed continues to increase and is indicative of the interest in expanding the use of forage tree legumes for fattening cattle. Seed production is best conducted on individually owned land as profit-sharing from communal village plantings has created difficulties.

In East Nusa Tenggara Province alone, there are >800,000 ha of suitable land available to grow Tarramba. Accordingly, there is a huge potential market for seed for the next 20 years. Ultimately, a private investor or investors should be encouraged to organize the seed business to ensure a sustainable market supply as demand increases.

The superiority of leucaena cv. Tarramba for the dry conditions of eastern Indonesia, especially for marginal lands (coral limestone Mollisols and Alfisol soils) of eastern Indonesia (West Timor, East Nusa Tenggara and Sumbawa, West Nusa Tenggara), and its multiple uses will ensure expanding demand for seed to supply the increasing demand for beef from other parts of Indonesia.

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(Note of the editors: All hyperlinks were verified 20 August 2019.)

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