

Australian **ACACIAS**

The potential to combat child malnutrition, build agricultural resilience and support adaptation to climate change in semi-arid Africa.



This paper was adapted from a research project undertaken in partnership by World Vision Australia and Peter Yates (Charles Darwin University).

Introduction: The need for a new green revolution

Summary points:

- **There is an urgent need to increase the nutritional value of local foods in Niger and other Sub-Saharan countries.**
- **There is an urgent need for crops that are better adapted to local conditions in Niger and other semi-arid regions, where climate change is likely to exacerbate stress on the agricultural system.**

Niger is one of the poorest countries in the world. Seventy percent of the population is rural, and virtually all of this population is dependent upon either farming or pastoralism for their livelihoods. Along with other Sahelian and semi-arid countries, Niger faces growing food insecurity due to a combination of rapid population growth, resource degradation and climate change.

At present, staple crops are failing two years in three due to increasingly erratic rainfall patterns and dwindling soil fertility. For poor rural Nigeriens, crop failure not only represents a loss of livelihoods but also has severe consequences for household nutrition. Cereal sources, such as the pearl millet which occupies almost 65 percent of Niger's farmland, make up over 90 percent of the energy in the Nigerien diet. Children, in particular, eat mostly a porridge made of pearl millet known as *kunu*. Crop failure and low harvests have dire consequences for children in Niger; base levels of nutrition are poor even in relatively good years, so a small shock such as a drought or a rise in food prices can plunge the country into a full-scale nutritional emergency, as occurred in 2005.

It is clear that this situation, whereby millions of people are living on the brink of starvation and regularly require emergency food aid, is unsustainable. It is a common observation that the "green revolution", which boosted food production in much of the developing world, had little effect in Africa. Rinaudo et al (2002) argue that a new "green revolution" is needed for Africa's dry lands – one based not on incremental improvements in the productivity and reliability of existing crops (and requiring expensive inputs), but on the introduction and widespread cultivation of new crops which are more adapted to the variability of semi-arid environments.

“If there is to be a 'green revolution' for the arid and semi-arid tropics, it will have to be through plants that thrive under such conditions, yield well and require minimal inputs. Millions of third-world farmers have no access to the usual green revolution inputs including chemical fertilizer, high-yielding seed varieties and irrigation. Increasingly they are farming on exhausted, marginal lands under adverse climatic conditions that are unsuitable for conventional crops. For them, a biological revolution is needed, in which plants are selected and bred to suit the prevailing environmental conditions...”

(Rinaudo et al., 2002; 167).

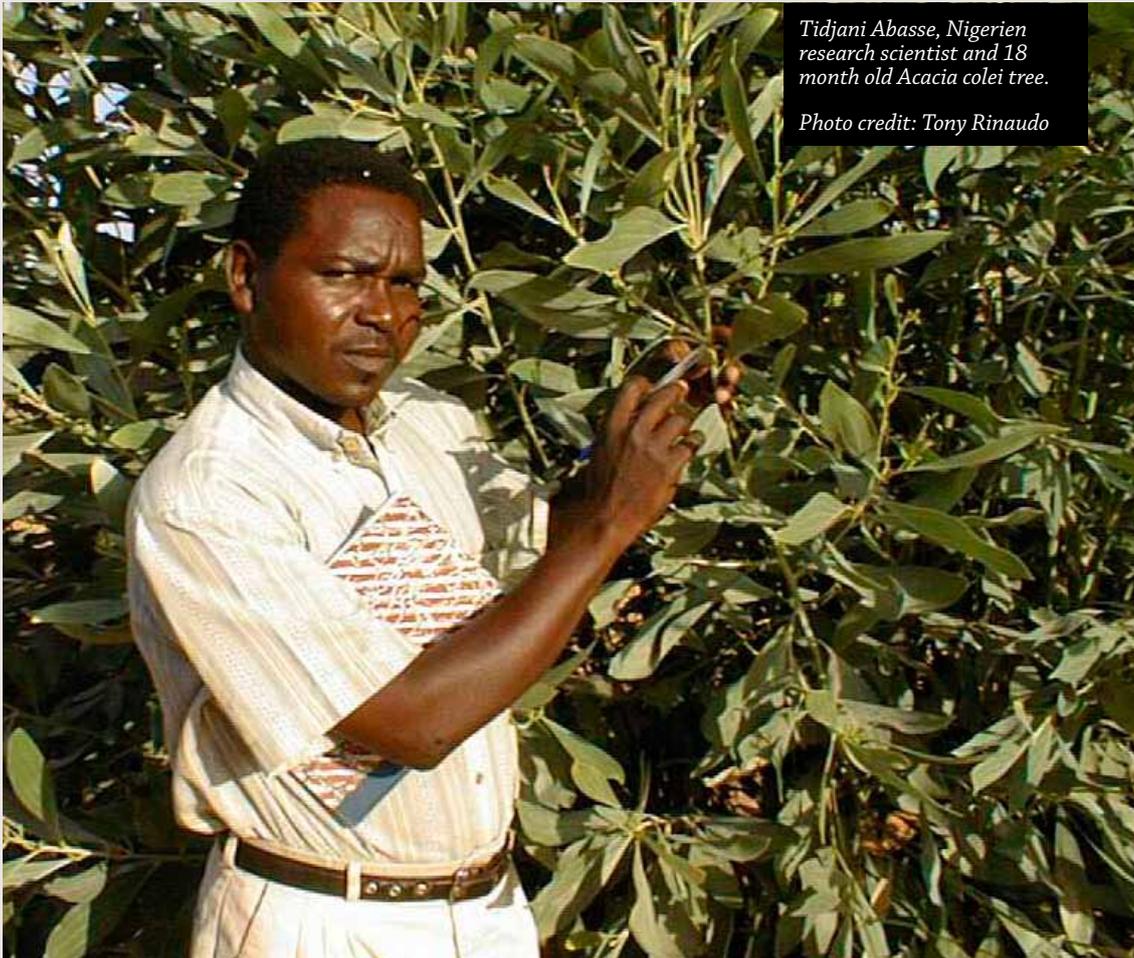
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The case for Australian Acacias

Summary points:

- **Australian acacias create multiple benefits for the agricultural system: they are drought-tolerant; reduce soil erosion and increase fertility; produce leaf material for mulching as well as wood when pruned; produce livestock feed and nectar for bee fodder.**
- **Acacia seeds are highly nutritious (high in protein and carbohydrates) and safe for human consumption.**

Australian acacias are an example of a crop that is drought-tolerant, yields well and requires minimal inputs. Although not widespread in Niger at this time, field trials in a 450mm rainfall zone have shown that with good management (with appropriate tree spacing, pruning and weeding), acacias can live for over 10 years, produce 4.5kg of nutritious seeds (high in protein and carbohydrates) per harvest, and provide valuable [fuel]wood when they are pruned. Acacias also act as windbreaks preventing crop damage, provide leaf material for mulching when they are pruned, produce nectar for bee fodder, and the seeds can also be fed to livestock.



Tidjani Abasse, Nigerien research scientist and 18 month old Acacia colei tree.

Photo credit: Tony Rinaudo

Malnutrition in Niger: Research focus and methodology

Summary points:

- **Acute child malnutrition rates in Niger are extremely high. Even in “normal” times they can exceed the World Health Organization’s threshold for intervention (10-14 percent).**
- **Responses to severe food crises most often involve the distribution of commercial products, which sends a message to affected people that they cannot source adequate foods locally.**

Despite the fact that Australian Acacias offer multiple benefits in semi-arid areas reliant on agriculture and pastoralism, the key aim of this field research was to investigate the potential of Australian acacias to increase the nutritional value of food supplements in Niger.



Acacia based foods have received very high acceptance in Nigerien villages.

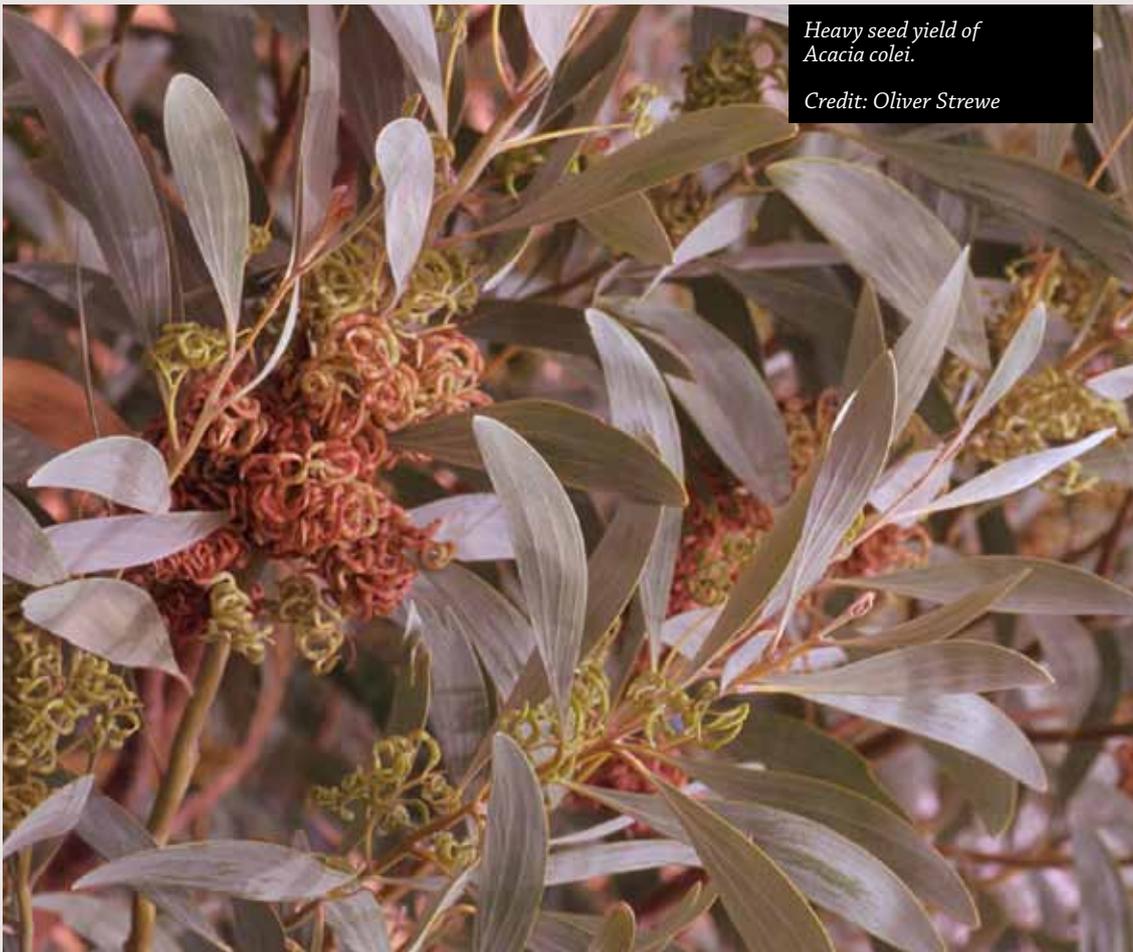
*Photo credit:
Peter Cunningham*

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Originally, the intention was to investigate the possibility of using Acacias as a component of emergency food aid products. However, when the researchers discovered the depth and pervasiveness of child malnutrition and food insecurity in Niger – even in “normal” periods – there was a realisation that local-level interventions could make a dramatic difference to the nutritional status of children.¹

The research approach sought to take into account all of the factors that might impact on the success of an acacia-based food. Thus, the development and trialling of acacia-based food products was undertaken in collaboration with local people, and attention was to be paid to production issues, compatibility with overall agricultural systems, price and price fluctuations, farmer acceptance of Acacia as a crop, taste acceptability and “fit” with local cuisine.

One important priority was that as many ingredients as possible for the improved *kunu* mix were locally available. This priority stemmed from a desire to maximise the market opportunities for local farmers should mass production of the product for distribution as a nutritional supplement come to pass, and also from a concern that the distribution of externally-produced nutrient-dense products in emerging emergency situations sends a subtle message to mothers that they cannot source adequate foods for their children locally. The aim was to ensure that the resulting product was comprised entirely of ingredients that lie within the experience and knowledge of rural people.



Heavy seed yield of *Acacia coleii*.
Credit: Oliver Strewé

¹ In Niger, acute child malnutrition rates are “normal” even as they approach, and periodically exceed, the World Health Organization’s threshold for intervention (10-14 percent) (WHO/UNHCR, 2009).

Research outcomes: Where to from here?

Summary point:

- **Different approaches are appropriate for interventions that seek to increase local food security and nutritional status in the long term, and those that seek to develop and market food supplements for distribution as food aid.**

Over a period of several weeks, a contested process of trialling and tasting *kunu* recipes occurred. While researchers were pressing for high levels of nutrient-rich ingredients such as Moringa leaves, local participants were also concerned about the taste and colour of the final product.² After a recipe was agreed on, an informal trial took place in the local area. The *kunu* mix was very well-received.

What should a localised program focus on?

A local program, prioritising long-term increases in food security and nutrition status for local communities, should have two foci: firstly, to encourage the planting of Australian Acacias on local farms; and secondly to raise awareness about the nutritional benefits of acacia-based *kunu*.

Farmers would need to learn about tree spacing, weeding and pruning in order to maximise yields, and could be educated about the multiple benefits acacias bring to the overall agricultural system and their capacity to withstand severe moisture deficits.

Regarding improved *kunu*, flexibility with ingredients should be emphasised over adherence to a rigid recipe, and there should be a strong educational component to any program encouraging women to incorporate ingredients within a particular category according to price and availability. The objective is not to help mothers produce a perfect food, but a better one. Hence the substitution of cowpea, soybean or other locally available ingredients is far preferable to omission if a family is running short of acacia seeds. It is not a food that is complete in itself or that could or should replace breastfeeding. What it is, though, is a food that is dramatically better than what is current practice (i.e. pure pearl millet *kunu*), and which can (in theory) be entirely produced within rural villages, under prevailing climatic conditions by the poorest of people. It is, furthermore, a product that will ripple benefits through the community and farming landscape, increasing resilience and supporting livelihoods in many ways.

A community-based program could also attempt to address other local issues such as the precipitous weaning of children if a mother becomes pregnant,³ and the practice of feeding all children from a common dish, which means that sick, weak or socially withdrawn children often do not get their share of the food available.

² In addition to acacia seed, which adds protein and carbohydrate to a *kunu* mix, other locally-available ingredients were trialled which complemented the nutritional value of acacia. These included Moringa (Vitamin A, iron and amino acids), peanut (fat and protein), and sesame seed (calcium and fat).

³ Though a child will be breastfed for up to two years as an ideal, it is widely believed that when pregnant, a mother's milk will harm a feeding infant. As a result, as soon as pregnancy is known, the feeding is stopped.

What should a program focusing on commercial production for food aid markets prioritise?

Where acacia-based products are being produced for wide distribution in emergency situations, the product would need to be formulated for optimal nutrition. An initiative like this would require sponsorship from an NGO with a role in food aid distribution or child health, and production would have to be at a scale sufficient to impact malnutrition across a significant population.

The potential of the food aid market is clear: The UN World Food Programme Regional Bureau for West Africa expects to provide assistance to over 12 million beneficiaries in 2010, with a total budget allocation of US\$494.9 million. Even if a tiny proportion of this amount was spent on acacia, the benefits to farmers could be significant, with a major stimulus to tree planting that would generate multiple income streams and build resilience. In sourcing ingredients locally and stimulating local economies, food aid can be moved from being a short-term solution to being transformative.

In order to capitalise on this opportunity, however, a viable market would need to be created and seed production would need to be scaled up by orders of magnitude. After the 2009 harvest, only 1,300kg was available for purchase. In order to achieve economies of scale in *kunu* production, it has been estimated that approximately 20 tonnes of acacia seed – in addition to domestic consumption – would be required. Once the product is established, the resulting acacia seed market can be expected to greatly stimulate the planting of acacias on farms, however there will be a need to actively promote the initial expansion in plantings.⁴



⁴ Involving training and close monitoring and encouragement for a period of time since acacias have particular requirements including plant spacing, weeding and pruning which are critical to successful seed set.

Conclusion

There is huge potential for Australian acacias to transform agricultural systems and child nutrition in Niger and more widely in semi-arid Africa. To date, the adoption and production of acacia seeds has been limited, despite the success of innovative farmers who have planted different types of acacia.⁵ Pilot projects should seek to understand what is limiting uptake of acacias and address emerging issues as a priority.

Any large-scale initiative aiming to significantly increase acacia seed production in Niger will require action at three levels:

Village level, wherein the concept and recipe for an acacia-moringa *kunu* is promoted as part of a package that provides nutritional education, encourages the planting of acacia and moringa trees, and includes measures to ensure that acacia seed is available to those who wish to buy it.

Urban/regional level, where supporting and replicating microenterprises will do much to alleviate malnutrition in urban areas.

Institutional level, wherein the further refinement, validation and large-scale production of a highly nutritious acacia *kunu* will allow nutritional support for vulnerable families during periods of staple food shortage, that is comprised mainly from local ingredients.

It is important that extension efforts create an enabling environment, integrating issues such as: markets and market access; economic viability compared to the alternatives; viable and known production technology; security of land tenure; and ability of farmers to control risks.

There may be significant opportunities to access international climate change adaptation funding, given that the interventions described above target vulnerable populations and seek to diversify agricultural systems toward drought-tolerant plants in semi-arid areas, where rainfall is becoming increasingly infrequent and unpredictable.

References

RINAUDO, A., PATEL, P. & THOMSON, L. 2002. 'Potential of Australian Acacias in combating hunger in semi-arid lands,' Conservation Science, 4, 161-169.

Traditional 'injera' flat bread made from 25% Acacia saligna and 75% teff grain.

Credit: Tony Rinaudo



⁵ Australian acacias are very rapid wood producers compared to African varieties, and some farmers have begun managing their trees to promote the production of tall, straight building poles rather than acacia seeds. One farmer, who has a large number of acacia trees on his farm, developed a *kunu* mix on his own initiative when he saw children becoming malnourished during a famine in 1988, and a small but regular trade has developed in his village – where the benefits of acacia *kunu* are widely known – since.