

Planting acacia seedlings for trials in Zimbabwe  
Richard Barnes



The population of Sub-Saharan Africa is predicted to double to 1.3 billion by 2025. If agricultural production is not increased, the region will face massive deficits in food supplies. Acacia trees, which inhabit even desert environments, could help Africa rise to meet this challenge.

## Acacia: a prickly tree for a thorny problem

In Sub-Saharan Africa, rainfall is erratic, amounting to no more than 800mm throughout the year. Life in this region depends on an intimate relationship with a dust-ridden land that yields little nourishment. In many areas, a key contributor to this survival is the acacia tree: a group of resilient plants found right across the African continent.

When other crops fail, farming communities can still depend on acacias for nutritious pods to feed their animals, and firewood and charcoal on which to cook food. Farmers use the thorny branches of acacias as fencing materials and are able to sell cash products such as gum arabic, a sticky substance used as a food thickener across the world. Acacias themselves provide shade under which grass can grow and cattle can graze.

Other benefits of acacias are more long-term. As nitrogen-fixing plants of the legume family, acacias enrich the poor sandy soils of arid areas. This in turn benefits neighbouring plants and creates fertile soil for future cultivations. Acacias can therefore act as natural "repair kits" on depleted soils in areas of Africa where increasing population and livestock, together with a series of droughts, have led to deforestation and severe land degradation.

Unfortunately, acacias have, over the last century, lost favour with smallholder farmers in Africa. In many areas, acacias have been clearfelled to make way for pasture and grain crops such as millet and maize, which have been promoted as more profitable. To counter such deforestation, rural development agencies have, since the 1980s, encouraged local

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Project cluster on African acacias  
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CEH Centre for Ecology & Hydrology  
Research, assessment, research solutions

Projects conducted by the Natural Forestry Institute, the Centre for Hydrology and Ecology and the University of Dundee



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people to plant and manage acacias and other indigenous tree species. Planting of African acacias has been hampered, however, by lack of information on the most appropriate species, species variety or seed source for any particular locality.

To address this problem, the Department for International Development's (DFID) Forestry Research Programme (FRP) provided funding to the Oxford Forestry Institute, the Institute of Terrestrial Ecology (now the Centre for Ecology and Hydrology) and the University of Dundee to lead a series of 14 research projects investigating how acacias could help rural communities in Africa. This research, which was initiated in 1986, addresses two of the eight UN Millennium Development Goals; namely, to "eradicate extreme poverty and hunger" and to "ensure environmental sustainability".

### **Assessing the potential of acacias**

The research on African acacias was carried out by a collaboration of organisations including the Zimbabwe Forestry Commission, the Kenya Forestry Institute and L'Institut Sénégalais de Recherches Agricoles. The projects focussed on six species: *Acacia erioloba*, *Acacia karroo*, *Acacia nilotica*, *Acacia senegal*, *Acacia tortilis* and *Faidherbia albida*.

Biologists at the Oxford Forestry Institute, the University of Dundee and the Zimbabwe Forestry Commission looked at how fast growing and productive seedlings of these *Acacia* species can be raised in tree nurseries using locally adapted methods.<sup>1-9</sup> Ecologists at the Institute of Terrestrial Ecology identified how acacia fallows can improve soil fertility<sup>10-11</sup> and botanists at the Oxford Forestry Institute investigated the potential of acacia pods as dry season fodder for cattle and goats.<sup>12</sup>



Cattle feed on the nutritious pods of *Acacia erioloba*. © Richard Barnes

A team of sociologists at the Oxford Forestry Institute and the Zimbabwe Forestry Commission looked at the fourth aspect of the research: the potential of acacia trees to generate cash income.<sup>6</sup>

### **Strengthening acacia research in Africa**

The acacia research projects have provided a solid base of information on the usefulness of six major species in Sub-Saharan Africa. For particular key species, this information has been presented in illustrated monographs.<sup>12-15</sup> The research team has also made data readily available in the Botanical Research and Herbarium Management System (BRAHMS) database. Information from this database is being incorporated into *A conspectus on the African acacias*: a major definitive work on the genus in Africa.<sup>16</sup>

By working in partnership with other organisations, the FRP-funded research teams pioneered the formation of the African Acacia Trials Network. Members of this network included CIRAD-Fôret, the Food and Agriculture Organization, the



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World Agroforestry Centre (ICRAF), the Danida Forest Seed Centre (DFSC) and the collaborating research organisations.

The African Acacia Trials Network has played an important role in strengthening the work of research institutions in developing partner countries. For example, in Senegal, the work of L'Institut Sénégalais de Recherches Agricoles on acacia fallows is being extended, via CORAF (Le Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles), to cover the whole of West Africa. And in South Africa, the University of Natal is examining how *Acacia karroo* can be integrated into small-scale farming systems in Kwa Zulu-Natal.<sup>17</sup>

### Informing smallholder farmers

In order to bring together information that was previously scattered and inaccessible to the layperson, ecologists and botanists at the Oxford Forestry Institute and the Zimbabwe Forestry Commission produced a field guide on the acacias of Zimbabwe.<sup>18</sup> The team distributed around 750 free copies to collaborating organisations, libraries, forestry development workers and farmers in Zimbabwe as well as individuals and organisations in neighbouring countries.

**"[The Field guide to the acacias of Zimbabwe] is the easiest guide to field identification of any trees that I have ever seen. Please don't stop now but do some more guides on other trees that grace our land."**

*Nic Stipinovich  
Farmer, Zimbabwe*

The success of the field guide for Zimbabwe has stimulated interest in producing guides for other countries or regions in Africa. As a result, botanists and ecologists at the Oxford Forestry Institute, the Royal Botanic



*Inhabitants of the Ntabazinduna Communal Area in Zimbabwe prune Acacia karroo to provide shade and fodder for their livestock. © Richard Barnes*

Gardens, Kew and Makerere University in Uganda are currently working on such a guide for Uganda.<sup>19</sup>

To help smallholder farmers make direct use of acacias, FRP-funded researchers are also developing a handbook on how to identify, propagate, plant and manage the most useful *Acacia* species in Zimbabwe and surrounding countries in south central Africa.<sup>20</sup> The handbook will be published in 2004 and distributed by non-governmental organisations (NGOs) to forest workers and teachers across the region. To complement the handbook, a colour poster explaining the virtues of *Acacia erioloba* has been widely distributed in Zimbabwe.<sup>21</sup>

As a result of the FRP-funded research, farmers in parts of Africa have rekindled their appreciation of acacias both in agricultural systems and for producing economic products. In the Masvingo province of Zimbabwe, for example, farmers are planting *Acacia senegal* in order to harvest gum arabic to sell to gum brokers in the region. And in North Kordofan in Sudan, farmers are tapping *Acacia senegal* for gum arabic during a specific two week period only in order to obtain greater yields. This change in practice has led to an increase in income and has particular benefits for women farmers in the area.



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## Creating sustainable livelihoods

The FRP-funded research on acacias complies with the core principles of the Sustainable Livelihoods Approach (SLA) advocated by DFID. Firstly, the research is **people-centred**, addressing the agricultural needs of a Sub-Saharan Africa population that is growing by 3.1 per cent a year: the highest growth rate in the world.<sup>22</sup> Secondly, the research **responds** to the needs of NGOs for scientific knowledge to inform their tree planting programmes and development projects in African countries.

Thirdly, the research involved the **participation** of local African staff in trial design and management and in information gathering and analysis. Fourthly, the research takes a **multi-level** approach providing information both to academic institutions and to NGOs working with smallholder farmers on the ground. The work itself was a collaboration between UK and African institutions, thereby adhering to the core principle of **partnership** working.

The core principle of **sustainability** is a key feature of the FRP-funded research. By promoting acacias that rejuvenate degraded soils, the collaboration advocates a long-term approach to the problems posed by devastating droughts in Africa. Acacias, which provide fuel, animal fodder, cash products and other benefits, are also an appropriate multi-purpose agroforestry crop for a rural population that relies on a **dynamic** range of livelihood strategies.

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## References

1. Fagg, C W and Barnes, R D (1990) *African acacias: study and acquisition of the genetic resources*. Final Report. Oxford Forestry Institute, UK. FRP R4348.
2. Fagg, C W, Barnes, R D, Gourlay, I D and Lockhart, L A (1993) *African acacias: study and acquisition of resources: Phase 2*. Interim Summary Report. Oxford Forestry Institute, UK. FRP R4583.
3. Barnes, R D, Filer, D L, Lockhart, L A and Gourlay, I D (1994) *Acacia karroo: evaluation and acquisition of genetic resources*. Final Report. Oxford Forestry Institute, UK. FRP R4526.
4. Fagg, C W and Barnes, R D (1995) *African acacias: study and assembly of the genetic resources: Phase 2 (extension)*. Final Report. Oxford Forestry Institute, UK. FRP R5655.
5. Barnes, R D, Marunda, C T, Makoni, O, Maruzane, D and Chimbalanga, J (1996) *African acacias - genetic evaluation: Phase I*. Final Report. Oxford Forestry Institute, UK and Zimbabwe Forestry Commission. FRP R5653.
6. Barnes, R D, Marunda, C T, Maruzane, D and Zirobwa, M (1999) *African acacias - genetic evaluation: Phase II*. Final Report. Oxford Forestry Institute, UK and Zimbabwe Forestry Commission. FRP R6550.
7. Sprent, J I and Sutherland, J M (1991) *Rhizobium strain selection for Africa acacias*. Final Report. University of Dundee, UK. FRP R4677.
8. Sutherland, J M, McInroy, S G, Odee, D W and Stanforth, A (1994) *African acacia rhizobial technology and ecology*. Final Report. University Of Dundee, UK. FRP R4714.
9. Sutherland, J M, McInroy, S G and Odee, D W (1995) *Rhizobial inoculum production for African acacias*. University of Dundee, UK. Final Report. FRP R6150.
10. Lindley, D K, Deans, J D and Diagne, O (1994) *Acacia tree fallows in Senegal*. Final Report. Institute of Terrestrial Ecology, UK and L'Institut Sénégalais de Recherches Agricoles, Senegal. FRP R4590.
11. Lindley, D K, Deans, J D and Diagne, O (1995) *Acacia tree fallows in Senegal*. Final Report. Institute of Terrestrial Ecology, UK and L'Institut Sénégalais de Recherches Agricoles, Senegal. FRP R6076.
12. Barnes, R D, Fagg, C W, and Milton, S J (1997) *Acacia erioloba: monograph and annotated bibliography*. Oxford Forestry Institute, UK. FRP R6349.
13. Barnes, R D, Filer, D L and Milton, S J (1996) *Acacia karroo: monograph and annotated bibliography*. Oxford Forestry Institute, UK. FRP R4526.
14. Barnes, R D and Fagg, C W (In press) *Faidherbia albida: monograph and annotated bibliography*. Oxford Forestry Institute, UK. FRP R7275.
15. Fagg, C W (In press) *Acacia senegal: monograph, annotated bibliography and a history of the gum trade*. Oxford Forestry Institute, UK. FRP R7275.
16. Barnes, R D and Fagg, C W (In preparation) *A conspectus of the African acacias*. Oxford Forestry Institute, UK. FRP R7275.
17. Mkhabela, T S (2003) The economic value of *Acacia karroo* in small scale farming systems and game farming in northern Kwa Zulu Natal, South Africa. *Southern African Journal of Forestry* 198.
18. Timberlake, J J, Fagg, C W, Barnes, R D and Wise, R (1999) *Field guide to the acacias of Zimbabwe*. CBC Publishing, Zimbabwe. FRP R6349.
19. Badaza, R, Barnes, R D, Beentje, H, Fagg, C W and Mucunguzi, P with illustrations by Rosemary Wise (In preparation) *Field guide to the acacias of Uganda*. Royal Botanic Gardens, Kew, UK.
20. Spicer, N, Barnes, R D and Timberlake, J R (In preparation) *Acacia handbook*. Oxford Forestry Institute, UK. FRP R7275.
21. Barnes, R D, Fagg, C W, Marunda, C T, Stewart, J L and Chimbalanga, J (1996) *Acacia erioloba: a tree of life in semi-arid lands*. Oxford Forestry Institute, UK and Zimbabwe Forestry Commission. Poster Series 4. FRP R6550.
22. Winrock International (1992) *Animal agriculture in Sub-Saharan Africa*. Winrock International, USA.

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