

# Embedded in science

Despite his administrative duties, Dr Ben Chikamai, the Director of KEFRI, remains close to his calling

By Jan Vandenabeele

**D**r Ben Chikamai, the Director of the Kenya Forestry Research Institute (KEFRI) was born in Western Kenya, close to Kakamega and Malava forests. This pushed him towards studying forestry, although originally he would have preferred to study agriculture or medicine.

Dr Chikamai graduated from the University of Nairobi with a Bachelor of Science - Forestry degree in 1983. He was picked to work in forestry research by Dr Jeff Odera, at the time a deputy director of the Kenya Agricultural Research Institute (KARI) and later, the first director of KEFRI.

The East African Forestry Research Organisation (EAFRO) had just collapsed and the Forestry Research Division became a department of KARI, following amalgamation with the forest conservancy of the then Forest Department. Dr Chikamai was seconded there from 1983 until 1986, when KEFRI was created through the Science and Technology Act, Cap 250, Laws of Kenya. Working on species and provenance trials in the out-stations of Kibwezi and Hola, Dr Chikamai became fascinated with dry lands.

From 1984 to 1986, while still at KARI, he obtained a scholarship to the University of Toronto, in Canada, to pursue a master's degree in forest products utilisation. The programme focused on pulp and paper, and it came with an attachment to Pan African Paper Mills. A practical outcome of Dr Chikamai's research was a reduction in the rotation age of pine plantations for pulp and paper from 25-30 years, down to 18 years. He also contributed to the formulation of three papers: Kraft liner, used in lining the inside of cartons; sack Kraft, for cement bags and MF Kraft, for packaging.

With the setting up of KEFRI, Dr Chikamai automatically joined the organisation in the forest products utilisation based at Karura where



Dr Ben Chikamai, director of KEFRI. (Photo BGF)

he was appointed head of the Forest Products Utilisation Unit in 1987. Dr Chikamai transformed this section from a timber-testing outfit into a forest products research division with four distinct units:

- i. Wood physics, mechanics and engineering
- ii. Wood anatomy
- iii. Wood energy, and
- iv. Non-timber forest products (wood chemistry).

At the time, it was not known internationally that Kenya was a potential producer of gums and resins. Gum arabic came, and still comes, mostly from Sudan, Ethiopia and further west from the Sahelian countries of Chad, Nigeria, Mali and Senegal.

In fact, the gum arabic from Kenya turned out to be of a different composition, and from a taxonomically distinct variety. This is *Acacia senegal* var. *kerensis*, common in eastern Africa (Kenya, Tanzania, Somalia, southern Ethiopia), as opposed to *A. senegal* var. *senegal*, from northern Uganda, northwestern Ethiopia, the Sudan and the Sahel.

The gum produced by the variety *kerensis* is more viscous compared to the *senegal* variety and presents challenges during spray drying but has valuable unique properties where adhesion is required. As such, this kind of gum has its own market. Today, gum arabic on the international market goes by type, not as simple gum arabic any more, and Kenyan gum has a niche market.

Much of this knowledge was derived from the doctoral research by Dr Chikamai in the University of Wales (Bangor) and the University of Edinburgh. In his PhD studies, (1991-94), Dr Chikamai concentrated on establishing exactly the types of *A. senegal* present in the country, the amount of resource in northern Kenya, and the chemical characteristics of the gum. He developed a procedure to reduce the high viscosity of the gum through enzyme technology, by breaking down the molecule, without destroying its functional properties.

Today, Kenya exports more and more of its gum arabic, while it has become the second world exporter – after Ethiopia – of myrrh, a resin harvested from a spiny shrub (*Commiphora myrrha*) that grows in Mandera and Wajir districts. Kenya is also the leading exporter of opopanax/hagar, a closely related resin from another species – *Commiphora holtziana* – growing in northern Kenya, southeastern Ethiopia and northeastern Somalia (Somaliland). Hagar has tick-killing properties and is therefore incorporated in pet shampoos in the USA. It also kills bacteria, and is heavily sought-after in the Far East for human medicine. Demand cannot be met, but Kenya exports over 1,000 tonnes per year to China.

The exudation of gums and resins is a stress-related phenomenon, from a physiological point of view. The gums exude during the dry season, and prevent loss of water from a tree through injury.

At this point of the interview, we realised Dr Chikamai could go on for much longer on this



fascinating subject of gums and resins, and with some regret, we directed the interview back to KEFRI, where Dr Chikamai was appointed director in 2009.

During its early years, KEFRI had segmented its research into 17-18 different disciplines. In 1989, the organisation started implementing its research agenda through five-year strategic plans. The individual disciplines were integrated into multi-disciplinary programmes in 1999, while the last strategic plan was revised to be in line with the Kenya Government Vision 2030.

The goal of KEFRI is to contribute to achieving the Vision 2030 by developing technologies for sustainable development and utilisation of forest and allied natural resources to enhance a clean and healthy environment. The strategic objectives are:

- to generate knowledge and technologies for forest development, conservation, management and utilization;
- to strengthen research and management capacity;
- to improve seed production, distribution and marketing;
- to disseminate forest research findings;
- to improve corporate profile and public image of KEFRI; and
- to strengthen linkages and partnership with stakeholders.<sup>1</sup>

Research programmes are now reorganised into seven programmes at national level. These are:

- Farm Forestry (tree farming) - compatible with agriculture and livestock;
- Natural Forests – for conservation, rehabilitation, restoration of the five water towers and making communities benefit from forests;
- Dryland Forestry - 80 per cent of the country is dry, with many challenges. Focus is on technologies that improve management of woodlands for poverty alleviation and environmental conservation.
- Industrial Forest Plantations - to support wood-based industries;
- Tree Seed Programme – focus is on improved seed sources e.g. camphor (*Ocotea usambarensis*), Meru oak (*Vitex keniensis*), Elgon teak (*Olea capensis*) and *Markhamia lutea*, while good seed sources of blue gum (*Eucalyptus grandis*) and *Grevillea robusta* have been developed;



Research by KEFRI's Dryland Forestry's programme Prosopis management. Reduction of stem numbers through thinning is now a standard method for management of natural invasions of Prosopis. Thinning helps to open up the spaces for growth of grass and plants otherwise suppressed by the invading trees. The tree will also produce bigger stems that can be exploited for timber. (Photo: KEFRI)

- Technology Dissemination and Service Programme – packaging and providing research information to service providers like the National Agriculture and Livestock Extension Programme (NALEP), the Kenya Forest Service (KFS), and VI, an agro forestry programme.
- Networks and Partnerships – for strengthening synergies and complementarities with various partners.

These programmes are at national level, while research is structured at grassroots level through KEFRI's regional research centres. These are six, distributed ecologically:

- Maseno – for Lake Victoria Basin eco- region with sub-centres at Kuja River, Ramogi and Kakamega;
- Londiani – for Rift Valley with sub-centres at Marigat, Turbo and Lodwar;
- Muguga - for Central Highlands (which is also the KEFRI headquarters) with sub-centre at Nyeri
- Karura, Nairobi – national centre for forest products;
- Kitui – for drylands of North Eastern and northern Kenya, with sub-centres in Kibwezi, Bura and Garissa;
- Gede - for the Coastal eco-region.

KEFRI employs about 1,000 people, of whom 90 are scientists while about 200 are technologists and foresters. The rest are professional support and general staff (administration, accounts, supplies, drivers, etc).

When asked to rank KEFRI among African forest research institutes, especially in sub-Saharan Africa, Dr Chikamai puts the organisation second behind South Africa, which has a rich history of forest research and indeed is a world leader in plantation forestry. The quality of forest research of course depends on availability of resources, and although KEFRI is relatively well endowed with facilities compared to neighbouring countries, networking has become the norm,

to seek synergies and complementarities. For instance, Dr Chikamai would contact the Forest Research Institute of Ghana (FORIG) for research on *Milicia excelsa* (mvule), a common and commercial species there. Tropical ecology in general is well developed in Ghana and Nigeria, while Kenya is ahead in agroforestry and tree improvement.

Networking also takes place at the national level, including public-private partnerships (PPPs) like the Baringo Aloë Enterprise Company, and national universities. At the international level, KEFRI works with, among others:

- the Association of Forestry Research Institutes in Eastern Africa (AFREA) which groups eight countries around the Horn of Africa, with KEFRI as the secretariat;
- the Forestry Research Network for Sub-Saharan Africa (FORNESA), with the secretariat in FORIG (based in Kumasi, Ghana), and
- the Network for Natural Gums and Resins in Africa (NGARA) hosted by KEFRI.

In addition, KEFRI cooperates with the International Centre for Research in Agro Forestry (ICRAF), which has a good back-up team of high-level scientists.

Heading KEFRI obviously is a managerial and time-consuming job. However, Dr Chikamai maintains his contacts with research through supervising several students, at both master and doctoral level, and he continues to coordinate NGARA. He is also the current Regional Coordinator for Africa for the Commonwealth Forestry Association (CFA) and member of the International Union of Forestry Research Organizations (IUFRO) where he is serving as its Liaison Officer.

A tough job!

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<sup>1</sup> KEFRI Strategic Plan 2008-2012, p.5