

PROSOPIS TECHNICAL WORKING SUB-GROUP - UPDATE
October 2009

NEWS FROM ETHIOPIA

A company – Ethio-feed plc - set up to produce livestock feed by a group of Ethiopians including some working for NGOs, is utilizing Prosopis seeds in the form of powder as an ingredient in multi-nutrient animal feed for dairy and equines, fattening and drought emergency feed for livestock. They are in the throes of promoting the feed in the market currently. As a private sector venture they are happy to make any linkages with NGO or government supported schemes promoting the use/removal of Prosopis.

For further details please contact me: fionaflintan@yahoo.co.uk

Save the Children-US will shortly be setting up a series of field trials assessing the economic, social and environmental costs of different methodologies for removing and utilizing prosopis, as part of its work in Dollo Ado, Somali region. The NGO will happily share the results once the study has been completed.

The **Horn of Africa Network** based at Addis Ababa University, is working on a programme called Re-Greening the Horn. As part of this they have decided to include an objective to keep invading species out of forested areas, particularly the famous Menagesha Forest, which is one of the oldest protected forests in Africa. They are also developing an Environmental Partnership Programme on Invasive Species.

An Australian (Mr Mat Pines – mat2pines@yahoo.com.au) working in the **Awash National Park** has been monitoring the occurrence of invasive species within the Awash National Park, using GPS, and according to him, Prosopis and Parthenium in particular are now developing into a serious threat to the park, and thus require urgent action. Not only animals on hoofs, but also monkeys have added Prosopis seeds to their diet, speeding up the dispersal of Prosopis seeds into the park.

Janny Poley of the Netherlands Embassy in Addis Ababa writes: "Regarding the Prosopis invasion in Awash, there might now still be a chance to get rid of all the young Prosopis trees by practicing the "Chinese" or the "Masaai-approach": e.g. making it part of the job description of scouts and other park personnel (preferably up to management level, leading by example) and motivating everybody else in the park (e.g. herdsmen) to kill every day at least ten Prosopis plants within the park, by cutting them up to 15 cm below the surface, until they are all finished. The scouts should then of course be instructed by park management in which parts of their patrolling areas they should cut the Prosopis on a certain day, based on the map-based strategy to get rid of all the Prosopis in the park (see below). For both scouts and herdsmen there should be an award and/or prize for the most committed and successful Prosopis killer. Regarding the Parthenium invasion, action is needed

before they start to flower. Scouts could also be requested via their task descriptions to remove at least ten plants a day during their patrols (again based on a map based strategy), but if this is not enough, working groups of scouts and daily labourers will have to be formed in my view, in order to work for several days or weeks on the Parthenium problem to uproot them all before they reach the seeding stage.

Janny also suggests that “a campaign approach is already necessary for Parthenium and/or Prosopis to prevent the park becoming completely spoiled, I advise to contact the Productive Safety Net Programme in the surrounding woredas of the park, requesting them to integrate the removal of Parthenium plants and/or Prosopis, in their programme in order to complement the day to day efforts of the scouts, with labour available for public works. In general perhaps also organisations like Ethiopian students associations in combination with Peace Corps and VSO could be contacted to provide back-up support to combating invasive species in and around parks? If needed, also the army can perhaps get involved?”

[Note from the coordinator: SC-US already links up with the Productive Safety Net Programme to remove Prosopis in areas around Dollo, Somali Region].

Prosopis juliflora in Yangatom and Turkana areas-South Omo SNNPs Ethiopia and Kenya by TV-south program. Transmitted on Monday May 04, 2009 night and Saturday May 9, 2009 morning

According to ETV, Prosopis is causing socio-economic and biodiversity problems in Yangatom (Ethiopia) and Turkana (Kenya) districts; around Ethio-Kenyan border. The two areas are adjacent to each other and sharing a lot of resources for their living. The history of the first introduction of *Prosopis juliflora* into Yangatom and Turkana is about 10 years old (in Yangatom-Ethiopia) and 29 years respectively. *P. juliflora* has become an acclimatised exotic in large parts of the region according the two local community elders (ETV-South program, 2009). Introduction of Prosopis to Yangatom and Turkana districts has affected biodiversity of the area. Disappearance of grasses from the area is the most disappointing phenomenon to the local people as they heavily depend on grazing land for livestock production. The most conspicuous fact, according to community elders of both districts, is that plant species (especially grasses) have disappeared in the Prosopis infested area. Moreover the communities ask the government to remove the plant (prosopis) from their lands as soon as possible before they have to move to another area.

The major impacts which were outlined by the communities due to Prosopis are:

- Impacts on grass species
- Impacts on agriculture and
- Impacts on water availability (basically water level decreases)

However these impacts need further study. And in addition to this distribution, biodiversity and socio-economic impacts need to be studied by responsible organization as soon as possible.

Who knows what is happening to wild animals and other wild organisms in the region if any due to this unwanted? A National Stakeholders Workshop

conducted in August 2002 in Addis Ababa identified *Prosopis juliflora* as one of the most threatening invasive alien species in Ethiopia.

NEWS FROM KENYA

Simon Choge and colleagues at KEFRI have just completed the first draft of a set of guidelines on management of *Prosopis* invasions. The tentative title is: "Guidelines for managing *Prosopis* invasions in Kenya: Practical steps for foresters and extension agents." The draft is with KEFRI's editorial board and it will be out in the next month.

WFP in Kenya may have money available for 'food for assets' work with some funds likely to be allocated for clearing *Prosopis* in areas where it is a problem. FAO are also interested in partnering with organizations on this.

For further details please contact me: fionafintan@yahoo.co.uk

CABI are applying for a no-cost extension for their programme on invasive species until the end of 2010, which will give them the opportunity to implement some of the mechanisms they have developed as part of the project. Arne Witt of CABI wrote: "Ethiopia is doing very well with the scaling up of clearing activities throughout the areas invaded by *prosopis* and *parthenium* – it does not appear that the utilization component is on top of the agenda but that eradication is receiving a high priority which is great. I think that Kenya is heading for a disaster - with no national management strategy for *prosopis* and rejection of an integrated management plan I don't hold out much hope. The focus for utilization has been the densest infestations which means that the isolated infestations which will form the nuclei for new infestations are being totally ignored. We have learnt from management plans that you should leave the dense growth for last and focus on the periphery first."

Walter Knausenberger was in Baringo a few months ago and described how the districts around the western shore are overrun by *Prosopis juliflora*. Whilst he was there he visited Murray Roberts of the Rehabilitation of Arid Environments Trust (www.raetrust.org). In addition to some impressive work over 20 years with communities on rangeland recovery, RAE also works with *Prosopis pallida* (edible pods, spineless). His son uses the wood for furniture making.

Walter also saw a group of girls carrying sacks full of, he believes, *P. juliflora* pods, which apparently are sold for only 150 KSh for each 50 kg bag. Contrary to his hope that they were being taken to be ground, it turned out that these pods were being collected for feed for the local goats and given to them intact, as the amount of extant forage was very low (the long rainy season has been spotty and with scant rain). Murray was worried that the seeds will find their way into westward valleys where *Prosopis* has not penetrated widely yet. It seems likely that the introduction of hammer mills to grind the pods before they are given to livestock would be of great benefit here.

Peter Felker responded to Walter's email and his suggestion about the need to grind the pods with the following: "In Argentina where I and my partners produce USDA organic Prosopis flour, my partner in Argentina buys mesquite pods for US 200 per ton. When the pods fall and are abundant the children and older people of one extended family can gather a ton of pods in less than a week in evenings, early mornings etc. This is half a month's salary for an engineer. However we are selling a higher value product and so we can pay a bit more. The cost of grinding the pods is only about \$30 per ton for the machine and electricity (if they are properly dried). I suspect that in a poor country like Ethiopia or Kenya that if you offered \$100 per ton for pods and if an extended family could get an extra \$100 per week for several weeks per year when the pods fell, that would be a big help to their economy. If you were to grind the pods for \$30, someone could sell the ground meal for \$200 per ton which I don't think would be that bad of a price for livestock feed. Someone has to do comparative prices for competing livestock feeds. However the point is that if you increased the bid price of the pods, you might well greatly reduce the amounts of pods over large distances. The hammer mills are a piece of cake, you just need to find some way to dry ten ton lots of pods efficiently. I have suggested rotary coffee dryers with a wood fired heat exchanger or plastic sheeting with a clear plastic tunnel."

A second email **Peter Felker** wrote responded in much more detail and I have included it here as it is full of useful information:

"I couldn't agree more that hammermills could be a very important solution to this problem. However the experience in Yemen, Mexico, India, Texas and Argentina is that drying is the hard part of this grinding process. Pods laying on the ground at 42 C are apparently dry but due to the very hygroscopic nature of the 35% sucrose they are about 13% moisture. If they are not dried to 4% moisture they will gum up any hammermill in a half hour to an hour. In Argentina my partner in the production of USDA Organic, Kosher flour for human foods uses a rotary drier like the one in the previous Ethiopia report. Since she has a wood fired bakery for breads, she ducts part of the heat from the bakery to the rotary dryer. With about 5 hr at 51 C, the pods grind very nicely in a hammermill (production of about 70 kg/hr for a 1 hp hammermill). However in 30 minutes the pods will reabsorb moisture from the air and they will have to be re dried again.

There has been talk about prices of animal livestock feed. What is needed are some real numbers, specifically the price of any ground feedstuff delivered to Lake Baringo. It is my feeling from around the world, that **ground** feedstuffs don't sell for much less than \$200 per ton. Grinding pods only costs about \$5 per ton, so the feedstock should probably have a minimum price of \$100 per ton. At a price of 150 Kenyan shillings (\$1.92 US dollar) per 50 kg bag, this is \$38.40 per ton. So I suspect a competitive price would be on the order of 500 Kenyan shillings per 50 kg bag.

I just googled maize prices and found them to be about 24,800 Kenyan shillings per ton which is \$317 per ton not ground and in the port.

http://www.monitor.co.ug/artman/publish/business/Kenya_records_highest_real_prices_in_region_83967.shtml

In looking at the photos of the women carrying the pods I was struck by the clear understory that is the perfect environment for *Panicum maximum*. In Texas we planted the very fast growing palatable African grass called guinea grass (*Panicum maximum*) under the canopies of *Prosopis* and the yield was double that outside the canopy and the protein content was higher under the canopy. However if you do this you are going to need Eric's help since despite *Panicum maximum*'s incredible productivity, it is very palatable and easily grazed out of these systems. The *Panicum* would have to be protected until it was established and then the grazing controlled.

The lumber at Murrays was most impressive. Keep in mind that this quality is well close to \$1500 per cubic meter at international prices. I suspect he has struggled a lot through trial and error to arrive at this point. However there is no need for him to learn this on his own. Phil Aramun, <http://www.woodscience.vt.edu/contactlists/facultydetail.asp?facultyID=2> is Director of the US Forest Service group in West Virginia charged with developing products from small diameter hardwood logs from the Appalachian region of the US such as cherry, oak, walnut. I have talked to Phil and he is willing to come and give you some advice. As he is a US govt employee you wont have to pay consulting. It would be good if you could invite a representative of a company such as woodmizer <http://www.woodmizer.com/corporate/corporate.aspx> or Morgan Saw <http://morgansaw.com/index.html> to come too. These people could really help Murray to leapfrog up the learning curve.

The photos of Murrays thornless erect *P pallida* were interesting too. When I think of *Prosopis*, I think of the ideotype of a thornless, erect N fixing tree with sweet pods that are palatable to humans and the various species and intra specific genetic variation that can accomplish that purpose. I work full time for www.andyboy.com doing genetic improvement of fennel for improved licorice flavor, broccoli rape (an Italian vegetable brassica) for improved resistance to white rust and cactus pears for greater brix, juiciness and firmness in the fruits. We have identified genetic sources of resistance for all of these characters and are working to incorporate them into our commercial varieties. For *Prosopis* you already have one erect, thornless species with sweet pods, i.e. *P. pallida* that doesn't require crossing. However there are other off the shelf clones from Peru with improved characteristics that could be used to fulfill all your dreams and desires. The *P. pallida* is very easy to root from cuttings and/or clonal seed orchards of thornless individuals could be established that should produce thornless progeny. I seem to recall there is a ploidy difference in *P. pallida* and *P juliflora* that prevents their hybridization.

So where does all this lead? My suggestions are:

1 In the short term make a contract with someone to develop a commercial technical package for drying and grinding Prosopis pods (it would be good to take advantage of heat from bakeries or brick kilns to fire rotary heaters).

2 Work out the fair market price of ground flour where the pods are collected and offer the people this price for the pods.

3 In the long term invite Phil Araman to come for a technical visit and/or arrange a mini workshop with Phil and small log sawmill industry representatives.

And **Eric Schwensen from the U.S** agreed: "Without a doubt, making cheap, easily-maintained, portable and accessible hammermills available would/will be a vital step in reining in Prosopis propagation. It also makes handling the product as a foodstuff much easier. It seems to me that for a relatively small expense, large NGOs could blanket "threatened" regions with hammermills, perhaps even in some sort of loan program, while products and markets gain time to sort themselves out. By definition regions not yet acquainted with Prosopis will not have a good sense of its uses and dangers; however with time to explore options they may develop a good exploitation strategy."

NEWS FROM DJIBOUTI

A few months ago Simon Choge (KEFRI) was in Djibouti working with the government on a program to control Prosopis. He writes: "What is amazing here is that the beetles attacking Prosopis are widespread. I estimate that over 60% seed destruction has been attained currently. Despite the attacks, we have started a pilot project to make livestock feeds using pods, Prosopis leaves and other locally available materials such as leaves of other local plants and fruits. We work with the University of Nairobi, Animal Production Department, and we have formulated various feed formulas using various combinations. We are now in the process of testing these formulations this and next week. I think these results will be of much interest regionally when completed end of the month."

Dr Lafrance from the DECAN Association in Djibouti is working in a protected area to remove prosopis. They have cleared 30 has. Taking off 4,000 plants. "Now, visitors come to pay and see the nature spreading every where and wild animals coming again..".

NEWS FROM SOUTH AFRICA

A cost-benefit analysis of prosopis is being carried out by CSIR in South Africa. The person leading the study wrote that all farmers surveyed (in Kenhardt and Vanwyksylei) complained that that their best, most trusted and reliable boreholes have run dry and they are now forced to pump water many kilometers from other boreholes on their farms. They attribute this to Prosopis. Although this is anecdotal evidence and there could be other factors at play here such as climate change all farmers who completed the questionnaire claim that Prosopis is depleting underground water resources.

NEWS FROM THE U.S.

Eric Schwennesen wrote to remind us to remember that: “If a plant is labeled “invasive”, the focus of resistance to it is narrowly placed on the plant itself. You are of course familiar with the many examples of reacting to the effect of a phenomenon rather than to its cause, and this is also often the case for Prosopis. However, that response is notoriously ineffective, and I offer the example of the American state of Texas: that state has funded, since the 1960s, the largest, most comprehensive Prosopis eradication campaign that I am aware of. It forms a large, permanent part of the administrative structure of state government, and includes enormous budgets for research and control in the field. Result: there is more land in Texas under Prosopis now, than when the program was started. I am sure you are aware that the same is true across Africa.”

And in another correspondence Eric wrote: “ALL crops use water. Some of the most valued crops also use some of the most water per unit of production, i.e. lucerne, fruit trees, flowers; so total water consumption must be balanced against the actual and projected value of the crop. In this regard it is once again important to understand Prosopis in a reasonable context, because although it has shown itself to be very aggressive and persistent, it also ranks very high on the list of crop values. Shade alone, in the very hot, semiarid regions, is extremely valuable as residents, livestock and wildlife will attest. What “value” does that have, especially with little or no maintenance? There are of course the many other products of this particular crop: effective nitrogen-fixer, deep-soil mineral pump, high-protein human and animal feed, a major source of nectar for honeybees and birds, firewood, lumber, etc. In sum, let us take care to recognize the balance needed between water consumption and product yield. There are millions of hectares where Prosopis is an unacceptable occupier of land intended for other uses; but that should in no way diminish recognition of its potential as a crop in areas where it is understood and can be managed. Recall that in India Prosopis is now being used as a commercially-favorable cover crop for reclaiming exhausted fallow land.”

In response **Walter Knausenberger**, USAID-Kenya raised some points for further discussion and questions: “What makes some introduced species invasive is generally well understood – fast growth rates, high seed production, adapted to a range of climatic regimes and soil types, generalist pollinators, dispersal by vertebrates, lack of natural enemies etc. etc. – to state that Prosopis only becomes invasive because the dispersal agents are animals is not complete. Another element to be taking into account is that Prosopis are major water suckers, known to lower aquifers in whole watersheds. Their role as nutrient pumps is also notable, and typically beneficial. As we know, there are dilemmas and trade-offs in looking at the uses and benefits of Prosopis as a control means. So, apart from preventing further spread, **can you shed some light on how the existing Prosopis situation can be better managed with the, in my mind, not so new insight that hoofed animal are the vectors?”**

Arne Witt of CABI, Nairobi also responded and sent in some papers that open up the discussion further (see below): “I am attaching two papers for your interest – one is an analysis of the impacts of cash crops on biodiversity and poverty – interestingly the researchers found and I quote “the findings contradict the neoliberal assumption that export-oriented development will generally stimulate economic growth and reduce poverty in the production areas”. Although the link to prosopis may be weak I see it as a cash crop since many of its products are not utilized locally but exported to cities and towns or elsewhere – in many respects it is a cash crop. I have also attached a paper on afforestation and its impacts on birds – prosopis is invading grasslands and is a monoculture so comparisons are valid. Below is also something on solar cookers fyi – sitting in our living rooms we always think that the promotion of solar cookers is a great idea to alleviate pressure on trees in rural Africa – in theory it is great, but getting people to use them is another challenge and this is what worries me about prosopis utilization – will people utilize it and will it be utilized on a sustainable basis without continued efforts being made to promote its use. Lots of resources were pumped into promoting leucaena and people started using it but it didn’t last.”

On a different note, **Peter Felker**, who has been a great supporter of this Prosopis TWG in many ways has set up a **personal website** from where many of his numerous publications on Prosopis and other “invasive” species can be downloaded: <http://sites.google.com/site/petersprosopismesquitesite/>

Documents Received in Last Months on Prosopis available from the Prosopis TWG or on the Internet

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General

Forage Production and Quality of 4 Perennial Grasses Grown Under and Outside Canopies of Mature Prosopis glandulos Torr. Var. glandulosa (mesquit) by R. East and P. Felker , *Agroforestry Systems*, Vol 22: 91-110. 1993. Internet: <http://sites.google.com/site/petersprosopismesquitesite/>

Grading Mesquite Lumber by P. Felder and P. Anderson. 1997. Internet: <http://sites.google.com/site/petersprosopismesquitesite/>

Prosopis Genetic Improvement Trials in Cape Verde by P. Harris, N. Pasiiecznik, M. Vera-Cruz and M. Bradbury. Undated.

Cloning of Erect, Thornless, Non-Browsed Nitrogen Fixing Trees of Haiti’s Principal Fuelwood Species (Prosopis juliflora) by T. Wojtusik, P. Felker, E. Russell and M. Benge. *Agroforestry Systems*. Vol 21. 1993. Internet: <http://sites.google.com/site/petersprosopismesquitesite/>

The Utilization of Mesquite and Screwbean by the Aborigines in the American Southwest by W. Bell and E. Castetter, University of New Mexico Bulletin, Biological Section, Vol 5, No 2. 1937.

Documents on Prosopis in Kenya

Agro-Pastoralists' Wrath for the Prosopis Tree: The Case of the Il Chamus of Baringo District, Kenya by Andillahi Abboud and D. Layne Coppock. Research Brief 05-02-PARIMA, December 2005.

Internet: glcrsp.ucdavis.edu/publications/PARIMA/05-02-PARIMA.pdf

Invasion of Prosopis juliflora and Local Livelihoods: A Case Study from the Lake Baringo Area of Kenya by E. Mwangi and B. Swallow. ICRAF Working Paper No. 3, Nairobi Kenya.

Documents on Prosopis in Ethiopia:

Experiences on Prosopis Management. The Case of Afar Region. A report by FARM Africa. 2008.

Documents on Prosopis in India

Performance of Prosopis Species in Arid Regions of India by L. Harsh, J. Tewari, N. Sharma and P. Felker. Internet:

<http://sites.google.com/site/petersprosopismesquitesite/>

Documents on Prosopis in Australia

The following are available from internet:

<http://www.weeds.gov.au/search.php?query=mesquite>

Volume 1: Best Practice Manual. Control and Management Options for Mesquite (Prosopis spp.) in Australia. State of Queensland (Department of Natural Resources and Mines). 2003.

Volume II: Managing Mesquite. State of Queensland (Department of Natural Resources and Mines). 2003.

Volume III: The Mesquite Control Toolbox. State of Queensland (Department of Natural Resources and Mines). 2003.

Volume IV: Case Studies. State of Queensland (Department of Natural Resources and Mines). 2003.

Review of Progress Towards the Implementation of the Mesquite Strategic Plan (2006-2007) by N. March and R. Cobon of the National Prickle Bush Management Group. 2007.

Other relevant articles available from the Prosopis TWG

Opuntia Forage Production Systems: Status and Prospects for Rangeland Application by J. Guevara, P. Suassuna and P. Felker, Rangeland Ecology Management, Vol 62, 2009.

Parthenium: Threat to Biological Diversity and Socio-Economic Activity in Central Rift Valley of Ethiopia by Adane Kebede, HOA-REC/N-IAS Program, Addis Ababa. 2009.

The Impact of Commercial Afforestation on Bird Populations in Mpumalanga Province, South Africa – Insights from Bird-Atlas Data by D. Allan et al. Biological Conservation, Vol. 79. 1997.

Biodiversity and Socioeconomic Impacts of Selected Agro-Commodity Production Systems by J. Joost Kessler et al, The Journal of Environment and Development, Vol. 16, No 2. 2007.

Sand Dune Stabilization in Central Somalia by D. Zollner. Forest Ecology and Management. Vol. 16. 1986.

Ecohydrological Impacts of Woody-Plant Encroachment: Seasonal Patterns of Water and Carbon Dioxide Exchange in a Semiarid Riparian Environment by R. Scott, T., Huxman, D. Williams and D. Goodrich. Global Change Biology. Vol. 12. 2006.

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- Geoffery Howard, IUCN, Kenya
- Araya Asfaw, Director of the Horn of Africa Regional Environment Facility and Network, AAU
- Janny Poley, First Sec. Dutch Embassy and Horn of Africa Environment Programme, Ethiopia
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- Adefires Worku Gizaw, FRC, EIAR Ethiopia

- Alan Nicol, Water Forum, Paris
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- Solomon Wakgari, Ethiopia
- Almaz Kebede, Ethiopia
- Mahamoud Haji, CARE Kenya
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- Joseph Matere, FAO Kenya
- Robert Allport, FAO Kenya
- Mohamed Al-Mussali, Yemen
- Ahema Tadesse, SC-US, Ethiopia
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- Fiona Flintan, NRM Regional TA, ELMT, Ethiopia