

 **BAMBOO**

**Botanists Identify new species of North American bamboo**

Two Iowa State University botanists and their colleague at the University of North Carolina have discovered a new species of North American bamboo in the hills of Appalachia. It is the third known native species of the hardy grass. The other two were discovered more than 200 years ago.

Lynn Clark, Iowa State professor of ecology, evolution and organismal biology, and Ph.D. student Jimmy Triplett study bamboo diversity and evolution. They first heard about "hill cane" from a botanist at the University of North Carolina. Although the plant was known to the people in the area, its distinctiveness was not recognized.

Hill cane differs from the other two native North American bamboo species – commonly known as switch cane and river cane – in an important way. It drops its leaves in autumn. "That's why it was recognized locally as being different," Clark said. "It's pretty uncommon for bamboos to drop their leaves."

Clark should know. She's an internationally recognized bamboo expert. She had previously discovered 74 new species of bamboo. Her 75th species discovery has been named *Arundinaria appalachiana*.

There are 1 400 known species of bamboo. Of these, about 900 are tropical and 500 are temperate. The bamboos of North America are found in the eastern and southeastern United States, from New Jersey south to Florida and west to Texas. Giant cane (*Arundinaria gigantea*) occurs in low woods and along riverbanks. Switch cane (*Arundinaria tecta*) is found in non-alluvial swamps, moist pine areas, live oak woods and along sandy margins of streams. "The United States' native bamboo has been a very important plant ecologically," says Clark. "And there's recent interest in using it for revegetation projects because it is native and has been used for habitat by so many different animals, especially birds."

Clark and Triplett began looking at the North American bamboos as part of a larger collaboration with botanists worldwide to develop an evolutionary family tree of bamboo species. They are using modern DNA sequencing technologies together with traditional plant taxonomy, which involve observation and description of a plant's form, anatomy, ecology and other characteristics. [Source: Iowa State University [in *Science Daily*], 13 March 2007.]

**Bamboo rice**

Hard-pressed tribals in Kerala's Wayanad district (India) are making a bountiful harvest of bamboo rice, a forest produce much in demand for its medicinal value and as an ingredient in ethnic cuisine.

With large stretches of the blossoming plant shedding its paddy-like seeds, tribal families gather in bamboo groves with brooms, baskets and sacks to collect the rice, which was a little supplementary income this year. A local Scheduled Tribe Cooperative Society is buying bamboo rice, brought mostly by the Paniya and Naika tribes in the Noolpuzha range of the Wayanad Wildlife Sanctuary.

The gruel made of bamboo rice mixed with herbs is prescribed for arthritis and rheumatic complaints in indigenous medicine. The tribal cuisine has several delicacies made of bamboo rice and wild honey, with which the rural poor survived in times of famine.

Grown in groves, bamboo has a lifespan of 12 to 36 years. The plants blossom only once in their life time and perish after shedding rice, leaving it for new shoots to come up from the stump. Local botanists say that the types of bamboo mostly found in Wayanad are *Bambusa* and *Dendrocalamus strictus*, but several other varieties also grow in the area.

A family can collect 20 to 30 kg of bamboo rice a day. The cooperative buys it for Rs10/kg, but private buyers offer higher prices. The rice is winnowed, husked and packed by the cooperative before being sold.

Bamboo blossoming also attracts tourists as vast areas of dark and shady forest turn aglow with yellowish flowers. [Source: *The Hindu* [India], 25 February 2007.]

**Hong Kong skyscrapers made of bamboo**

Hong Kong's skyscrapers proudly dot its shores, giving the island its glossy, modern image. Yet the structures, which are being built higher and faster every day, owe their identities to one of the oldest construction materials in history – bamboo.

Advances in engineering and construction have not been able to outdate bamboo, a tried and successful material used to construct buildings in China for more than a thousand years. Light and cheap bamboo, mostly from southern China, helps Hong Kong's builders sheathe entire buildings in a matter of weeks and is constantly in high demand. [Source: NDTV.com [India], 23 February 2007.]



 **BEE PRODUCTS**

**New study of Spanish varieties of honey**

According to a new study of Spanish varieties, honeydew honey has even higher levels of disease-fighting antioxidants than the honey that bees make from nectar.

But all honey, regardless of its origins, is good for you, experts say. In recent years, honey has gained a reputation as a health food, especially in the light of research suggesting that it has germ-fighting powers and is high in antioxidants and chemicals that appear to block certain types of cell damage caused by molecules called free radicals.

In 2004, researchers in the United States of America found that antioxidant levels rose in people who ate between four and ten tablespoons of honey per day, depending on their weight. It was not clear at the time, however, which varieties of honey harboured the most antioxidants.

In the new study, researchers looked at 36 varieties of Spanish honey in two groups, clover honey, made by bees from the nectar of flower blossoms and honeydew honey, made by bees from a sweet, sticky substance secreted by insects such as aphids that live off plants. Honeydew honey is only produced in a few parts of the world and is considered a delicacy in certain regions.

The researchers performed tests on the honeys and reported their findings in the February issue of the *Journal of the Science of Food and Agriculture*. According to the results, honeydew honeys had higher levels of antioxidants in general. The researchers also report that Spanish honeydew honeys tend to be darker and more acidic than clover varieties.

Study coauthor Rosa Ana Perez, a researcher with the Instituto Madrileño de

## PROPOLIS

Propolis is the sticky glue used by honey bees. It is usually coloured dark brown, although it may also be yellow, green, grey or red. Plants are literally rooted to the spot where they grow. This means that threatened by an enemy, they cannot get away. They therefore protect themselves with chemical defence systems, which include toxins, bitter tastes and stinging repellents. Tender buds provide tasty snacks for insects unless defended, and plants often protect their buds with sticky gums. When a tree is wounded it secretes resin around the wound as the first stage of the healing process.

People have great benefit from these powerful plant chemicals and many medicines and drugs are derived from the plants. Propolis is antibiotic – it has been proved to kill bacteria and there are many claims for its medicinal properties.

A bee collects propolis by biting off scraps of plant resin with its mandibles and packs them into the *corbiculae* (pollen baskets) on its hind legs. Each of these can carry about 10 mg of propolis. Because of its stickiness, gathering propolis is a slow business: it can take an hour to fill both baskets. Back at the hive, unloading can take another hour. Propolis is only collected when the temperature is above 18°C. Bees use propolis in a variety of ways, such as keeping their homes dry, cosy and hygienic.

It is not possible to define propolis any more than it is possible to define honey – it all depends on what is available for the bees. In general, propolis consists of resins, waxes, volatile oils and pollen, as well as vitamins, minerals and plant chemicals such as flavonoids. The problem for people marketing propolis commercially is to obtain a standardized product.

Depending on quality, the world price of propolis is currently around US\$50/kg. (Source: *Bees for Development*, March 2007.)

Investigación y Desarrollo Rural, Agrario y Alimentario in Madrid, said honeydew honey from outside of Spain should also show similar signs of higher levels of antioxidants. Honeydew honey is relatively rare in the United States.

Perez said, however, that honey is not a miracle food: "I don't think that a foodstuff on its own could allow the improvement of the health of anyone, or even prevent some disease." (Source: *HealthDay News, Washington Post* [United States of America], 22 February 2007.)

### Rare New Zealand honey leads to sweet importing business

The buzz about manuka honey has to do with its health benefits, not its flavourful properties in recipes. The antibacterial-rich honey is produced by bees during the few weeks a year that New Zealand's manuka bushes are in bloom and is touted as a remedy for everything from skin conditions to digestive disorders.

Known in parts of Europe, New Zealand and Australia, the product is virtually unknown in the United States of America, but Fiona Nelson wants to change all that. In October, Nelson opened Wedderspoon Organic, an importing company that is bringing the honey to the country. She currently imports and sells two products. Both are stamped with the National Organic Program of the United States Department of Agriculture (USDA).

Manuka Honey Active 16+ is equivalent to 16 percent antiseptic solution, according to a testing method developed by the University of Waikato in New Zealand. People take a spoonful of active manuka honey for such gastrointestinal disorders as acid reflux, oesophagus ulcer, heartburn, upset stomach, stomach ulcer and irritable bowel syndrome. It is also touted for external use for wound care, burns, diabetic leg and foot ulcers, bedsores and post-operative scar healing.

Nelson said the honey has no expiry date because it is organic and does not need refrigeration. Unlike processed honey bought for cooking, it does not crystallize.

The other product, Autumn Forest Honeydew Honey, is derived from the sap of beech trees. It was named by the Maoris, the indigenous people of New Zealand, for the golden colour of the beech sap in the morning light. Honeydew honey contains complex sugars in greater levels than average floral honeys. It is more readily available than manuka honey but, unlike

manuka honey, honeydew honey can be used in cooking or dribbled on pancakes or fruit. (Source: *Pottstown Mercury* [United States of America], 5 February 2007.)

## PROFITING FROM HONEY BEES



This engaging film looks into the traditional and sustainable honey harvesting methods of the communities living around Danau Sentarum in West Kalimantan, Indonesia, one of Southeast Asia's largest wetlands.

The communities harvest honey from wild honey bees (*Apis dorsata*) from the colonies that make the wetlands their home. Harvesting up to 25 tonnes of honey yearly, forest honey is a significant source of income.

The traditional *tikung* method is widely used for honey harvesting in the area. Since there are few tall trees, people facilitate conducive nesting conditions for the bees by attaching rafters or *tikung* to trees. A *tikung* takes about an hour to prepare and a family can have tens, or even hundreds of them, whose ownership is passed on from generation to generation.

Also described is the *periau*, or traditional regulations for the use and management of forest honey.

The film aims to underscore how supporting traditional methods of management are highly effective in ensuring the sustainability of honey in the area. (Produced by: Riak Bumi, Telapak and NTFP Exchange Programme for South and Southeast Asia, 2005. DVD [25 minutes]. In Bahasa Indonesia with English subtitles.)

### FOR MORE INFORMATION, PLEASE CONTACT:

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 (See page 24 for information on another DVD produced by the Programme.)

**Beekeepers in Australia enjoy massive honey harvest**

Tasmanian beekeepers have reaped a massive honey harvest from the state's native leatherwood trees. The trees, which mainly grow in the state's western rain forests, produce a unique flavoured honey for export and domestic markets. Yields this year are expected to be 30 to 40 percent above average. Beekeepers believe the exceptionally warm February weather has made the difference. [Source: ABC Online [Australia], 8 March 2007.]

 **BRAZIL NUTS**

**Brazil nuts' path to preservation**

Help is at hand for the Amazon rain forest and Brazil's poverty-stricken rural people, courtesy of the country's famous native nut.

Brazil nuts are a valuable food source with a huge market in Europe and North America: up to 7 000 tonnes of unshelled nuts and 20 000 tonnes of shelled nuts are shipped every year. And because the trees that supply the nuts grow wild, they offer a way for communities to make a living from the forest without destroying it, something that is now being put to use in the country.

"This is a real financial resource for communities," says Dr Rafael Salomao, who works at the Museu Goeldi, one of the most important centres for the study of the Amazon. "A tree which is over 400 years old can provide for generations and generations."

Brazil nuts are considered to be one of the most valuable products to be harvested from undisturbed rain forests. The nuts, known to Brazilians as *Castanha do para*, grow uniquely in the Amazon basin. They are hazardous to collect: each hard outer shell weighs over 1 kg. However, they offer an alternative to the way that many areas of Brazil are trying to develop, by clearing the forest to create areas suitable for grazing cattle or growing products such as soya.

For many years, this has meant the destruction of Brazil nut trees, even after they became officially protected. But forests are burned to clear the land and the Brazil nut tree is very sensitive to fire. After three years, the trees are dead. What is worse for Brazil nut collectors is that once the trees have been destroyed, there is little chance of getting them back. Attempts to replace them have been largely unsuccessful. Saplings will not grow in shade and they take up to 15 years to begin producing nuts.

However, at the end of 2006, the governor of the large state of Para announced a protected reserve of 16.4 million ha of forest, with the aim of creating a huge conservation corridor through the northern Amazon. And in the state over Para's northern border, Amapa, small communities are taking the Brazil nut to generate income from the rain forest without destroying it. "We needed to create organizations in the region in order to strengthen local production," said Ajama da Silva Mendes, from the Amapa state department of industry, commerce and minerals. "So the government gave some incentives to create cooperatives, together with the communities."

Brazil nut gatherers and their families are now able to maintain decent livelihoods. And small-scale factories have been set up to produce Brazil nut biscuits and oil, broadening the range of products available for export, meaning that there is a better way for people to obtain a fair price for their valuable resource.

But there are further problems. Subsidized production in Bolivia is challenging Brazil's dominance in the market. And when, in 2004, the European Union found that Brazil nuts with shells on had traces of aflatoxins, which can cause liver cancer, strong regulations were put in place regarding the nuts. While the American limit on aflatoxin levels in Brazil nuts is 15 parts per billion, the European limit is just four parts per billion. This has damaged Brazil nut exporters. [Source: BBC News, 28 January 2007.]

**Modelling Brazil nut subsidies and incentives**

Over the last decade, settlers have moved to Brazil's western Acre state and put significant pressure on the Amazon forests. Most settlers are clearing land for cattle pasture. However, half of the farm families maintain part of their farm as forest in order to harvest Brazil nuts. Some policy-makers have suggested subsidizing Brazil nuts to provide incentives to maintain more forest cover.

ASB (alternatives to slash and burn) researchers used a specially developed bioeconomic model that explored the interactions of labour, capital and land allocation over a 25-year period under various market and price scenarios. When they doubled the price of Brazil nuts in the model, they found that the deforestation rate would not decrease. In fact, they

projected that subsidies would potentially exacerbate deforestation because farmers would earn more cash from the Brazil nuts and then reinvest it by clearing forest for the more lucrative activity of cattle raising. [Source: *Field guide to the future. Four ways for communities to think ahead.* 2006. K. Evans *et al.*; [www.asb.cgiar.org/ma/scenarios/](http://www.asb.cgiar.org/ma/scenarios/)]



**Brazil nuts as an alternative energy source**

A study conducted by the National Research Institute of Amazonia (INPA) demonstrated that waste material from Brazil nuts can be used by industry and commerce. The material can be used to generate energy both in its natural state as well as in the form of subproducts, for example, charcoal, charcoal bricks (pieces of small charcoal compressed into blocks), tar (bio-oil) and gases.

The study, a result of the project, "Brazil nut fruit: potential use as a source of raw material for energy grid in the State of Amazonas", was prepared by INPA technician, Paulo Roberto Guedes Moura, with guidance provided by the Coordinating Office for Forest Products Research (CPPF/INPA).

The study showed that this waste material has potential for use as firewood in thermal plants, boilers, pottery works, etc. In the form of a subproduct (charcoal and bricks), the waste can be used by the steel industry in making pig (raw) iron.

Moura clarified that during his comparative analyses of basic density of the waste material with other timber species, Brazil nut acts as if it were dense wood. In his opinion, the tar is especially interesting as it is a sort of wood-based bio-oil to generate energy, or for cooking since it adds taste to smoked products. Additionally, the oil can be used in the composition of paving materials and to increase the durability of wood products. "It

is highly valuable on the consumer market," he stressed.

The study was conducted to show that value can be added to waste material that would otherwise be discarded. Moura said that there will be a lack of raw material to supply industry and commerce, as in 2004 alone, the state of Amazonas produced some 9 000 tonnes of Brazil nuts. This would generate roughly 18 000 tonnes of waste material. [Source: *Jornal da Ciência*, 24 January 2007 [in *Amazon News*].] (See page 7 for information on certified Brazil nut oil.)

## FOREST INSECTS

### Eating worms and protecting parks

In an effort to ensure that mopane worms (*Imbrassia belina*), in the Uukwaluudhi Conservancy of Namibia are not overharvested but utilized in a sustainable manner, the Uukwaluudhi Traditional Authority (UTA) has set up regulations governing the harvesting of these worms in their forests.

Before people start harvesting mopane worms, says Veikko Iishila, the Headman of Likokola district in the Uukwaluudhi area, a meeting is held to inform the people that the worms are mature and can be harvested. Each harvester has to have written permission from the UTA or from other relevant authorities at a fee. Mopane harvesting time is usually from March to April. This helps to make sure that forests are not overharvested and that immature worms are not collected.

Iishila said money levied from mopane collectors is put into the UTA under the chairmanship of King Taapopi and is used to solve community problems.

Mopane worms are large caterpillars that feed on the leaves of the mopane tree in southern Africa. They are high in fat and protein, have a gritty texture and a slightly meaty taste when fried; they are considered a delicacy by many people in Namibia, Zimbabwe, Botswana and South Africa.

The Uukwaluudhi Conservancy was established through the Community-Based Natural Resource Management programme of the Ministry of Environment and Tourism, which enables people to manage and benefit from the natural resources in their environment in a sustainable way. [Source: *The Namibian*, 15 February 2007.]



### Collectible forest insects

There are basically three reasons why people collect insects: for subsistence, for professional purposes or purely as a recreational hobby. Although collecting is occasionally broad-based, it is most often focused on specific groups of insects sought for their utilitarian, scientific, ornamental or other benefits.

#### The collectors

**Subsistence.** Some traditional cultures in Africa and elsewhere depend on hunting/gathering to some extent, including the collecting of insects and their products for food, medicinal purposes, as a source of arrow poison, as fish and bird bait, and occasionally for ornamentation (jewellery, textiles).

**Professional.** The two distinct categories of individuals who make a living collecting insects are professional entomologists (who study insects for scientific reasons) and commercial collectors (who collect or breed insects on behalf of others or who act as intermediaries in the trade of live or dead insects and their products). Live insect exhibits (butterfly houses or insect zoos) are a relatively new but dynamic development in the commercialization of insects.

**Amateur.** Insect hobbyists come in three varieties: the aestheticist, the naturalist and the trophy hunter. Most entomological hobbyists are attracted to insects for their ornamental qualities, while some aspire to owning the biggest, most bizarre or rarest specimens available. Some collectors are willing to pay thousands of dollars for certain outstanding specimens. In Japan, for instance, where some long-living beetles are very popular as pets, one trophy stag beetle sold for US\$20 000 in the mid-1990s.

#### The collected

Given the fact that the more conspicuous species of insects tend to be well documented, contemporary scientific collectors are often focused on obscure taxonomic groups of small but species-rich groups that may be useful as bioindicators.

Amateur collectors, however, still seek specimens that are large or beautiful in terms of colour, shape, texture or other things, with the highest prices going for those specimens that are rare and in mint condition. The dead stock insect trade alone runs into tens of millions of dollars annually.

The humid tropics of Southeast Asia and South America are generally the most species-rich areas and thus the most significant suppliers of collectible insects in the world. However, the United Republic of Tanzania not only has many indifferent genera of insects, but also some specifically or largely African representatives, including some of extraordinary size and beauty. As elsewhere in the tropics, the more humid parts and mountains may be the most rewarding areas in terms of collectibles, but the drier woodlands and semi-deserts also yield some remarkable specimens.

Amateur collectors everywhere are most strongly attracted to *Lepidoptera* and *Coleoptera*, but several other orders include highly sought-after specimens. [Source: Springer/Kluwer Academic Publishers, *Forest Entomology in East Africa: Forest Insects of Tanzania*. 2006. Chapter 9, Forest-based insect industries. H.G. Schabel. (With kind permission of Springer Science and Business Media.)]

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**(See page 59 for information on insect-based industries in the United Republic of Tanzania.)**





**COLLECTIBLES: BUTTERFLY RANCHING IN PAPUA NEW GUINEA**

The ranching for collectibles started in Papua New Guinea, a country that considers insects a “national resource” and in its constitution specifies insect conservation as a national objective. In 1966, seven rare and magnificent birdwing butterflies, *Ornithoptera* spp. (Papilionidae), were declared protected and a year later the world’s largest butterfly, *O. alexandrae* Roth, was proclaimed legally endangered. In 1968, a law banned the taking of any of the seven species of birdwings threatened with extinction. With these steps, Papua New Guinea tried to stop unscrupulous bioprospectors who had opportunistically exploited the country’s spectacular insect fauna with little if any benefit for the rightful owners of these resources.

In the meantime, most of the formerly threatened birdwings and other spectacular and sought-after insects of Papua New Guinea have become available through legal trade. This was made possible by the establishment of several wildlife management areas, the development of butterfly ranching for export as part of the country’s rural development programme and involvement of an Insect Farming and Trading Agency (IFTA), which has assured quality control

and the marketing of the insects produced since 1974.

In 1995, over 800 villagers in Papua New Guinea supplied stock to IFTA, whose staff fills orders from collectors worldwide (especially Japan, Germany and the United States of America), while the profits (less 25 percent for administrative costs) return to the villagers.

At present, a pair of a certain species of *Ornithoptera*, such as *O. priamus* and *O. goliath supremus f. titan*, may be worth up to \$300, but some collectors have paid thousands for outstanding specimens.

Serious butterfly ranchers in Papua New Guinea can earn US\$2 500–5 000 per year in a country where the per capita income is around US\$50/year. Villagers that earn revenue from insects are said to have shown a strong tendency to conserve forests, demonstrating the potential of such enterprises to foster ecologically sensitive economic development. (Source: Springer/Kluwer Academic Publishers, *Forest Entomology in East Africa: Forest Insects of Tanzania*. 2006. Chapter 9, Forest-based insect industries. H.G. Schabel. (With kind permission of Springer Science and Business Media).)

Because demand and competition for kroto have increased in recent years, some areas are being overharvested and as a result collectors are finding fewer larvae. To fill their baskets they work on a much shorter rotation of host trees, which in turn affects the ability of the ant populations to recover. With less intense harvesting, the ants normally rebuild and recoup quite quickly.

As kroto can only be kept fresh for two days, traders often transport boxes into the city on a daily basis. Because of increased demand and economic necessity, local traders may take 10–30 kg a day to the market. They also take some dried kroto, which is produced by collectors and can be kept for six months, but it sells at half the price of fresh supplies.

The rapid deterioration of the fresh produce and the need for immediate transport represent the biggest hurdles in marketing kroto. During the high season, traders pay collectors US\$1.20–1.40 per kg and then sell to merchants at US\$1.60–1.70 per kg, leaving little profit after transport costs. The Jakarta markets sell around 100 kg of kroto a day at US\$3.50–5.00 per kg, making the merchants the main beneficiaries in the kroto trade. To make more money, some collectors sell their daily harvests directly to small retailers, who are often willing to pay more for fresh kroto.

For many collectors, kroto represents an important or principal source of income and is regarded as one of the few ways that poor people can earn money from a free resource. Collectors use the money for subsistence needs or to save for harder times. Farmers often collect the resource as well, as a way of earning some extra money in between the two rice harvesting seasons. (Source: Case study on “Kroto, ant larvae and pupae”, by Nicolas Césard and Irdez Azhar [in *Riches of the forest: food, spices, crafts and resins of Asia*, eds C. López and P. Shanley].)

(Please see page 44 for information on snail farming in Cameroon.)

**Lac – Corrigendum**

The authors of the article “Cultivation of NTFPs as the best measure of poverty eradication of poor tribal cultivators – A case study of lac cultivation” printed on pages 28–29 of *Non-Wood News* 14 should have read: Dr S.P. Bhardwaj (Principal Scientist) and Dr S.D. Sharma (Director), Indian Agricultural Statistics Research Institute, New Delhi 110012, India.

**Kroto ant larvae and pupae: the bird food delicacy**

“Kroto” is the Javanese name given to a combination of larvae and pupae from the Asian weaver ant (mainly *Oecophylla smaragdina*). This mixture is well known to Indonesian bird lovers and local fishers, with the ant larvae being popular as a fishing bait and also as a dietary supplement to improve the performance of songbirds. Bird fanciers treat their favourite pets with the protein- and vitamin-rich kroto when preparing them to challenge other birds in singing competitions.

Weaver ants are found from India to Australia and throughout the Indonesian archipelago, within a wide range of habitats including coastal areas, secondary forests and plantations. They are well known for being aggressive predators and for building

nests in trees. The ants can invade almost any type of tree but tend to prefer fruit trees, such as the jackfruit or mango. A given colony may occupy various nests in a single tree or even several trees. Located in one of the highest nests is the queen, whose eggs are distributed to the other colony sites nearby. Weaver ants’ nests are among the most complex of ant nests, with the *Oecophylla* species using the well developed silk glands of their larvae to weave together a nest of living leaves – hence their name.

Throughout the year, kroto is harvested and sold on the islands of Java and Sumatra. Collecting kroto is a solitary job, which begins with the identification of host trees. During the dry season, the resource is less abundant but during the wet season the rice-like smaller larvae are more common, of a better quality and more highly valued.

## GINSENG

### Ginseng genome library established in China

After years of study, Liu Shuying and her team at the Institute of Applied Chemistry under the Chinese Academy of Sciences have established the first ginseng genome library in China. Including holographic material and genetic data, this library is another step forward in the modernization of traditional Chinese medicine.

Jilin province in northeast China currently produces 80 percent of all ginseng in China and 60 percent of ginseng available on the world market. (Source: People's Daily Online, 15 March 2007.)



Ginseng

### A note on ginseng terms

Wild ginseng refers to the plant as it grows in its native forest, with no help from people. Wild ginseng commands the highest price and is limited to the plant's native range. American ginseng (*Panax quinquefolius*) is found in the mountains east of the Mississippi River, although it does grow in patches as far west as Nebraska. Wild Asian ginseng (*Panax ginseng*) is found only in northeastern China, the Republic of Korea, the Democratic Republic of Korea and parts of Siberia.

Other ginseng relatives are *Panax notoginseng*, found in China as "san chi" or "tien chi" ginseng; *Panax japonicum*, or Japanese ginseng found only in Japan; and *Panax trifolium*, known as dwarf ginseng. There is a less documented basis for these plants than for the main two ginseng species, and they are not nearly so valuable. *Eleutherococcus senticosus*, sometimes called Siberian ginseng, is not a true ginseng, but a relative in the same plant family; it has almost no ginsenosides (the active chemical compounds in the

*Panax* species), and labelling rules now prohibit it from being marketed under the name "ginseng".

Cultivated ginseng is the farm-grown version, which requires shade arbours, chemical pesticides and fungicides, and intense labour. For generations it was primarily cultivated in Wisconsin (United States of America), but it is now widely grown in China and on farms around the world.

Simulated-wild ginseng is a fairly new, middle category (although experts maintain that thousands of years ago, Koreans grew simulated-wild ginseng in forests).

Promoted as an ecologically sustainable alternative to cultivated ginseng, simulated-wild plants grow from seeds sown by people in forest conditions that mimic the habitat of wild ginseng. Simulated-wild ginseng is mainly limited to areas where ginseng also grows wild – in the United States of America, in forests east of the Mississippi River – and it is raised with no or very few chemicals and little tilling. Markets in Asia have been slow to acknowledge this as a separate category; simulated-wild roots are easily mistaken for wild roots and command a higher price than cultivated ones. (Source: *Ginseng, the divine root. The curious history of the plant that captivated the world*, by David A. Taylor.)

(Please see page 77 for more information on this book.)

## MEDICINAL PLANTS AND HERBS

### Medicinal and aromatic plants: the way out of poverty?

About 20 000 tonnes of medicinal and aromatic plants (MAPs) worth US\$18–20 million are traded every year in Nepal alone, and about 90 percent are harvested in an uncontrolled fashion by landless, resource-poor mountain farmers for whom the harvest and trade in medicinal plants constitute their only form of cash income. The situation is similar in Bangladesh, Bhutan, India and other countries of South Asia, and 90 percent of the plants from Nepal are exported to India in raw form.

The greater Himalayan region, in fact, has the comparative advantage of being home to many MAPs found only there. The region also has various well-developed practices in traditional medicines

(Ayurveda, Unani, Siddha) based on indigenous knowledge of these plants' medicinal and healing properties. Considering the global trade in MAPs – now a US\$60 billion industry and still growing, especially with the increasing demand worldwide for herbal medicines – the potential of MAPs to provide relief from poverty in South Asia, where 40 percent of the world's poor reside, is tremendous, if it can be tapped.

However, issues of sustainable harvesting – the need to balance the push-and-pull factors of commercial demand on the one hand and conservation of these valuable plants and their contribution to biodiversity on the other; the need for greater value addition at the community level and for stronger farmer-industry collaboration to realize this; the need for commercial cultivation of important species, as well as for more research about the plants and more information including market information and strategies together with a more supportive policy in the region must be addressed.

Given the increasing value of MAPs, both in terms of primary health care and as a critical source of livelihoods and income for the rural poor in the region, the International Centre for Integrated Mountain Development (ICIMOD) with support from the Common Fund for Commodities (CFC), the Netherlands, is implementing a four-year, US\$1.68 million project "Medicinal Plants and Herbs: Developing Sustainable Supply Chain and Enhancing Rural Livelihoods in the Eastern Himalayas" in three countries, Nepal, Bangladesh and Bhutan, with India providing technical expertise. ICIMOD's Medicinal and Aromatic Plants Programme in Asia (MAPPA) is the project's implementing agency, with FAO's Intergovernmental Subgroup on Tropical Fruits providing a supervisory role.

The project's overall objective is to conserve natural resources, reduce poverty and improve livelihoods for mountain communities of the Himalayan region through the sustainable development and utilization of high-value, low-volume MAPs.

A three-day inception workshop in April launched the project. Participants included representatives from nodal agencies (focal point organizations for the project in each country), research and academic institutes, non-governmental organizations (NGOs) and the private sector. During the

workshop, ICIMOD and experts from India shared the latest trends and organic practices in MAP cultivation and processing as well as emerging value supply chain practices.

Partners in each country are implementing the project. In *Bangladesh* the nodal agency is the Ministry of Commerce, with the Bangladesh Neem Foundation and the Development of Biotechnology and Environmental Conservation Centre as implementing partners. In *Bhutan* the project will be implemented by the Ministry of Agriculture, while the Ministry of Forests and Soil Conservation is the nodal agency in *Nepal*, with the Herbs and Non-Timber Forest Products Coordination Committee, Nepal working with partners to implement the project in western Nepal.

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**MOUNTAIN MEDICINAL PLANTS**

Medicinal plants are one of the most valuable resources at high altitudes. For example, 1 748 species from the Indian Himalayas are used for local medicinal treatment or for trade, involving the pharmaceutical industry. Roughly a third grow in the subalpine or alpine zone. Cultivation of medicinal plants instead of harvesting wild plants, which often causes local extinction of highly priced medicinal species, and local processing instead of exporting raw material, are two strategies that can ensure the sustainable use of medicinal plants and increase the incomes of mountain dwellers. (Source: Flyer, International Mountain Day 2006, FAO.)



**Artemisia annua: WHO publishes guidelines on cultivating an essential plant used in antimalaria medicines**  
 The World Health Organization (WHO) today publishes guidelines for the cultivation and collection of *Artemisia annua* L., a Chinese traditional medicinal plant which is the source of artemisinin, used to produce the most effective medicines for malaria. The guidelines will contribute to improving the quality of *Artemisia annua* L. to develop artemisinin-based medicines further, and help ensure a sustainable supply to meet market demand.

*Artemisia annua* L., used in Chinese traditional medicine for centuries, is today considered part of the solution where malaria has become resistant to other medicines. Artemisinin-based combination therapies (ACTs) have been recommended by WHO since 2001 in all countries where falciparum malaria – the most resistant form of the disease – is endemic. Since then, the world market for products containing artemisinin derivatives has grown rapidly. However, not all artemisinin meets the required standards to produce quality medicines, making it all the more urgent to promote best practices in the cultivation and collection of the raw material used to make the combination therapy.

About 40 percent of the world's population is at risk of contracting malaria which is resistant to other medicines. Of the 76 countries needing artemisinin-based treatment today, 69 have adopted the WHO recommendation to use this therapy.

The availability of these treatments still falls short of what is needed. Of an estimated 600 million people needing ACTs worldwide, only about 82 million are receiving the treatment through public sector distribution systems (which constitute 90 percent of antimalarial distribution in developing countries).

The WHO monograph on good agricultural and collection practices for *Artemisia annua* L. provides a detailed description of the cultivation and collection techniques and measures required for a harvest to meet quality requirements. The information is based on research data and the practical experience of several countries where successful cultivation practices have led to a high yield of good quality *Artemisia annua* L.

The authors of the guidelines caution governments on two fronts. First, they must ensure that farmers work with

manufacturers to determine the actual market demand for the plant. Recent experience in some countries has shown that overproduction not only wastes money and time, but it can also have a negative effect on the plant's future yield. Second, they must ensure the availability of the technical skills and expertise needed to extract artemisinin from dried leaves.

The WHO monograph also aims to provide a model for countries and researchers to develop further monographs on good agricultural and collection practices for other medicinal plants, and promote the sustainable use of the plant as part of the larger aim of protecting the wild resources of medicinal plants. (Source: World Health Organization, 12 March 2007.)

**Global standard set for wild medicinal plant harvesting**

A new standard to promote sustainable management and trade of wild medicinal and aromatic plants was launched on Friday in Nuremberg at Biofach, the World Organic Trade Fair. The standard is needed to ensure plants used in medicine and cosmetics are not overexploited.

About 15 000 species or 21 percent of all medicinal and aromatic plant species are at risk, according to the report by the Medicinal Plant Specialist Group of the World Conservation Union's (IUCN) Species Survival Commission that sets forth the new standard.

More than 400 000 tonnes of medicinal and aromatic plants are traded every year, and about 80 percent of these species are harvested from the wild.

Almost 70 000 species are involved, many of them in danger of overexploitation or extinction through overharvesting and habitat loss. In India, for instance, 319 medicinal plants are listed as threatened by IUCN.

In Ecuador, one of the best known medical herbs in the world, cascarilla *Cinchona pubescens* – the original source of the antimalarial drug quinine – may be threatened as a result of overexploitation, according to the World Wide Fund for Nature (WWF). Today the herb is used to treat a variety of ailments, from upset stomachs to immune system problems.

In Eastern Europe, unsustainable collection of the wild herb pheasant's eye, *Adonis vernalis*, used to treat cardiac ailments, has led to declines throughout the plant's range, says WWF, and today the

species is protected from collection in many countries.

In the United States of America, large quantities of American ginseng, *Panax quinquefolius* and goldenseal, *Hydrastis canadensis*, are collected in the wild. Although much of the ginseng exported from the United States is now cultivated, enough collection of the wild plant occurs that trade in the species is now regulated. Both ginseng and goldenseal are listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Flora and Fauna, which allows trade in these plants only through a permitting system.

About 90 percent of the ginseng exported from the United States each year goes to countries in East Asia. The United States imports hundreds of thousands of tonnes of many different herbs each year to support its US\$3 billion market.

Following extensive consultation with plant experts and the herbal products industry, the International Standard for Sustainable Wild Collection of Medicinal and Aromatic Plants, ISSC-MAP, was drawn up by the Medicinal Plant Specialist Group. The German Federal Agency for Nature Conservation was involved in the consultation together with WWF-Germany, and the wildlife trade monitoring network TRAFFIC, plus industry associations, companies, certifiers and community-based NGOs.

The standard is based on six principles – maintaining medicinal and aromatic plant resources in the wild, preventing negative environmental impacts, legal compliance, respecting customary rights, applying responsible management practices and applying responsible business practices.

Traditional Medicinals, a Californian herbal medicine company, is testing the application of the new standard to the collection of bearberry, a shrub whose leaves are used to treat the kidney, bladder and urinary tract.

To view the Medicinal Plant Specialist Group paper that sets forth the complete standard, please visit: [www.floraweb.de/proxy/floraweb/MAP-pro/Standard\\_Version1\\_0.pdf](http://www.floraweb.de/proxy/floraweb/MAP-pro/Standard_Version1_0.pdf) [Source: Environment News Service [United States of America], 20 February 2007.]

#### **Assessment of success and failures in cultivation, processing and marketing of medicinal plants in the Malwa region, Central India**

During the last decade India, particularly Madhya Pradesh state, has observed a

major boon in cultivating medicinal and aromatic plants (MAPs), which are on high demand in the international as well as the national market. The Government, semi-government, NGOs, private industries and even individuals were largely attracted because of the high cost of raw materials of species such as safed musli (*Chlorophytum borivillianum*), sarpgandha (*Rauvolfia serpentina*), lemon grass (*Cymbopogon martinii*), stevia (*Stevia rebaudiana*) and coleus (*Coleus forskohlii*).

The state and central government launched a massive campaign to promote large-scale cultivation of some 20 to 30 species by giving subsidies and loans to farmers. The basic aim of the campaign is to conserve medicinal plants from the forest, increase rural employment and income and also increase exports. Because of the decreasing availability of raw material from the forest and the *Coleus forskohlii* high costs of planting material and raw products, several companies and progressive farmers have started large-scale cultivation of highlighted species. As a result there is a scarcity of planting material, crop suitability, market and proper management.

Therefore, in the last decade or so the area under medicinal crop cultivation has greatly increased because of the attractive and remunerative market prices in both the international and national markets. However, more recently, through lack of market demand, low prices, high planting material and production costs, increasing labour costs, less local and Industrial consumption, and more production, the market for these commercially cultivated medicinal plants has crashed. As a result, small-scale farmers failed to sell their produce (wet) in the local market: the cost of the raw or wet product dropped considerably and there were no buyers. Hence, some farmers left the cultivation or sold their produce at bargain prices in the local market.

A recent report examines the various causes of success and failures in the cultivation of ashwagandha, safed musli, asaria, coleus and stevia plants in the Malwa region of Madhya Pradesh state. For several reasons, the market for the much sought after wonder crop safed musli has drastically crashed in the last one to two years. It has been flooded by the cultivated medicinal crop and there were no buyers for the raw material produced particularly by small-scale farmers of the region.

The study reveals that because of market saturation (overproduction) of

commercial crops (such as safed musli and ashwagandha), increase in labour costs, little enthusiasm for processing and value addition techniques and other marketing problems, farmers are rapidly decreasing the area under MAP cultivation. The cases of failures in cultivation and marketing of selected species are more than successful cases in the study area. This situation needs special attention from government, traders and the industry.

The survey of the study area clearly indicates that the cultivation of selected species is not remunerative for small landholding farmers. Overall, the false hopes given by planting material suppliers, consultants and the industry, along with farmers' own mistakes in cultivation and processing, have led the small farmers of the Malwa region to start reducing the cultivation area even further. [Source: extracted from the executive summary of a project report submitted to the Indian Institute of Forest Management (IIFM), Bhopal, Madhya Pradesh, India in October 2006 by Dr Manish Mishra and Dr P C Kotwal.]

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*Rauvolfia serpentina*



#### **Masses of moss**

Moss has been harvested in Scotland, the United Kingdom, for thousands of years and still is, although until recently very little was known about it outside harvesting circles. A recent four-month study investigated moss harvesting in the country, involving contact with 308 harvesters, traders, landowners, bryologists (moss experts) and informants on the illegal trade. The study comes at a



time of increasing interest in NTFPs from the Forestry Commission Scotland, private landowners, community woodland groups and conservation bodies alike.

Today moss is harvested for use in the floristry and horticultural trades and represents a worldwide commodity [see article on moss harvesting in the Pacific Northwest, *Non-Wood News* 13]. In Scotland, 70 percent of florists and 60 percent of garden centres trade in moss, although the majority of these import their supplies from wholesalers in England or the Netherlands, who in turn source most of their moss from across the European Union (EU). Given its wet climate, Scotland is home

to a wealth of mosses however and those growing in non-native conifer plantations offer opportunities for harvesters, either for personal use or commercial sale.

The study found that moss harvesting does occur throughout Scotland and on a variety of scales; from large-scale commercial harvesting enterprises to individual florists and garden centres supplying their own needs, to individuals harvesting for personal or charitable purposes. As much illegal harvesting, i.e. without landowner permission, is thought to occur as legal harvesting. Estimations put the total value of the harvest and trade of Scottish-grown moss at UK£0.5 million

annually and 125 jobs. Landowners charging permit fees make on average very little money from moss harvesting but welcome the diversification of land activities.

One-third of all landowners contacted had experience of moss harvesting in their forests, although large-scale harvesting is concentrated in the expansive forests in the south of the country. Cases of illegal moss harvesting from peat bogs do occur and these cause concern over the sustainability and legality of the practice, thus damaging the industries' reputation. However, most harvesting concentrates on just four genera, *Pleurozium*, *Polytrichum*, *Pseudoscleropodium* and *Sphagnum*, the

**MOSS GATHERING IN THE UNITED STATES OF AMERICA**

*The following e-mail exchange of March 2007 presents interesting points of view on moss harvesting guidelines.*

**Proposal from JeriLynn E. Peck**

A number of us have been asked to pull together some draft guidelines for the commercial harvest of mosses for discussion and distribution among the members of the International Association of Bryologists (IAB) at the annual meeting this summer, with the ultimate intent of providing IAB-approved general harvest guidelines. We are just starting to think about this, so I wanted to throw out to anyone who might wish to provide some input the opportunity to provide some guidance on developing the guidelines!

Specifically, any advice/documents/ Web links referring to existing guidelines for moss or similar NTFPs or to the process of developing workable guidelines would help ensure that we think about everything that we should. (JeriLynn E. Peck, Research Fellow, 207 Forest Resources Building, Penn State, University Park, PA 16802, United States of America; <http://silv.cas.psu.edu/jp.htm>; [www.strengthinperspective.com/JPMoss](http://www.strengthinperspective.com/JPMoss))

**Response/proposal from Eric Jones**

I suppose the creation of harvesting guidelines could be a positive step towards moss conservation, but so often these sorts of efforts seem to do more to disrupt harvesting patterns, such as the way in which local knowledge about stewarding

the resource is formed. If the end goal is moss conservation, maybe efforts should first target the widespread destruction of moss habitat that occurs from clearcut logging, mountain top removal for coal, freeway construction, housing developments, etc. I suspect the impact from harvesting is nothing compared with these other activities.

Harvesters have no power and so an attack on their livelihoods by science will only push them more underground. How do we as scientists and managers protect the good harvesters that are trying to make some money while also trying to understand and safeguard their moss patches?

What would be great is to figure out a way for a much greater number of harvesters to be brought into the knowledge-sharing fold. I have yet to see a single scientific study that has interviewed and documented the techniques and tools of harvesters and then tested them. Instead, what so often seems to happen is a harvester gets busted "poaching" moss and the pictures end up in the newspaper. Fear then spreads to all of us, scientists and managers included, that harvesting equals resource destruction.

My friend Kurt is just one of many good people out there harvesting who could be a great resource, but there is no way he or other harvesters are going to participate in the process the way things are now. He doesn't speak science, doesn't have extra time or money and he resents management for making him jump

through hoops, but never lifting a finger to help him the way they do other stakeholders. However, he might be persuaded to collect some data if he were offered money and training to do so. That would be the sort of positive step that could bring people like Kurt into discussions like these. It would send a message to him that he is not viewed negatively by management and science, but actually is seen as someone with important skills and knowledge to contribute.

I mean no disrespect to the research you have done, every little bit helps. However, in reality we have so little information on moss it seems premature and presumptuous to create guidelines for how to harvest moss before we really investigate what harvesters are doing.

What if we tabled that idea and instead worked to do the following three things.

- Submitted grants for serious in-depth ethnobotanical research on moss harvesting culture, knowledge and technology/techniques.
- Developed a strategy for educating land managers about conservation (e.g. less damage to moss from logging).
- Worked to promote opportunities for harvester involvement in knowledge generation, such as data collection.

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*(Minor edits have been made for clarification purposes only.)*

harvested species of which are all considered common and widespread. The knowledge and practice of sustainable harvesting techniques among large-scale harvesters were also found to be high. Although conifer plantations are subject to cyclical disturbances during felling operations and, as such, moss harvesting pales into ecological insignificance, bryologists recommend that places such as streams, springs and rock outcrops where rare mosses may be found should be avoided during harvesting.

To conclude, market opportunities exist for Scottish-grown moss to replace current imports from elsewhere in the EU. Despite the ecological sensitivity demonstrated by many harvesters, concerns over the sustainability of harvesting must be addressed in order to build confidence in the industry. A code of conduct for moss harvesting in Scotland is currently being developed and is hugely welcomed as a way to promote this NTFP-based industry, for which Scotland has great potential. *For a copy of the full report on which this article is based and for more information on the code of conduct, please visit: [www.forestharvest.org.uk](http://www.forestharvest.org.uk) (Contributed by: Sam Staddon, Institute of Geography, University of Edinburgh, Edinburgh EH8 9QP, United Kingdom. E-mail: [s.c.staddon@sms.ed.ac.uk](mailto:s.c.staddon@sms.ed.ac.uk)*



*Sphagnum sp.*

### **Sphagnum moss (*Sphagnum sp.*)**

Sphagnum moss has long been used for its medicinal properties. The entire plant is antiseptic and a tar extracted from the decaying moss is particularly valuable as an external treatment for a variety of skin diseases, including eczema and psoriasis. Yet it is the plant's incredible absorptive properties that have made their mark on modern field medicine. When thoroughly dried, sphagnum is able to absorb 16 times its weight of water, making it an excellent

wound dressing that is said to have saved thousands of lives during the First World War. It is also used as a potting material and soil conditioner.

However, sphagnum's potential as a NTFP should be limited to small-scale development, as extensive harvesting is leading to the destruction of many natural bogs, a delicate ecosystem that takes centuries to develop. [Source: *Our Life, Medicine Path: Non-Timber Forest Products of the Boreal*. Taiga Rescue Network fact sheet.]

### **PAPER MULBERRY** (*BROUSSONETIA PAPYRIFERA*)

Paper mulberry (*Broussonetia papyrifera*) is native to Japan and Taiwan Province of China and is an ancient introduction across the Pacific as far east as Hawai'i. Although the tree is fertile in its native range, the plants carried into the Pacific were all male clones, transported and planted as rootstock or stems. Thus, the female plants with flowers and fruit are absent.

The tree reaches a height of 12 m or more if allowed to grow, but in practice it is usually harvested at a much shorter height when the stems are about 2.5 cm in diameter and 3–4 m tall. The tree was very important in traditional Polynesian culture, as its bark supplied one of the most important materials in ancient Polynesia, tapa cloth.

Today, the tree has disappeared from most of its traditional range and is cultivated to any extent only in Tonga, Fiji and Samoa. It is important in these places because it is a major source of handicraft income in the form of finished tapa cloth. Although it is no longer used in Polynesia for clothing, in Tonga and Samoa tapa cloth is still worn during ceremonial occasions such as festivals or dances. It does not last very long when worn as everyday clothing.

The tree is grown in plantations and home gardens on islands where tapa cloth is still made. It can tolerate a wide range of environmental extremes and even does well in temperate climates (its native habitat). Since only the male clones are present in Polynesia, the tree has no potential for becoming invasive.

### **Uses and products**

The most significant part of the paper mulberry is its strong, fibrous bark used in

making the native bark cloth known as tapa. The plant also has other less important uses. *Fruit.* The sweetish fruits are edible, although where only male clones are present, such as in the Pacific Basin, no fruit is formed.

*Leaf vegetable.* In Indonesia, the steamed young leaves are eaten.

*Medicinal.* In Hawai'i, the slimy sap was used as a laxative and the ash of burnt tapa was used for treating thrush. In Samoa, an infusion of the crushed leaves is sometimes taken as a potion for treating stomach pains and ill-defined abdominal pains. The leaf, bark and fruit are used medicinally in Viet Nam, the Lao People's Democratic Republic and Cambodia.

*Animal fodder.* The leaves are fed to pigs in Viet Nam, the Lao People's Democratic Republic and Cambodia and to silkworms in China.

*Fuelwood.* After removing the bark for tapa, the stems can be used for kindling.

*Fibre/clothing.* The inner bark has been used for centuries in Southeast Asia for paper and textiles. The bark is traditionally used in Polynesia to make tapa.

The finest and most delicate tapa in Polynesia was made in Hawai'i. Nowadays, however, tapa making in the Pacific is limited to Tonga and Fiji and, to a lesser

### **THE MAKING OF TAPA CLOTH**

The bark is stripped from the cut stems by making a lengthwise incision across the stem and pulling it off intact to obtain a single long strip. The inner bark, or bast, is then separated from the outer bark, and any green matter remaining on the bast is removed using scrapers; the bast is then washed to remove the slimy sap. The strips are pounded on a wooden anvil using a square beater made of a hard wood. Two or three of the strips are then felted together by the pounding, helped by the stickiness of the bark. Several of the resulting sheets are often pounded together in layers to increase the thickness or to cover over thin spots or holes in the individual sheets. A bit of paste in the sprinkling water is usually used at this point. These white tapas are then painted or, as in Hawai'i, printed with decorative designs.

extent, Samoa, and the tree and the art are nearly forgotten everywhere else.

**Tannin/dye.** Charcoal from the wood makes one of the best permanent black inks for tapa designs.

**Rope/cordage/string.** The bark fibre can be used to make rough cordage, as can the roots.

**Ceremonial/religious importance.** The bark cloth is used ceremonially in Tonga, Fiji and Samoa. In Hawai'i, tapa was important in burial wrapping and other funerary customs.

[Source: extracted from *Traditional Trees of Pacific Islands*, ed. Craig R. Elevitch. 2006. Full text available for downloading from: <http://www.traditionaltree.org>]

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*Broussonetia papyrifera*

"Riches of the forest: food, spices, crafts and resins of Asia"

**PINE PRODUCTS**

**Pine resin: turpentine, paints and varnish from Cuban trees**

Turpentine is one of the products manufactured from the thick, translucent pine resin extracted from tall coniferous pine trees. Different *Pinus* species can be found growing naturally in various parts of the world, including Europe and Asia.

Species such as *Pinus radiata* are also grown within plantations in many countries, given the well-developed market for pine products and the versatility of the timber.

In Cuba, *Pinus caribaea* (known as "male pine") is used for both its timber and resin. The processed pine wood is used for a wide variety of construction purposes (doors,

windows, boats and furniture). Farmers also use the unprocessed round wooden poles for building houses. The resin is used as an industrial component to make products such as colophony (processed resin) and turpentine, which are in high demand for the production of paints, varnishes, adhesives and disinfectants. Most of Cuba's pine resin is exported to several countries including Mexico, India and Spain. One tonne of crude resin has a market value of around US\$350, tripling in value once it is distilled.

Pine trees in Cuba have a long history of use, stretching from precolonial times up to the present day. *Pinus caribaea* is part of the natural vegetation of Cuba and is distributed mainly across Pinar del Río. This province is home to approximately 100 000 ha of pine trees, 70 percent of which are plantation based. Here, nearly 200 families are actively involved in the collection of pine resin. At present, the average Cuban monthly wage is 250 pesos, but resin extractors can earn almost three times this amount. One tonne of resin fetches around 663 pesos and, on average, an extractor can produce 1.5 to 2 tonnes per month.

In Cuba, industrial resin processing began in the mid-1980s. In the 17 years between 1985 and 2002, a total of 12 500 tonnes was produced – 80 percent of which were exported. In the first year of production the output was around 70 tonnes, increasing to almost 1 200 in 1989. However, following the country's economic crisis in 1990, the annual output plummeted to less than 200 tonnes.

In recent years research efforts have focused on the processing of resin products for export, using nationally developed technologies. As a result, production levels have rapidly risen. In Pinar del Río, approximately 1 200 tonnes of resin have been produced per year since 2000 and the forecast is for production to increase to around 5 000 tonnes per year. The establishment of several factories has helped to boost the volume being processed.

The fluctuations of resin production and the development of new processing technology are part of Cuba's recent economic and political history. Through the efforts of its citizens, and through government support and research, Cuba has managed to make its intensive agricultural and industrial activities more sustainable both socially and environmentally. The pine resin industry is one such example.

**Compatible extraction: wood and resin**

Pine trees are ready for resin extraction around the same time they reach a sufficient diameter for timber logging – upwards of 20 cm. However, the felling of trees generally takes place two to four years after the resin is tapped, to ensure a good harvest of both products: resin and pine logs.

Resin tapping involves producing a central wound in the trunk, at a height of around 1.6 m above the ground, along with additional, small wounds called picas, which point downwards in a V-shape. To prepare the tree for tapping, a section of trunk, at a width of around 65 cm, is debarked. This is the surface area that resin will be extracted from over the next 40 to 44 weeks, using a technique that allows the tree to continue living and growing until its timber is harvested.

To stimulate the flow of resin a central wound is cut, below which a metallic funnel is hung, leading to a collection pot. Connected to the central wound, several picas are then made, each about 5 mm in depth and 10 mm in length. An additional incision is made each week to maintain the resin flow. Once the resin channels are accessed, the thick, sticky resin slowly exudes from the trunk for up to 25 hours. This is collected and deposited into 200 kg tanks or cans, which are transported to plant processors or export companies. A single *Pinus caribaea* tree can yield about 4 kg of resin per year, which is equivalent to around 2 tonnes of resin per ha. Each extractor is responsible for a production area of 6 to 10 ha (containing 2 000 to 5 000 pine trees) – from which they collect between 15 and 30 tonnes of resin annually.

All resin extractors are linked with the State Forestry Company, which establishes the payment system, and the Cuban Forest Commission keeps them informed about raw material prices, trade conditions and product commercialization. The present management of pine trees and resin extraction includes the application of appropriate technologies and a focus on the conservation of pines – guaranteeing ongoing wood and resin production. The extractors benefit through stable employment and the use of techniques that ensure a high quality resin. If such conditions are maintained, this all bodes well for a sustainable future for the industry. [Source: case study on pine resin, by Ynocente Betancourt Figueras and Maria Josefa Villalba Fonte [in *Riches of the forest: fruits, remedies and handicrafts in Latin America*, eds C. López, P. Shanley and A.C. Fantini].]



## PINE RESIN PRODUCTION

The following is a reply from FAO's NWFP Programme to a reader in Fiji regarding an inquiry on pine resin production. Regarding general information about pine resin (tapping techniques, markets, etc.), I am pleased to invite you to browse our online publication on pine tapping (*Gum naval stores: turpentine and rosin from pine resin*, [www.fao.org/docrep/v6460e/v6460e00.htm](http://www.fao.org/docrep/v6460e/v6460e00.htm)). The techniques described are still valid, although the market information is a bit outdated. Since its publication, China has reinforced its dominant place in the global rosin market.

Here is the reply to your two specific questions

### 1. To collect and export raw pine resin ... which are the best markets for export?

First, raw pine resin is not a commodity for international trade. It needs to be refined locally, from which rosin is an exportable raw material. Investment costs for setting up a resin refinery are relatively low (see estimate in the above publication).

Please check also the species of pines available for tapping, as not all pine species are fully suitable to yield marketable resins (rosin from some pine species commands much higher prices). In addition, please be aware that tapping pines is damaging to their stems and that the wood from tapped pines sells at lower prices (so there will be an economic trade-off to be calculated between extra income from tapping pines versus selling the wood at a lower price).

The best markets to look for from Fiji for the rosin would be China (that cannot get enough of it for its fast-growing chemical industries), but also Japan, the Republic of Korea or nearby New Zealand and Australia. The rosin market is very competitive, so production "costs" would have to be very low in order to be able to sell at a profit.

### 2. To manufacture resin-based products ... what are the best products, which fetch high returns?

Raw pine resin can be refined into (solid) rosin (which is the most common resin-based product and maybe the best suitable product in your case). It is exported in barrels. Eventually the capture of the volatile substances during the refinery process can also be envisaged, but this requires substantial higher investment. Rosin is a raw material for the chemical industries (e.g. paint, varnishes, prints, flavours and fragrances).

For Fiji, my suggestion would be to go into the "tourist-curious" type of products and produce from the rosin an oil-based "aromatherapy type of fragrance substance" sold in small glass flasks to tourists at a high prices.

(Please contact us at the address on the first page for a hard copy of the publication mentioned.)

especialmente a nivel local que participan en la validación del marco jurídico forestal y del PRONAFOR (Programa Nacional forestal), llevando a cabo procesos locales de carácter piloto de los cuales surjan propuestas para su mejoramiento y dinámicas participativas para su implementación. El FNPP, Apoyo a la Operacionalización del Marco Jurídico Forestal y del Programa Nacional Forestal trabaja en Honduras desde enero de 2005 en tres áreas pilotos: Villa San Antonio, MAMUCA y Gualaco.

En la comunidad de Protección, Villa de San Antonio, a unos 50 km al oeste de la capital, Tegucigalpa, un grupo de mujeres fueron capacitadas para elaborar artesanías con acículas de pino a través del Proyecto FNPP. La Villa de San Antonio, es una comunidad forestal, enclavada en un bosque de pino y tiene organizada una cooperativa que se dedica al aprovechamiento de la madera, a la extracción de resina de pino y además poseen un pequeño aserradero y una carpintería, estas labores son realizadas por los hombres.

Alrededor de 20 mujeres de la comunidad se capacitaron en noviembre pasado para elaborar artesanías utilizando las hojas de pino, las cuales son «cosechadas» después que los árboles son derribados para aprovechar la madera; la capacitación duró un par de semanas, al final de las cuales el ingenio humano y la imaginación se ponen a prueba, porque las personas comenzaron a elaborar diferentes objetos, para adorno o para uso práctico de los hogares. Ésta es una actividad innovadora en la zona y en las áreas que trabaja el FNPP, utilizando productos forestales no madereros, por ejemplo las acículas, que durante años se quemaban en la época de incendios forestales. Esta actividad es realizada por mujeres de todas las edades que han estado siempre al margen de las actividades productivas que genera el bosque. Esta actividad significa ingresos para los hogares. Además, la capacitación para su aprendizaje fue realizada por mujeres de otra comunidad, las cuales no formaban parte del proyecto, lo cual evidencia la solidaridad entre grupos de mujeres.

Además de los beneficios indirectos que aportan para la protección del bosque, el beneficio directo es que los ingresos monetarios aumentaron sustancialmente en las familias que se dedican a esta labor, ya que una pieza la pueden vender en alrededor de \$15, producto de dos días de trabajo. Ésta es una actividad temporal puesto que el

## Pine bark extract shows promise for slowing sugar uptake

Extracts from French maritime pine bark may inhibit an enzyme linked to glucose absorption 190 times more than a synthetic medication, says new research from Germany that could offer significant benefits for diabetics if the results can be translated from the laboratory to humans.

The results of the new study, published online in the Elsevier journal *Diabetes Research and Clinical Practice* ("Oligomeric procyanidins of French maritime pine bark extract [Pycnogenol] effectively inhibit alpha-glucosidase", by A. Schafer and P. Hogger), add to a growing

body of research reporting the antidiabetic effects of the pine bark extract, Pycnogenol.

The product is extracted from the bark of the maritime pine that grows on the southern coast of France and is currently used in over 400 dietary supplements, multivitamins and health products.

(Source: NutraIngredients-usa.com [France], 9 February 2007.)

## Mujeres elaboran artesanías con acículas de pino en Honduras

El Programa de Cooperación entre la FAO y los Países Bajos (FNPP, siglas en inglés), brinda una oportunidad a diversos actores,

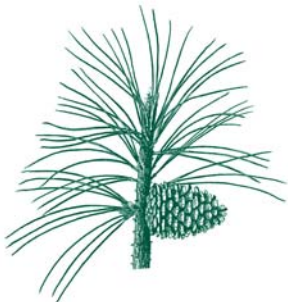
grupo necesita apoyo en el proceso de mercadeo.

A pesar de que Honduras tiene más de dos millones de ha de bosques de pino, son muy pocas las comunidades que poseen esta experiencia de aprovechamiento de las acículas del pino.

Aportado por Renán Mairena, FNPP Honduras, rmairena@yahoo.com

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www.agendaforestalhn.org/noticias207.htm**



**Pine nut harvesting in Mexico**

Every seven years, hundreds of tonnes of piñon nuts are wild harvested in the Sierra. These pink nuts bring the highest value on the global market – 800 pesos per kg in Mexico.

The problem is that thousands of harvesters from all over Chihuahua descend on the ejidos (communal land) on the eastern foothills of the Sierra, most notably Balleza, to harvest this natural production. The local people also harvest, but receive nothing from outside harvesters. The Tarahumara and mestizos (people of mixed blood) in the region want to control production and develop value-added enterprises such as shelling, packaging, and the production of chocolates, sweets and other products with pine nuts.

Piñon pines produce large quantities of nuts every seven years. In their shells, the nuts store for years, so a community can store the harvest and have products on a sustainable level for five or six years. Smaller intermittent harvests could also sustain production during off years.

With support from Sierra Madre Alliance, agronomist Nora Jacques has helped a group in Ejido Baquiriachi to organize, evaluate the feasibility of the project and develop proposals to purchase 10 tonnes of nuts from harvesters and to

develop a processing plant. This project will probably be funded in 2007. [Source: Sierra Madre Alliance [SMA] Update, March 2007.]

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www.sierramadrealliance.org/index.shtml**

**Pine nut production in the Kozac region of Turkey**

Some 27 percent of stone pine (*Pinus pinea*) forests in Turkey are located in the 16 villages of the Kozac region. They produce about 1 000 of the 1 300 tonnes of the country's annual yield of pine nuts, 80 percent of which are exported. Of the 18 600 ha of stone pines in the area, 16 500 ha are on private land, 1 400 ha belong to villages and 700 ha are private plantations in state forests.

Rising revenues from pine nuts have encouraged people to convert vineyards, fruit gardens and degraded coppice lands into stone pine stands. Higher incomes have allowed them to invest in agriculture, horticulture and animal husbandry, thereby diversifying their economic base as well as that of the region. Because stone pine forests make good grazing lands, integrated land use became more common. Manure fertilizes the soil and the trees' large canopy protects grass from the sun so that it stays green longer and develops better. The areas are opened to animals only when trees reach a certain age so that no damage occurs.

Because selling pine nuts has increased incomes and employment levels, the Kozac region has experienced significant changes in socio-economic conditions: health services and infrastructure have improved, education has increased, etc. These benefits have created a unity not seen in other parts of the country and fostered the development of business cooperatives that not only have increased bargaining power but also created jobs. [Source: extracted from *Better forestry, less poverty: a practitioner's guide*. FAO Forestry Paper 149. 2006. Rome. ISBN 92-5-105550-5; www.fao.org/docrep/009/a0645e/a0645e00.HTM]

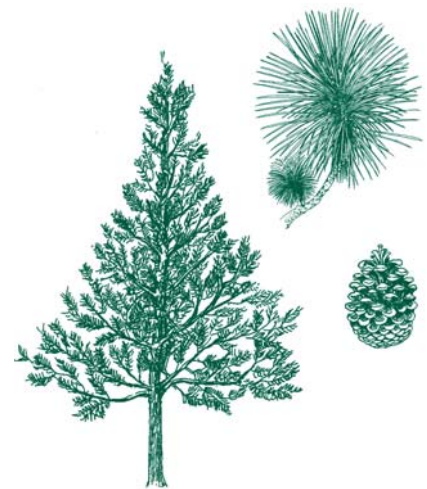
**Pine products from boreal forests**

A large number of pine species are found throughout the boreal forest and many of these species make a significant contribution to the local economy, beyond the obvious harvesting of timber.

For example, turpentine can be obtained from the oleoresins of all pine species, although trees from warmer areas generally give higher yields, making the process more economically viable. The pitch that can also be extracted from these resins can be used for waterproofing and as a wood preservative.

Certain species are also edible and can be used for medicinal purposes. For example, in the northeastern Russian Federation *Pinus pumilla* (dwarf Siberian pine) produces edible pine nuts and the inner bark of *Pinus sylvestris* (Scots pine), which ranges across northern Europe and well into the Russian boreal, has been ground up and used to make bread in times of famine.

In terms of medicinal uses, *Pinus sylvestris* is also valued for its antiseptic properties and its positive effects on the respiratory system; its essential oil is often used in aromatherapy. [Source: *Our Life, Medicine Path: Non-Timber Forest Products of the Boreal*. Taiga Rescue Network fact sheet.]



"Riches of the forest: fruits, remedies and handicrafts in Latin America"



**Halting the rapid disappearance of the world's rattan resources**

Unlike bamboo, which is quite widely cultivated because of its versatility and importance in trade, most of the rattan people use is collected from the wild. But, apart from timber, rattan is now one of the most economically important products from the moist tropical forests of Asia and West Africa. Overharvesting is becoming a serious threat – both to the survival of rattan populations and the livelihoods of the people who depend on them.

However, despite their economic and social significance, there are hardly any reliable data on rattan resources. Rattan is part of the forest undergrowth so it is not picked up by the remote sensing techniques used in routine forest inventories. It is, therefore, hard to evaluate the true state of the world's rattan

## RATTAN

Rattans are spiny, climbing palms. Some 600 species grow in the tropical forests of Asia and Africa, with around 50 traded commercially. Unlike bamboo, rattan does not regrow rapidly and is seldom sustainably managed. Overexploitation and loss of habitat have led to a dramatic reduction in the resource over the last 50 years.

Rattan is used locally for bridges, netting and baskets. Most is gathered by villagers and forest dwellers and in some places communities have developed advanced management systems, such as the rattan gardens in Kalimantan, Indonesia.

Commercially, rattan is mainly used to make furniture and craft goods for export. Rattan collection is often separated from manufacture so the poorest people do not benefit from the value of the finished product. But products can be made by small craft industries to increase local incomes significantly. For example, collectors in Ghana who send rattan poles to commercial factories earn about US\$45 per month, while furniture makers can earn up to US\$250 per month simply from producing items for local sale.

Product quality and design are two of the most important factors influencing marketability. Export of rattan products can make important contributions to national incomes. China, Indonesia, Malaysia and the Philippines exported an estimated US\$1.68 billion worth of rattan and rattan products in 2004. Some countries, such as Indonesia, have introduced export controls on rattan poles and semi-processed rattan with the aim of protecting resources and boosting local manufacturing, but the effects on local and global trade appear to be mixed.

resources. What we do know is that rattan's forest habitats are shrinking while demand and extraction rates are increasing.

The International Network for Bamboo and Rattan (INBAR) aims to increase awareness of the threats to rattan resources as a first step in promoting their sustainable management and use. At the same time methods of gathering basic information should be developed as to how much rattan remains and where it is, and to encourage organizations to go out and collect such information. Sustainable management and harvesting methods must also be developed and show how they can be applied in natural rain and monsoon forests and assist in developing and demonstrating ways of growing rattan in plantations. [Source: *In partnership for a better world – strategy to the year 2015*. 2006. INBAR, Beijing, China.]



"Riches of the forest: for health, life and spirit in Africa"

### Rattan: from harvest to market

Rattan is a valuable palm family NTFP providing income for villagers who harvest it for sale and use it in handicrafts.

From harvest to market, the rattan business is laborious. Villagers harvest on foot. Using simple hand tools, they scale huge trees and cut the vines. Skill is required to make accurate cuts while keeping watch for ants and wasps nesting in the spiky protection of the vine's outer covering.

Processing soon follows harvest. Methods vary between regions, but one goal is shared: producing smooth, even-coloured, blemish-free, pliable cane.

Oil curing or deglazing consists of placing the canes in boiling diesel oil solutions. Curing removes moisture, reduces fungal attacks, improves colour and increases pliability.

In some regions workers place canes in mud solutions and heat them over a fire before rubbing the surface clean. This method is seen in Indonesia, while in Papua New Guinea water washing is followed by a fine steel and kerosene scrubbing.

Drying and sometimes sulphur fumigation follow oil curing. Drying is determined complete by weight, colour and the pitch of the sound made when a cane is rapped on the ground. Drying is crucial to quality. Sulphur fumigation kills insect larvae and enhances colour.

Bringing rattan to market is not thought to create significant environmental damage or danger to workers. Undesirable canes can cause litter and monetary waste. Care must be taken in using hand tools and personal protective equipment is a wise choice to protect the respiratory system.

Rattan resources can be renewable. Research is critical to the ecosystem and the people who work in the industry. Cultivation efforts have seen small successes but deforestation threatens rattan's natural habitats. Rattan's value protects trees from cutting as it supports families. [Contributed by: Rebecca Arrington, Side Porch Ind., LLC, 2705 W. Buno Rd, Milford, MI 48380, United States of America; e-mail: RUWeavin@aol.com] (Please see page 52 for information on participatory rattan management in Nepal.)



People obtain more than 20 percent of their protein from wild meat and fish in 62 developing countries. People in the Congo Basin alone consume more than 1 million tonnes of wild meat yearly (equivalent to 4 million cattle), while people in the Amazon Basin consume 67 000 to 164 000 tonnes per year. Wild forest-dwelling animals represent a mixed blessing, however, with raids on crops counterbalancing ease of hunting. (Source: *Unasylva*, 57(224): 5-6.)

### How wildlife can better contribute to livelihoods and poverty reduction

Wild animals historically have been a major source of food, clothing, weapons, medicine and rituals, although intensive use is declining because wildlife populations are decreasing. As an important component of forests, the sustainable management of wildlife requires a range of integrated approaches if lasting solutions to the supply crisis in many poor rural areas are to be found (see Box).

**CREATING INCENTIVES FOR CONSERVATION**

The World Wide Fund for Nature (WWF) is working with a village on the edge of the rain forest in southeast Cameroon to regulate the commercial hunting of bushmeat. With new roads opened for logging, local hunters and outside poachers were selling their catch to passing truck drivers for more money than they could earn from other activities. Collaborative efforts with the Ministry of Environment and Forests to stop such trading failed because it was impossible to patrol the large number of trucks travelling on the numerous roads.

Given the incentive to keep wildlife abundant for foreign hunters who pay large sums of money for trophies, the villagers and WWF worked out a scheme by which residents hunted only for their own needs in return for the community receiving a portion of the licence fees that foreigners were charged. These revenues paid for improvements such as equipment for schools. The logging concessionaire also agreed to improve operations, provide jobs for local people and allow them to access forest products for their own consumption. To help restrict hunting, company trucks bring frozen meat back from the cities to feed workers.

Although gaps in information make it difficult to determine the extent to which bushmeat can alleviate poverty and improve livelihoods, evidence shows that poor people obtain a significant portion of their protein from this source, particularly in lean seasons. They also earn income from the sale of any surplus catch. While hunting wild animals is unlikely to be a major route out of poverty, if regulated and sustainable it can diversify livelihood options and provide a stepping stone for landless people to start a small business or have money to invest elsewhere.

*Open access.* Despite the value of bushmeat as a source of high-quality protein and income, access is not tightly controlled in most cases. Individuals or entities generally do not own the resource *per se* so that local use or management rights are not well defined, especially over large areas that

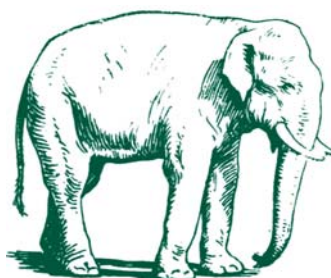
encompass several villages. As a result, hunters generally do not feel a sense of stewardship, preferring instead to capture as many animals as possible before others deplete the stocks. In addition, the equipment is simple (bows and arrows, guns and traps), hunting fits in well with the farming cycle in terms of labour needs and dried meat is easy to transport to market because it is light.

*Illegal harvest and trade.* Bushmeat is often harvested for meat, as well as for trophies, by using explosives, wire traps and other unlawful methods. Drivers of logging trucks then illicitly move the carcasses to urban markets. These activities involve thousands of people and are spread over immense areas, many of which are remote and inaccessible. Efforts to regulate hunting and trade with the intention of benefiting poor people can have quite the opposite effect.

Given clear indications that current levels of wildlife harvesting are unsustainable in many places, finding solutions requires building national and local capacity, clarifying rights, adopting participatory approaches to decision-making, using local knowledge and skills, and integrating bushmeat issues into broader strategies to improve livelihoods.

Field practitioners can address issues related to the sustainable use of wildlife by first learning about the local hunters, the trade in bushmeat and the links to livelihoods. On the basis of this information, they can then suggest to village leaders and other authorities ways to maintain sustainable hunting levels. [Source: extracted from *Better forestry, less poverty: a practitioner's guide*. FAO Forestry Paper 149. 2006. Rome. ISBN 92-5-105550-5; [www.fao.org/docrep/009/a0645e/a0645e00.HTM](http://www.fao.org/docrep/009/a0645e/a0645e00.HTM)]

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**Rhinos and elephants targeted by poachers in southern Africa**

Rhinos and elephants are being increasingly targeted by poachers for the rhino horn and ivory trades, while smaller mammals such as antelope are being tracked for bushmeat, according to Animal Rights Africa (ARA). In its *Consuming wild life: the illegal exploitation of wild animals in South Africa, Zimbabwe and Zambia* report, the group notes that the illegal killing of wild animals, using guns, snares, poison or hunting dogs, falls into three categories: *traffickers*, often operating as part of international criminal networks, trade meat, ivory and rhino horn on local and international markets; *poor people* kill game for food and to sell parts as souvenirs or to traditional healers; and, finally, *wealthy individuals* hunt animals in protected areas for their trophy value.

While data on the subject are fragmented, figures obtained by ARA show significant amounts of poaching, often targeting reserves. At least 70 rhinos have been killed in South Africa's famous Kruger National Park in the past six years. In Zimbabwe, the rhino population in three parks has dropped sharply, ARA said, quoting figures from the Zimbabwe Conservation Task Force. The group also cited media reports of 28 elephants killed in two national parks in Zimbabwe since October 2006.

In Zambia, the trade in illegal bushmeat was seen to be brisk with 12 tonnes of meat seized in the country in 2006.

Several countries, including Zimbabwe, have complained that the ban on elephant products proposed by Kenya and Mali will seriously affect hunting. The proposal is to be discussed at a conference of the Convention on International Trade and Endangered Species of Wild Fauna and Flora (CITES) in the Netherlands in June. [Source: *Monsters and Critics* [United Kingdom], 2 April 2007.]

**Nature & Faune**

Nature & Faune is an international bilingual (English and French) publication of the FAO Regional Office for Africa. Its aim is to disseminate information (scientific and technical knowledge) and promote the exchange of experiences on wildlife, protected area management and the sustainable use and conservation of natural resources in Africa.

The current issue deals with the theme of human/wildlife conflicts.

Subscription is free; just send an e-mail to [nature-faune@fao.org](mailto:nature-faune@fao.org). Alternatively, the

magazine can be downloaded from the Nature & Faune Web site at the address below.

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#### FUNDING FOR WILDLIFE PROJECTS

SITA Trust's Enriching Nature Programme is providing funds for wildlife projects. Funding is available to support species and habitats that have been identified as a priority by the Biodiversity Action Planning process.

**FOR MORE INFORMATION, PLEASE CONTACT:**

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#### Illegal bushmeat trade growing in the United States of America

The illegal import of African bushmeat is a growing trade. Federal agents are confiscating thousands of animals including African rats, bats and great ape parts smuggled into the country. Tourists bringing in bushmeat in suitcases are being caught at airports at least once a week. Boxloads of illegal cargoes of bushmeat have been discovered. There is a thriving black market and the authorities say that it is a dangerous one. Bushmeat is a cultural food preference for African expatriates in the United States. But government scientists say bushmeat carries potentially deadly diseases that have already spread from animals to humans.

University of California, Berkeley Wildlife Ecology Professor Justin Brashares says health is not the only issue. He is worried that whole species are now in danger of extinction. "I don't condone it at all," he said, "but many people who are selling it, and eating it, would like to see some legalized trade. A United States

Department of Agriculture-approved trade." Brashares said his team of volunteers have seen markets openly selling the banned meat. The black market is especially lucrative in the Bay Area, including San Francisco and San José.

Brashares says anyone who wants it can find bushmeat. (Source: CBS 5 [San Francisco, United States of America], 21 March 2007.)



#### The Neotropical bushmeat crisis

The devastating effects of the bushmeat trade on wild primates in Central and West Africa are well recognized. In contrast, the largely uncontrolled hunting of primates in Central and South America has received little attention. As in Africa, the convergence of large-scale deforestation, increasing commercial hunting and the capture of live animals have had devastating effects on Neotropical primates and many species may be pushed to the brink of extinction.

Drawing on almost 200 primarily scientific publications, *Going to pot. The Neotropical bushmeat crisis and its impact on primate populations* comprehensively reviews the scale of primate use across 22 Central and South American countries. In doing so, the authors demonstrate that current levels of offtake are unsustainable across most Neotropical primates' range and that effective conservation measures are urgently required. In at least 16 of the 22 Neotropical nations examined, hunting for bushmeat poses a critical threat to primate populations. There is a paucity of data for the remaining five countries (Argentina, Belize, El Salvador, Nicaragua and Uruguay). However, this does of course not imply a paucity of problems. One country, Chile, does not have any primates at all.

Approximately eight million people in South America regularly consume

bushmeat as a source of protein. A significant portion of bushmeat from tropical forests consists of primates. While local farmers and subsistence hunters are consumers and increasingly traders, wealthier households also consume considerable amounts of bushmeat.

Rural populations in the Brazilian Amazon alone are estimated to consume between 2.2 and 5.4 million primates per year. Because of their slow reproductive rate and low population densities many primate species cannot sustain this immense offtake. Hunting of large and medium-sized Neotropical primates occurs at a rate that poses an extreme threat to their long-term survival. Although current hunting levels are lower in some areas, this does not necessarily indicate a decreased threat. Instead, these numbers may reflect overexploitation in the past that has led to generally low population numbers. The increasing commercialization of bushmeat hunting, modern hunting techniques and equipment, expanding infrastructure and growing human populations, combined with serious habitat degradation and fragmentation, further exacerbate the situation.

Whereas the extent of habitat destruction in the Neotropics is widely acknowledged, the serious impact of hunting is often ignored. However, the hunting of primates for food, rather than habitat loss is predicted to pose the most serious threat to the survival of large primates in Central and South America within the next two decades. As in Africa, habitat fragmentation and hunting are synergistic, causing newly accessed forest regions to become available to hunters.

Data from hunted areas in many different Amazonian sites show that large primate biomass has dropped by up to 93.5 percent, in comparison with areas where hunting is absent. The impact of this reduction goes beyond the effects on primate species. There is a domino effect on the forest ecosystem as a whole. Primates are important seed dispersers. Highly mobile woolly and spider monkeys feed on fruits, and woolly monkeys in particular consume the fruit of over 200 different woody plants. The removal of these species therefore significantly affects the ability of plants to disperse their seeds and changes the dominance relationship between tree species. In the medium term this leads to changes in forest composition, structure and biodiversity.



The hunting of Neotropical primates outlined in this report illustrates how a traditional way of life has become biologically devastating. There are no easy answers to this dilemma, and any resolution of this continent-wide conservation crisis depends on genuine commitment from all stakeholders. Preventing the disappearance of many primate species in the Neotropics requires urgent national and international action. To protect national biodiversity and the integrity of their forests, range states are therefore encouraged to prohibit primate hunting and strengthen the implementation and enforcement of binding protection measures. [Source: extracted from the Executive Summary, *Going to pot. The Neotropical bushmeat crisis and its impact on primate populations*. 2007. Care for the Wild International, Kingsfold, United Kingdom and Pro Wildlife, Munich, Germany. Download from: [www.careforthewild.com/files/Bushmeatreport1206\\_singlepages.pdf](http://www.careforthewild.com/files/Bushmeatreport1206_singlepages.pdf) (Please see page 56 for information on the bushmeat trade in Sierra Leone.)

**Wildlife management**

Among the multiple threats to wildlife, two of the most immediate and direct are unsustainable hunting and trading in wildlife and wildlife products, and human/wildlife conflict.

In many parts of Africa, commercial trade in bushmeat for consumption is probably the single most important cause of the decline of wildlife populations, ranging from insects, birds and turtles to primates, antelopes, elephants and hippopotamuses. It was estimated that in the Congo Basin alone, the annual offtake of bushmeat is about 5 million tonnes, but a recent, detailed study of bushmeat offtake in the moist forests of Cameroon and Nigeria, which documented an average offtake of 346 kg per km<sup>2</sup>, suggests a much lower offtake of up to 1 million tonnes for the Congo Basin. However, this lower estimate gives little cause for comfort, because it is still far in excess of a sustainable level, given the inherently low production of animal biomass in tropical forests.

Meat from wild animals is not only an African issue (see Table). The meat from freshwater turtles is consumed in huge volumes in East Asia, despite the fact that 75 percent of the 90 species found in Asia are considered threatened, and 18 of these are critically endangered.

**Decline in selected animal populations**

Species	Initial population	Year	Current population	Decline (%)
Bonobo (pygmy chimpanzee)	100 000	1984	5 000	95.0
Asian elephant	200 000	1900	40 000	80.0
African elephant	10 000 000	1900	500 000	95.0
Tibetan antelope	1 000 000	1900	75 000	92.5

There are success stories of the revival of overexploited wild animal populations. In 1969, all 23 species of crocodilians were threatened or had declining populations. Today, one-third of crocodilians can sustain a regulated commercial harvest, and only four species are critically endangered. In many cases, well-managed, CITES-approved ranching programmes produce sustainably harvested hides for the international market, garnering the support of industry and governments, while helping supplant illicit trade. Similar programmes in regulating the trade in wool products from South America’s vicuña have resulted in similar successes. By the 1960s, vicuña populations had been reduced to 5 000 animals, less than 1 percent of historical populations, but conservation and management have restored their numbers to 160 000. Today, the illegal global trade in wildlife is second only to narcotics and is valued at almost US\$5 billion.

Because of human population growth, the accompanying growth of human settlements and the consequent reduction of wildlife habitat, conflicts between humans and wildlife are occurring more and more frequently around the world. In Africa, where many people depend directly on natural resources for their livelihoods, wildlife species such as crocodiles, elephants, hippopotamuses and lions raid crops, injure or kill livestock, invade human settlements and cause damage to personal belongings, and can even injure and kill people. As a result, local people are increasingly hostile to wildlife and local communities do not cooperate with conservation authorities. The result is increased instances of poaching and other illegal activities.

The causes of human/wildlife conflict will not be eliminated in the near future and it can be expected that conflict will only increase in frequency and intensity. There is, therefore, an urgent need to find ways to manage this conflict. A range of approaches are being tried, including natural and artificial barriers, such as

suspending chilli pepper-impregnated cloths on ropes surrounding agricultural fields, a technique used successfully in an FAO project in Ghana to deter elephants from raiding crops. At present, the most reasonable approach to managing the conflict is to implement short-term mitigation strategies jointly with long-term preventive measures.

A challenge for policy-makers is to balance conservation of wildlife resources with the livelihood requirements of local populations in all regions. [Source: *State of the World’s Forests* [SOF0] 2007, FAO.]



**The impact of acorn crops on deer hunting in the United States of America**

Deer hunters around Pocahontas say that many of the trees are withering and their vegetation is dead. Thanks to a cold snap that hit Northeast Arkansas last week much of spring’s green has now turned to brown. Avid hunters know the threat this could have on wildlife: not having an acorn crop will make it hard for deer and turkeys to make it through the winter.

Acorns produced by many of these withering trees provide vital nutrients for animals such as deer. “Acorns are the staple for wildlife. They count on the nut crop every year. You have lean years, but I don’t think there’s ever been a year where you have zero,” said one hunter. He says the true effects of this cold snap on plant vegetation probably will not be seen until later in the year, when the deer hunting season begins. “In order for the does to produce good fawns for the spring, they are going to need some fat preserves. That’s what the acorns do for the deer.”

The problems with vegetation will not affect the current turkey season, but hunters will see the effects on the deer hunting season which begins in October. [Source: KAIT [Arkansas, United States of America], 14 April 2007.]



*Smilax sonchifolius*



YACÓN

### El Yacón (*Smilax sonchifolius*) en Perú

El Yacón (*Smilax sonchifolius*) es una especie conocida principalmente en el Perú y en los últimos años ha tomado importancia económica. Fue domesticada y cultivada utilizando su raíz tuberosa como alimento fresco, de sabor dulce, refrescante y con propiedades antidiabéticas. Esto se confirma a través de los restos arqueológicos (cerámica, textiles y restos de raíces) de las culturas Nazca (500 aC.-700 dC), Paracas (1500-500 aC y Mochica (500 aC-700 dC), de la costa peruana, así como la cultura Candelaria del noroeste argentino, entre otras.

Del vocablo quechua llaqón (su agua), también conocida en Aimara como aricama o jicama, es originaria de la vertiente oriental de los Andes y valles interandinos, principalmente en Perú. Es común encontrarla en los huertos familiares y alrededor de los campos o en asociación con otras especies tales como maíz (*Zea mays*) y frijol (*Phaseolus vulgaris*); sin embargo posee un amplio rango de distribución, desde Venezuela hasta Argentina, extendiéndose su cultivo a zonas agroecológicas tropicales altas. Su hábitat natural varía entre los 1000-2500 m de altitud. Requiere humedad en las primeras etapas de crecimiento, pero después puede soportar períodos de

sequía así como temperaturas altas y mínimas de 4-5 °C. Para producir raíces comestibles necesita suelos profundos, ricos y bien drenados. En el Perú se cultiva actualmente desde el norte hasta el sur del país.

Pertenece a la Familia Asteraceae (Compositae), es una planta perenne que puede medir hasta 2,5 m de altura, con hojas laminares simples palmatinervias de color verde con abundante pubescencia en el haz y en el envés, tallo exhuberante cilíndrico, piloso y hueco, de color verde. Flores visibles a partir de los 4-5 meses después de la plantación, de color amarillo o anaranjado, inflorescencia racimosa de tipo cabezuela en capítulo con un promedio de 10 flores por planta, con 5 sépalos por flor. Posee dos tipos de raíces: fibrosas y de reserva, raíz tuberosa. Las raíces fibrosas son muy delgadas y su función principal es la fijación de la planta al suelo y la absorción de agua y nutrientes. Las raíces de reserva son engrosadas, fusiformes, ovadas, existen diferentes formas hortícolas, tales como la blanca, anaranjada y morada. Entre las labores más importantes para su cultivo está la propagación exclusivamente asexual, encontrándose seis formas: 1) por porciones de cepa; 2) por brotes enraizados en la cepa; 3) por estacas; 4) por nudos individuales; 5) por tallos enteros y 6) in vitro, siendo las más usadas las dos primeras.

El período vegetativo varía entre 8 y 9 meses dependiendo del ecotipo y lugar de siembra, se puede cultivar todo el año, pero se restringe básicamente a la época de lluvias (octubre a diciembre). La pubescencia de las hojas evita que los insectos se alimenten y transmitan plagas y enfermedades importantes.

El rendimiento de raíces varía entre 20 y 50 tm/ha y es considerado un producto perecedero después de cosechado. El precio en campo es de 0,13 euros/kg (S/ 0,50 nuevos soles), pudiendo llegar a los mercados de Lima a 0,38 euros/kg (S/1,50 nuevos soles). Las hojas también son comercializadas, principalmente para forraje y para la elaboración de tisanas.

El Yacón se cultiva también en Nueva Zelandia, Japón, República Checa, China, Corea, Estados Unidos, Brasil, Paraguay y Taiwán. Es en el Japón donde radica su mayor estudio y comercio.

Como elaboración de productos derivados de esta especie podemos mencionar refrescos, miel y tisanas (de

hojas), teniendo otras alternativas de industrialización tales como: hojuelas, jarabe y pasas. Numerosos estudios demuestran la presencia de altas concentraciones de oligofruktanos en las raíces, fundamento importante para considerar a esta especie como fuente de azúcar natural para el control de la diabetes.

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