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# Following Walnut Footprints (*Juglans regia* L.)

Cultivation and Culture, Folklore  
and History, Traditions and Uses

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## Following



## Walnut Footprints in Afghanistan

R. Knowles

Horticulture and Forestry Consultant, 56 Lincroft, Cranfield, Beds, UK. MK43 0HT

### Country Introduction

Afghanistan is landlocked and shares borders with Pakistan, Iran, Turkmenistan, Uzbekistan, Tajikistan and China. With a population of around 30 million, it has an area of 647,500 km<sup>2</sup>, making it slightly larger than France. Only 12% of the land area is cultivated and only 8% is irrigated. Current forest coverage is estimated at about 2.2 million hectares (3.4% of Afghanistan's territory). The country is divided into 34 provinces and although supposedly administered from the capital, Kabul, the reach of government to rural areas is weak. Approximately 10% of the population live in Kabul.

There are many ethnic and religious divisions compounded by tribal allegiances. Pashtuns (42%) and Tajiks (27%) are in the majority, followed by Hazaras and Uzbeks (9% each) and several smaller minorities. Sunnis form the religious majority (80-85%), but there are substantial numbers of Shiites (15-19%) especially among the Hazaras. Ismaili Muslims are common in certain areas.

The climate can be extreme with winter temperatures averaging -15°C in parts of Badakhshan and Nuristan in the North East. Summer temperatures average 35°C in the East (Jalalabad, Nangarhar Province) and in the North West on the border with Turkmenistan. But temperatures are largely dependent on altitude. The Hindu Kush Mountains, a western extension of the Himalayas, sport many peaks over 6,000 metres; the highest is Nushaq, at 7,492 metres. Many villages are found at over 3,000 metres. Kabul itself is at 1,800 metres, but there are low areas in the East around Jalalabad (550 metres) where the Kabul River slips into Pakistan, in the South West where the great Helmand River flows into the Sistan Basin (475 metres) and in the North West where the Amu Darya (Oxus) River divides Afghanistan from Uzbekistan and Turkmenistan (250-300 metres).

Afghanistan is an arid to semi-arid country receiving erratic rainfall over the years. Below is a simplified description, but there is a detailed precipitation map in the Watershed Atlas of Afghanistan (Favre, 2004). Rainfall occurs mostly in the winter months and particularly in the February/April period. The wet season is mainly in winter and spring when the vegetative cover is low. At higher elevations, precipitation falls in the form of snow, which is critical for river flow and irrigation in summer. From

June to October, Afghanistan receives hardly any precipitation, with the exception of areas in the East which catch a little of the monsoon. These rainfall patterns result in high dependency on melting snow for irrigation. They are also insufficient to support dense natural forests. The southern part of Afghanistan receives less than 300 mm of rain per year. The Central Highlands and Northern Afghanistan receive between 300-400 mm of rain per year, with a little more on the highest mountains. The Hindu Kush Mountains and parts of the Pamir Mountains in the North-East<sup>1</sup> and East (western edge of summer monsoon from the Indian continent) receive above 400 mm rainfall per annum, sometimes exceeding 1,000 mm in places. Thus un-irrigated walnut forests are limited to the North-East and East.

Afghanistan was once famous for its dried fruit and nuts, before the Russian invasion in 1979, horticulture comprised 40% of the country's exports and Afghan dried fruit and nuts constituted 10% of world trade. India is the main export market. The main fruit and nut crops are almonds, apricots, table grapes, raisins, pomegranates, melons, and apples. Apart from apples, all are export crops. Peaches, Plums and Figs are grown in central areas and Citrus fruits, Olives and Persimmons are grown in the east but are not exported. Pistachios, Pine nuts and Walnuts are also important exports, but are seldom planted as crops.

## Historical Background

Scientists generally agree that Afghanistan lies in the centre of origin for the "Persian" or "English" walnut, *Juglans regia*. Afghanistan also lies on both the Northern and Southern routes of the Silk Road connecting Europe through the Middle East, Iran, Afghanistan, Central Asia, Pakistan, and India until it reaches China. Thus walnut types spread in all directions along this trade route and the walnuts in Afghanistan today are probably mixed with those from other countries. Nevertheless, the global significance of the walnut forests in Central Asia, Iran and Afghanistan, and their importance as an international genetic resource should not be overlooked. In Afghanistan, the dense forests covering mountains in the East of the country are seriously threatened by illegal logging and over-grazing and therefore this genetic resource is also threatened. *J. regia* in its wild state in Central Asia and Afghanistan has been given 'near threatened' status in the IUCN Red List (IUCN 2012).

One of the most important traits of *J. regia* in Afghanistan is lateral bearing, which leads to precocity and dwarfing habit. Alexander the Great recognised this in the 4<sup>th</sup> century B.C. when he introduced ancestral forms to Macedonia with lateral fruitfulness from Iran and Central Asia. They hybridized with terminal bearing forms to give lateral bearing trees. There is no evidence that these in fact came from Afghanistan, but it seems highly likely given the time that Alexander spent there.

Although Afghan walnuts have been taken and used in the breeding programs of other countries, there has never been any breeding in Afghanistan itself and there are no

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<sup>1</sup> The Wakhan Corridor or 'Pan Handle' of Badakhshan that stretches along the Pamirs to the border with China, is extremely dry – precipitation about 150 mm p.a.

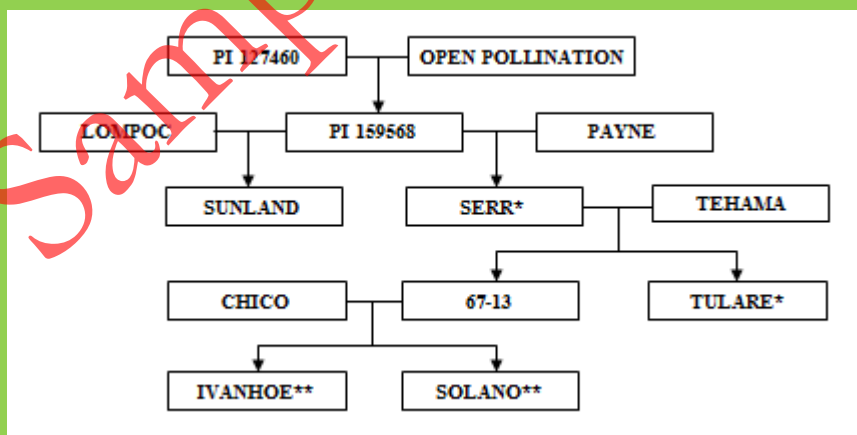
walnuts listed in the Afghanistan National Nursery Growers Organization (ANNGO) catalogue. However, all that is changing and a national walnut collection has been started at Badam Bagh experimental station in Kabul (PHDP, 2012). The Perennial Horticulture Development Project (PHDP), a 15 year program funded by the European Union, organised the collection of some walnuts from single plants in the north. A short list was then made based on fruit characteristics, and budwood was selected from the selected lines. Plants were budded in 2012, so trees will be available for planting out in 2014. These will then become new varieties, but the timescale is very long. They are all paper-shell types. Several lines had incomplete shells, but only lines with complete shells were collected, otherwise the kernels become discoloured and are open to moulds including aflatoxins. A small number of imported varieties have been added to the collection for comparison. In the latest PHDP report the collection has:

- Budwood collected from 10 *in situ* trees (identified in Kapisa, Panjsher, Badakhshan, Samangan) budded in Badam Bagh farm on seedling rootstocks.
- 10 existing imported clones.
- 8 more clones imported from US ('Sunland', 'Serr', 'Cisco', 'Chico', 'Payne', 'Sch. Franquette', 'Hartley', and 'Chandler').

The walnut breeding program in California has a long history and in it is a seedling collected by USDA from Paghman just west of Kabul in 1937 (Tulecke and McGranahan, 1994). Its number is PI 127460. Below on Table 1 is a pedigree showing its important contribution to the University of California breeding program through its open-pollinated offspring PI 159568.

*“The tree has a phenology similar to Payne but is not fruitful on lateral buds. It bears an elongated nut with a good quality kernel. P.I. 159568 was used by Serr and Forde in a number of crosses, and it gave rise to Sunland and Serr. P.I. 159568 was*

**Table 1. Contribution of PI 127460 to California walnut breeding programme.**  
(McGranahan, 2013)



\* Important cultivars in California.

\*\* New cultivars in California.

used as a parent because of a number of good characteristics. The nut is well filled, the kernel is plump, kernel color is fairly good, the percent kernel is good - about 54%. The shell is smooth and light colored. Perhaps most important, our P.I. 159568 trees have had very little if any walnut blight. P.I. 159568 nuts also seem to be resistant to sunburn.”

There may be many more breeding traits yet to be discovered in Afghanistan’s wild walnuts.

## Species and Geographical Distribution

*Juglans regia* is the only walnut species found in Afghanistan. Where rainfall is sufficient, there are still areas of pristine walnut forests, especially in the Nuristan Province. Walnut is found wild at altitudes between 1,300 to 3,000 metres (Karlstetter, 2008), but reliable survey data is scarce. Nuristan is particularly difficult to access and poor security along the Pakistan border makes accurate aerial surveys difficult. In the period 1988 to 1992, the NGO Madera worked in Nuristan and recorded information on walnuts:

“In the valley of Sarigal at about 2,200 m on a north-facing ledge with a little depression the soil was fresh, rich in organic matter and probably deep colluvial. The rock was a very rich mica schist. Around groups of walnut trees, the woodland was Himalayan cedar (*Cedrus deodara*), mixed with oaks (*Quercus semecarpifolia*) and *Pinus wallichiana*. The undergrowth was composed of *Indigofera gerardiana*, *Corylus sp*, *Rumex sp*, nettle, violet and strawberry. The floor was covered with nuts. There were about a dozen walnut trees per 0.1 ha. The largest had a diameter of 60 cm and the smallest 40. I estimated the height at about 30 m. The form was that of trees that had grown as saplings in a clearing. The trunk was not very straight and well branched. I took trunk samples using a Presler auger. The heart wood was quite clear and the sapwood was 6 cm wide. The growth rings averaged 6 mm telling us that the average age of the trees was about 60 years. The core was sent to INRA Champenoux.”

“In the neighbouring village of Mortshel, altitude 1,300 m, a resident showed me behind his house a wild walnut asking me if I knew how to graft walnuts: I gave a negative response. This tree was probably from a nut carried by a bird. At Kamdesh, a large village in eastern Nuristan, I saw a group of wild walnut trees of about 0.2 ha in a dense cedar forest at 2,000 m with a north aspect, very similar conditions to those of Sarigal. From Sarigal nuts harvested from wild trees and some nuts harvested from village trees at 1,300 m altitude were sent on my return to INRA Orléans and grown in the nurseries of Guémené-Penfao (Loire Atlantique). The trees are still there.” (Braud 2013, translated by the author).

It has also been reported that general forest cover in Afghanistan has diminished by as much as 50-60% during the quarter century of instability and strife and that it continues to diminish. (UNEP 2003). How much this affects wild walnuts is not reported and it may be that villagers protect walnut trees from loggers in the same way that they protect Chilgoza Pine (*Pinus gerardiana*) because of its valuable nut crop. Nevertheless the ‘near threatened’ status accorded by IUCN is alarming. Current

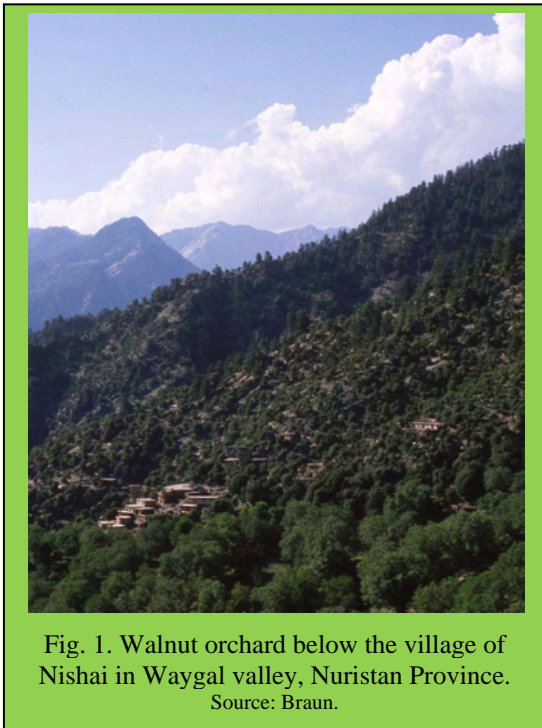


Fig. 1. Walnut orchard below the village of Nishai in Waygal valley, Nuristan Province.  
Source: Braun.

Madera forestry staff have reported that there are still forests in Wama and Parun Districts of Nuristan Province and in Chapadara District of Kunar Province in which walnut is the dominant species (Fig. 1). However, mostly it is quite rare in the forests of Eastern Afghanistan. It grows as single specimens or in small clumps and accompanies the Himalayan cedar, *Pinus wallichiana*, *Quercus baloot* and *Q. semecarpifolia*.

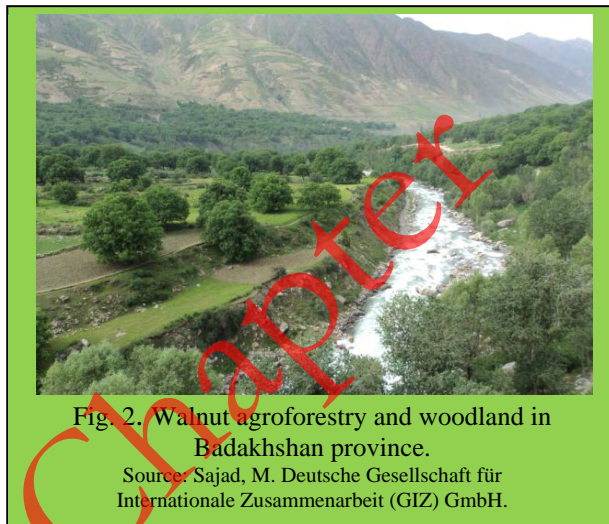
Although wild walnuts may have declined, walnuts are often planted by farmers along canals and riverbanks close to villages; or they are part of an agroforestry mix with cropped land. In either case they receive water to the roots in addition to precipitation. In 2003, Eng. Khaurin carried out a survey of the trees and bushes of Afghanistan on behalf of FAO (Khaurin, 2003). The objective was to list Afghan

trees as an economic asset. Walnuts are not mentioned in the text, but are listed in tables under 'fruit' important for "fruit, fodder, fuel & timber". *Juglans regia* was listed for the following provinces: Laghman, Kunar, Nangarhar, Nuristan, Khost, Paktya, Ghazni, Helmand, Farah, Herat, Badakhshan, Takhar, Kunduz, Baghlan, Samangan, Saripul, Balkh, Jawzjan, Faryab and Badghis. For some reason, Khaurin did not survey the central provinces, e.g., Kabul, Parwan, Panjsher, Bamyán, Wardak where *J. regia* is also common.

While working for a sawmill in Kunar in the late 1960's, Jean Braun reported seeing no wild walnut but many splendid village trees, either planted close to farmhouses or as agroforestry with irrigated crops. The largest exceeded one metre in diameter and 25 metres in height (Braun, 2013).

Several development projects have supported walnuts. Between 2002 and 2011 USAID claims to have funded the planting of 4,000 walnuts in the Nuristan Province (USAID, 2011), and a recent farmer survey by Madera in Laghman and the Nuristan Provinces reports planting along streams and canals (Madera, 2012). In all these cases, saplings are grown from local seed, usually established in small nurseries either in polythene bags or directly in soil. In the Madera survey, farmers also planted Mulberry, Oak, Pistachio, Willow (*Salix wallichiana*), Russian Olive (*Elaeagnus angustifolia*), Persian Lilac (*Melia azedarach*), Wild Persimmon (*Diospyros lotus*) and Wild Almond (*Amygdalus communis*), but it does not state whether these were in conjunction with walnut or separate. In Laghman and Nuristan, each family could own from five to ten walnut trees.

In the Pamir Mountains, which joins the Hindu Kush in Badakhshan to the North East, GIZ has been implementing a walnut project with local villagers (GIZ, 2011). It is reported that the local walnut varieties are particularly well adapted to the extreme temperature fluctuations and extreme site conditions. Some trees are estimated to be more than 100 years old and are carefully tended by villagers. GIZ has been attempting to establish the area as a 'Designated Area of Origin' and to bring in certification schemes to supply nuts and nut products from this region, including aflatoxin testing. The walnut trees are sometimes intercropped with Alfalfa and Wheat, and sometimes on steep hillsides. GIZ has been facilitating the conversion of this economy to organic production in accordance with the EU regulation for organic agriculture (Fig. 2). Moreover, since the farmers are working in cooperatives Fair Trade certification is being introduced. Organic and Fair Trade certification was expected from 2011 season, but success is unreported. GIZ hopes that by establishing a direct supply chain to high-end markets, it can make a substantial contribution to reducing poverty and thus contribute to political stability in the region. Furthermore the preservation of this unique cultural landscape can be guaranteed.



## Economic and Technical Data

According to FAO Stat<sup>2</sup> for 2009, Afghanistan exported 1,177 tons of walnuts in-shell and 2,501 tons of shelled walnuts, mostly to neighbouring countries which are already producing walnuts. They were probably for re-export. The total area harvested was 2,382 ha, production (with shell) was 10,000 tons and the total yield was 4.2 t/ha. These figures must be estimates as there is no way of knowing the area of walnut in mixed forest and it would be very difficult to assess the area of informal planting in villages and along streams and canals. With 80% illiteracy, few villagers keep records. As far as is known, there are no formal orchards except possibly of imported varieties planted under NGO programmes<sup>3</sup>. This is in spite of a very positive assessment of the economic potential back in 2004 in a market sector assessment for the whole of horticulture (Altai 2004). All walnuts are grown from seed. There are three main criteria

<sup>2</sup> Any statistics from the Afghan government have to be treated with caution. Borders are very porous; farmers do not keep written records of harvest.

<sup>3</sup> The varieties Hartley, Tulare, Fernor were introduced by the NGO Roots of Peace for the CHAMP project. Note that Tulare is a direct descendent of PI 127460 collected in Paghman District in 1937. About 80 orchards of 1 jerib (0.2 ha) were planted in Badakhshan at a spacing of 10 x 10 m.

in selecting a source of seed: from a high-yielding tree, with large nuts, and thin/soft shells<sup>4</sup>.

The dry climate of Afghanistan does not encourage walnut diseases. But Codling Moth can be a nuisance and cause significant damage (Fig. 3). No attempt has been made to control it and given the dispersed nature of the trees, mating disruption and other forms of biological control are unlikely to be effective. Harvesting is done by farmers climbing the trees and beating the branches with sticks. Underneath children collect the nuts in their husks into buckets for sorting at home (Fig. 4).

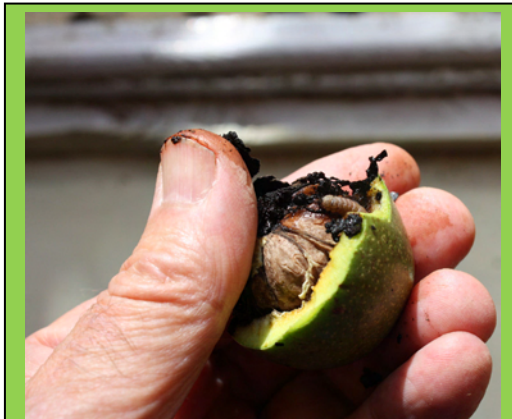


Fig. 3. Codling Moth attacks are common in Afghan walnut.  
Source: Knowles.



Fig. 4. Child harvesting walnuts in Guldara Village near Kabul.  
Source: Knowles.

This always seems rather perilous - no hard hats are worn! In some districts, the walnut harvest is controlled by the local *Shura* (council of elders):

“The local communities cannot harvest their own walnut seed until the village Shura and elders of the community announce for harvesting. When the families collect the walnut and transfer it to their houses, they put them under the sun and when the shells are dry they remove the shells. They sort the walnut seed and transport them to the local market and sell them different categories at different prices and keep some walnut for their own use, families especially use it in the winter and Eid time”<sup>5</sup>.

After harvest, walnuts are graded into three types (local description):

1. “Best quality: by the local name of Chghzi<sup>6</sup>, this type walnut is of great importance commercially”
2. “Low quality: by the local name of Matak, this type of walnut is not edible because the nut is not extractable, but it regenerates naturally”.
3. “Medium quality: this type is not bad and not good, useable in local communities and local Markets. The nuts extract partially”.

<sup>4</sup> Many wild walnut fruits are reported to be almost impossible to open. Those with thin shells easy to open are referred to as ‘paper-shell’ types.

<sup>5</sup> As described by Eng. Tahir Stanikzai, Forestry & Horticulture Technical Advisor to MADERA NGO.

<sup>6</sup> The spelling of this does not seem quite right, but presumably it means paper-shell type.

Farmers usually sell their walnuts to middlemen who come to the village. There have been few attempts at group marketing and it is likely that farmers have little market awareness. They are weak sellers when pitted against wealthy traders.

**The Future.** The story of Afghan walnuts told here contains three important pointers for the future. Firstly, walnut timber has been the palette for some of Afghanistan's most creative talent. The tradition of decorative carving goes back centuries and is still alive through the efforts of the Turquoise Mountain Foundation and will survive through future generations of local craftsmen.

Secondly, it is still not too late to explore the unique germplasm concealed in forests of the Hindu Kush or seeded by farmers in villages throughout the country. It has already played a significant role in foreign breeding programs, but it now needs to be collected and classified with representative samples of *in situ* specimens reproduced for a national *ex situ* collection. This has been completed for most other Afghan perennial fruit and nut species under the Perennial Horticulture Development Project, but the process only started for the walnut in 2011/12 and there is a long way to go.

Thirdly, the market for Afghan walnuts and walnut products is buoyant. In 2004, a market assessment by Altai Consulting demonstrated a 25% return on investment and a 345% potential income increase from improved walnut cultivation (Altai, 2004), but walnut growing has not taken off. This situation has not changed. The widely reported health benefits from eating walnuts have made the international market very attractive; a huge Indian market is on the doorstep and walnuts are easy to transport. The Afghan climate is ideal for disease-free walnuts. In order to market Afghan walnuts properly, varieties with defined characteristics need to be identified and propagated. In the currently uncertain political climate, it is difficult to commit to and invest in a 20-year-plus program of walnut selection and planting, but someone should grasp the nettle and get it started!

The potential in Afghan walnut timber is being realised but there is also huge potential in the nut crop, which could come about with commitment and investment.

## Uses and Traditions

Farmers use all parts of the walnut tree: fruit, trunk, branches, leaves and bark (Fig. 5). Here is a typical entry from the Madera farmer survey:

“Fruits are collected in October:

The trunk, when the trunk is damaged by wind or flood it is harvested. The branches, when the branches are damaged by pest, wind or flood they are harvested.

The leaves fall in autumn and they are collected from the ground, bark is used when the trunk is damaged by wind or flood or people peel the bark”.

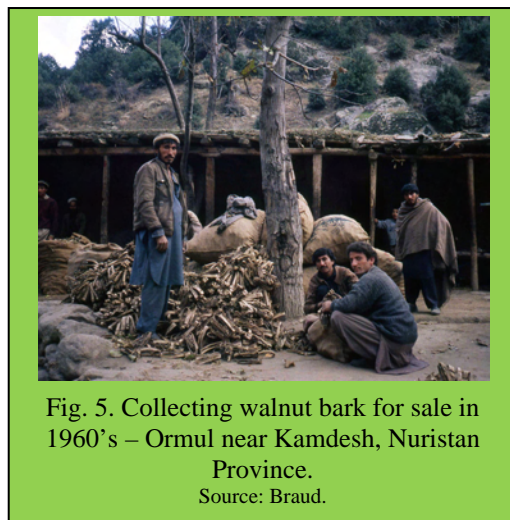


Fig. 5. Collecting walnut bark for sale in 1960's – Ormul near Kamdesh, Nuristan Province.  
Source: Braud.

“The Fruit is for eating and selling, the Trunk is for timber, construction and fuel, the Branches are for fuel, the Leaves are for food for goats and sheep, the Bark is for brushing one’s teeth.”

In many mountainous areas, farmers are short of winter fodder for sheep and goats. The lower branches are cut, and the leaves of many tree species are collected for feeding to flocks in the winter as ‘tree hay’. Other villagers use the leaves for cleaning carpets, making an ointment for burns or mixing with henna.

As well as using the bark for teeth, the husks are also employed, not only for cleaning teeth but also for reddening the lips of girls to make them more attractive. Jean Braun’s photograph from the late 1960’s shows bark being collected for sale. Locals strip off the bark when the sap is flowing and dry it for export to Pakistan where it is used as a toothbrush (Braun, 2013). Walnut shells are used for heating and sometimes merchants buy walnuts in-shell and then contract villagers shell them, allowing them to keep the shells for fuel as part of their remuneration. Unlike China and India, there are no records of walnut shell powder being produced for industrial use.

Walnut wood, known for its grain variety, hardness, strength and colouring, is used for furniture and decorative doors, windows and traditional pataya screens. There are two styles of walnut carving, Kabuli Classic and Nuristani. Nuristan, ‘land of light’, was the last part of Afghanistan to be converted to Islam as late as 1896. It was formerly known as Kafiristan ‘Land of the Unbelievers’ and the people are closely related to the non-Muslim Kalash in Chitral, North Pakistan. The tradition of fine carving of walnut is found either side of the border and before the Nuristani ‘saw the light’, much of the work incorporates Hindu or secular motifs. Today the motifs are geometric or floral, typical of Islam, but sometimes the walnut shells are included as a decorative embellishment. Ancient carvings in walnut from Nuristan can be found in the Kabul Museum and the tradition has been kept alive by The Turquoise Mountain Foundation (TMF) which has a workshop in Kabul for craftsmen and women, but there are still

village craftsmen working in the Province of Nuristan itself. In 2006, TMF founded the Institute for Afghan Arts and Architecture (Fig. 6). Examples of the Institute’s exquisite work can be viewed on the website. (TMF, 2011). Since 2007, Turquoise Mountain Arts production workshops have sold \$ 2,3 m in Afghan crafts, providing market access to the craftsmen and women in the workshops and for the graduates of the Institute.

Walnut carving in Nuristan probably arose because of the inaccessibility of the region and the need to export something of high value, which is easily exported such as furniture and smaller decorative items. In



Fig. 6. Craftsman at work in the Institute for Afghan Arts & Architecture, in the Schools of Woodworking, Ceramics, Calligraphy and Jewelry Making & Gem-Cutting.  
Source: Turquoise Mountain Foundation.



Fig. 7. Twin pair made by Nuristani craftsman (left). Source: Turquoise Mountain Foundation.

Fig. 8. Nuristani kitchen implements and other artefacts from walnut (right). Source: Braud.

the 1960's, it was reported that local artisans in Nuristan used walnut for the production of butter churns, ladles, funnels, bowls, turned dishes, carved stools and chairs (Braun, 2013) (Figs. 7 and 8). Today, TMF does not buy walnut from Nuristan because of government restrictions on felling trees; instead it is sourced from the Nijrab and Tagab Districts of the Kapisa Province and well seasoned for at least two years.

In 2008, analysis of the pigments in paintings of Buddha in Bamyán revealed very early use of oil, probably from walnut or poppy-seed. The frescoes date from the 7<sup>th</sup> century A.D. and survived the Taliban onslaught blowing up the colossal statues of Buddha in 2001. Hitherto, the earliest known oil paintings were from Europe in the 15<sup>th</sup> century and walnut oil was popular owing to its short drying time and lack of yellow tint.

Today, walnut oil is very expensive and little used in Afghanistan. It can be blended with beeswax and used to finish items of walnut furniture, but linseed oil is preferred. However small quantities of oil have been cold-pressed in Badakhshan as part of a GIZ project. In 2009, a trial shipment of 600 litres of walnut oil was exported to Germany. The problem is that there is a good market for walnuts within Afghanistan and the prices paid for processed walnut products are not very attractive to growers. The initiative by GIZ has not been followed through.

Walnuts are known for their health benefits and are a favourite snack, especially at breakfast and often with dried mulberries. Walnut is used in breads, biscuits, sweets and in a special tea which is called Chawa. Chawa is a kind of Afghani hot drink, which is boiled water with Walnut, Almond and Tea. It is said that this is good for backache and women use it during pregnancy. Talkhan is a local Afghan sweet, made from Walnut and red or white Mulberry. Talkhan are said to resemble chocolates, only they are lighter and coarser. Talkhan is mainly produced in the Hindu Kush mountain valleys, including the Parwan Province. Walnuts are also an important ingredient of Mayway Nawroze, a compote of dried fruit served on New Year's Day (Nawroz – March 21<sup>st</sup>). The people of Kamdesh, a village in Nuristan, make a festive dish which consists of pieces of boiled goats meat mixed with a large quantity of ground-up walnuts (Braun, 2013). Here are two further popular Afghan recipes using walnuts (McKellar, 1972):

**Baqlauwa** (sic). This is similar to the popular Middle Eastern baklava except that most Afghan homes do not have an oven so it is fried instead. The ingredients are white flour, cornstarch, baking powder, salt, egg yolks and vegetable fat to make a dough. This is rolled very thin and layered with ground pistachios and walnuts before frying. A syrup of sugar, water, saffron and ground cardamon is thickened by cooking for 10 minutes and then poured over the pastry. Some pistachios are reserved for sprinkling over the top.

**Samsay Sheereen** (fried fruit and nut turnover). Make a dough similar to the above. Combine ground raisins and walnuts with a little water and spoon onto pastry squares. Fold squares diagonally and deep fry until lightly browned. Remove, drain and dust with caster sugar and pistachios. Usually served with tea.

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