

# **Promoting Nepalese Agrifood Exports**

## **Nepalese Timur (*Zanthoxylum armatum*)**

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## Introduction

There is a great medicinal plant diversity in Nepal with potential applications to the pharmaceutical industry; local people possess substantial knowledge of these plants' biology, management and their uses (Shrestha & Dhillon, 2003; Joshi & Edington, 1990; Kunwar et al, 2013). *Zanthoxylum armatum*, locally known as Timur, is a deciduous shrub or a small tree, around 6 meter tall or higher, with dense foliage, armed branched flattened prickles, yellow flowers and red fruits. It naturally occurs in Nepalese forests and on open sites at altitudes ranging from 1000 to 2100 m and can be found in different management systems. According to farmers, certain environments are better for timur growing, such as sites with deep, well-drained moist soils in full sun or semi-shade. This can explain the occurrence of timur's shrubs or small trees around cultivated cropfields (Hertog & Wiersum, 2000). Timur trees are mainly disseminated by birds that eat the fruits, but can also be propagated from seeds or branch cuttings.

Hertog & Wiersum (2000) conducted a study that analyzed different management systems of timur's production in Nepalese forests. There were four management regimes: open-access State lands, two types of lands controlled by communities, and also trees growing on private lands. Each system was characterized by a specific set of access regimes, organizational protocols and rules for collecting and managing the plant, and management practices. The study authors found that a substantial increase in management intensity takes place from government lands to private lands as a result of various factors, including social, economic, political and legislative.



(<http://www.nepl.com.np/herbs/details?herb=Zanthoxylum-Alatum/22/NE613>)

Almost all parts of this medicinal plant are aromatic and are supposed to possess essential oil. The fruit is used to make an essential oil. In the process of extraction of essential oil, the mature seeds are collected and crushed for hydro distillation. The essential oil is extracted from distillate with diethyl ether: hexane mixture (1:3 v/v) (Waheed et al, 2011). Monoterpenes (e.g. linalool and limonene) are the major constituents of the essential oil, being rich in these substances. This products can be used not only with pharmaceutical purposes, but also in the flavoring and fragrance industries. Parts of the plant (e.g. leaves, seeds, fruits, stem, bark, and roots) have been used by indigenous people to prepare medical treatments against several diseases. This plant has effective phytochemical potential, because of some of the following properties: antioxidative, antiinflammatory, analgesic, antimicrobial and insecticidal activities (Brijwal et al, 2012). *Z. armatum* is also used in the treatment of respiratory diseases, asthma, bronchitis, indigestion, toothaches, diarrhea and rheumatism.

Hertog & Wiersum (2000) mentioned the fundamental reasons for farmers to intensify the management of timur. The first one is financial: the market price of timur has increased considerably, with the increase in the demand of timur by the Indian pharmaceutical industry. If timur reaches the buying interest of pharmaceutical industries in other countries, the tendency is that the exploitation of timur for commercial purposes increases even more. Moreover, the authors mentioned the possibility of cultivation surrounding croplands with very little impact to the crop yields, and also the advantages over other fruit trees. For example, timur requires less fertile soil; farmers can begin the harvest three years after planting; and timur is only planted for sale and not for domestic (household) consumption. Hence, there are no social obligations to divide the yield with neighbors, relatives and closest friends. The third factor influencing intensification of timur production is the change in labor situation: villagers are increasingly involved in seasonal labor in their study area. Some timur owners that do not have sufficient family labor can make a sharecropping compromise with marginal farmers to collect timur on their lands. The collectors generally receive half of the profits. Such arrangements for timur collection are an attractive alternative to employment for farmers. An example of the importance of timur for some regions of Nepal is the

Salyan District, where timur is the main nontimber forest product (NTFP) with 400–600 tonnes collected annually. Approximately 70% of the total value of the NTFPs collected is attributed to the fruits of this species. Assuming that one working day is needed for the collection of 4 kg of timur, approximately 100,000 - 150,000 woman days per year are required in the Salyan District to pick the fruits during the collecting season. Collectors mentioned that, if timur shrubs are easily accessible, in the case of private land, one adult can collect a quantity equivalent to 5 kg after drying. On the other hand, timur shrubs in the forest are more dispersed and the collection in those lands takes more time. Additional labor is needed for further steps, as drying, sorting, packaging, and transportation (Hertog & Wiersum, 2000).

As some regions in Nepal present the adequate characteristics for the growth and development of this plant, the exportation of the dried seeds or the essential oil already processed by other countries can be an alternative to increase the income of small local farmers and Nepalese industries. Products of this medicinal plant collected in the Middle Hills of Nepal are already traded with India. Actually, only a minor proportion of the collected herbs is processed within Nepal. The bulk is exported to India, and it is processed there to be used in the pharmaceutical and flavour-fragrance industries (FAO).

The organization that process medicinal and aromatic plants in Nepal began in 1981, with the establishment of Herbs Production and Processing Co. Ltd. (HPPCL), under the care of Nepal's government. In the past years, a number of private sector industries were created, manufacturing resinoids, essential oils and other medicines (FAO).

Recognizing the importance of agricultural product exports for decreasing the national deficit, the Ministry of Agricultural Development of Government of Nepal established the Agricultural Commodity Export Promotion Program under the Department of Agriculture, Agri-business Promotion and Market Development Directorate for developing the pre-requisites of the national market to be linked with international markets (Agricultural Commodity Export Promotion Program, n.d.).

Despite the substantial promise of timur as an export product, Kala et al (2005) mentioned that the crescent commercial interest in timur in India ended up in conflicts that started due to its harvest, since this plant grows in community land or land belonging to the government. In the case of land belonging to an specific village, the claim of that village is sustained, while in the case of land belonging to the government, other villagers can also require the right to collect the fruits. Thus, the disputes are strongest with regard to government lands followed by those in community forests.

The increasing demand also has drawn the attention of the village councils approaching the management of timur grown in community forests and government lands. Members of communities started to elaborate mechanisms for organization, regulation, management and sharing of timur yield between people. The success of this regulatory mechanism is assigned to the fact that the rules and regulations were formulated by the collective decision of members of the community (Kala et al, 2005).

To sum up, the potential benefits to Nepal are encouraging, as the extra income, the generation of jobs in the field, among others; however there are many challenges to be overcome for this economic activity and exportation to be successfully deployed.

## Export Potential

According to the website of the Canadian government, one of the most innovative industries in Canada is the pharmaceutical sector. Companies work on research and development (R&D) to develop new medicines and improved therapies, while others research to develop innovative drugs once patents expire. Then one can say that Canada constitutes a market opportunity for commercialization of timur with Nepal (Pharmaceutical Industry Profile, n.d.).

Table 1 shows the leading companies in the sector in Canada; these could be possible buyers of timur or encourage the research of applications of timur's properties in the pharmaceutical industry.

**Table 1. Leading Pharmaceutical Companies in Canada in 2012**

Rank	Leading Companies	Total Sales (\$ billions)	Market Share (%)

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Rank	Leading Companies	Total Sales (\$ billions)	Market Share (%)
1	Johnson & Johnson	1.89	8.6
2	Pfizer	1.60	7.2
3	Apotex	1.27	5.7
4	AstraZeneca	1.22	5.5
5	Merck	1.11	5.0
6	Teva	1.03	4.7
7	Novartis	0.99	4.5
8	Abbott	0.95	4.3
9	GlaxoSmithKline	0.95	4.3
10	Pharmascience	0.77	3.5

Source: *IMS Health Pharmafocus 2017*

([http://www.ic.gc.ca/eic/site/lsg-pdsv.nsf/eng/h\\_hn01703.html](http://www.ic.gc.ca/eic/site/lsg-pdsv.nsf/eng/h_hn01703.html))

Other companies include: Sanofi-Aventis, Roche, Bristol-Myers Squibb, Wyeth, Eli Lilly and Co., among others. They were not necessarily founded in Canada, but since they are global pharmaceutical companies, they have offices, research and development units in Canada.

Despite the huge potential of bi-lateral trade for timber between Nepal and Canada, it may not be easy to attract the interest of these companies. This may be overcome via the successful marketing of timber products and overcoming of constraints, such as improvements in the methods to process the essential oil, development of blending techniques, research, diagnostic tests by laboratories to demonstrate the usefulness of the product (some properties of timber have already been scientifically demonstrated, but not others) (FAO), as well as improvements in Nepal's internal factors including reduction in the conflicts between villagers, indiscriminate exploitation and the possible ecological impacts and consequences to Nepalese forests of timber harvesting.

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