

NEEM OIL:

A POTENTIAL NEPALESE EXPORT PRODUCT

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SUMMARY: Neem is a promising crop for Nepal. It has the potential to improve small-farmer livelihoods by contributing to the economic, environmental, and social sustainability of agricultural systems.^{1 2 3} In particular, neem oil, pressed from the seeds of the tree, has good Canadian market potential.^{1 4} It can be sold raw, or incorporated into value-added products such as biopesticides or beauty products.⁵ However, a number of logistical obstacles- including start-up costs, product certification, and poor rural infrastructure- must be overcome in order for production to reach its full potential.^{1 4 6}

PART 1: INTRODUCTION TO NEEM

THE PLANT: *Azadirachta indica*, commonly known as neem, is a large-sized evergreen tree in the Mahogany family Meliaceae. It is native to the Indian Subcontinent, and typically grows best in tropical or semi-tropical regions.⁷ It is notably resilient and can survive dry, arid climates and hostile soil conditions.¹ It also demonstrates remarkable natural pest resistance.¹ It cannot withstand freezing temperatures and will not survive in elevations over 1000 metres.² For these reasons, the neem tree is only viable in lowland Nepal, and not in the hills or the mountains.

THE PRODUCT: Neem oil is derived from the seeds of the neem tree. It is usually yellowish-brown in colour, with a strong bitter taste and a nutty odour that some consider unpleasant.⁷ It contains several biologically active chemicals called limonoids, including azadirachtin, nimbin, salannin, azadirachtol, nimbidin, and gedunin.

These compounds have diverse properties including antifeedant, insect growth disrupting, insecticidal, nematicidal, fungicidal, and bactericidal. Azadirachtin is by far the most potent and the most abundant chemical found in seed kernels of neem.⁸ Neem oil has a variety of potential uses including: plant protectant, commercial pesticides, medicines, animal care, oil extraction, soap production, edible oil, cosmetics, lubricant, lamp oil, and food-stock protection.⁷

INDUSTRY STATUS: Currently, neem is not a common agricultural crop in Nepal.¹ Lack of local knowledge concerning neem as a commodity poses a constraint to the success and popularization of neem production. Underdeveloped and poorly organized methods of cultivation, collection, and processing threaten the industry's efficiency and profitability.¹ Women, children, and other marginalized groups are the traditional harvesters of neem. It is therefore likely that improvements to the neem industry would have positive impacts on these groups.¹

LABOUR AND COST: Neem plantations have high start-up costs. The FRP estimates the cost of establishing a 1 ha plantation to be around US\$ 128.¹ There is no income for the first five years, and labour requirements are high while plants are first becoming established. Seedlings must be watered, weeded and monitored regularly.¹ Start-up farmers will likely require access to credit.

After plantations are established, it is possible for farmers to generate an annual income of US\$ 350 from 1 ha of neem (150-200 trees.)¹ Choosing well-adapted progeny that produces seeds rich in the active compound azadirachtin will help to maximize profits.⁹ Higher prices can also be achieved through best-practice and

value added measures such as picking the fruits when they are most ripe, removing the skin and pulp of the seeds, covering them and drying them under shade, and processing them to produce seed kernels.”¹ Under ideal circumstances, neem farmers can produce neem oil on-site, achieving the highest possible profits. However, this would require access to a cold press.¹ In all cases, reliable storage facilities help to maintain quality, and allow traders to sell seeds strategically, when market prices are best.¹ To avoid the high costs of middlemen, neem products should be traded directly with the manufacturer.¹ Producer cooperatives could help farmers find access to credit, infrastructure, and markets.³

SUSTAINABILITY (NEEM IN THE AGRO-ECOSYSTEM): There are many on-site benefits to growing neem. It is an ideal species for agroforestry, and has the potential to improve environmental, economic, and social sustainability of agro-ecosystems in Nepal.² When trees are young, they can be planted with fruit cultures and crops such as sesame, cotton, hemp, peanuts, beans, sorghum, and cassava.⁷ This can provide farm revenue during the period before neem trees begin to produce fruit.¹ Neem can also be added to silvipastoral systems, or forage production systems to increase total overall yields.⁷ ² Establishing plantations along field boundaries and households can minimize reduction in land available for grazing or food production.¹

Neem contributes to farm resilience and climate change adaptability. It can grow in harsh, arid environments, can tolerate high levels of water salinity, and can rehabilitate degraded soils. It provides shade and wind breaks, natural insecticidal

properties, and helps to prevent soil erosion.² The by-products of neem-oil include firewood, fodder, and high-quality green fertilizer, all of which are valuable to farmers.⁷

Neem also provides important socio-cultural benefits. It is used in traditional medicines to treat diverse ailments such as boils, eye diseases, exzema, headaches, hepatitis, leprosy, rheumatism and ulcers.³ During the Hindu Gudhi Padwa festival, neem leaves are eaten to purify blood. For generations, many South Asians have used the twigs of the neem tree to clean their teeth, and many people believe that simply sitting under the neem tree is good for the health.³ Neem is also commonly used by women as a natural- and highly effective- contraceptive.⁷

PART 2: EXPORT POTENTIAL

NEEM-BASED BIOPESTICIDES: Researchers widely agree that neem-based bio-pesticides are safe and effective.^{1 4 10} Azadirachtin works against approximately 200 types of insects as an antifeedant and growth disruptor.³ At the same time, azadirachtin exhibits remarkably low toxicity to mammals, has minimal impact on non-target organisms, and breaks down rapidly in the environment.^{5 6} For these reasons, neem is an ideal pesticide for many ecologically-minded farmers.⁵

The neem-based bio-pesticide industry is already well established in India, with over 100 registered products.⁷ In Canada, market trends show the demand for improved bio-pesticides is growing, as producers and consumers become more ecologically conscious.¹¹ However, there are strict regulations governing

commercial bio-pesticide use in Canada. Products must be patented and registered with the Pest Management Regulatory Agency (PMRA). Currently the PMRA has approved only two neem-based products; TreeAzin™ and NeemAzal,™ made by the company BioForest. These products are only available to professional, licensed pesticide applicators. Therefore, the market for these products is quite small. ¹²

The high costs and restrictions associated with product patenting, risk assessment, and PMRA registrations present great obstacles to the development of new neem-based bio-pesticide products for Canada. ^{1 6 11} However, the Pest Management Centre of Canada claims to assist with development, funding, registration, and adoption of biological pest control products for conventional and organic agriculture.¹¹ Otherwise, if support is unavailable, selling raw materials to pre-existing companies like BioForest might be a more viable option for resource-poor Nepalese farmers. They would have a competitive advantage against neem-oil producers in other parts of the world, due to the fact that neem trees grown in their native region typically produce higher quality seeds, with the higher concentrations of azadirachtin.² However, value-added production models are generally more profitable.¹

NEEM-BASED BEAUTY PRODUCTS: If product patenting and PMRA registration proves unfeasible, neem-based beauty products- such as soaps, skin treatments, lotions, or toothpastes- may be a viable alternative. If this route is taken, Fairtrade certification should be considered in order to gain a marketing advantage. Organic certification should also be considered.⁷

POTENTIAL CANADIAN IMPORTERS:

- <http://www.bioforest.ca/index.cfm>
- <http://www.lush.ca/>
- <https://www.drbronner.com/wholesale/international/canada/>
- <http://organiquecosmetics.ca/>
- <http://www.puritylife.com/aboutus-values.php>
- http://www.cranberrylanenaturalbeauty.com/?utm_source=cranberrylane&utm_medium=main-page-red-buttons&utm_term=main-site&utm_content=med-links&utm_campaign=main-site-links
- <http://www.thebodyshop.ca/en/index.aspx>
- <https://www.tenthousandvillages.ca/>

CERTIFICATION BODIES:

- FLOCERT (Fair Trade Certifier): <http://www.flocert.net/>
- OCIA International (Organic Certifier): <http://www.ocia.org/>
- Quality Assurance International (Organic Certifier): <http://www.qai-inc.com/>
- Pest Management Centre Canada: <http://www.hc-sc.gc.ca/ahc-asc/branch-dirgen/pmra-arla/index-eng.php>

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