

RUNNING HEAD: *Acacia catechu*: Nepal Export

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Introduction

Acacia catechu is a thorny tree found in Nepal in lower mountains and hills¹, which covers 44% of Nepal's total area². It is commonly found in drier regions consisting of sandy soils or riverbanks, however can be grown in a wide range of soil, including areas with shallow soils. The typical environment experiences a mean annual temperature of 32-39 degrees Celsius, with 500-2000 mm annual rainfall. Khersal is a crystalline form of the solid extract from *Acacia catechu*. It has been used medicinally for hundreds of years to treat coughs and sore throats, or to combat diarrhea and heal wounds. It has also been shown to have an anti-inflammatory and anti-fungal effect, and could even treat obesity as well as help manage diabetes¹. The export product discussed will be used in an extracted form (either oil, powder, or pill) to combat these ailments.

Health or nutritional information associated with the product

Acacia catechu is full of flavonoids and antioxidants, having an antimicrobial, anti-inflammatory, and anti-fungal effect. Extract from the bark is obtained by boiling the heartwood with water, later evaporating the water from the solution to prepare the extract. What is left behind is a rich source in catechin, epicatechin, and flavonoids³. Traditionally, only the bark has been used for its healing properties. However, many studies are now examining the health effects of the bark, leaves, and heartwood⁴. Although limited well-controlled human studies have been conducted, many animal studies have tested the various effects, both in vivo and in vitro. A dosage of 250 mg/kg was shown to have significant anti-diarrheal properties on rats. A dosage of 250-550 mg/kg was shown to significantly reduce blood sugar levels in diabetic rats, predictably because of the tannins and flavonoids present. One of the few human studies

conducted resulted in anti-inflammatory effects when taken orally for 12 weeks, and was shown to reduce pain associated with osteoarthritis of the knee³. This is largely due to the extract acting as an inhibitor of cyclooxygenase and 5-lipoxygenase⁵.

Diabetes is projected to affect approximately 11% of Canadians by 2020, 90% of those being diagnosed as type 2 diabetics. Health care costs will be a shocking \$16 billion by 2020. Intensive multifactorial interventions have been shown to greatly reduce complications associated with diabetes⁶. Ethanol extracts of *A. catechu* have been shown in animal studies to lower blood glucose levels in rats induced with type 2 diabetes mellitus. Because it was compared to Metformin- a common insulin sensitizing drug taken by North American diabetics- and was shown to have similar effects, it can be predicted that *A. catechu* is also an insulin sensitizer. The rats studied also had common side effects of type 2 diabetes mellitus, such as dyslipidemia and hyperglycemia, which *A. catechu* was shown to have anti-dyslipidemic and anti-hyperglycaemic effects on as well. Although this study is not conclusive, it can still be predicted that *A. catechu* could be utilized in the production of plant based anti-diabetic agents⁵.

Labour Required, Cost and Issues

The *Acacia catechu* tree grows slowly, and regular weeding is required when the plant is still young to reduce competition. Protection against pests and disease is also essential. Parasitic plants of *Cuscuta* are a threat to the plant, as well as the genus *Loranthus*. Seed boring beetles and *Dasychira*, which are known as leaf eating insects are a threat to the tree's health and growth. The fungi *Ganoderma lucid* can cause root rot¹. This could require extensive work for Nepalese women and children as they are the

main providers of agriculture labour⁷. Additionally, *A. catechu* may take 10-15 years to reach appropriate maturity for harvesting wood, bark, and seeds which are beneficial to human health. This means it is not a quick solution.

Seed storage is standard, with the choice of storing at room temperature allowing seeds to be planted within one year, while storing at 10 degrees Celsius will allow several years of storage¹.

Hillside Nepal is characterized by acidic soil and soil erosion. Acidic soil is due to soil organic matter content falling extremely low, but can additionally be attributed to aluminum and acidic buildup, partially because of application of ammonium sulphate as a chemical fertilizer, and the use of pine needles in compost. Because hillside farming is common in Nepal, this contributes to high rate of erosion on the top fertile layer of soil, mainly due to sloping and poorly maintained land. Acidic soil and soil erosion contributes to the decline in agriculture production, namely nutrient depletion in soil. However, decreased number of livestock is also a large factor due to decreased manure deposits⁸. Because *A. catechu* is primarily found on hillside, it would provide a huge benefit to hillside farmers that may have difficulty planting other crops on sandy, dry, nutrient depleted soils. It is ideal for the drier regions or those near riversides that may be nutrient poor, as it has an ability to grow in a wide range of soil, such as sandy, gravelly, and with varying degrees of clay and black cotton. Additionally, Acacia trees are Nitrogen-fixing, meaning they would add much needed nutrients to the soil to allow for other crops to thrive⁹. Leaves fall off during the hot months of February, reducing competition with other plants for sunlight¹. IFAD is currently working with Nepalese

farmers to work with families below the poverty line to increase production of crop trees, some of which could be *A. catechu*¹⁰.

Practical information to help a business get off the ground in this area

Approximately 80% of Nepal's people rely on subsistence farming for their survival. Converted to US dollars, the poverty line in Nepal falls below making \$104.50 per person per year. Approximately 38.8% of Nepalese people fall below that poverty line (as of 2013). This can be largely attributed to decreased agriculture productivity, as 80% percent of Nepalese rely on subsistence farming for their livelihood. Women of Nepal make up the majority of the agriculture labour force at 60%, while having little access to training, land, and production technology¹⁰. Training programs for farmers on how to properly use technology to enhance productivity, as well as increasing transportation from rural to urban areas can increase agriculture productivity. Additionally, increased use of fertilizer and education specifically for increasing agriculture productivity will increase yields. However, combining these effects has a much stronger influence on increasing productivity than implementing one strategy on its own. Combined effects are estimated to decrease poverty by 55%².

Market Opportunity

Medicinal herbs in Canada play an important role in the natural health product industry, especially with the increasing interest of natural ingredients that have health benefits, including prevention and treatment of disease. The organic food oil market is experiencing extensive increase in demand, being valued at \$3 billion in 2012¹¹. Many people are taking interest in a more "natural" lifestyle, taking health maintenance and disease prevention into their own hands, becoming increasingly dissatisfied with

Western medicine. However, attaining and sustaining commercial significance in medicinal crops can be extremely risky. Human health trials are further needed to solidify the safety and benefits to consuming *A. catechu*. Realistically, demand for herbal medicine can often be irregular, depending on continuously changing “trends”¹². Partnering with companies such as *Whole Foods* and *Goodness Me!* would target the population of interest, as well as other “natural” healthcare providers with contact information below.

Conclusion

In conclusion, extract of *Acacia catechu* touts extensive health benefits and has been used for hundreds of years. Although more research needs to be done before complete adoption and export into Canada can be executed, it shows high promise, especially in today’s society.

Contact Information

Whole Foods:

4771 Yonge Street

Toronto, ON M2N 5M5

P: (416) 730-1100

Goodness Me!:

P: (519) 826-9042

Healthy Planet Canada:

47 Rainside RD

North York, ON M3A 1B2

Canada

P: (416) 640-5713

Aviva Natural Health Solutions:

1224 St. James Street

Winnipeg, MB R3H 0L1

(204) 947-6789

Sobeys Ontario:

480 Tahoe Blvd.

Mississauga, ON L4W 0C7

(905) 238-7124

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