

Acacia pycnantha gum exudates recognised as a traditional food in two countries may have economic potential

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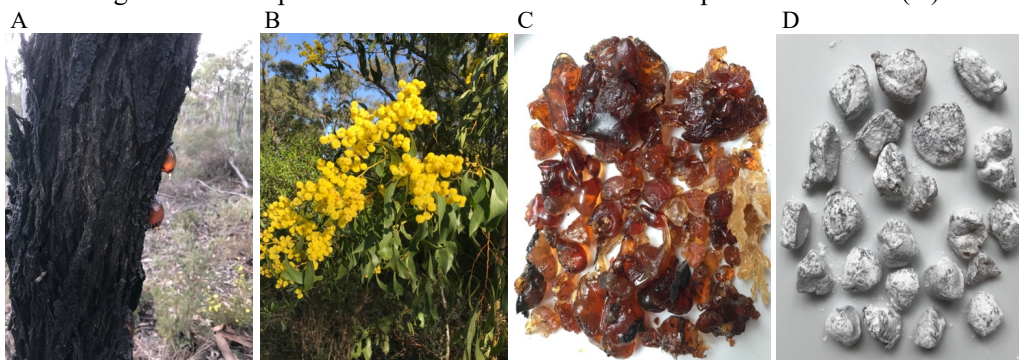
Abstract

Acacia pycnantha is a native tree growing in the southern regions of Australia, particularly South Australia. The tree trunk and branches exude gum, which is most prolific around April (autumn) and can be removed by simply pulling off or cutting, yielding about 10g/tree/year. Approximately 40% of trees have gum available with about 1%, usually mature trees, having significant amounts. Food Standards Australia and New Zealand has recently formed a view that *Acacia pycnantha* gum can be recognised as a traditional food for consumption up to 30g/day in these countries. The economic potential of *Acacia pycnantha* gum as a food, additive or for other uses, requires further research into increasing the yield/tree and creating demand.

Keywords: *Acacia pycnantha*, gum, wattle, gum Arabic, gastroesophageal reflux, reflux, adhesion.

Graphical abstract

Acacia pycnantha gum on a mature tree (A), in flower (B), collected gum (C) and 5-10g cleaned soft pieces rolled in calcium carbonate to prevent adhesion (D)



Introduction

The *Acacia pycnantha* (AP) tree is also known as the golden wattle, with the flowers being the floral emblem of Australia. Some, but not all, AP trees naturally produce exudative gum that can be pulled or cut from the trunk and branches, but there is no commercial industry for the production and sale of the gum. Exudative gums from *Acacia senegal* or other closely related species of *Acacia*, collectively termed gum Arabic (GA) or *Acacia* gum, grow in Northern Africa and is sold worldwide as part of a multimillion-dollar industry [1-4]. Gum Arabic is mainly used as a food additive with a European food safety code E414, does not require a numerical acceptable daily intake limit (ADI) and is permissible for use as an additive in the United States of America up to a maximum level of 85% [2,4]. The average yield of GA is reported to be $\approx 250\text{g/tree/year}$, depending on the rainfall in the growing seasons with the trees deliberately cut or wounded to cause more gum to exude, increasing production [1,3,5]. The chemical composition of AP and GA have been characterised and found to be similar, with both sticky when moist, but not oily, as the gum is composed mainly of carbohydrates with very little fat or oil [6]. Gum Arabic has been reported to have health benefits including gastroprotective activity [1,7]. Gastroprotective benefits have also been found for other *Acacia* gums including AP, bringing relief from gastroesophageal and laryngopharyngeal reflux [8,9]. Australian *Acacias* are reported to be invasive in South Africa and several other countries, with some species such as AP reported as having limited or no commercial value [10].

Materials and Methods

Soft AP exudates were pulled or cut from the tree trunk and branches during April (autumn) with pieces weighing 5-30g which could be eaten directly or cleaned of bark and cut into smaller 5-10 g pieces ready to eat or store. Approximately 40% of trees had gum, with $\approx 1\%$ of trees, usually mature trees, having significant amounts while $\approx 60\%$ being younger trees, had little or no gum. Seasonal conditions, rainfall and location are likely to influence gum production. Approximately 500g of gum was collected per hour from all the trees that had gum to collect ($\approx 20/50$ trees), in one location, with $\approx 30\text{g}$ lost on cutting by hand, bark that had adhered to the edges of some pieces, taking another ≈ 30 minutes. The gum was usually lighter in colour when first collected, becoming hard, brittle (drier) and darker over time, possibly due to oxidation of the contents. To prevent the soft sticky gum pieces from adhering together to form a solid mass, particularly the softer regions that originally were adhered to the tree, they were rolled in food grade powdered calcium carbonate. The calcium

carbonate coating gives the pieces a white appearance and prevented adhesion, making them dry to touch and easy to store and eat. The 5-10g pieces can be sucked like a lozenge with a soothing mild flavour but in the past, traditionally, could also be cooked [11]. The gum pieces should not be chewed as its adhesive nature may extract fillings from the teeth.

In winter, rain washes the exposed water-soluble gum from the trunk and branches, removing all traces except when located under branches and kept dry. Gum that had remained on the tree for months was still edible but had become hard and difficult to remove. The collected gum could be stored without refrigeration.

In 2022 an application to Food Standards Australia and New Zealand was made to recognise AP gum as a traditional food, resulting in the group forming a view in response, that AP gum be given traditional food status, due to a history of use in Australia, for consumption up to 30g per day [12]. These are likely the only 2 countries in the world to permit AP gum to be sold as food for human consumption and may indicate the gum is safe for sale in other countries for non-food uses like adhesives or other uses, as for GA [1,12].

Results and Discussion

The collection of the AP gum from native trees, not prepared for commercial production, was $\approx 500\text{g/hour}$ from $\approx 20/50$ trees (40%) at $\approx 10\text{g/tree/year}$, much lower than the yield of GA reported to be $\approx 250\text{g/tree/year}$ from Northern Africa [3]. The current retail prices (2023) for GA in Australia are AUS\$42/Kg, marketed for use as an emulsifier and adhesive but AP gum is not grown commercially and is not available for sale at present [13]. *Acacia pycnantha* gum was collected and marketed in Western Australia in 1836, but collection was labour intensive, could not compete on the price or quality with the African gums, that were widely available, and so was unsuccessful [5,8]. In Australia, AP gum could only be harvested from trees growing on private property and is not permitted to be collected from trees growing on public land. The cost of labour is still high, likely preventing any commercial development of the resource unless the yield/tree could be improved or demand for the gum established.

Detailed knowledge about the commercialisation, economic value, feasibility as a commercial product, nutritional value, health benefits and industrial applications of AP gum were not found available in the literature and require further research if a product is to be developed.

Conclusion

Acacia pycnantha gum has been recognised as a traditional food for consumption up to 30g/day and allows sale of the gum in Australia and New Zealand. The recognised safety of AP gum in these countries may allow the sale of AP gum for non-food uses in other parts of the world, as an adhesive or for other uses, as for GA. Whether AP gum has any economic potential, as found for GA grown in Northern Africa, requires further research and development to increase the yield/tree and to create demand.

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References

1. Mariod AA. (Editor). Gum Arabic: structure properties applications and economics. Academic Press. 2018;1-342.
2. Mortensen A, Aguilar F, Crebelli R et al. Re-evaluation of acacia gum (E 414) as a food additive. EFSA J. 2017;15:e04741.
3. Barak S, Mudgil D, Taneja S. Exudate gums: chemistry, properties and food applications - a review. J Sci Food Agric. 2020;100:2828-2835.
4. eCFR, Code of Federal Regulations, § 184.1330 Acacia (gum Arabic).
5. Economics potential from Western Australia Acacia species: secondary plant products. D S Seigler, Conservation Sci. W. Aust. 2002;4:109-116.
6. Food polysaccharides and their applications, AM Stephen, GO Philips, PA Williams. 2nd.ed. CRC Press Taylor Francis Group. 2006;13:455-85.
7. Salama SM, Mariod AA. Gastroprotective activity of gum Arabic: a review in Gum Arabic: structure properties applications and economics. Ed. Mariod AA. Academic Press. 2018;26:305-312.
8. Macintyre K, Dobson B. The sweet gum- a Nyungar confection. Anthropology from the shed. 2017;10:1-29.

9. *Acacia pycnantha* and gum Arabic an alternative to antacids and proton pump inhibitors in the management of gastroesophageal and laryngopharyngeal reflux. TJ Hurr, NE Hurr. Oxford Med. Case Reports. 2021;11:490-492.
10. Hoffmann JH, Impson FAC, Moran VC, Donnelly D. Biological control of invasive golden wattle trees (*Acacia pycnantha*) by a gall wasp, *Trichilogaster sp.* (Hymenoptera: Pteromalidae). South Africa. Biological Control. 2002;25:64-73.
11. Clark PA. The Aboriginal ethnobotany of the Adelaide region, South Australia, South Australia. Trans. Royal Soc. South Aust. 2013;137:97-126.
12. Food standards Australia and New Zealand. Record of views formed by the FRANZ novel foods reference group or the advisory committee on novel foods. 2023.
foodstandards.gov.au
13. The goldleaf factory. Gum Arabic powder per kg. goldleaf.com.au