

THE ESSENTIAL OIL INDUSTRY IN TASMANIA

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The island state of Tasmania produces and exports a range of essential oils from introduced and native species. It is regarded as a pioneer in the Australian essential oil industry, especially for research and development on new products.

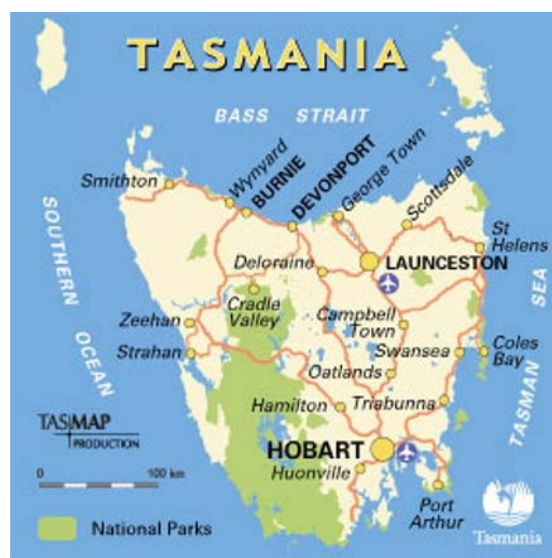
This paper focuses on the current status of the industry in Tasmania: its structure, the products and their markets.

General background on Tasmania

Tasmania is separated from the southeast coast of the Australian mainland by the Bass Strait. The capital is the city of Hobart.

The island has an area of 68,102 km² and has a population of just under 0.5 million, making it Australia's least populous state.

The climate is mild and of a unique character within Australia, soils are highly fertile, water quality is good and the atmosphere is clean. These factors, together with the benefits of geographic isolation, are natural advantages for farming, which is one of Tasmania's principal industries.



Vegetable production, in which potato is prominent, and associated industries are of major importance to the state's economy, generating more than A\$200 million annually.

Other significant agricultural industries include livestock (beef/dairy/lamb/wool), fruit (apples/cherries/strawberries) and the growing of culinary herbs for the dried market and as feedstock for the essential oil industry. Two agro-industries deserve special mention:

- the growing and processing of pyrethrum is on a scale that places Tasmania as the world's second largest producer, and
- about 40% of the world's legal pharmaceutical opiates requirement is supplied by the licensed cultivation and processing of poppies.

Tasmania's other principle industries are forestry, fishing, mining, shipbuilding and tourism.

The essential oils industry in Tasmania

Evolution and current structure of the industry

The modern era of the essential oils industry in Tasmania may be regarded as dating back to 1921 when a British immigrant, C K Denny, established Australia's first lavender farm near Launceston at Lilydale in northeast Tasmania with seed of French *Lavandula angustifolia*. In 1947, the plantation moved to a new site at Nabowla, which is the present location of Bridestowe Estates Lavender Farm. Over the years, the Denny family devoted considerable effort to strain selection and built a reputation for the consistent high quality of its lavender oil, which contains less than 0.4% camphor. Today, the operation remains the only truly commercial-scale producer of lavender oil in Australia and it is the largest lavender oil origin in the southern hemisphere.

The second phase of development of the Tasmanian industry, involving diversification into new products, occurred in 1986 with the creation of Essential Oils of Tasmania (EOT) as a joint-ownership venture between the Tasmanian Government, the University of Tasmania and a growers co-operative, Natural Plants Extracts. EOT's product range has been built up from extensive R&D carried out at the University of Tasmania, which continues this work and also operates an efficient product quality control service. The company owns and operates its own solvent extraction plant and steam distills essential oils. Raw material for processing is supplied by contract farmers, to whom EOT provides a field service under the ISO 9001:2000 standard.

The structure of the Tasmanian industry changed with the acquisition by Bronson & Jacobs Pty Ltd. of the Bridestowe Lavender Farm in 1997 and of EOT in 2000. Under this new ownership, all Tasmanian essential oils and extracts are marketed and exported by one entity, which retains the name of Essential Oils of Tasmania.

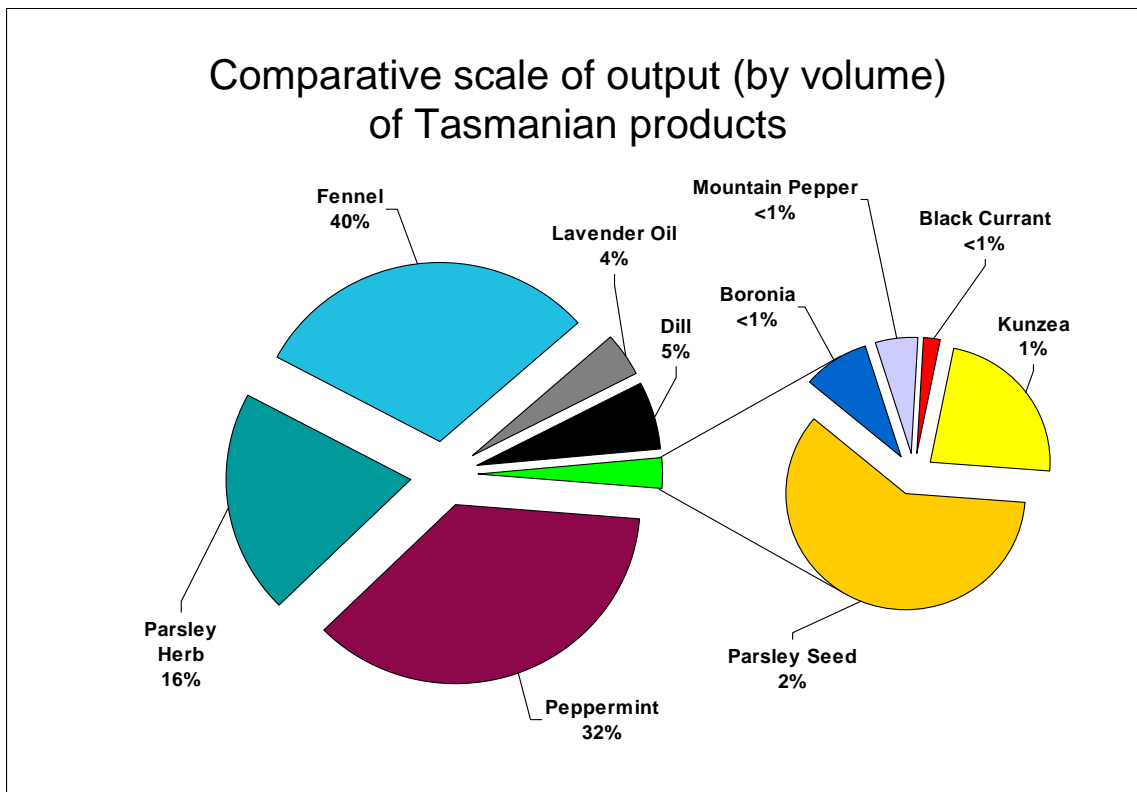
The current commercial product range

The recent EOT output and markets for its products are summarised in the following table:

Product type		Recent average annual production (tonnes)	Amount exported
Essential oil	Peppermint (<i>M. piperita</i>)	12	50%
	Fennel	15	95%
	Parsley (herb and seed)	6	95%
	Dill weed	2	95%
	Lavender	1.5	90%
	Kunzea	0.5	95%
Extract	Boronia	0.1	95%
	Black currant	0.1	95%
	Mountain pepper	0.1	85%

The recent comparative volume of annual output of individual products is shown in the pie chart overleaf.





Individual products

Lavender oil

The Bridestowe Estates Lavender Farm has 48 hectares of *Lavandula angustifolia* under cultivation and this annually yields 1.5-2 tonnes of premium quality lavender oil, plus a substantial quantity of dried flowers. Most of the oil is exported.

Harvesting commences in January and extends into early February. Distillation is performed onsite and the oil is released for sale during the year.

The photographs overleaf illustrate harvesting and distillation operations at the Bridestowe Estates Lavender Farm.

Approximately 10% of the farm area is rotated from lavender to other crops, that are grown for a two year period before replanting again with lavender. This assists in reconditioning of the red basalt soil and ensures plant health and vigour over the expected 15 to 20 years life of the lavender plants.

No insecticides are used on the farm. The residual riparian vegetation on the Bridestowe property provides a habitat for birdlife sufficient to control any pests.



Bridestowe Lavender – cultivation, harvesting and distillation



Bridestowe Lavender – distillation



Peppermint oil

Tasmania's latitude of 42°S produces long summer days with low night time temperatures and is ideal for growing peppermint oil.

The Black Mitchum variety of *M. piperita* has been cultivated commercially since the 1980s in the Huon and Derwent valleys and this semi-perennial crop fits in well with other farm operations.

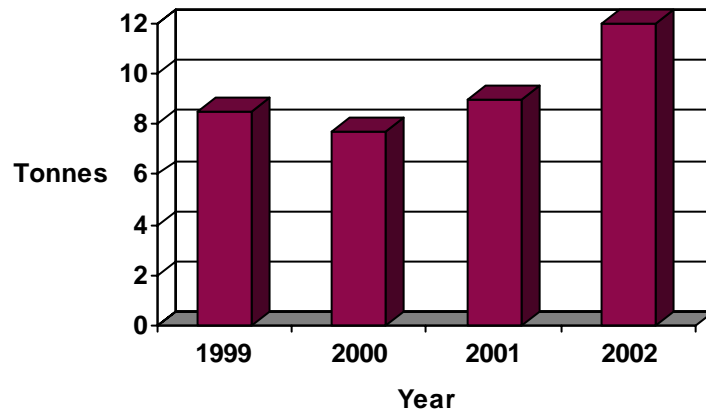
Crops are harvested from early January until late March, and the oil is available for sale from April. Unlike the US industry, which rectifies and redistills mints for specific applications, Tasmanian peppermint is single distilled and sold in bulk lots.

Annual production of oil is currently around 12 tonnes. Around half of the current production is consumed by the domestic market and the balance is exported.

Over the next few years, an expansion of cultivation planned in 3 different regions of Tasmania. This will include implementation of new research work on elite planting stock and micro-nutrition.



Annual production of Tasmanian peppermint oil



Fennel oil

The main impetus for the development of fennel oil production in Tasmania was the formation of a joint venture relationship with Pernod Ricard in France in the early 1990s. The French company's interest was to obtain oil with a high anethole content and selected cultivars were supplied for this purpose.

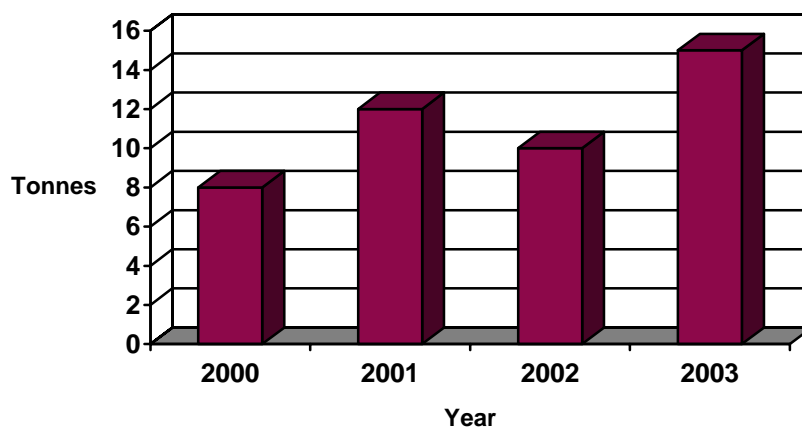


Additionally, EOT developed two harvesting systems in order to produce an oil matching an individual buyer's specific anethole content requirements. By use of a direct chop forage machine or headers on harvesting the flowering plant, two grades of oil can be produced without the need for subsequent rectification: a less than 55% anethole grade, and a 70% (+) anethole grade.

Crops are harvested from February to April and fresh oil is available for shipment from May.

The crop is also a long term perennial with some areas still producing good yields after 16 years.

Annual production of fennel oil in Tasmania

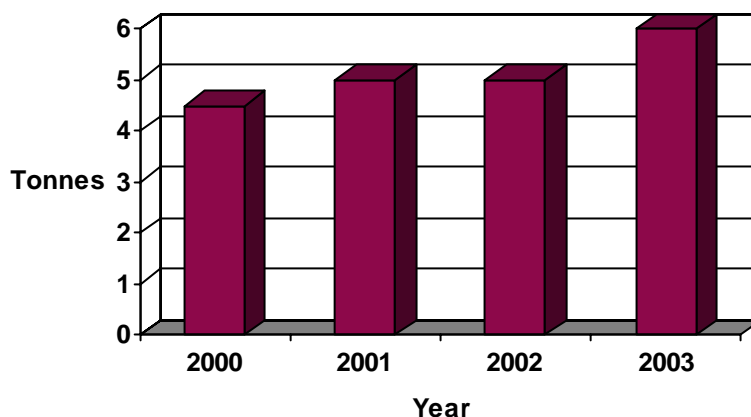


Parsley oil

The crop is harvested from late December to mid February for parsley herb oil production by use of a forage harvester with a transportable still pot attached. The herb oil is available for sale in March.

A small quantity of parsley seed oil is also produced in Tasmania.

Annual production of parsley oil in Tasmania



Dill weed oil

High yielding varieties with d-carvone levels in excess of 45% are grown in Tasmania. The crop is planted in late spring and is harvested 4 months later using a forage harvester. The oil is available for sale in May.

The annual production of dill weed oil is around 2 tonnes, of which about 95% is exported and the remainder is consumed on the Australian market.

Kunzea oil

The Spring Flower or Tick Bush, kunzea (*Kunzea ambigua*) is a tall woodland species native to southern Australia and Tasmania.

A small- scale plantation at Waterhouse in northeast Tasmania is currently distilling an oil from the leaves and twigs of this tree. Production is estimated at between 300-500 kg p.a. with annual sales of approximately A\$100,000.



The oil has a spicy pine-eucalyptus odour and is marketed as having pain relieving and anti-arthritis properties.

Laboratory studies have shown the oil to be effective against yeast and moulds and a kill test using neat kunzea oil on Golden Staph (*Staph.aureus*) achieved >99.9% in 60 mins.

The producer has TGA (Therapeutic Goods Administration) listed kunzea oil for aromatherapy and as a therapeutic good for external use only with the following indications:



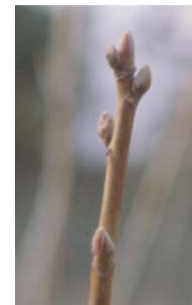
- For temporary relief of arthritis pain and muscular aches.
- Relief of the symptoms of influenza.
- Help relieve nervous tension, stress and mild anxiety.
- Temporary relief of the pain of rheumatism.

Blackcurrant bud concrete

Blackcurrant bud production in Tasmania utilises high density plantings set up for mechanical harvesting. Extraction of buds is carried out at the EOT facility.



Crops are harvested during the dormant period with the canes cut at ground level before being passed through the bud stripping mechanism in a single operation. After removal of the buds, the canes are mulched by the harvester before being returned to the field. Since the crops are harvested during the winter, production areas have to be selected carefully to ensure soil types can handle harvesting equipment under wet conditions.



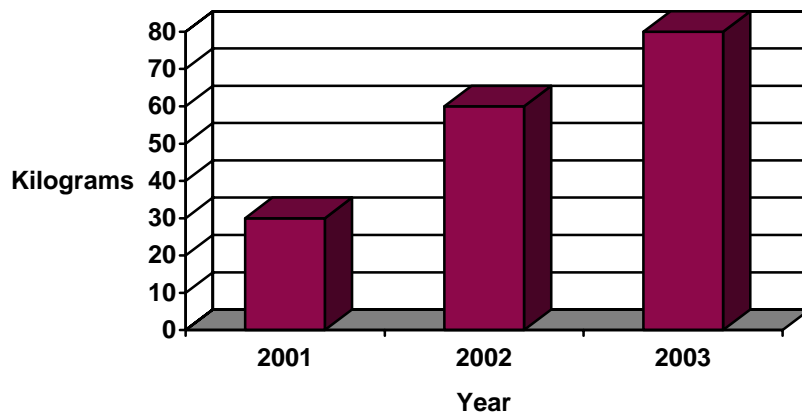
A high plane of nutrition is used to promote strong cane growth and maximum bud numbers. Ample water and nitrogen side dressings are required to give a dense stand of canes with a height of 1.0 to 1.2 metres by the end of the growing season. Blackcurrant production for bud extract is

relatively free of pest and disease problems with the main risk from fungal attack due to the density of the crop. A routine copper based fungicide used only at the commencement of the growth cycle generally gives good control.

Research work recently has focused on bud physiology to determine optimum harvest times and post-harvest treatments to achieve maximum oil yield and volatile levels, especially the thiol components that contribute to the ‘cattiness’ of the final extract.

Harvesting of the crop takes place from May to August and the concrete or absolute is available for shipment in November – December.

Annual Production of Blackcurrant Bud Absolute



Boronia

Boronia (*Boronia megastigma*) is a perennial shrub indigenous to south Western Australia, which produces scented flowers in spring. Solvent extraction of the flowers yields a golden yellow absolute with an intense rich, flowery aroma, with the character of ripening hay and an exotic undertone of yellow freesias, leading to a somewhat woody dry-out. Both the concrete and the absolute are well suited to perfumes and as flavouring material. Extracts are a rich natural source of beta ionone and have applications for flavour enhancement especially when combined with citrus and berry formulations.



The Tasmanian boronia industry was originally based on seedling populations established for cut flower production. In 1987, selected clonal stock was introduced, initially with 4 cultivars designed to replicate the complexity of seedlings when blended in the right proportions. The industry now utilizes 9 selections covering a wide range of attributes including yield, β -ionone levels, disease resistance and suitability for mechanical harvesting.

The crop is established using transplants in spring or autumn with 20,000 plants per hectare. Site selection aims for areas which have well drained soils, preferably previously uncultivated and sheltered. While irrigation is recommended initially to aid establishment and to promote vigorous growth, the crop is able to withstand prolonged dry periods. Boronia is naturally adapted to low fertility soils and careful manipulation of nutrition is required to promote maximum flower production without excessive vegetative growth or premature mortality. The normal life span of plantations in Tasmania has proved to be 10 years or more.

All EOT boronia production is based on mechanical harvesting, using systems that have been developed over the last 20 years. The equipment currently employed harvests around 300kgs of flowers per hour recovering at least 95% of the available flowers. An important aspect of crop management is development of a uniform, continuous canopy to aid harvesting. Special pruning techniques are employed at the commencement of each season to promote strong, lateral growth without side branching.

Most of the clones have some degree of rust resistance but fungicide applications are frequently required, particularly if warm and humid conditions are encountered. Research into the life cycle of the *Puccinia sp.* involved has reduced fungicide use to 2 carefully timed applications early in the season. Insect pests created difficulties early in the development of plantations but the use of integrated pest management systems has resulted in Tasmanian production being completely free of an insecticide inputs for several years now.

Currently, about 100kg of extract is produced annually and the major market outlets are Europe, the USA and Japan

Tasmanian Mountain Pepper concrete

The extract of Tasmanian mountain pepper (*Tasmannia lanceolata*.) is unique to EOT and relatively new to the international market but the leaves and fruits have enjoyed a much longer history of use.

The concrete is a dark viscous liquid with a characteristic hot, spicy aroma



and is a rich natural source of polygodial.

Large natural stands of mature shrubs exist in Tasmania and can provide sustainable source of leaf material from which the concrete is derived. However, natural stands include quite diverse chemotypes and significant variation in morphology. Consequently, EOT has recently established a plantation using a large number of clones selected from wild populations. The clones have been selected for desirable quality characteristics and the uniformity of stands will allow future production to be mechanically harvested. Leaves are dried and milled prior to solvent extraction.

Current production of the concrete is around 100kg annually. Commercial applications of the extract have been in the flavour area: snack foods, cheeses, beverages and confectionary.

Studies being conducted on the potential of mountain pepper as a natural insect repellent and as an-microbial agent.

Nguyet Nguyen is a graduate in industrial chemistry from the University of New South Wales. She has been with the Bronson and Jacobs Group for the past 11 years and is a director of its subsidiary Essential Oils of Tasmania (EOT) with responsibility for sales and marketing.

