Communication of Research Findings to Tea Tree Oil Industry Levy Payers by Tony Larkman 2020
Communication of Research Findings to Tea Tree Oil Industry Levy Payers

By Tony Larkman

June 2020

AgriFutures Australia Publication No. 20-135
AgriFutures Australia Project No. PRJ-011626
Foreword

The AgriFutures Tea Tree Oil Program has funded this project to improve the dialogue with industry stakeholders to ensure the long-term profitability and sustainability of the Australia tea tree oil industry. This project supports Objective 3 of the AgriFutures Tea Tree Oil Research, Development & Extension (RD&E) Plan 2018-20 – extension, sustainability and human capital.

The effective communication of research and development (R&D) results to growers, distillers, manufacturers and marketers has assisted in the adoption of R&D outcomes leading to improvements in production and increases in demand. Communication to industry leaders outside the industry association from private enterprise, government, universities and other bodies has encouraged wider support for industry initiatives. End users, consumers and regulatory bodies in importing countries have been kept up to date with the safety, quality assurance and traceability advances in the industry for improved demand.

This communication project has been effective as it has involved a two-way interface, both for sharing R&D outcomes for adoption by the industry, and also for gathering emerging issues from the industry and conveying these back to the AgriFutures Tea Tree Oil Advisory Panel in a timely manner for managing future R&D expenditure.

The dissemination of newsletters to industry stakeholders, updates to the Australian Tea Tree Oil Industry Association (ATTIA) website, production of fact sheets and coordination of industry field days have been important project outputs. Liaison with the Australian Pesticides and Veterinary Medicines Authority (APVMA) has maintained access to current pesticides and made new pesticides available.

This report for the AgriFutures Tea Tree Oil Program is an addition to AgriFutures Australia’s diverse range of over 2000 research publications and it forms part of our Growing Profitability arena, which aims to enhance the profitability and sustainability of our levied rural industries. Regional communities and the broader Australian economy depend on profitable farms.

Most of AgriFutures Australia’s publications are available for viewing, free downloading or purchasing online at: www.agrifutures.com.au.

John Smith
General Manager, Research
AgriFutures Australia
About the Author

Tony Larkman is CEO of the Australian Tea Tree Industry Association Ltd (ATTIA). He has more than a decade of experience in delivering outcomes-driven foundation projects for the Australian tea tree oil industry.

Acknowledgments

The Board of Directors of ATTIA Ltd have provided invaluable advice and overseen all communications efforts during the life of this project.

Many researchers have also willingly contributed to aspects of this project, including reports and presentations at field days and symposiums.

Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC</td>
<td>American Botanical Council</td>
</tr>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
</tr>
<tr>
<td>APVMA</td>
<td>Australian Pest &amp; Veterinary Medicines Authority</td>
</tr>
<tr>
<td>ATTIA</td>
<td>Australian Tea Tree Industry Association Ltd</td>
</tr>
<tr>
<td>BP</td>
<td>British Pharmacopeia</td>
</tr>
<tr>
<td>CCOSH</td>
<td>Canada Centre for Occupational Health and Safety</td>
</tr>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
</tr>
<tr>
<td>CofA</td>
<td>Certificate of Analysis</td>
</tr>
<tr>
<td>COP</td>
<td>Code of Practice</td>
</tr>
<tr>
<td>CRC-P</td>
<td>Cooperative Research Centre - Project</td>
</tr>
<tr>
<td>DAWVE</td>
<td>Department of Agriculture, Water and the Environment</td>
</tr>
<tr>
<td>DPI</td>
<td>Department of Primary Industries</td>
</tr>
<tr>
<td>ECHA</td>
<td>European Chemicals Agency</td>
</tr>
<tr>
<td>EMEA</td>
<td>European Medicines Agency</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>FDA</td>
<td>Federal Drug Administration</td>
</tr>
<tr>
<td>GMP</td>
<td>good manufacturing practice</td>
</tr>
<tr>
<td>GACP</td>
<td>good agricultural and collection practices for medicinal plants</td>
</tr>
<tr>
<td>HACCP</td>
<td>Hazard Analysis and Critical Control Points</td>
</tr>
<tr>
<td>HMPC</td>
<td>Committee on Herbal Medicinal Products</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standards Organisation</td>
</tr>
<tr>
<td>LO</td>
<td>lavender oil</td>
</tr>
</tbody>
</table>
MCNE  Main Camp Natural Extracts Pty Ltd
MT    metric tonnes
MVP   minimum value product
MUP   Minor Use Permit
OECD  Organisation for Economic Co-operation and Development
Ph Eur Pharmacopeia Europa
QA    quality assurance
RD&E  research, development & extension
REACH registration, evaluation, authorisation and restriction of chemicals
RIRDC Rural Industries Research & Development Corporation
S&D   supply and demand
TGA   Therapeutic Goods Administration
TTBP  Tea Tree Breeding Program
TTO   tea tree oil
USP   United States Pharmacopeia
Contents

Foreword .................................................................................................................................. iii
About the Author .................................................................................................................... iv
Acknowledgments ................................................................................................................... iv
Abbreviations .......................................................................................................................... iv
Executive Summary .............................................................................................................. viii
Introduction .............................................................................................................................. 1
Objectives .................................................................................................................................. 3
Methodology .............................................................................................................................. 4
  Monitoring regulatory affairs ........................................................................................ 4
  Monitoring regulatory literature ................................................................................. 4
  Minor Use Permits ........................................................................................................ 4
  Communication ............................................................................................................. 4
  Extension ...................................................................................................................... 5
  Field days .................................................................................................................... 6
Results ....................................................................................................................................... 7
  Monitoring regulatory affairs ........................................................................................ 7
  Monitoring regulatory literature ................................................................................. 8
  Minor Use Permits ........................................................................................................ 9
  Communication ............................................................................................................. 9
  Extension .................................................................................................................... 13
  The future .................................................................................................................... 16
Implications ............................................................................................................................ 20
  Communication ........................................................................................................... 20
  Code of Practice (COP) .............................................................................................. 20
  Extension .................................................................................................................... 21
  Field days .................................................................................................................... 21
Recommendations .................................................................................................................. 22
References ............................................................................................................................... 23
Tables

Table 1: FOB Export Volume by Region and Month 2019-20............................................................. 12
Table 2: FOB Price by Region and Month 2019-20............................................................................. 12
Table 3: Supply & Demand Data 2009 to 2019-20............................................................................... 13

Figures

Figure 1: A bush still being charged before firing ................................................................. 1
Figure 2: Melaleuca alternifolia in its natural habitat .............................................................. 1
Figure 3: Tissue culture of M. alternifolia................................................................. 6
Figure 4: Usage statistics for attia.asn.au: Summary by month Jul 2019 to Jun 2020.............. 8
Figure 5: ATTIA's logo................................................................................................. 11
Figure 6: ATTIA 5A orchard August 2019 .............................................................................. 15
Figure 7: Controlled pollination of elite M. alternifolia trees showing bagged flowers............. 17
Executive Summary

What the report is about

Consistent communication with all sectors of the tea tree oil (TTO) supply chain from producer to end-user ensures all involved remain up to date with strengths, weaknesses, opportunities and threats. It enables agile and proactive responses to capitalise on favourable outcomes while managing and ameliorating adverse outcomes.

This project benefits all links of the TTO supply chain by helping to ensure that quality assurance (QA) and traceability are at the forefront of everyone’s mind. This helps to ensure that 100% pure Australian TTO continues to retain its preeminent position as a superior product.

Who is the report targeted at?

Australian producers/growers, traders, manufacturers, and end-users of TTO and TTO-containing products.

Where are the relevant industries located in Australia?

In Australia, 100% pure Australian TTO is produced in the northern and central coastal littoral zone of northern NSW and in scattered pockets of coastal QLD. There is also a concentration of producers on the Atherton Tablelands in Far North QLD.

The industry comprises around 150 producers/growers serviced by about 25 distilleries. More than 5,000 hectares is planted to *Melaleuca alternifolia*, producing about 1,000 metric tonnes (MT) of 100% pure Australian TTO per annum. About 90% of all production is exported to multiple destinations, with North America (50%), Europe (35%) and Asia (15%) the dominant markets [1].

Background

This project ensures the TTO industry continues to monitor developments and provides extension and communication of the multiplicity of current issues, which allows it to turn outwards and more proactively manage issues. It effectively sustains a dialogue with the supply chain, researchers and end-users around the world.

By maintaining these channels, key opinion leaders from private enterprise, universities and other institutions can be influenced to advocate for and advance the benefits, safety and effectiveness of pure Australian TTO to manufacturers and end users. The industry continues to identify and effectively manage new and emerging challenges in a timely and proactive manner.

Aims/objectives

The project aims to deliver communication and extension for the Australian tea tree industry for:

- Awareness of regulatory issues arising in major export destinations (US, EU, Asia) and domestic markets.
- Compiling and maintaining a Literature Database in the ATTIA website to provide a searchable reference resource for TTO related research publications.
- Promoting international knowledge and information in tea tree oil and related disciplines via a single source that supports Australian producers.
- Monitoring, managing and updating chemical Minor Use Permits (MUP) issued by the APVMA for all pesticides used in tea tree plantations.
- Providing monthly ATTIA member newsletters and quarterly newsletters for non-members and members to ensure that any new or emerging developments pertinent to the industry are communicated.
Developing and delivering industry fact sheets for inclusion in marketing/educational communications to TTO customers.

This project is intended to benefit all links of the TTO supply chain by ensuring that QA and traceability are at the forefront of everyone’s mind. This helps ensure that 100% pure Australian TTO continues to retain its pre-eminent position as a superior product.

Methods used

ATTIA’s CEO maintains close links to the whole TTO supply chain to ensure that formal and informal communication is disseminated and acted upon in a timely manner.

Results/key findings

The breadth and scope of the communication effort of this project is through extension, the ATTIA website, field days, and the positive feedback from all links in the TTO supply chain. It shows how important continuous, agile and targeted communication is to help ensure a cohesive approach to issues faced by an emerging industry.

Newsletters and factsheets on key issues provide a level of certainty to participants in the TTO supply chain, which allows them to continue to operate their businesses with confidence.

Implications for relevant stakeholders

Consistent communication with all sectors of the TTO supply chain ensures they remain up to date with strengths, weaknesses, opportunities and threats. It allows agile and proactive responses to capitalise on favourable outcomes while managing and ameliorating adverse outcomes.

Recommendations

Building on continued cooperative approaches to managing issues confronting the industry as a whole is vital; this can best be achieved by maintaining and, wherever possible, enhancing communication aimed at all levels of the supply chain for pure Australian TTO.

Between 2009 and 2018, the TTO industry increased production by 136%. While the matching communication and extension effort has largely kept pace, the increased sophistication and workload needed to ensure these activities remain effective has shifted because managing communication and extension tasks continues to grow.

As the TTO industry grows, succession planning for ATTIA as the industry representative body and for communication and extension is vitally important. The TTO industry should consider engaging more resources for communication, extension and allied activities to ensure effective succession planning is achieved over the next two to three years.
Introduction

In 1924, Penfold and Grant identified that the oil of *Melaleuca alternifolia* (Maiden & Betche) Cheel had a germicidal value exceeding that of phenol, the antiseptic of choice in that era. With this discovery and knowledge that Aboriginal populations had been using the leaves and twigs of this species as a herbal remedy for many years, the TTO industry was born. Wild stands of *M. alternifolia* were hand harvested and distilled in the bush, Figure 1 and Figure 2.

![Figure 1: A bush still being charged before firing](image1)

The discovery of penicillin and other antibiotics in the 1940s kept it to a niche industry level until the early 1980s when commercial production was pioneered in the Bungawalbin catchment. As interest grew in TTO, a natural product with remarkable antimicrobial, antifungal and anti-inflammatory properties, the industry also grew. It was driven by several passionate communicators who not only developed the first commercial plantations but also communicated the values of this quintessentially Australian product to the world. The industry developed rapidly – indeed, too rapidly. By the mid-1990s, TTO production peaked at a then unsustainable 800+ metric tonnes (MT) per annum, which caused the price to crash. The industry languished for a decade while the large pool of unsold stock was slowly depleted at unsustainably low prices, and unviable farms were abandoned; many were ripped out.

![Figure 2: Melaleuca alternifolia in its natural habitat](image2)
Despite the price crash, the industry as a whole continued. Rural Industries Research and Development Corporation (RIRDC) funded research into the efficacy, safety and uses of pure Australian TTO, and maintained a breeding program at the Department of Primary Industries’ (DPI) Wollongbar research centre that produced better seed.

By 2007, supply and demand once again balanced as producers continued to abandon plantations, and TTO stocks were reduced. Industry leaders realised that without successful and practical management and communication of supply and demand, and of other issues facing the industry, similar boom and bust cycles were inevitable. Other issues included:

1. Adulteration, which was, and continues to be, damaging the market
2. Regulation, with the potential to effectively ban TTO as an ingredient in many formulations, not only for producers but the entire supply chain.
3. Competition from overseas producers with lower cost of production

After much debate, it was determined that effective, centralised and sustained communication was key to successfully growing an industry that needs a more agile and proactive approach to its many challenges.

When a voluntary levy for ATTIA members was introduced in 2009, an industry development officer was engaged to ensure that monitoring and communication of RD&E to the industry was maintained.

A large volume of available information had to be centralised. This was through developing a website with an embedded literature database for the 1,600+ papers included from earlier R&D.

In 2007, regulatory authorities in the European Union (EU) and other jurisdictions began to look closely at chemicals, including TTO, that were being imported and sold as cosmetics, medicinal products or biocides. These regulatory barriers continue to hinder the market for TTO.

A voluntary quality assurance program – ATTIA’s Code of Practice (COP) – already existed. Its implementation for most commercial growers went a long way towards alleviating the legislative restrictions imposed on importers in the EU. Effective communication of TTO’s value, for producers and the supply chain, was and still is considered a vital strategy. The latest version of the COP (v2.0) was released in October 2014. While a revision of this document was planned for 2019-20, the complication of securing an Environmental Protection Agency (EPA) licence for an industrial TTO-containing product has delayed the revision while the USA’s EPA process the licence application.

When finalised and released, the next COP version will conform to the principles of good manufacturing practice (GMP) and good agricultural and collection practices for medicinal plants (GACP). Both are fundamental requirements for EU and other regulatory regimes, such as the EPA and FDA (USA), that govern safe and effective use of chemicals, including TTO, in a variety of products.

This project ensures the TTO industry continues to monitor developments and provides extension and communication of current issues so it can turn outwards and more proactively manage emerging issues. It effectively sustains a dialogue with the supply chain, researchers and end users around the world.

By maintaining these channels, key opinion leaders from private enterprise, universities and other institutions can be influenced to advocate for and advance the benefits, safety and effectiveness of pure Australian TTO to manufacturers and end users. The industry continues to identify and effectively manage new and emerging challenges in a timely and proactive manner.

The author is engaged full-time by ATTIA, which occasionally results in conflicts of interest between non-members and ATTIA members who form the vast majority of the TTO community in Australia. This conflict is managed as well as possible, given the workload in an ever-expanding industry.
Objectives

The TTO industry in Australia needs ongoing monitoring, communication and extension to ensure an agile, outward-looking and proactive approach helps it retain a competitive edge in the global TTO market in seven areas:

1. Regulatory affairs that might affect the TTO supply chain.
2. New literature published in journals and other publications.
3. Minor Use Permits (MUP) for pesticides, including consolidation into a single permit for tea tree plantations, where possible.
4. Publication of monthly ATTIA newsletters on the members section of the ATTIA website for downloading.
5. Publication of quarterly newsletters for non-members and members in the public section of the ATTIA website.
6. Extension activities with TTO levy payers: ATTIA members, and non-members as required, to identify, analyse and communicate RD&E needs to ensure a proactive management approach to emerging issues.
7. A field day/symposium to enable ATTIA members and interested parties to develop networks and foster communication.

The project aims to deliver communication and extension for the Australian Tea Tree industry for:

- Awareness of regulatory issues arising in major export destinations (USA, EU, Asia) and domestic markets.
- Compiling and maintaining a Literature Database [2] in the ATTIA website to provide a searchable reference resource for TTO related research publications.
- Promoting international knowledge and information in tea tree oil and related disciplines via a single source that supports Australian producers.
- Monitoring, managing and updating chemical MUP issued by the APVMA for all pesticides used in tea tree plantations.
- Providing monthly ATTIA member newsletters and quarterly newsletters for non-members and members to ensure that any new or emerging developments pertinent to the industry are communicated.
- Developing and delivering industry fact sheets for inclusion in marketing/educational communications to TTO customers.
Methodology

Monitoring regulatory affairs

Regulatory body news and alerts feeds are monitored regularly, including the APVMA and the TGA (Australia); the FDA and the ABC (USA); Health Canada and CCOSH (Canada); and REACH, ECHA, EMEA, HMPC and the EU Directorate General for Health and Consumers (Europe).

Any regulatory revisions are communicated to the ATTIA Executive for action, as required. Where appropriate, it is included in ATTIA newsletters or news alerts in the ATTIA website.

Monitoring regulatory literature

The National Centre of Biotechnical Information or ‘PubMed’ (http://www.ncbi.nlm.nih.gov/) and Google Scholar are the primary source for journal articles, with searches set in both to monitor for keywords ‘tea tree oil’, ‘melaleuca’, ‘hydrosol’ and ‘gynaecomastia’.

Besides these primary sources, the group discussions (e.g. Essential Oils, Natural & Integrative Medicine and Distillers & Extractors) in LinkedIn (https://www.linkedin.com/) are also regularly monitored for developments that may affect the tea tree industry. A global network of researchers, aromatherapists and essential oil wholesalers and retailers also regularly provide links to relevant articles and research programs in their areas of expertise.

All relevant literature sources are included in the ATTIA Literature Database [2].

Minor Use Permits

The APVMA website is regularly monitored for changes to relevant pesticides that are either permitted or registered. Existing MUPs are monitored and renewed, as needed. New pesticide MUP applications are compiled and submitted to the APVMA, as needed.

Since mid-2019, with assistance and funding from the APVMA through an Australian Government ‘Permit-to-Label’ [3] initiative, we have tried to transition as many pesticides related to TTO production as possible from permits to label registration for use in tea tree plantations.

Communication

Since March 2009, an executive-approved monthly ATTIA newsletter has been posted to the members section of the ATTIA website where members can downloading them. These newsletters address a wide range of industry topics and form a valuable resource for participants to be informed of developments and threats.

News and media alerts are created and posted to the ATTIA website as frequently as required. They include AgriFutures Australia project updates, factsheets, supply and demand, and ABS reports as well as upcoming events.

Two blogs for the Tea Tree Breeding Program (TTBP) and the Cooperative Research Centre-Project (CRC-P) are maintained and regularly updated with material from the project researchers.

At least once a year, the author visits almost all properties where TTO is grown, harvested and distilled. During these visits, stakeholders are asked to identify threats and areas where RD&E could help overcome obstacles that affect the whole industry. The issues raised have instigated several research projects, some of which have attracted funding.

No quarterly newsletters have been prepared or disseminated since this project began due to lack of resources.
The ATTIA website (www.attia.org.au) and the Facebook page (https://www.facebook.com/PureAustralianTeaTreeOil) remain a valued source of information for members and interested parties. The website receives on average more than 20,000 hits per month (Figure 4) with the Literature Database and two blog pages accounting for about 20%.

Extension

Code of Practice (COP)

The Code of Practice was originally developed in 2005 to bring the industry to a common standard of quality management. This came about from rising pressure on TTO producers from declining profitability and an increasingly complex regulatory situation. Continued development and use of the COP will ensure producers remain well equipped to face challenges.

The quality management outlined in the COP was rationalised in 2014 (v2.00). It starts with material procured for planting and continues through processing and the supply chain. It culminates in pure Australian TTO packed, sealed and delivered in the best possible condition and to the highest quality, making fit for intended use and complemented by demonstrable assurance.

The COP was originally developed using a Hazard Analysis and Critical Control Points (HACCP) approach to identify quality hazards and to complement ISO 9001:2001 quality management systems. The latest version was developed after extensive survey and input from all COP-accredited operators since 2009. It is now based on the ISO 9001:2008 QA system as well as some GMP and GAC principles.

A revision of the COP to v2.1 is overdue, but attempts have been thwarted by rapid development of regulatory initiatives, including:

1. in mid-2018, the implementation of REACH
2. in mid-2019, the request for updates to the British Pharmacopeia (BP) and Pharmacopeia Europa (Ph Eur) Standards
3. in late 2019, the stalled FDA licence application for a TTO-containing industrial product
4. in mid-2020, the development of a blockchain protocol to provide inviolable tracing
5. a new proposal to create and have registered a GMP process specifically for TTO production because current GMP protocols (e.g. TGA, APVMA or pharmaceutical manufacture) are totally unsuited to production of TTO, which is a primary industry output.

In mid-2019, the ATTIA Executive decided to put a revision of the COP on hold until all these issues have been resolved. The current version continues to be widely accepted and poses little or no extra burden on producers to comply.

After these major regulatory hurdles have been resolved, ATTIA intends to review and rewrite this document to more fully align to GMP and GAC principles. As the industry develops and adapts to competitive, regulatory and other pressures, this document will continue as the basis for updated editions of the COP. It will remain split into the four sections aligned to the production sequence for pure Australian TTO:

- grower operations
- harvest operations
- distilling operations
- storage, packing and despatch operations.

Fully integrated producers must comply with all sections while those growers who use contract harvesting, distilling, storage or packing/despatch operators must ensure contractors are COP compliant. Conversely, contractors who are COP compliant must also ensure that growers are COP compliant to ensure the supply chain maintains integrity throughout production until the goods are despatched.
COP audit visits invariably include extension activity to members and some non-members to identify, analyse and communicate RD&E needs. This includes an annual extension visit to members of the North Queensland Essential Oil Cooperative (NQEO). Extension visits allow growers to discuss one-on-one the many aspects of TTO production that affect them while providing growers with expertise and advice on how these things are being managed or mitigated through R&D.

Field days

Australian Tea Tree Industry Association Ltd holds an annual field day in October, usually in the Northern Rivers of NSW.

One field day has been held during the term of this project, on Thursday 17 October 2019 at the Windara Function & Conference Centre, Casino. It communicated the results of several R&D projects and provided an update on the compulsory levy, which was introduced in July 2017.

A field day is still scheduled for Thursday 8 October 2020 at Southern Cross University (SCU) Lismore subject to COVID-19 restrictions. It will inform members and other participants of ATTIA and AgriFutures Australia’s progress in all R&D projects and on new project proposals.

A separate symposium was scheduled for mid-March 2020, but COVID-19 restrictions forced the cancellation at short notice. It is still hoped that the October 2020 field day can proceed on schedule because activity continues on the large number of AgriFutures Australia projects.

Another field day is planned for October 2021, but the format, location and agenda have not yet been considered.

Figure 3: Tissue culture of *M. alternifolia*
Results

This project runs from 1 July 2019 to 30 June 2020; however, project funding has been allocated by ATTIA Ltd for 1 July 2019 to 30 June 2021, so this report does not cover the final year (1 July 2020 to 30 Jun 2021). This anomaly arose from a need to disburse RD&E funding to ensure matched funding was maximised; it will be corrected when a new communication project is proposed in the 2020-21 financial year.

Despite this being the final report for this project, funding will be carried over to the 2020-21 financial year to continue to provide effective communication and extension activities until 30 June 2021. Another report for these activities can be delivered if required.

Monitoring regulatory affairs

No significant new regulatory barriers have been identified during this project; existing barriers continue to be addressed as efficiently as possible:

1. A long-held goal of the Australian TTO industry is to have a globally unified set of Standards for TTO. A completed project (PRJ-011678) included a draft of the current BP [4]. In July 2019, Ph Eur Standards [5] were modified and transmitted along with supporting data to the relevant regulatory authorities in the EU. No response had been received at the time of writing.

2. A project (PRJ-011625) to seek a licence for a TTO-containing industrial application (air-conditioning cleaner/purifier) from the USA’s FDA was commenced in late 2019. The intention here is to use this (relatively) easier approval path as a stepping stone towards establishing a United States Pharmacopeia (USP) monograph for TTO. This project has stalled while the FDA decides whether TTO falls under their biocides division or their antimicrobial division. A decision is expected by the end of 2020. To minimise delays, the cooperating manufacturer is continuing to commission specific studies required by the FDA beyond those available from the 2018 REACH Dossier.

3. The EU’s SCCP Opinion on TTO [6] remains unchallenged, pending the final report of PRJ-9998 to provide dermal penetration as scientific evidence to support TTO within the EU/SCCP cosmetics framework. Expected in July 2020, the final report will provide the penultimate step in a long process towards preparing and presenting a new dossier to the SCCP. The main steps include:
   a. Revised data on the methyl eugenol content of TTO derived from *M. alternifolia* (complete).
   b. A revision of the ISO 4730 Standard for TTO to include only *M. alternifolia* and *M. linariifolia* as botanical sources of TTO (complete).
   c. A revision of the BP and Ph Eur Standards to match ISO 4730: 2017 (incomplete, pending a review by the relevant technical expert committee; completion date unknown).
   d. Conduct a survey of manufacturers and consumers of TTO-containing cosmetic ingredients in the EU to establish inclusion rates for TTO, use patterns, exposure estimates and cosmetic functions for a wide range of personal care products available in the EU (complete).
   e. Provide robust dermal penetration data to OECD guidelines for TTO-containing cosmetics on a variety of skin types, concentrations and formulas (due for completion in mid-2020).

When these steps are complete, a dossier can be prepared and submitted to the SCCP requesting a revision to their 2008 Opinion on TTO [6].
Monitoring regulatory literature

Literature resources are monitored; any papers from peer-reviewed journals judged to be useful are added to the Tea Tree Oil Literature Database [2]. A total of 148 new acquisitions were made in the past 2½ years:

- 2018: 53 acquisitions
- 2019: 51 acquisitions
- 2020: 44 acquisitions (to June 2020).

This resource continues to be widely used globally by producers, formulators, regulators, researchers, manufacturers and end users. It will be an invaluable resource for a new AgriFutures Australia project due to begin in July 2020, revising the Safety & Efficacy of TTO booklet fact sheet.

On average, ATTIA’s website receives more than 20,000 hits per month, with the Literature Database [2] accounting for around 10% of them; a large number considering the highly specialised nature of the resource. This clearly demonstrates the interest in ATTIA and the TTO information on the general information and specialist knowledge pages.

Figure 4: Usage statistics for attia.asn.au: Summary by month Jul 2019 to Jun 2020
Minor Use Permits

ATTIA’s main minor use permit (MUP) PER 82090 [7] allows all TTO growers/producers to legally apply a total of 34 pesticides (10 insecticides, 18 herbicides and 6 fungicides) that have not been registered under the Agricultural and Veterinary Chemicals Code Act 1994 [8]. It was renewed in May 2020 and is valid to 31 July 2023. No new pesticides were added to this MUP while one obsolete fungicide was removed, and one herbicide transitioned to being registered for use, meaning an MUP entry is no longer required. It is hoped that the APVMA’s Permit-to-Label initiative will transition many of the currently permitted pesticides to full registration for use in tea tree plantations by mid-2023.

A similar extension to another MUP (PER 85605) [7] for a fungicide also due to expire in July 2020 was applied for. The APVMA has not yet handed down a decision on this product, which is already included in the Permit-to-Label initiative. A decision is expected by September 2020 at the latest.

For two new MUP applications submitted to the APVMA, decisions are expected by September 2020. A request will be made for these products to also be inducted into the Permit-to-Label initiative if permissions are issued:

1. A termiticide1 (restricted to use only in QLD) to manage incursion of the giant northern termite, or Darwin termite (Mastotermes darwiniensis), into tea tree plantations in far north QLD.
2. A new herbicide2 accompanied by a full suite of data on efficacy, phytotoxicity and use patterns that came out of a 2018 project (PRJ-011454) titled Minor Pesticide Consultant for new and emerging industries.

Communication

Newsletters

Since this project began, nine ATTIA newsletters have been published, covering a wide range of topics. More monthly newsletters will be published between July 2020 and June 2021, which will be partially funded through this project. This clearly demonstrates the breadth and scope of the communication effort of this project to date. Topics covered in these newsletters are:

June 2020

- Field Day & AGM: 8 October 2020
- Pesticide Guide for Tea Tree Growers
- Stability of TTO
- Research Updates

May 2020

- Two New AgriFutures Research Projects
- S&D and ABS Exports 2019-20 Reports
- 2018-19 Report to Levies Stakeholders
- Minor Use Permit PER 82090 for Pesticides
- Field Day & AGM: 8 October 2020

Apr 2020

---

1 Lorsban®, active ingredient 500 g/L chlorpyrifos
2 Terrain®, active ingredient 500 g/kg flumioxazin
• COVID-19 Update
• COVID-19 and Travel Restrictions/Bans
• COVID-19 and TTO
• Fire Regulations and TTO Packaging
• S&D Survey and a Research Update

Mar 2020
• Glyphosate gets the OK from the USA’s EPA
• NMI for Pesticide and Trace Element Screening
• Nylon bungs for Metal Drums & the NFP30 Code
• Genotype x Environment for Tea Tree

Feb 2020
No newsletter published

Jan 2020
• Biosecurity Plan for Tea Tree released
• PHA’s Biosecurity Online Training (BOLT)
• Incoterms 2020 released
• Research Update

Nov 2019 & Dec 2019
No newsletter published

Oct 2019
• ATTIA Industry Day
• 2019 AGM
• President’s Report – AGM 2019
• Fire Ants & Chicken Manure – a Warning
• Modernising Agricultural Levies Legislation
• Tournaire Aluminium Flasks Approved

Sept 2019
• ATTIA Industry Day & AGM: Thurs 17 Oct 2019
• Property Identification Code (PIC)
• Plant biosecurity system released by PHA
• Sustainable Weed Management Project

Aug 2019
• ATTIA Industry Day & AGM: Thurs 17 Oct 2019
• Research Update (Multiple Projects)

May – July 2019
No newsletter published

Apr 2019
• Seed Sales: 1997 to 2019 year to date
• UK REACH: how to be ready
• What’s in a Name?
• AgriFutures Newsletters
• Membership Classes & Categories
Code of Practice (COP)

The latest version (v2.0) has been widely accepted by all participants, including growers, harvesters, distillers, packers and exporters. Currently, 72 producer members are COP compliant, representing about 90% of all Australian conventional TTO production.

ATTIA’s COP is now beginning to gain real traction with manufacturers. Packaging and advertising material bearing the ATTIA ‘100% Pure Australian Tea Tree Oil’ logo is used in an approved and standardised form by 15 manufacturers in Australia, Singapore, Thailand, USA, China, Italy, Brazil and the UK [9]. Interest is being shown in Spain, Germany and France, but these have yet to be endorsed.

The long-anticipated full review and rewrite of the COP to bring it into line with GACP and GMP principles has been delayed, as described earlier in the Methodology section.

![Figure 5: ATTIA's logo](image)

Discussions are ongoing between ATTIA and a service provider to develop a GMP protocol for TTO production. It will have two strands: GACP principles used for agricultural (grower and harvest) sections; and GMP principles used for distillation, storage and transport sections of the COP.

The rationale for this approach is sound: no compatible GMP or GACP templates exist for the production of any essential oil globally. It has now become apparent that trying to ‘shoehorn’ TTO production into available TGA, Manufacturing or APVMA GMP protocols is akin to forcing a square peg into a round hole. It is hoped that if a ‘TTO GMP’ protocol is accepted by the governing body it will provide a template and leadership to encourage other essential oil manufacturers in Australia and overseas to follow suit.

Critically, once the COP has been reviewed and accepted, this new version will likely include an optional third-party accreditation process with an independent annual external audit by a qualified GMP auditor. The aim is to give producers/growers and distillers the option to gain GMP accreditation. This will allow what is described as ‘substantial equivalence’ by the USA’s FDA if a licence is issued for TTO-containing products in the USA through AgriFutures Australia’s PRI-011625. This optional audit process will ensure that the extra work, cost and requirements of a full GMP system will not impose an unnecessary burden on smaller producers.
ATTIA has prepared and released four informative fact sheets during the life of this project:

1. **ABS Export Data for Tea Tree Oil: 01 April 2019 to 31 Mar 2020**

   **Table 1:** This annual report details exports by volume, destination region and FOB price. The latest ABS Report shows that between 1 Apr 2019 and 31 Mar 2020, the ABS reported total export volume of 691 MT, a decrease of 131 MT, or 15.94%, over the prior export period (Apr 18 – Mar 19) of 822 MT.

2. **Stock & Production Survey: 1 Apr 2019 to 31 Mar 2020**

   **Table 2:** This report helps producers, traders and manufacturers to better gauge demand for 100% pure Australian TTO.
### Table 3: Supply & Demand Data 2009 to 2019-20

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reporting Period</td>
<td>1 Jan to 31 Dec</td>
<td>1 Jan to 31 Dec</td>
<td>1 Jan to 31 Dec</td>
<td>1 Apr to 31 Mar</td>
<td>1 Apr to 31 Mar</td>
<td>1 Apr to 31 Mar</td>
<td>1 Apr to 31 Mar</td>
<td>1 Apr to 31 Mar</td>
<td>1 Apr to 31 Mar</td>
<td>1 Apr to 31 Mar</td>
<td>1 Apr to 31 Mar</td>
<td></td>
</tr>
<tr>
<td>Opening Stock</td>
<td>34</td>
<td>71</td>
<td>156</td>
<td>146</td>
<td>4</td>
<td>13</td>
<td>3</td>
<td>12.5</td>
<td>15.0</td>
<td>16.0</td>
<td>39.4</td>
<td>1.0</td>
</tr>
<tr>
<td>Production</td>
<td>427</td>
<td>511</td>
<td>402</td>
<td>407</td>
<td>551</td>
<td>667</td>
<td>845</td>
<td>714</td>
<td>899</td>
<td>1008</td>
<td>681</td>
<td>887</td>
</tr>
<tr>
<td>Available supply</td>
<td>461</td>
<td>582</td>
<td>558</td>
<td>553</td>
<td>555</td>
<td>680</td>
<td>848</td>
<td>726</td>
<td>905</td>
<td>1024</td>
<td>721</td>
<td>888</td>
</tr>
<tr>
<td>Sales (implied demand)</td>
<td>390</td>
<td>428.5</td>
<td>411.5</td>
<td>549</td>
<td>541.7</td>
<td>677</td>
<td>896</td>
<td>711</td>
<td>889</td>
<td>985</td>
<td>720</td>
<td>887</td>
</tr>
<tr>
<td>Demand change (%)</td>
<td>-7%</td>
<td>9%</td>
<td>-3.5%</td>
<td>33.4%</td>
<td>-1.3%</td>
<td>25.0%</td>
<td>23.4%</td>
<td>-14.9%</td>
<td>25.0%</td>
<td>10.8%</td>
<td>-26.9%</td>
<td>23.3%</td>
</tr>
<tr>
<td>Closing Stock</td>
<td>71.0</td>
<td>156</td>
<td>146.0</td>
<td>4.0</td>
<td>13.0</td>
<td>3.0</td>
<td>12.5</td>
<td>15.0</td>
<td>16.0</td>
<td>29.4</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Average Price</td>
<td>$46.92</td>
<td>$37.17</td>
<td>$33.50</td>
<td>$30.33</td>
<td>$37.17</td>
<td>$43.02</td>
<td>$45.02</td>
<td>N/A</td>
<td>$44.12</td>
<td>$45.08</td>
<td>$45.98</td>
<td>N/A</td>
</tr>
<tr>
<td>ABS Export (MT)</td>
<td>N/A</td>
<td>443</td>
<td>582</td>
<td>620</td>
<td>584</td>
<td>910</td>
<td>822</td>
<td>691</td>
<td>825</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Export change (%)</td>
<td>N/A</td>
<td>N/A</td>
<td>32%</td>
<td>6%</td>
<td>-6%</td>
<td>56%</td>
<td>-10%</td>
<td>-16%</td>
<td>19%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic demand (implied)</td>
<td>N/A</td>
<td>99</td>
<td>95</td>
<td>90</td>
<td>90</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In transit volume (implied)</td>
<td>N/A</td>
<td>0</td>
<td>0</td>
<td>126</td>
<td>38</td>
<td>-116.00</td>
<td>67.96</td>
<td>-66.35</td>
<td>-33.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## 3. Tea Tree Oil and the SARS-CoV-2 Coronavirus Pandemic

This document, released in March 2020 for producers, traders and manufacturers of products containing 100% pure Australian TTO, provided general advice on the potential virucidal activity of TTO. It will help them make informed decisions for statements about the efficacy and safety of 100% pure Australian TTO as a topical antiseptic agent, either in a formulated product or as the whole oil.

## 4. Pesticide Guide for Tea Tree Growers, v3.0 (June 2020)

This indexed and cross-referenced guide, which is a mandatory part of ATTIA’s COP, summarises the use patterns, application rates, withholding periods and critical comments for 42 pesticides (fungicides, herbicides and insecticides) that are either permitted or registered for use in tea tree crops.

Bringing all critical information into an easy-to-use guide helps producers manage application of pesticides, and manage withholding periods for harvest and grazing to ensure pesticides cannot contaminate the crop’s TTO.

The Pesticide Guide will be revised again in October after the APVMA has handed down their decisions on three pending MUP applications.

## Extension

During many extension visits to growers in FNQ and most growers in NSW, participants were informed of current research, and were asked for specific areas of concern. The overwhelming response was that they are delighted with RD&E efforts and wanted it to continue in its current form for the foreseeable future.

Since March 2020, COVID-19 restrictions have hampered extension visits but it is hoped that visits will resume by July 2020.

Areas of research that participants repeatedly suggest:

- **Nutrition** and **agronomic advice** for better performance per production unit.
- **Improved planting material** for further improvements in performance per production unit.
- **New weed management** tools and advice.
- **Pest & disease management**, particularly on *Elsinoë* spp., myrtle rust (*Austropuccinia psidii*), pitted apple beetle (*Geloptera porosa*), African black beetle (*Heteronychus arator*), pyrgo beetle (*Paropsisterna tigrina*), other as yet unidentified Chrysomelid beetles, tip gall midge (*Dasineura* spp.), web-moth caterpillars (*Orthaga thyrsalis*), Xylorectid caterpillars, psyllids (*Trioza* spp.) and thrips (*Order Thysanoptera*).
• Maintenance of the Pesticide Guide for TT growers and inclusion of chemicals to manage fungal infection, including data and recommendations for withholding periods.

• Advice and assistance with record-keeping ensuring that COP audits are successful.

• Management of marketing opportunities, and ensuring that novel and existing markets for TTO are maintained and enhanced.

All of these areas are being addressed in current and planned projects funded through AgriFutures Australia using matched levy funding.

It is worth noting that until recently, unless the author mentioned regulatory affairs (e.g. REACH, SCCP, ECHA, and HMPC) or aspects of marketing (e.g. harm from gynecomastia and adulteration, or benefits, e.g. a blockchain protocol for inviolable traceability), these were generally not considered a priority by the growers/producers. Since mid-2019 and despite two consecutive poor seasons (2019 and 2020) in many areas, the emphasis has changed significantly. Producers now consider adulteration, traceability and novel uses for TTO as areas of most concern.

This change in emphasis from production to demand is likely because the record 2018 harvest (1008 MT) resulted in a small surplus for the first time in five years. It is fortunate that the 2019 harvest (681 MT) and the projected 2020 harvest (887 MT) have reduced production capacity and ensured that stocks are cleared annually before harvest. The COVID-19 pandemic, which increased demand for TTO in all major destination markets, has also been a boon for the Australian TTO industry as a whole despite its impact on global populations and economies.

Producers continue to say that ATTIA is ‘on top of all that and managing it well’. Indeed, there appears to be widespread satisfaction and confidence in the direction of ATTIA’s work. It is also clear that satisfaction and confidence levels in the ATTIA Board of Directors remains high.

Field days

During this project, one field day was held, at the Windara Conference Centre, Casino, on 17 October 2019. This was a real success, with almost all ATTIA members attending, either in person or by proxy. Topics included:

1. Levies: update & statistics Paul Byrne, DAWE
2. AgriFutures: role & responsibilities John Smith, AgriFutures Australia
3. Blockchain: a novel concept Lucas Cullen, Geora Ltd
4. Weeds Scoping Study Paul Kristiansen et al., UNE
5. TTBP 2 – an update Mervyn Shepherd, SCU
6. CRC-P: an update Mervyn Shepherd + students, SCU
7. REACH and EPA: an update Paul Bolster, P. Guinane Pty Ltd
9. Forum: Questions/comments ATTIA Board & delegates

A symposium to specifically address the CRC-P and TTBP was scheduled for Tue 23 March 2020 at SCU. Over 60 producers and other interested parties had registered to attend before it was cancelled because of COVID-19. Topics scheduled:

1. Clonal eucalypts: lessons for tea tree David Lee (USC)
2. Operationalising cutting production Paul Warburton (Nur-Seed)
3. Developing and growing tea tree Tony Marnane (Beecroft tea tree)
4. Prospects for micro-propagation of tea tree
   Alan Saunders (Agromillora)

5. Commercial propagation tea tree by rooted cuttings
   David Cliffe (Narromine)

6. Cutting techniques and stock-plant management
   Gail Lowe (SCU)

7. Exogenous rooting hormone: does it improve the rooting rate?
   Shoaib Mirza (SCU)

8. Managing risk and reward planning new plantations
   Julia Voelker (SCU)

9. CRC-P progress update
   Merv Shepherd (SCU)

10. Workshop: barriers and knowledge gaps for the commercialisation of clonal tea tree

11. New planting material for the tea tree industry
    Tony Larkman (ATTIA)

12. Regenerating a 25-year-old orchard
    Shoaib Mirza (SCU)

13. Mini-cutting and stock-plant management techniques
    Gail Lowe (SCU)

ATTIA intends to allow Dr Shepherd and his team to run this symposium at the annual 2020 ATTIA Field Day scheduled for Thursday 8 October 2020, and include other aspects of the TTBP, such as showing producers the new ATTIA 5A orchard, which was established in August 2019.

It is hoped that project updates and other developments can be included and communicated to participants in the 2020 Field Day; however, it will not be addressed until the venue (SCU) and state and federal governments permit large gatherings.
The future

ATTIA will continue to deliver extension, communication and advice for all aspects of TTO production and marketing where appropriate, with emphasis on four key projects that have been slowed by circumstances beyond the control of the researchers.

1 Blockchain protocol

Reports for PRJ-011952 (Blockchain Feasibility) and PRJ-012315 (First MVP\(^3\) version) of a functional blockchain protocol have recently been submitted to AgriFutures Australia. This now-functional protocol was designed and built to collect the maximum amount of validated learning about customers without substantial expenditure on a complex ready-to-launch protocol with integration into existing financial and other systems. We intend to continue demonstrating the blockchain MVP in extension visits to key organisations in Australia, and overseas manufacturers and retailers via videoconferencing, to understand product interest, and features and functions they want.

With these preferences listed, ranked and costed, more funding (likely very significant) must be sought to develop the MVP version into a fully functional and tested product that is ready for the global TTO supply chain for COP-accredited 100% pure Australian TTO.

When the blockchain product is ready for release, the Australian TTO community must persuade manufacturers, retailers and end users to use the system to ensure it is demanded by end users and retailers, such as Walmart in the USA which has already implemented blockchain traceability for fresh food [10] and pharmaceuticals [11].

2 CRC-Project

Drought, flood, bushfires, COVID-19, novel disease and even a suspected shooter at SCU’s Lismore campus have compromised the delivery of expected results from this complex multi-disciplinary and multi-centre project. Despite setbacks, the outcomes achieved to date are remarkable, and could open the way for a step-change in the way germplasm for TTO plantation establishment is delivered to producers/growers.

3 Tea Tree Breeding Program (TTBP)

This iconic project has been running for 30 years. In late 2017, a management change from NSW DPI to SCU significantly disrupted the way the program is delivered, including gearing it towards a faster and more agile way of supplying new elite germplasm to producers/growers. This has been done by:

1. Consolidating, curating and databasing a diverse set of records from almost 30 years into a single program, capable of analysing and delivering breeding value predictions based on specific criteria, the most important being ‘yield of TTO per production unit (hectare) in a commercial environment’.

2. Developing and implementing a rolling front breeding cycle to deliver new germplasm every second year from 2024, using controlled pollination techniques linked to production and deployment of the best.

3. Integrating the findings of the CRC-Project and the breeding value predictions into the program to maximise return on investment.

\(^3\) MVP is a concept that stresses the impact of learning in new product development. An MVP is a version of a new product that allows a team to collect the maximum amount of validated learning about customers with the least effort. It enables an understanding of the interest in the product without fully developing it.
Figure 7: Controlled pollination of elite *M. alternifolia* trees showing bagged flowers

Drought, flood, bushfires, novel disease and COVID-19 have again compromised delivery of aspects of the TTBP. Despite setbacks, the progress since SCU formally took over program management has been outstanding. It is expected that the first concrete results of ATTIA 5A assessments from the controlled pollination program will be available in 2024, for a 6th generation orchard for mass deployment in commercial plantations.

4 Dermal penetration results

This project has been delayed, mainly because of lack of funding for key outcomes, such as an EU-wide survey of consumers and manufacturers of TTO-containing cosmetics. It is also because of the need for data on the methyl eugenol levels of TTO derived from *M. alternifolia*, and the need to have the ISO, BP and Ph Eur Standards modified to meet the expectations of the SCCP who released their *Opinion on Tea Tree Oil* [6] in 2008.

With only the BP and Ph Eur Standards revisions needed, attention turned to developing an OECD-compliant study of the dermal penetration of five key components of TTO. The data and final report for this seminal dermal penetration study, which will also be published in a peer-reviewed journal, is expected in July 2020. This final step will allow ATTIA to begin preparation to submit a revised dossier to the SCCP requesting a revision of their 2008 Opinion on Tea Tree Oil. The expectation is that the Opinion will be favourable and remove a perceived barrier to the inclusion of TTO in cosmetics due to safety concerns at up to 5%.

Other key factors

Consistent and well-ordered communication of arguments and research outcomes will be needed to ensure that 100% pure Australian TTO retains its pre-eminence as safe and effective as a personal care product ingredient, a TTO-containing industrial product ingredient, and a therapeutic product in its own right.
Gynaecomastia
Since 2007, [12] TTO and lavender oil (LO) have been unfairly targeted as an endocrine disruptor, particular on gynaecomastia (breast development in prepubescent boys) and, more recently, premature thelarche (precocious breast development on prepubescent girls).

In March 2018, a press release [13] was published on the Endocrine Society webpage titled ‘Chemicals in lavender and tea tree oil appear to be hormone disruptors’. It generated widespread interest and morphed into dozens of other articles with more sensationalist titles: ‘Essential oils in hygiene products may make boys grow breasts’ [14]; ‘Lavender and tea tree oil can cause a male bust’ and ‘Lavender and tea tree oil could give men MOOBS’.

Despite concerted efforts by ATTIA and other experts in essential oils, this putative link between endocrine disruption and essential oils has persisted. In 2019, AgriFutures Australia part-funded a two-year study by researchers at the Franklin Institute of Wellness in the USA to investigate this link. The researchers have largely completed this study although COVID-19 continues to interrupt contact with the study’s subject cohort.

An important new review [15] of literature relating to endocrine disruption by the authors of this study investigated the relationship between TTO, LO and paediatric endocrine disorders. This paper exonerates TTO and largely clears LO as well. The authors conclude: This systematic review finds that tea tree essential oil is not related to documented cases of endocrine disruption in children, and that there is little to no evidence to substantiate the proposed link between lavender essential oil and endocrine disruption in children.

Dermal irritation
For more than two decades, researchers have been patch testing human subjects with TTO to determine the level and incidence of dermal irritation (dermatitis and sensitisation). However, they have largely failed to reveal that nearly all patch testing is done with oxidised TTO (a known irritant) rather than fresh TTO, which producers of COP-accredited 100% pure Australian TTO strive to supply. This practice is a clear and unjustified bias against TTO and misreports the level and intensity of sensitisation and cutaneous reaction to TTO. The published reports are related almost exclusively to oxidised material. This is especially pertinent to quantitative risk assessment for sensitisation criteria developed by the fragrance industry, a key consideration for regulatory bodies, such as the SCCP in the EU, and the EPA and FDA in the USA.

A recent paper [16] again implicated TTO when only oxidised TTO is used [pers.com. Sophie Rolls 2020]. When challenged about the inclusion of oxidised TTO as the only essential oil that is deliberately oxidised, the author responded: …we see patients who do not always follow advice labels with respect to correct storage of their products and who often ignore sell-by-dates. Patients may therefore be exposed to oxidised fragrance chemicals and develop allergy. As our aim is to identify the underlying cause of a patient's dermatitis, it is the oxidised TTO which is tested [pers.com. Sophie Rolls 2020].

This statement was challenged: Based on your response ‘…patients who do not always follow advice labels with respect to correct storage of their products and who often ignore sell-by-dates …’ would it not be reasonable to have all products oxidised prior to patch testing as there is little doubt in my mind that patients who fail to follow advice labels for TTO-containing products are just as likely to do the same for Peppermint, Lavender, Jasmine or Ylang-Ylang containing products to name just a few?’ At the time of writing this report, no response has been received.

Adulteration
AgriFutures Australia is funding a three-year project (PRJ-011624) for chiral purity and other parameters to demonstrate and communicate the purity and origin of commercially available TTO from retail outlets globally. It has been compromised by the pandemic; for the next round of testing, sourcing of new samples from Asian and European stores could possibly restart in July or August 2020.
Telling manufacturers they have been defrauded by unscrupulous or ignorant suppliers of adulterated material sold as ‘100% pure TTO steam distilled from M. alternifolia’ is an ongoing communication strategy. It is a critical adjunct to other efforts to increase and maintain market share for 100% pure Australian TTO, including the COP campaign backed by inviolable blockchain traceability.
Implications

Communication

Consistent communication with all sectors of the TTO supply chain ensures all remain up to date with strengths, weaknesses, opportunities and threats and allows. It enables agile and proactive responses to capitalise on favourable outcomes while managing and ameliorating adverse outcomes.

Two good examples are the ATTIA Pesticide Guide, which provides critical data for all pesticides used in tea tree plantations, and the annual Supply and Demand report, which shows that significant volatility in price and production in the 1990s and early 2000s (Table 3) is over. Stable prices are being maintained despite more production and variable climatic conditions affecting production, which has been steadily increasing since 2010. Critically, prices have been consistently strong and well above the lows of $10–$15/kg around the turn of the century.

The collection, collation and release of annual ABS data (Table 1 and Table 2) have also been invaluable to industry participants, with information on volumes and prices by destination over time helping targeted marketing campaigns. ABARES use the ABS data to develop models for annual production for matched levy funding.

Extreme price fluctuations in the late 1990s and the early 2000s have not reoccurred. Participants are aware of the relationship between supply and demand. Supporting data enables marketing to be coupled with planned planting and expansion to keep pace with demand. This is being driven in part by effective communication and renewed awareness of the efficacy, safety and uses of pure Australian TTO as opposed to adulterated material that was allowed to dominate the marketplace for many years.

These, and other, communications are an invaluable resource to all participants while helping to ensure that a ‘TTO lake’ is far less likely to eventuate. Increased confidence supports a sustainable and profitable price structure to be maintained.

Code of Practice (COP)

Marketing of COP-accredited 100% pure Australian TTO continues to gain traction as producers adopt this QA system that attests to the quality and purity of their product. This is particularly important because they supply a raw material for personal care products. Quality management of inputs, especially active ingredients such as TTO, is tightly regulated in most jurisdictions. The quality of the supplied product is eventually reflected in consumer products, which is why quality management of TTO must be from paddock through to the customer.

When individual growers accept responsibility for maintaining the quality of their oil up to the moment it is despatched, they will confidently export pure Australian TTO that meets or exceeds the customer standards. The possibility of rejection is significantly diminished through a clearly documented process that demonstrates quality, safety and efficacy.

Deployment of a blockchain traceability protocol to underpin the COP will reinforce the entire process from farmgate to consumer. The new version of the Code (v2.0) has been rationalised to reflect the steps in the production process and can only enhance the reputation of 100% pure Australian TTO as a premium product.

In the same way that communication has enhanced the value of TTO, increased confidence in quality control of production will improve as the industry grows and matures. The next step in this evolutionary process will help producers integrate COP with GMP and GACP protocols. It is a key requirement for REACH legislation in the EU, and in North America where adoption of Globally
Harmonised Systems (GHS) for classifying, labelling and packaging chemicals, including TTO, which is classified as Dangerous Goods Flammable Class III, has standardised export consignments.

**Extension**

Extension visits to producers reinforce value and effectiveness of communication and COP accreditation. They also allow individuals to raise concerns that are addressed in a timely manner.

Throughout this project, extension in QLD and NSW has helped producers/growers identify the likely cause of new pest threats (e.g. FNQ stump death) as well as inspiring producers to adopt and maintain COP accreditation.

Regular personal visits are a critical part of a two-way communication process where producers are informed of developments and are able to raise issues of concern with ATTIA.

**Field days**

Annual field days enable networking for many in the TTO community while sharing research outcomes in a semi-formal atmosphere. Attendance at field days remains consistently high; many participants say how valuable these days are to them and their businesses. Informal participant feedback indicates widespread support for an annual field day to continue as it provides a relaxing and informative day for learning and building networks.
Recommendations

Building on continued cooperative approaches to managing issues for the tea tree industry is vital. It can best be achieved by maintaining and enhancing communication aimed at all levels of the supply chain for pure Australian TTO.

As the TTO industry grows, succession planning both for ATTIA as the industry representative body and for communication and extension activities is vitally important.

Over the past decade, the TTO industry increased production by 136%, from 427 MT in 2009 to a peak of 1,008 MT in 2018. The increased communication and extension effort to match has largely kept pace. However, the greater sophistication and workload necessary to ensure these activities continue to be effective has shifted as the task of managing communication and extension continues to grow.

The TTO industry must consider engaging more resources to help with communication, extension and allied activities in a way that ensures effective succession planning is achieved over the next two to three years.
References


Communication of Research Findings
to Tea Tree Oil Industry Levy Payers

by Tony Larkman

2020

AgriFutures Australia Publication No. 20-135
AgriFutures Australia Project No. PRJ-011626
ISBN: 978-1-76053-170-6

AgriFutures Australia

Building 007
Tooma Way
Charles Sturt University
Locked Bag 588
Wagga Wagga NSW 2650

02 6923 6900
info@agrifutures.com.au

@AgriFuturesAU
agrifutures.com.au

AgriFutures Australia is the trading name for Rural Industries Research & Development Corporation. AgriFutures is a trade mark owned by Rural Industries Research & Development Corporation.