Artemisia Extraction, Purification and crystallisation Overview

Colin A Hill
Managing Director
Botanical Developments Limited
Extraction Technology Developments Limited
Why is research necessary?

- Only 40%-60% of artemisinin in leaf ends up as pure artemisinin crystals
- Has big impact on supply
- Has big impact on price / profitability
Extraction-Solvent choice:

Ideally solvent choice is governed by:

• Selectivity for molecule of interest
• Solubility of molecule of interest
• Solvent toxicity, flammability, environmental impact
• Solvent availability / cost
• Capital cost / running costs

Artemisinin has somewhat unique polarity characteristics
Solvent Choice has big impact on purification and Crystallisation:

- $\text{LCO}_2$: <50% art in extract
- good selectivity / low solubility
- Non polar contaminants to remove
- **Ethanol**: <15% art in extract
- high solubility / poor selectivity
- Polar contaminants to remove

There is not a “**one cure all solution**” for purification and crystallisation for extracts made from these two solvents
Solvents presently being used commercially or being researched:

- LCO$_2$
- SCO$_2$
- HFC
- Hexane
- Petroleum Ether
- Toluene
- Ethanol
- Novel “bespoke” solvents or combinations
Presentations in this section:

- **HFC**: Dr. Bhupinder Khambay (Kamtech)
- **Ethanol**: Dr. Michaela Von Freyhold (Bremen)
- **Hexane**: Dr. Jain (Ipca)
New Research Equipment available for use on Artemisia in UK:

- Solvent extraction
- HFC extraction
- LCO2 and SCO2 extraction
- HFC/SCO2/Solvent purification
- Crystallisation

Equipment is to be used to investigate a range of purification and crystallisation methods to improve overall yield.
1 X19 litre HFC Plant
2 X 1.5 litre SCO$_2$ Plant
Separators on Lab Scale SCO$_2$ Plant
4X 40 litre Pilot SCO$_2$ Plant
Another 4 X 40 Litre SCO$_2$ Plant
2 X 500 litre Scale HFC Plant
Pilot Solvent Plant
(1200 litre-2400 litre Scale)
4 Metre Liquid/Liquid Extraction Column
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