ACIAR project

FST/2009/062

Development of advanced veneer and other product from coconut wood to enhance livelihoods in South Pacific communities

Project organisation

Commissioning organisation

Australian Government
Australian Centre for International Agricultural Research

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Forestry Research Program Manager
Australian Centre for International Agricultural Research

Australia based

UTAS

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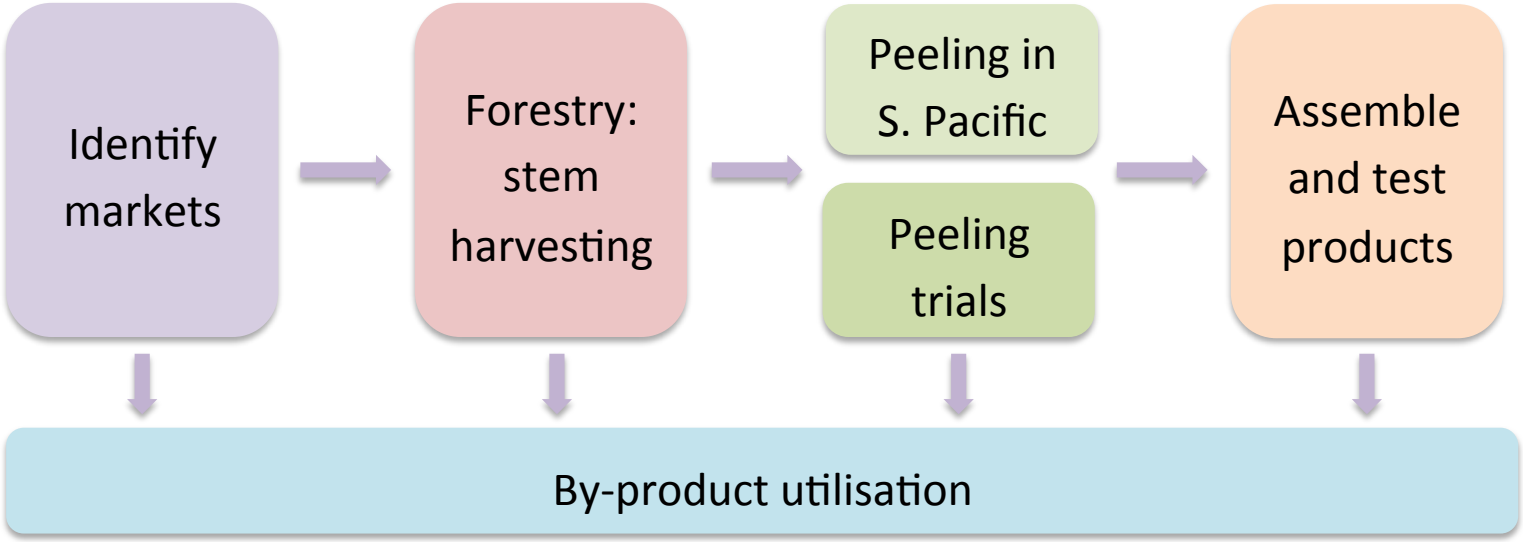
Project Objectives



Objective 1 – Identify Markets

Identify markets

Objective 1 – Identify the most promising product options for the veneer from coconut stem

1.1 – Market assessment and product development

1.2 – Value-chain analysis

1.3 – Stakeholder engagement

Objective 1 – Identify Markets

Objective 2 – Forestry

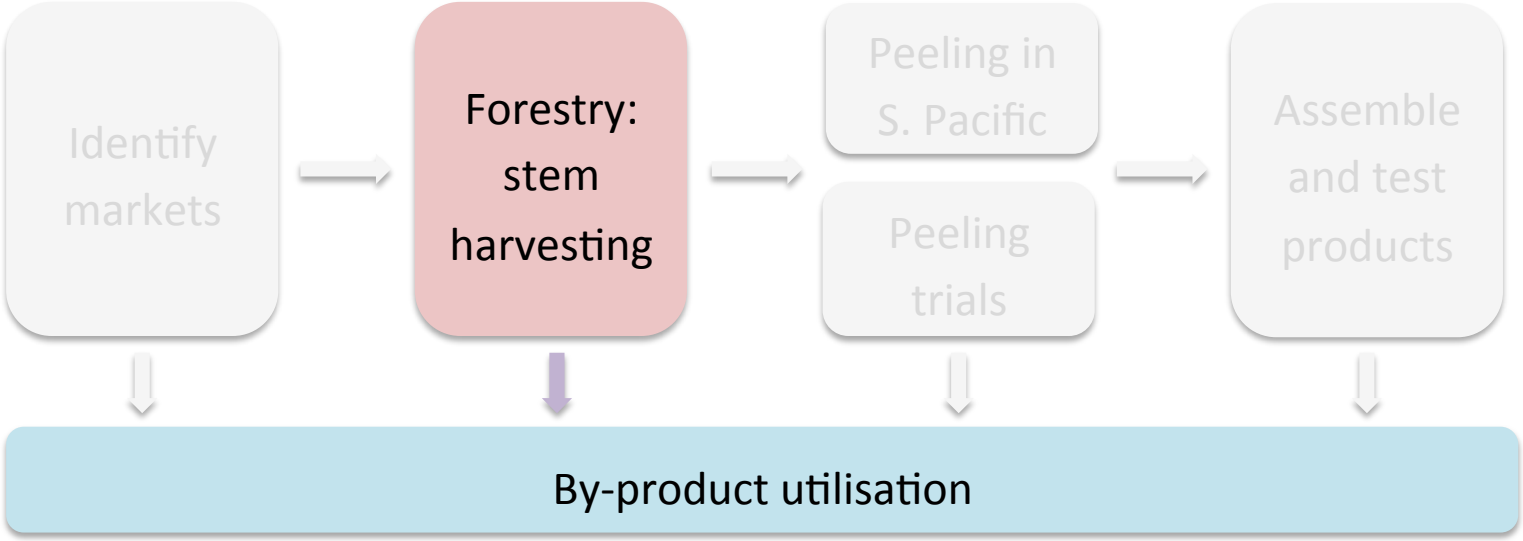
Forestry: stem harvesting

Objective 2 - Develop protocols and capacity for sustainable low-impact coconut wood harvesting, plantation rehabilitation, and log grading, handling and transport

2.1 - Local resource assessment and harvesting

2.2 - Development and training in harvesting and handling protocols

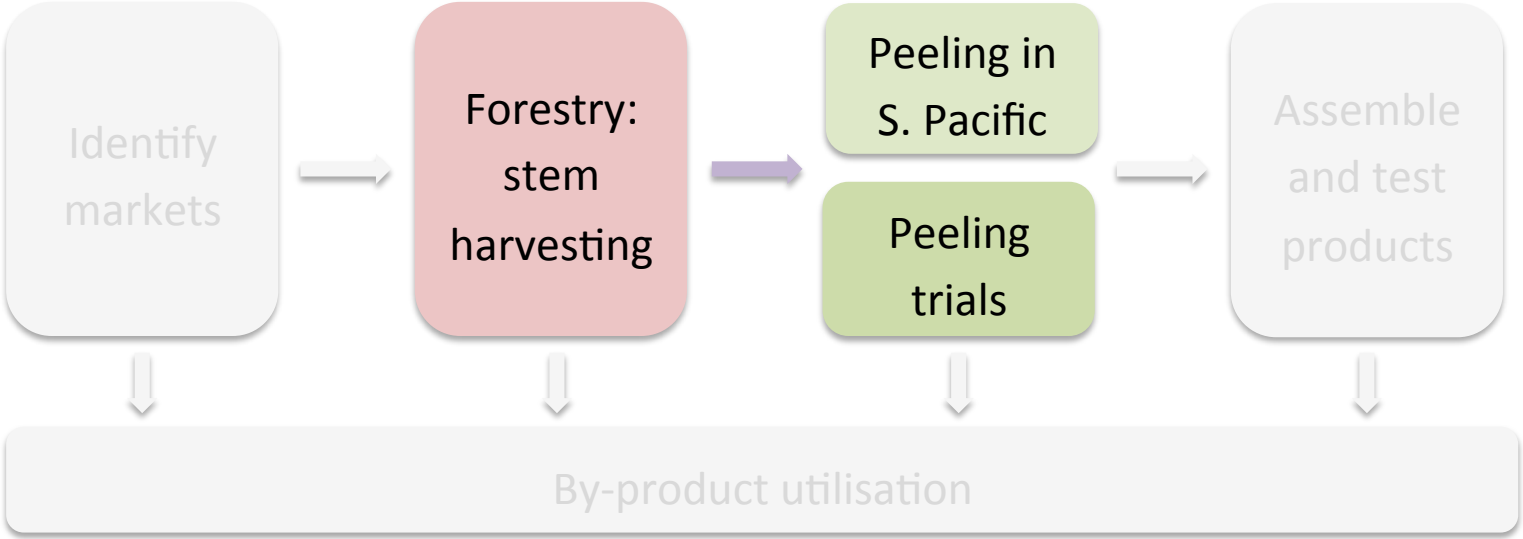
Objective 2 – Forestry



Material collected for Objective 4 peeling trials:

- Below grade stems
- Fronds

Objective 2 – Forestry



Material collected for Objective 6 trials of residue uses:

- Discs
- Stems

Obj. 3 – Veneer peeling in S. Pacific

Peeling in S. Pacific

Peeling trials

Objective 3 – Establish experimental veneer-peeling capacity in the South Pacific

3.1 – Commissioning a spindleless lathe equipment

3.2 – Assessing the potential of a regional trial and demonstration program

Objective 4 – Peeling trials

Peeling in S. Pacific

Peeling trials

Objective 4 – Determine the optimum processing parameters & protocols for peeling coconut stems & the properties of the recovered veneer

4.1 – Assessing veneer processing parameters from cocowood disks

4.2 – Calibrating processing parameters at QDAFF

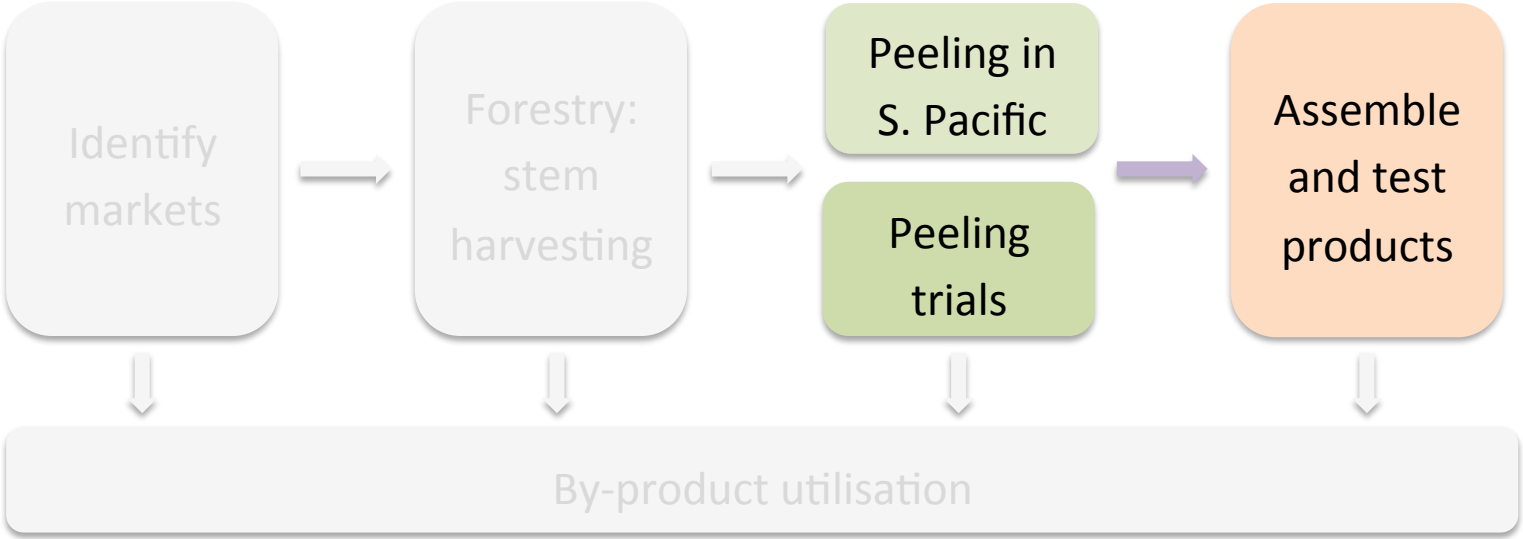
4.3 – Initial compact experimental peeling trial in Fiji on new lathe

4.4 – Compact commercial peeling trial in Fiji

4.5 – Broad industrial peeling trial in Fiji

4.6 – Properties and recovery assessment

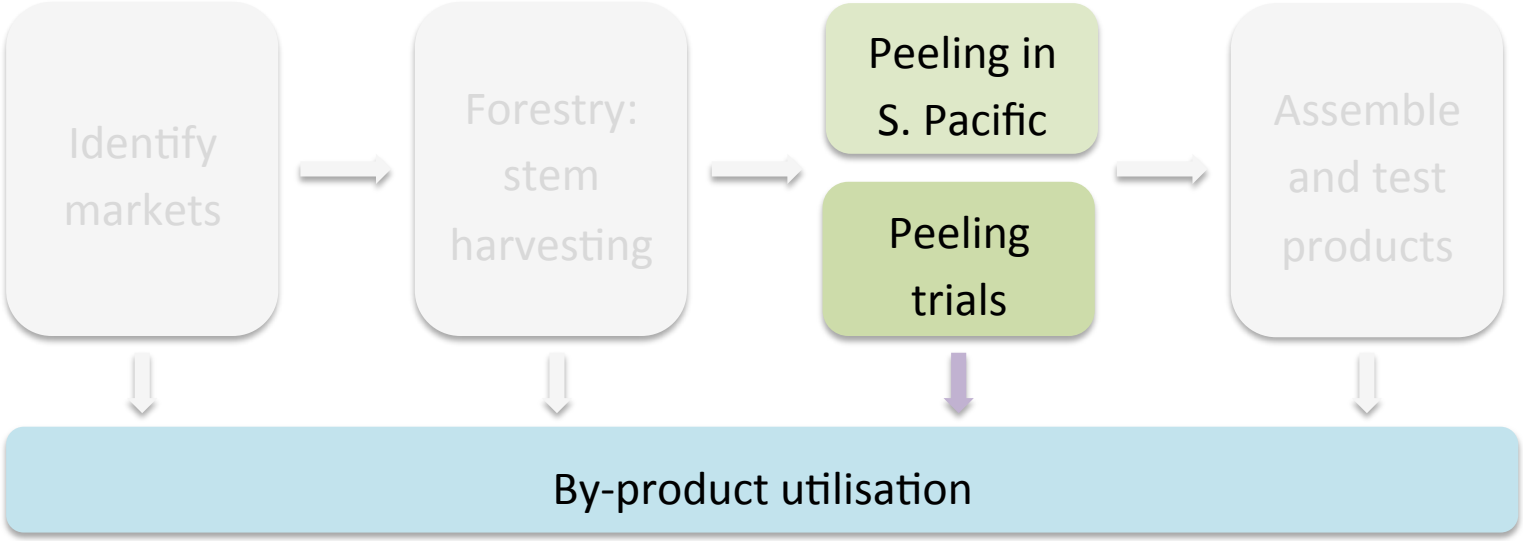
Objectives 3 & 4 - Peeling



Recovered veneer used to assemble product suite

- plywood
- Laminated veneer lumber etc

Objectives 3 & 4 - Peeling



Material collected for residue trials

- Outer material
- Core
- Below grade veneer

Objective 5 – Products

Assemble and test products

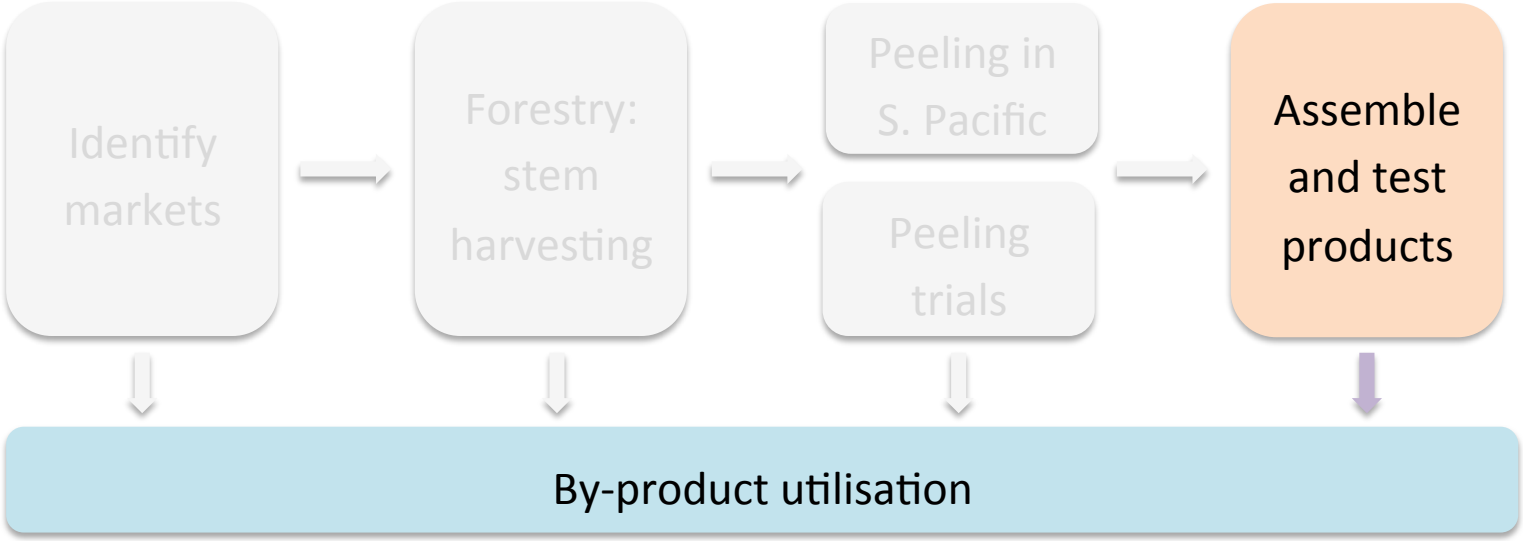
Objective 5 – Assemble the product suite and establish its characteristics and in-service performance

5.1 – Experimental product assembly

5.2 – Product characterisation and testing

5.3 – Product assessment in-service

Objective 5 - Products



Material collected for residue trials

- Assembly residues

Objective 6 – By-product utilisation

By-product utilisation

Objective 6 - Determine the costs and benefits of using the residual cortex and soft, central cores for bio-char and other agricultural products

6.1 – Collaboration with agricultural projects

6.2 – Biochar trials

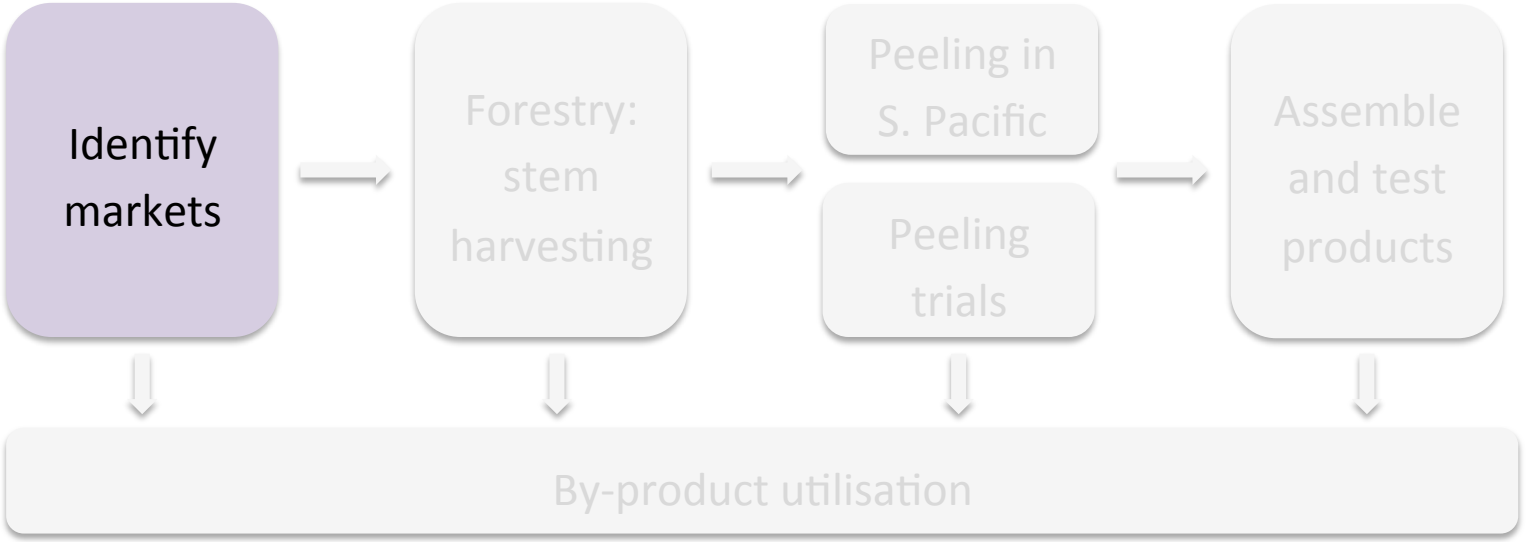
Summary

This is a four-year, collaborative project with six specific objectives:

1. Identify the most promising product options for the veneer from coconut stem.
2. Develop protocols and capacity for sustainable low-impact coconut wood harvesting, plantation rehabilitation, and log grading, handling and transport.
3. Establish experimental veneer-peeling capacity in the South Pacific.
4. Determine the optimum processing parameters and protocols for peeling coconut stems and the properties of the recovered veneer.
5. Assemble the product suite and establish its characteristics and in-service performance. Characterisation would be to local and export performance standards.
6. Determine the costs and benefits of using the residual cortex and soft, central cores for bio-char and other agricultural products.

Questions

Objective 1 – Identify Markets



Objective 1 – Identify Markets

Identify markets

1.1 – Market assessment and product development

- Engagement with building designers, builders, producers and industry bodies in local and export markets
- Determine suite of appearance and structural products to develop all-cocoveneer and composite products

Objective 1 – Identify Markets

Identify markets

1.2 – Value-chain analysis

- Analysis performed in association with ACIAR's PARDI network
- Costs and recoveries of each stage of production determined
  - This work runs in parallel with technical program
- Explore potential production models.

Objective 1 – Identify Markets

Identify markets

1.3 – Stakeholder engagement

- Regular stakeholder engagement meetings.
  - Impact in partner countries is fundamental to the project
- Website and resource packages
- Training days organised

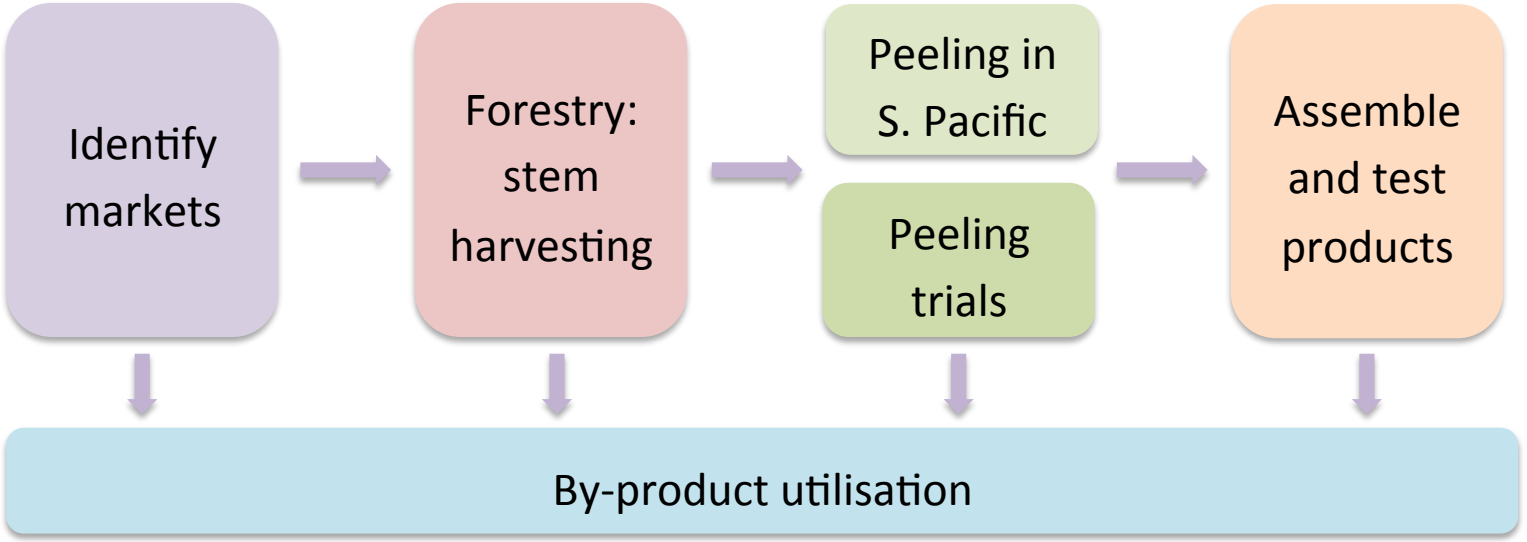
Objective 1 – Identify Markets

Identify markets

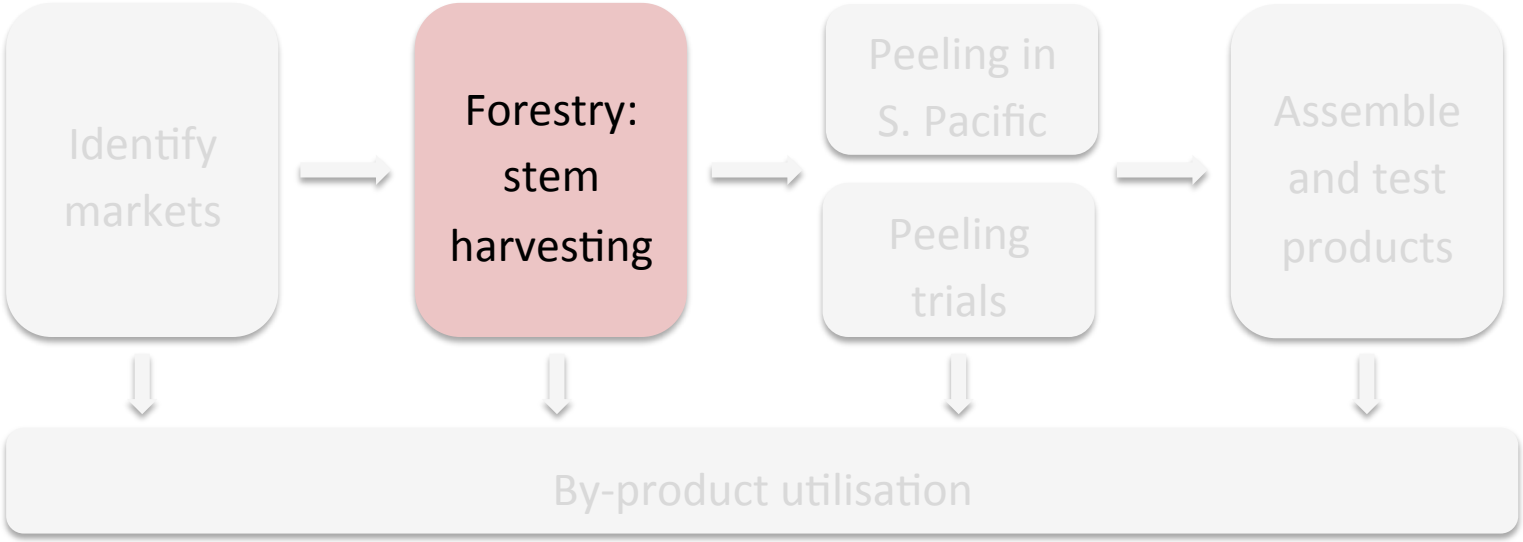
Key completion dates –

- Initial markets and products defined – Jan 2013
- Interim value chain analysis – January 2014
- Final value chain analysis – October 2015
- Cocowood website updated – October 2012
- Stakeholder meetings –
  - July 2013
  - May 2014
  - May 2012

Objective 2 – Forestry



Objective 2 – Forestry



Objective 2 – Forestry

Forestry: stem harvesting

2.1 - Local resource assessment and harvesting

- Representative resources identified in each partner country
- Stems harvested and transported for use in peeling trials
- Sustainable harvesting practices

Objective 2 – Forestry

Forestry: stem harvesting

2.2 - Development and training in harvesting and handling protocols

- Protocols developed for low impact harvesting and transportation practices
- Training provided to ensure best practice is followed

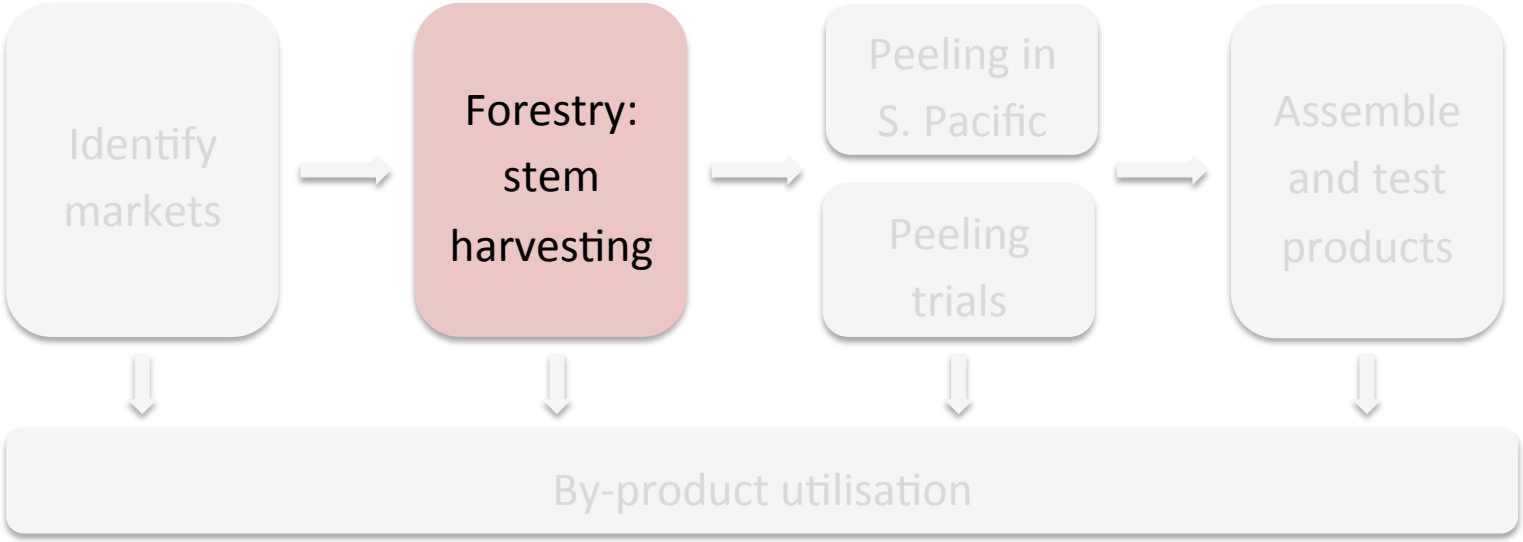
Objective 2 – Forestry

Forestry: Stem harvesting

Key completion dates –

- Local resources assessed and obtained for peeling trial 1 – Sep 2012
- Local resources assessed and obtained for peeling trial 3 – Nov 2013
- Local resources assessed and obtained for peeling trial 4 & 5 – Nov 2014
- Harvesting and handling protocols developed – May 2015
- Training sessions – November 2015

Objective 2 – Forestry



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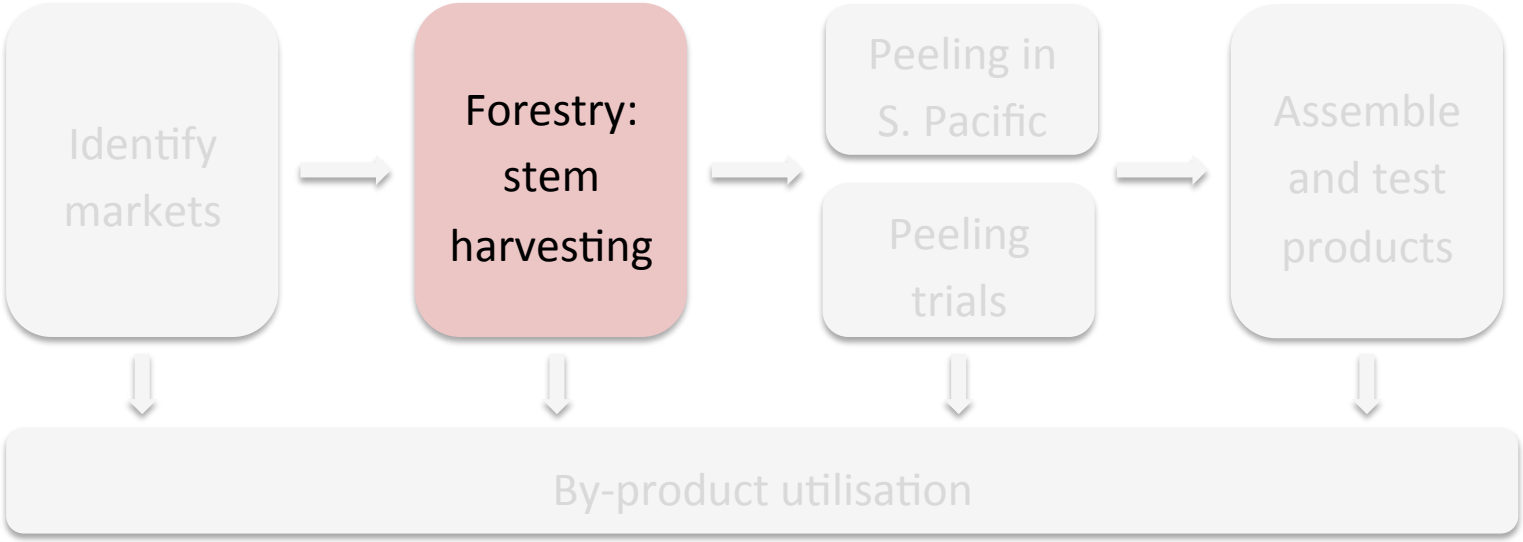

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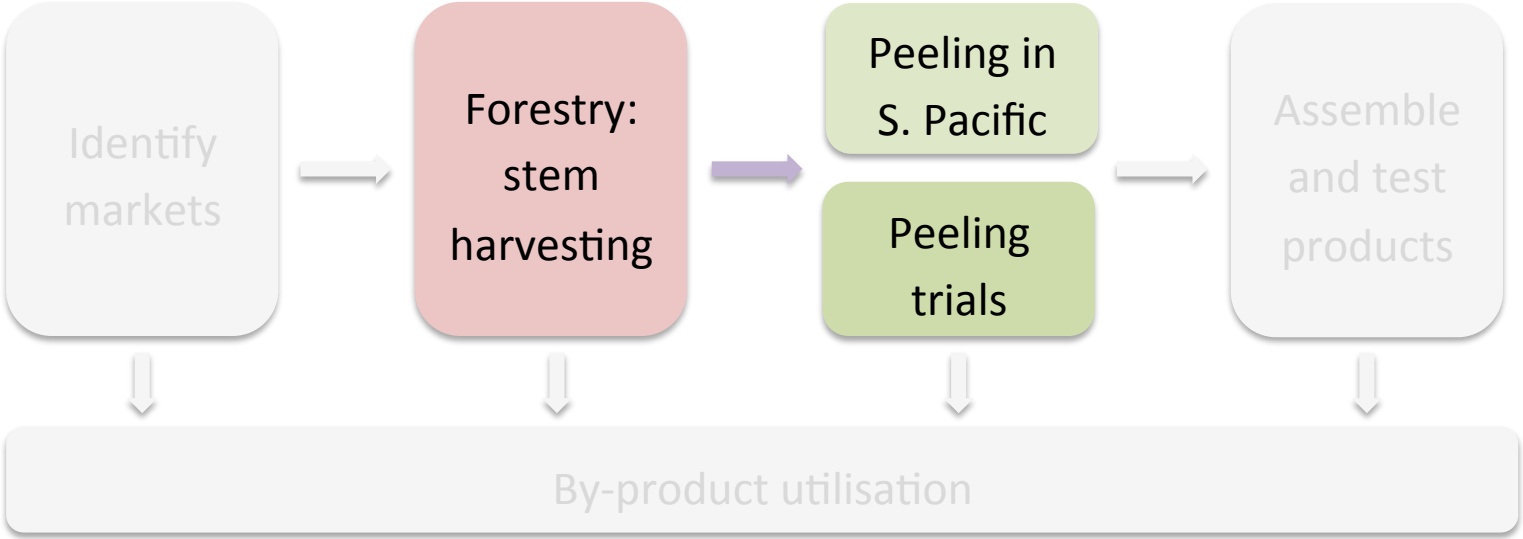
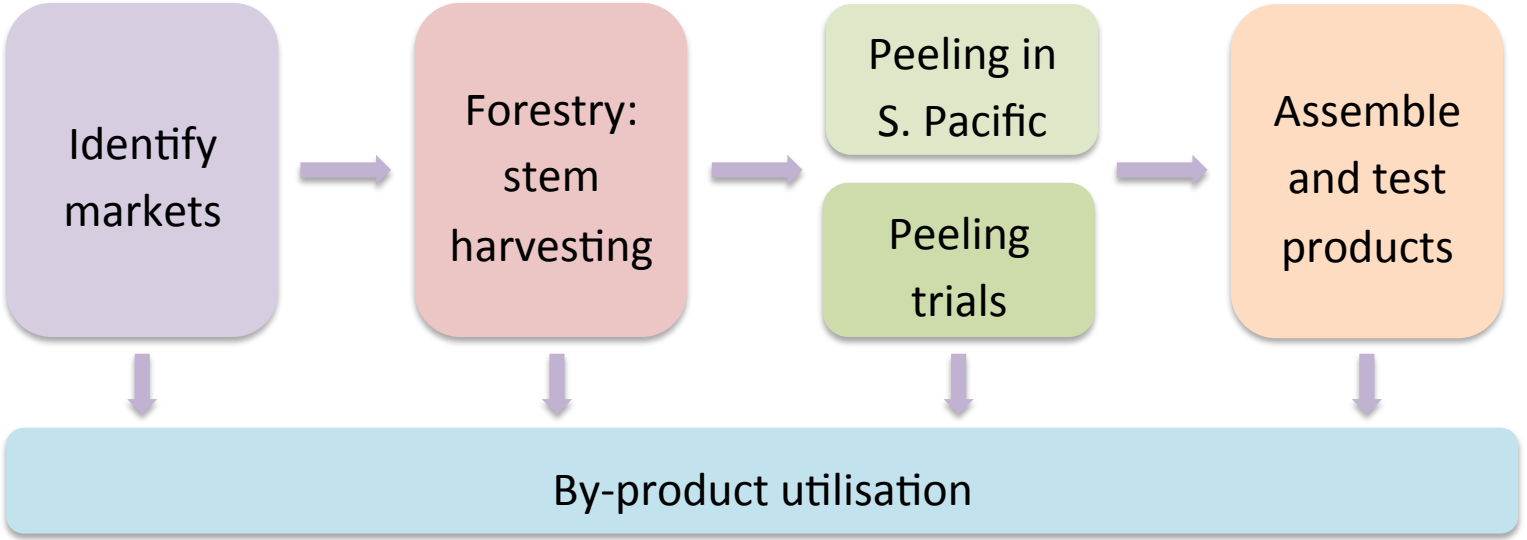
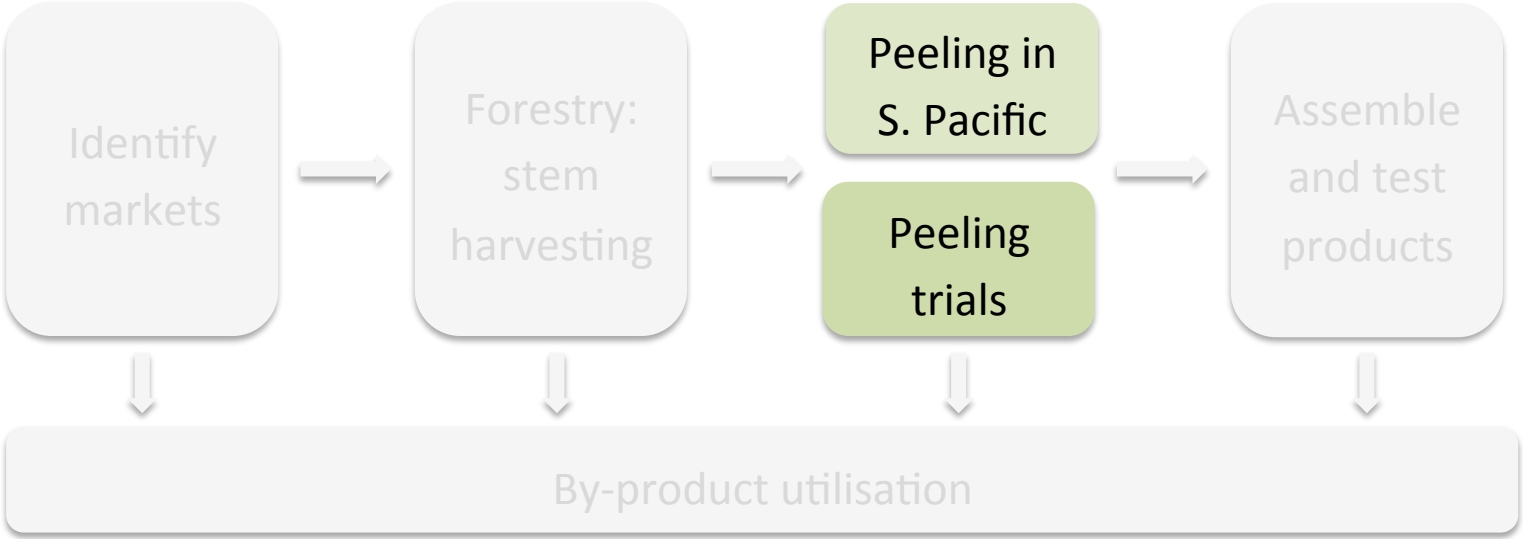


Objectives 3 & 4 - Peeling



Objectives 3 & 4 - Peeling



Objectives 3 & 4 - Peeling

Peeling in S. Pacific

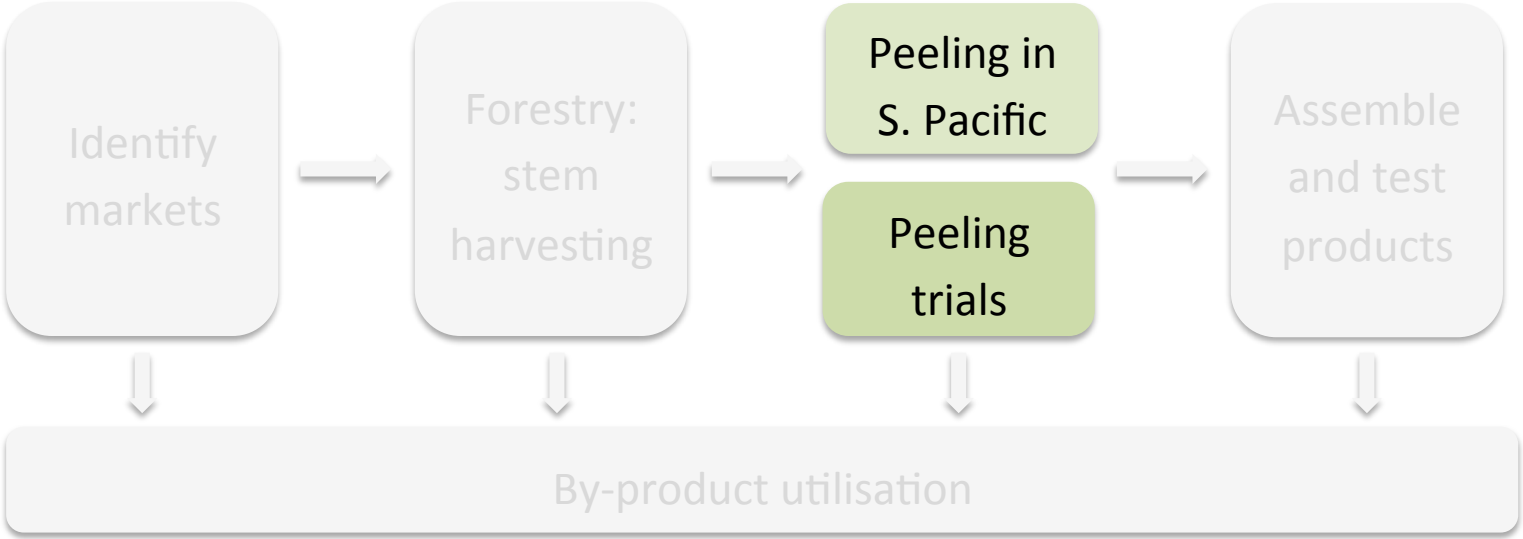
Peeling trials

Objective 4 – Peeling trials

Peeling in S. Pacific

Peeling trials

Objectives 3 & 4 - Peeling



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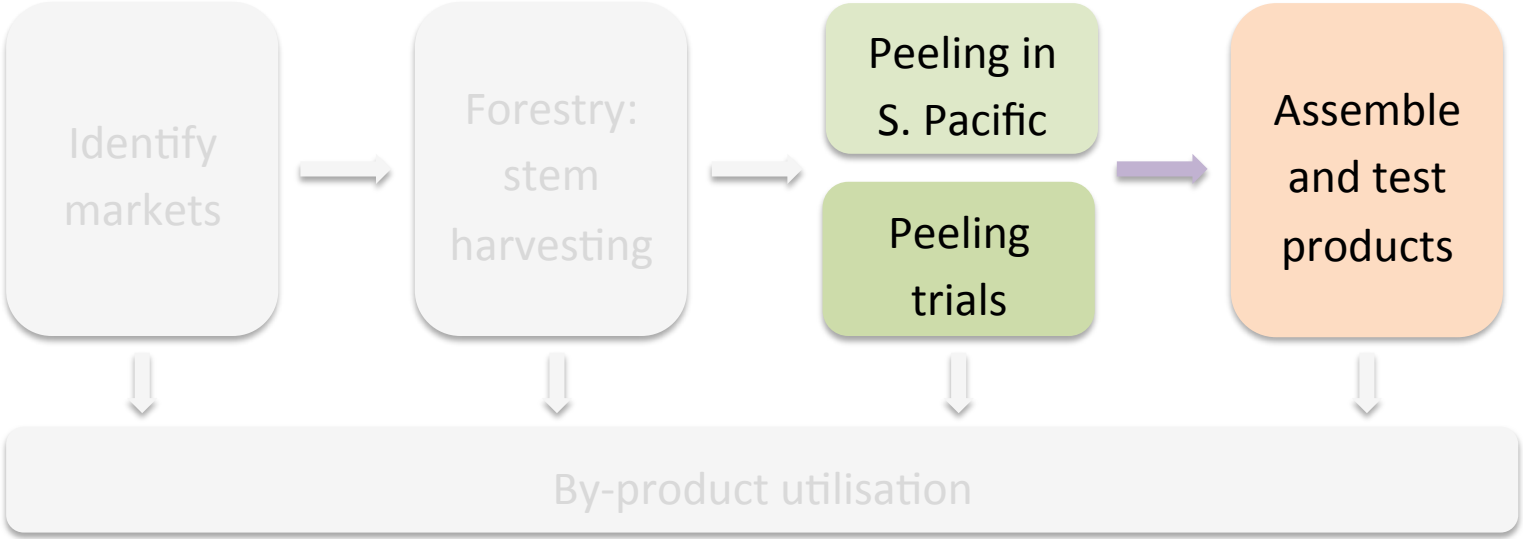

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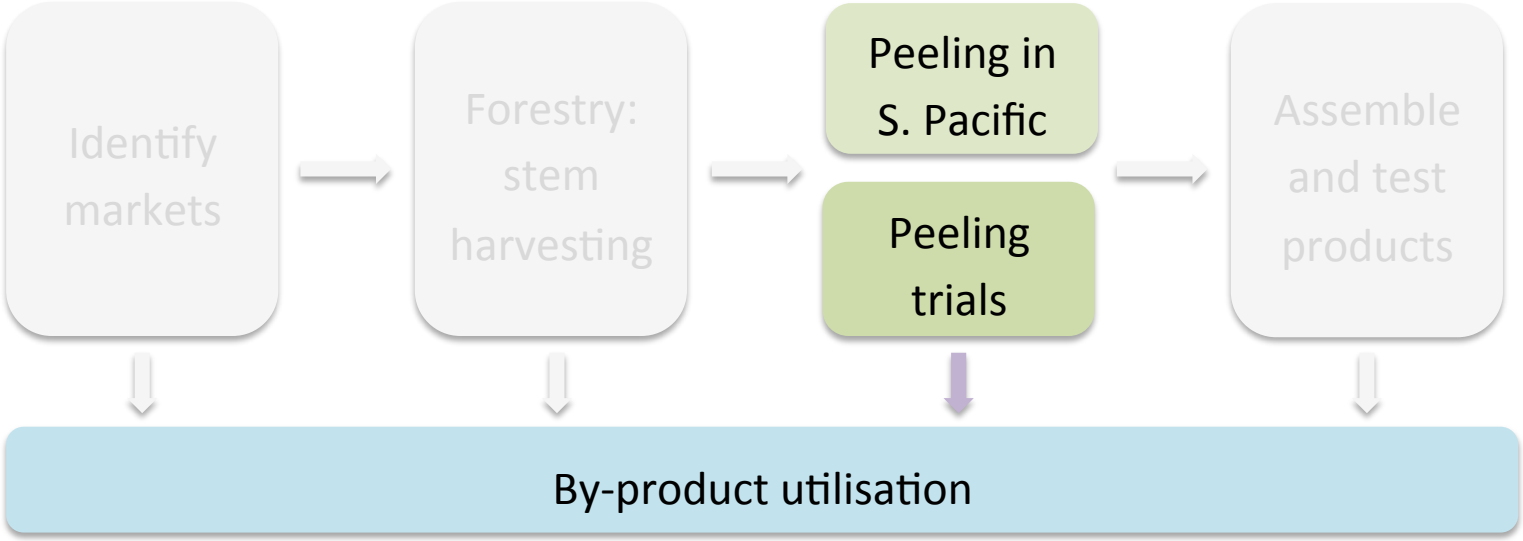


Obj. 3 – Veneer peeling in S. Pacific

Peeling in S. Pacific

Peeling trials

3.1 – Commissioning a spindleless lathe equipment

- Lathe equipment suite procured and commissioned at DEEDI
- Lathe modifications carried out at DEEDI
- Peeling facility then established in Fiji

Obj. 3 – Veneer peeling in S. Pacific

Peeling in S. Pacific

Peeling trials

3.2 – Assessing the potential of a regional trial and demonstration program

- Feasibility of transporting the lathe suite between regional centres will be assessed
  - Technical
  - Economic
  - Physical

Obj. 3 – Veneer peeling in S. Pacific

Peeling in S. Pacific

Peeling trials

Key completion dates –

- Lathe procured and commissioned at DEEDI – August 2013
- Lathe suite relocated to Fiji – January 2014
- Assessment of potential regional peeling program – July 2014

Objective 4 – Peeling trials

Peeling in S. Pacific

Peeling trials

4.1 – Assessing veneer processing parameters from cocowood disks

- Optimum peeling parameters assessed from disc trials at ENSAM in France
- Micro-lathes used to determine lathe settings and stem pre-conditioning requirements

Objective 4 – Peeling trials

Peeling in S. Pacific

Peeling trials

4.2 – Calibrating processing parameters at DEEDI in Queensland

- Stem peeling trials in order to calibrate parameters from those established at ENSAM
- Trial includes
  - Pre-conditioning
  - Peeling
  - Grading
  - Drying
  - Handling

Objective 4 – Peeling trials

Peeling in S. Pacific

Peeling trials

4.3 – Initial compact experimental peeling trial in Fiji

- Stems from two sites in Fiji processed to verify parameters developed
- Recovered material used for production trials
- Stems to be
  - Peeled
  - Dried
  - Graded

Objective 4 – Peeling trials

Peeling in S. Pacific

Peeling trials

4.4 – Compact commercial peeling trial in Fiji

- Trial to asses viability of commercial production
- Stems from two sites in Fiji processed at VTB mill at Labasa
- Lathe setup verified
- Processing and handling protocols tested and refined
- Recovered material used for product trials

Objective 4 – Peeling trials

Peeling in S. Pacific

Peeling trials

4.5 – Broad industrial peeling trial in Fiji

- Peeling trial at experimental facility in established in Fiji
- Stems from each resource centre peeled
- Material characteristics determined
- Peeling, handling and grading protocols tested
- Recovered material used for product tests

Objective 4 – Peeling trials

Peeling in S. Pacific

Peeling trials

4.6 – Properties and recovery assessment

- Recovered veneer quality assessed
- Dried material from each resource centre to be graded
- Strength, dimensional stability, gluing characteristics etc will be determined
- Recovery data collected for economic assessment

Objectives 3 & 4 - Peeling

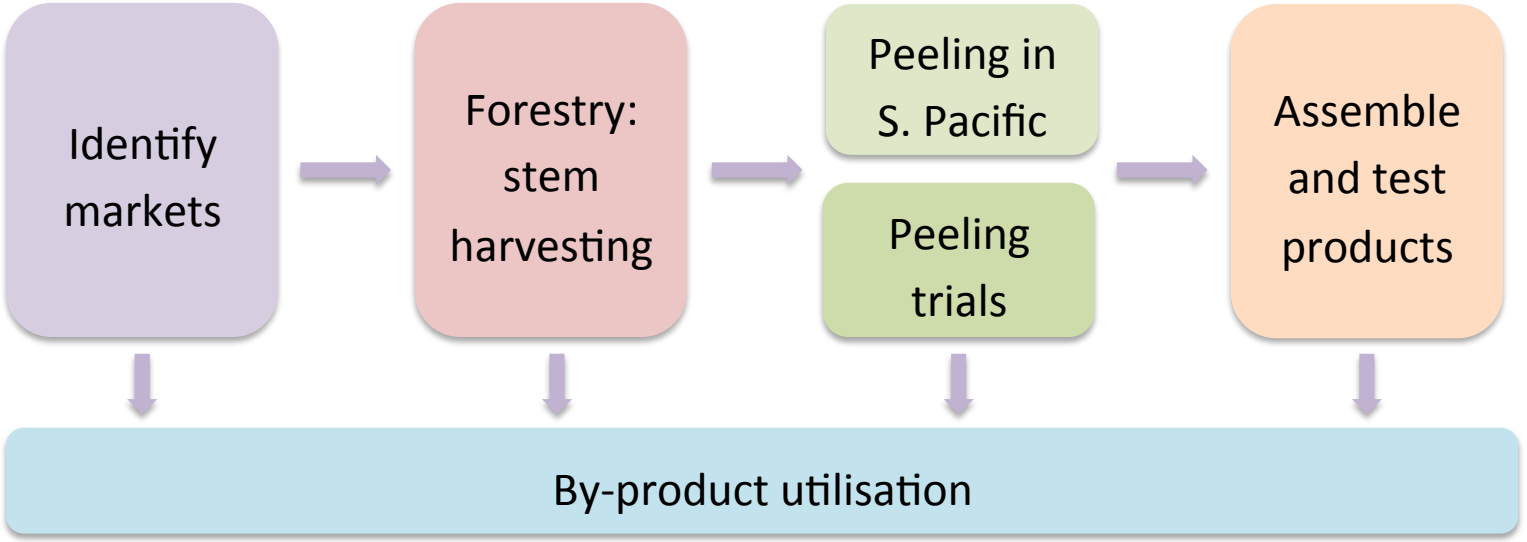
Peeling in S. Pacific

Peeling trials

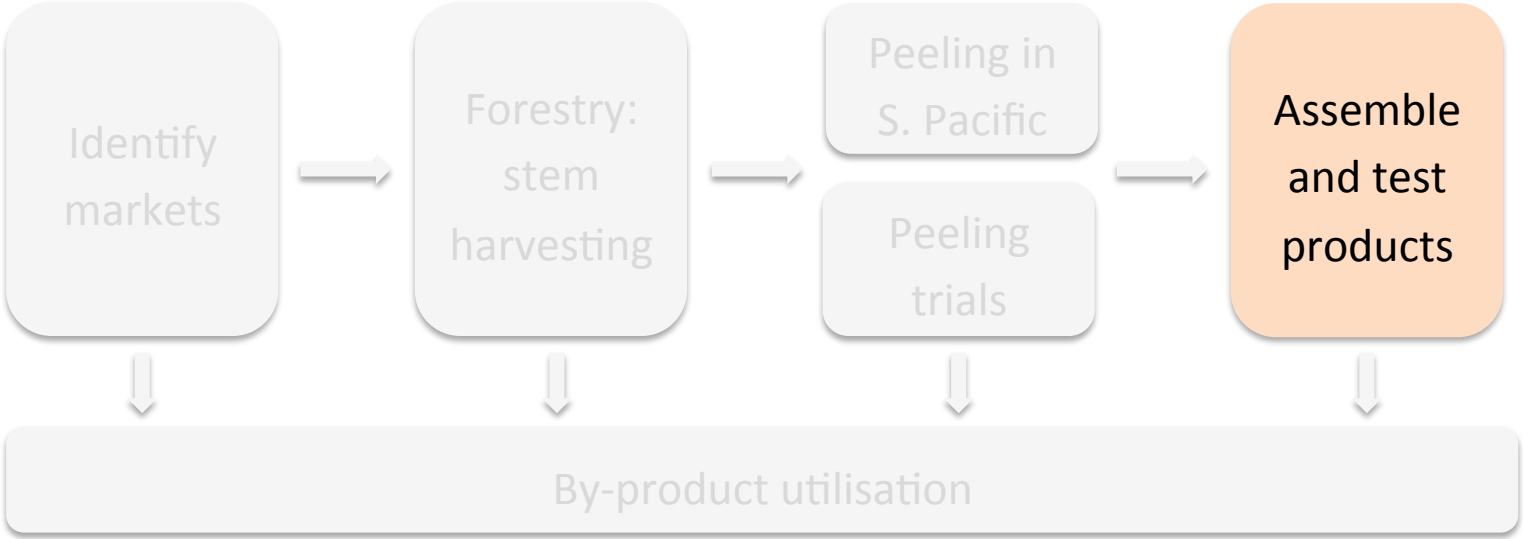
Key completion dates –

- Disc peeling at ENSAM micro-lathes – Feb 2013
- Calibration peeling trials at DEEDI – Sep 2013
- Peeling trial in Fiji – Sep 2014
- Compact commercial peeling trial in Fiji – Jan 2014
- Commercial peeling trial - August 2015
- Recovered material assessments – after each peeling trial

Objective 5 - Products



Objective 5 - Products



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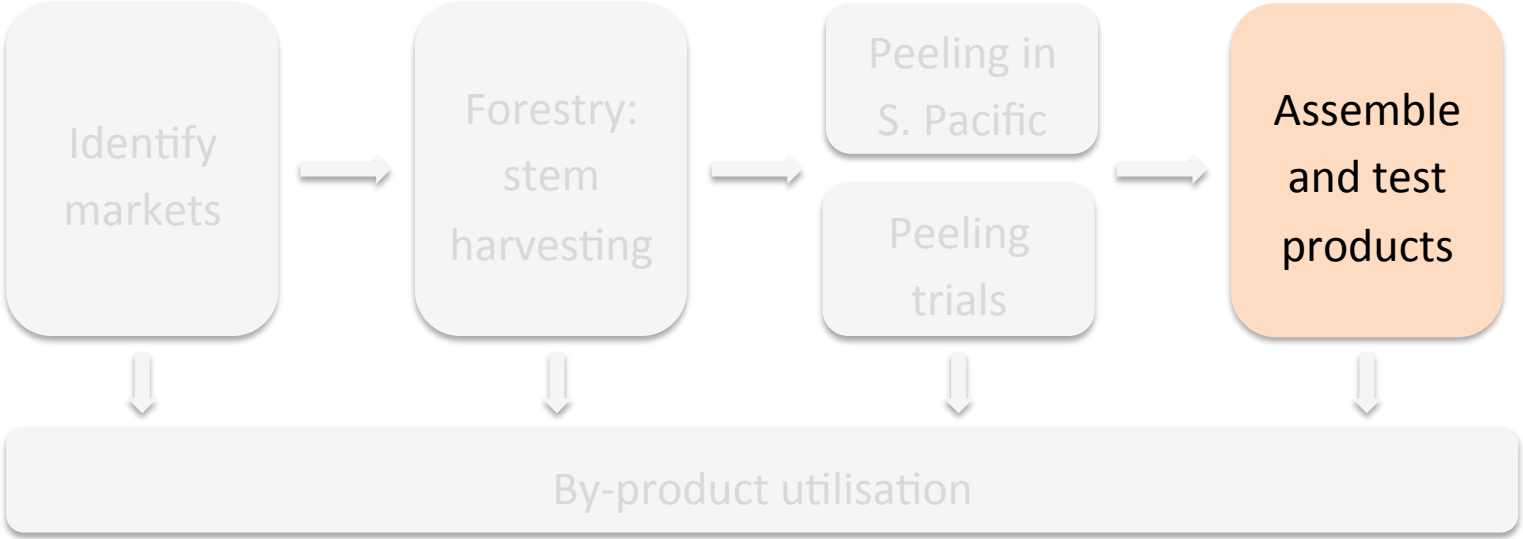

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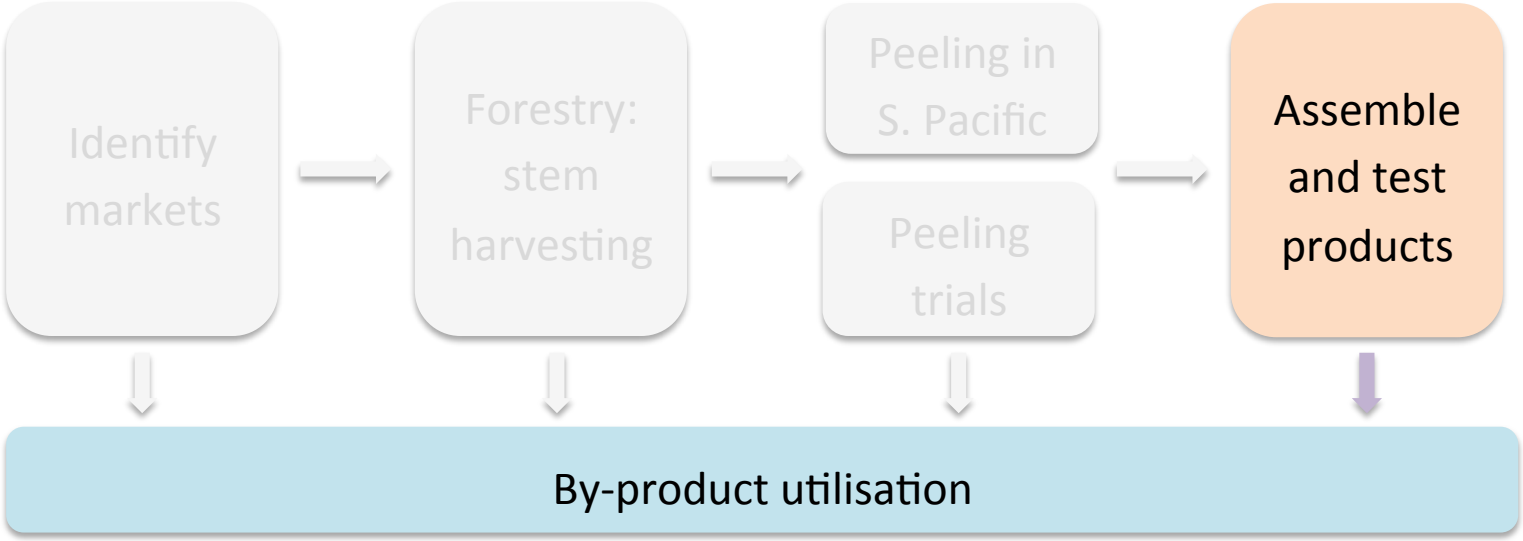


Objective 5 – Products

Assemble and test products

5.1 – Experimental product assembly

- Suitable products assembled from the recovered veneer
- Products developed based on suitable of veneer obtained from different density material
- Products assembled on experimental scale then broadened to commercial

Objective 5 – Products

Assemble and test products

5.2 – Product characterisation and testing

- Mechanical properties of assembled products determined in accordance with relevant standards
- Properties assessed include
  - Strength, glue-bond, dimensional stability

Objective 5 – Products

Assemble and test products

5.3 – Product assessment in-service

- Demonstration appearance and structural products placed in simulated service conditions
- Products will be benchmarked against existing products
- Work in associated with the Engineered Wood Products Australasia (EWPAA)

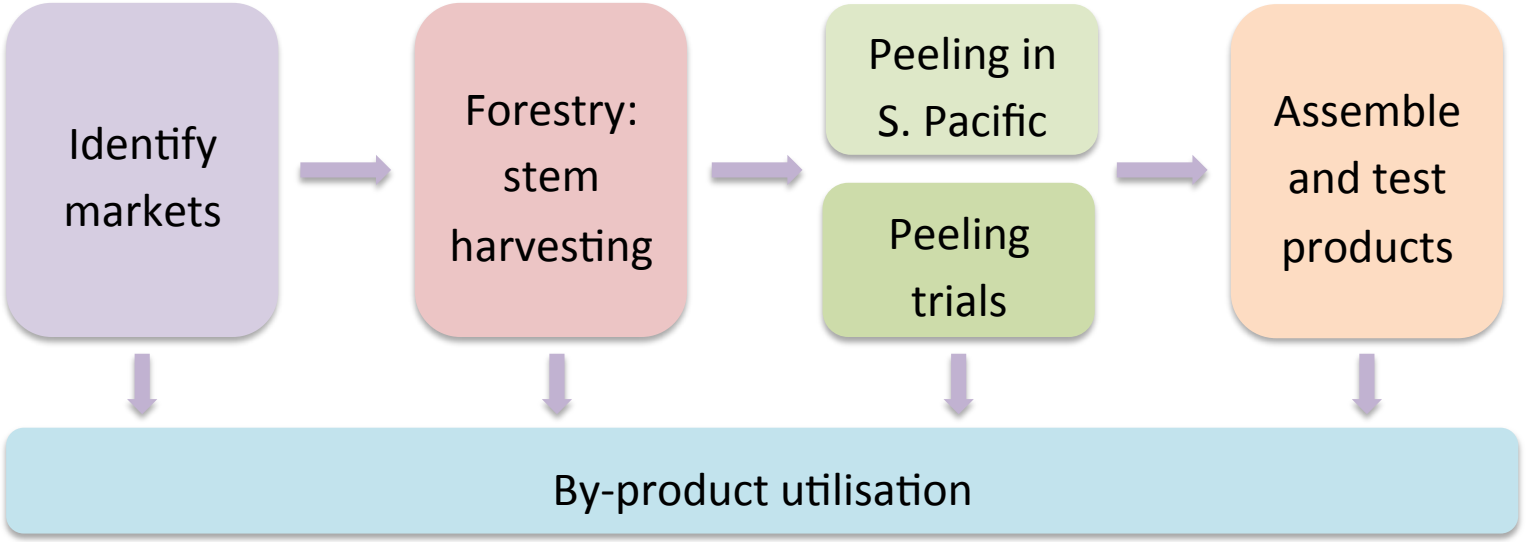
Objective 5 – Products

Assemble and test products

Key completion dates –

- Experimental product assembly, characterisation and testing –
  - — Sep 2013
  - — Oct 2014
  - — Aug 2015
- Product in-service assessment –
  - — Ongoing
  - — Report 2015

Objective 6 – By-product utilisation



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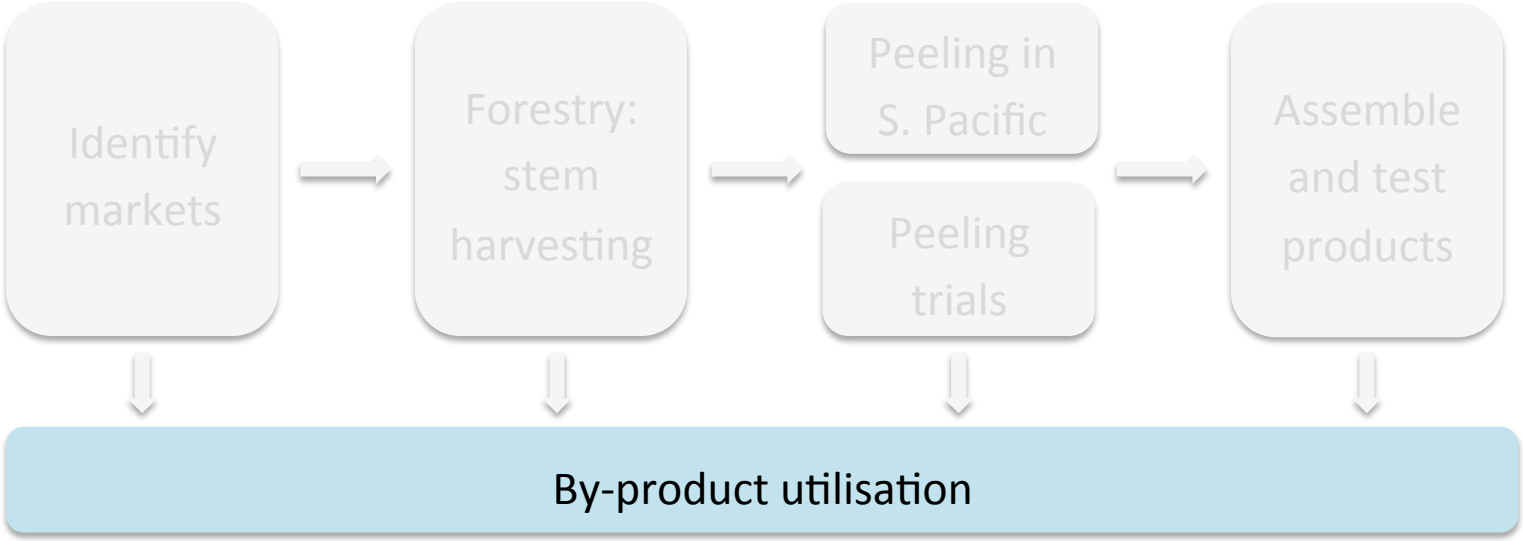

Objective 6 – By-product utilisation

By-product utilisation

6.1 – Collaboration with agricultural projects

- Residue use could include chip, mulch, bio-char, or growing medium
- The use of forestry residues and peeling residues in agriculture will be coordinated with existing agricultural research projects in the region
- Soft core material supplied for agricultural trials

Objective 6 – By-product utilisation

By-product utilisation

6.2 – Biochar trials

- Residues obtained will be tested to determine calorific value
- Residues will be tested to asses viability of biochar production

Objective 6 – By-product utilisation

By-product utilisation

Key completion dates **–**

- Collaboration with agricultural projects – November 2014
- Assessment of cocowood bio-char potential – November 2013
- Biochar produced and trialed – November 2014