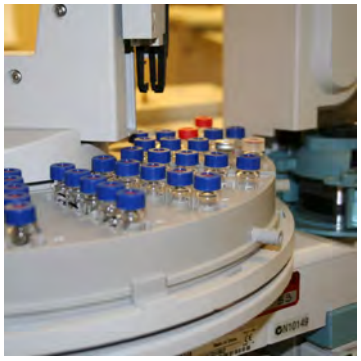
Biotechnology and Analytical Services




Rubber Consultants

TESTING • INNOVATION • SOLUTIONS

since 1984

for all commodities

Biotechnology Services

Since its establishment in 2008 as a laboratory serving the advancement of natural rubber (NR) research, the Tun Abdul Razak Research Centre's (TARRC) Biotechnology Unit has continued to build its expertise portfolio which now extends to a broad range of biotechnological areas. Under TARRC's consultancy arm, Rubber Consultants, we can offer specialised services in:

- *plant genomics*
- *plant molecular biology / genetics*
- *plant proteomics*
- *bioinformatics*

A wide range of both routine and specialised techniques are available for nucleic acid and protein studies. We can provide our clients with advice and practical assistance in troubleshooting and results interpretation, as a part of our service.

TARRC's purpose built biotechnology laboratories are equipped with state-of-art instrumentation. Space in these facilities can be rented on a 'bench fee' basis.

TARRC's affiliation with the Malaysian Rubber Board and Ministry of Plantation Industries and Commodities has facilitated numerous collaborations with the biotech industry based in South-East Asia and worldwide. TARRC also has well established partnerships with leading research organisations in Europe.

Main areas of expertise

International Standard Testing

- Protein content determination in NR products:
  ASTM D5712-10
  EN 455-3:2006
- Individual allergenic protein content in NR products:
  ASTM D7427-08
  In-house developed methods

Accreditation

- Site-wide accreditation to ISO9001
- A number of test methods are approved by UKAS to ISO17025

Biotechnological expertise

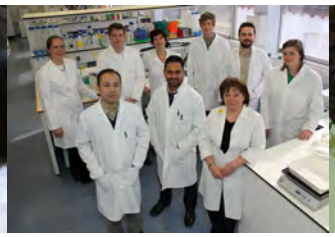
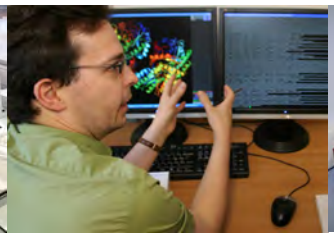
- Gene cloning and protein expression in plant or bacteria heterologous systems
- Generation of protein mutants for studies on protein stability and functionality
- Studying protein processing, maturation and targeting using both *in vivo* and *in vitro* approach
- Production of recombinant proteins in E. coli or plant systems such as *Arabidopsis thaliana* and *Nicotiana tabacum*
- ELISA tests
- Protein purification from bacterial cultures or plant tissues and protein characterisation
- 2D electrophoresis and image analysis for proteomic studies
- Molecular marker development and validation
- Genotyping using range of molecular markers – SNP, SSR, AFLP, RFLP and others
- Genetic mapping
- QTL mapping and its utilisation in Molecular Marker Assisted Selection (MAS) and Molecular Marker Assisted Breeding (MAB)
- Sanger sequencing
- assembly and annotation using combination of NG and Sanger sequencing data
- Gene Expression Analysis
- Bioinformatics

Instrumental platforms

- Low volume, high-precision pipetting platform: Nanodrop II
- Automated nucleic acid purification: QIAcube
- Protein purification, FPLC: AKTAavant
- Analysis of two-dimensional protein gels: Delta2D
- Capillary electrophoresis: Applied Biosystems Prism 3130xl
- Automated electrophoresis system: BioRad Experion
- Fluorescence and absorbance assays: Labtech LT-4000 Microplate Reader, BioTek Epoch Microplate Spectrophotometer
- Real Time - PCR: Applied Biosystems 7900 HT

Typical areas of work

- Genome sequencing
- Molecular marker development and application
- Gene Expression Analysis
- Lateral flow diagnostics
- Proteomics
- Bioinformatics
- Training of staff in specialised research areas / degree training / mentoring through UK university attachments with experimental work


Bioinformatics Services

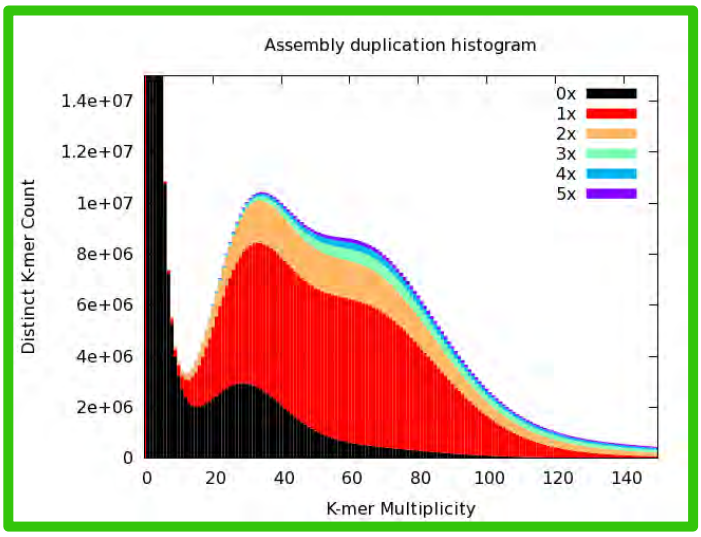
Bioinformatics addresses the challenges of analysing, storing and interpreting biological data with a range of computational and statistical techniques. This can involve analysing DNA and protein sequences, gene expression patterns, interaction and regulatory networks, protein structure prediction and a host of other applications.

Hardware resources

Currently we have a 55-core high-performance Linux computing cluster with 136GB RAM and 10TB dedicated storage and using Platform LSF software for job management. This can facilitate a wide range of computationally intensive applications including sequence assembly and annotation and gene expression analysis.

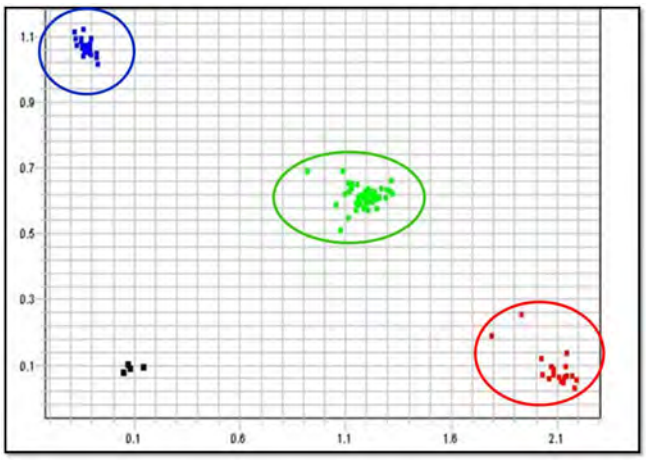
Bioinformatics

Our main bioinformatics efforts are currently in sequencing, assembly and annotation of the rubber tree genome and in comparative studies of the rubber tree and related species.



Main areas of expertise

- *De Novo* sequence assembly from next generation platforms and Sanger sequencing
- Functional annotation of genomic sequence
- Gene and protein sequence analysis
- Data curation
- RNA-seq and transcriptome analysis
- SNP marker selection
- Characterisation of target genes and gene families of interest



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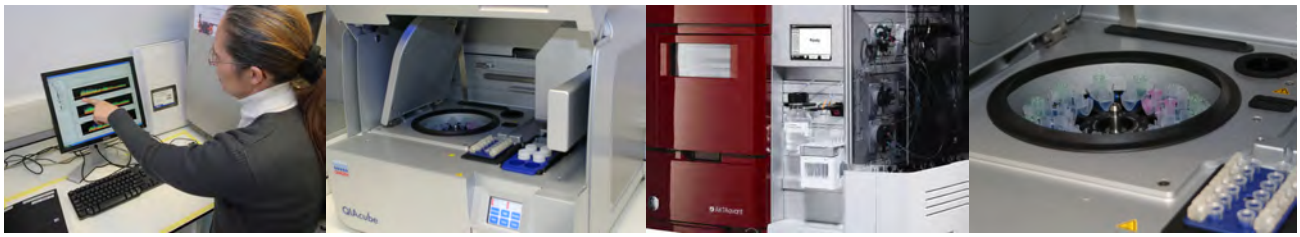

Analytical Services

Analysis is one of the major tools for successful problem solving and trouble-shooting, especially when conducted by experts with the experience to interpret the results. The techniques can be applied to any commodities where structure, trace elements, contamination and packaging are the subject of investigation. The TARRC analytical laboratories are equipped with a wide range of instrumentation and experienced staff. This allows for the analysis of a wide range of materials from low molecular weight volatiles to complex molecules, mixtures and polymers.

We can provide certification of compliance with European regulations. Our analytical expertise is recognised extensively in the polymer sector and the pharmaceutical industry, and our Consultancy reputation has been built up over 30 years.

Main areas of expertise

- Micro-structure analysis
- Polymer experience with respect to packaging
- Compliance with European Directives
- Contamination investigation
- Pesticide residue analysis
- Biomass composition
- Oils and plasticisers
- Working to GMP (pharmaceutical standards)

Instrumental techniques

- Spectroscopy: FTIR, FTIR-ATR, PIR, UV, NMR
- Chromatography: GC-MS, GC-FID, GC-NPD, GC-NCD, TLC, HPLC, GPC, IC, LC-MS, GC-HID, Headspace analysis
- Thermal Analysis: TGA, TGIR, DSC
- Microscopy: light, SEM, STEM, TEM, AFM, ultramicrotomy
- Elemental: SEM-edx, ICP, IC

Pharmaceutical standard analysis

- Method development
- Method validation
- Substances of special concern (PAH, nitrosamines and MBT)
- Extractables or migration testing (*eg* from packaging to product)
- Formaldehyde analysis

Typical areas of work

- Reject product testing
- Checking against specification
- Compliance with European requirements
- Method development for regulatory bodies
- Trace metal analysis
- Wax characterisation
- Preservatives / antioxidants
- Surface finishes
- Residual processing chemicals

Packaging analysis

- Analysis of existing materials or development products
- Compliance testing with European / US food contact regulations
- Leachables and extractables
- Migration testing

Oils analysis

- Saturated, unsaturated, polyunsaturates fatty acid levels
- Biofuels analysis
- Aromatic oils analysis

Accreditation

- Many of the analytical methods are approved by UKAS to ISO17025
- Site-wide accreditation to ISO9001
- In 2009 our pharmaceutical facility was audited by an independent US agency with no critical findings

Contact one of our team

for further information

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