National LED Conference

Exploiting capacities and capabilities of Science Councils for inclusive local sector development

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The CSIR at a glance

- The Council for Scientific and Industrial Research (CSIR) is a science council, classified as a national government business enterprise
- CSIR is a mandate driven organisation
- CSIR Biosciences is an Operating Unit contributing to a sustainable South African bioeconomy through development of health, agricultural and industrial biotechnology-based technology solutions

- 69 years in 2014
- 2411 total staff
- 1691 total in SET base
- 310 doctoral qualifications
CSIR Research Impact Areas

- Energy
- Natural environment
- Industry
- Built environment
- Defence & security
- Health & Nutrition

CSIR Mandate
The objects of the CSIR are, through directed and particularly multidisciplinary research and technological innovation, to foster, in the national interest and in fields which in its opinion should receive preference, industrial and scientific development, either by itself or in co-operation with principals from the private or public sectors, and thereby to contribute to the improvement of the quality of life of the people of the Republic, and to perform any other functions that may be assigned to the CSIR by or under this Act.”

(Scientific Research Council Act 46 of 1988, amended by Act 71 of 1990)
Unique proposition in the NSI

- Support government departments through thought leadership, innovation and technology development to help solve national priorities

- Support industry through development of innovative new knowledge and tools to support their innovative products

- Partner with communities to access IKS, cultivation technologies for crops

- Support technology development within CSIR technologies with University’s know-how

- Support SMEs through combining CSIR technologies with process design

- Support industry through technology development and process design

- Support government through development of innovative new knowledge and tools to support their innovative products
Linkages and Relationships

- HEI/Science Councils (QC/Research)
- Other Government Programs
- Cooperatives SMMEs
- Market
- Agripark
- Cultivation
- Nursery
- Processing
- Community Farms
- External Clients
Focus Areas

Enterprise Support Programmes

Opportunity Identification
Opportunity Assessment and Packaging
Enterprise Creation and Development

Capacity Building for LED

- Manufacturing
- Agro-processing
- Green economy
- ICT
- Built environment
Integrated approach to enterprise development

- Rapid Review
  - Social Interventions
  - Infrastructure Interventions
  - Economic Interventions
    - Product or Business Idea
    - Technology and Product Development
    - Feasibility
    - Enterprise Creation
    - Incubation And Support
    - Enterprise Improvement

- Sector Study
  - Interventions to strengthen the sector
  - Interventions to strengthen the enabling environment
Agroprocessing Infrastructure

**B18A: Bench-scale Lab (<50kg Batch)**
- 10L & 40L Rotovaps
- Centrifuges
- 5L-50L Buchi chemical reactors
- Distillation columns
- Short path distillation unit
- Micro-reactors
- Spray dryer lab-scale
- Parr reactor
- Moisture analysers etc
- Homogenizers, stirrers etc

**B18E: Agroprocessing Pilot Plant (>100kg Batch)**
- Washers
- Centrifuges
- Blanchers: pots, oven
- Slicer, dicers etc
- Mills, sievers, blenders
- Pulpers, mincers
- Presses: hydraulic, screw
- Drying ovens
- Extruder
- Tanks
- Moisture analysers etc

**B18A: Extractions Pilot Plant (>100kg Batch)**
- 400L chemical reactor
- Wipe d film evaporator
- Mixer settler
- Karr columns
- Centrifuge
- 40L Flash distillation
- Scrubber
- 1500L holding tank
- Solvent preheaters etc
- Pumps, trolleys, jib crane etc
- POPE

**B20: Product & Cosmetic Formulations (<50kg Batch)**
- Capsuler, polisher, counter
- Tea/sachet bagging machine
- Silverson homogenizers
- High pressure homogenizer
- Tube filler
- Bottle filler
- Cream tube filler
- HPLC & GC
- Viscometer, moisture analysers etc
- Spray dryer
Experience in community and enterprise development projects

- INTABA JAMS
Overview

- Situated on mountain at Piketberg
- Registered in 2001
- Owners:
  - 9 Farm Workers
  - Retired Production Engineer
- Produces:
  - Jams
  - Chutneys
  - Preserves
  - Jellies
CSIR Involvement

- Development and implementation of production facility and production lines
- Product Development
- Market Development
- Implementation of Health and Safety systems
- Regulatory compliance
- General business development support
Outcomes and Achievements

• Secured contract with Woolworths
• Stringent requirements met:
  o Woolies quality
  o Personal hygiene
  o Factory health and safety compliance
  o Product labeling
• Sustainable business
• Enhanced product range:
  • Orange marmalade
  • Grapefruit marmalade
  • Apple sauce
  • Green fig preserve
  • Many others
• Permanent employment opportunities created
Tshivase Botanical Extracts

- Tshivhase Tea Estate- Limpopo:
  - CSIR’s intervention
    - Extraction of active ingredients and plant oils
    - Product development to create new products
      - hand creams, herbal oils, etc.
    - Extraction processes tested and optimised
    - Quality control, treatment and ‘cleaning’ processes confirmed
    - Blending with selected products investigated
Nutri-Health Drink Launch in Cofimvaba, Eastern Cape

- Nutritious breakfast drink for school children was finalised and launched at 25 schools in the Eastern Cape
- Nutritional status survey informed modifications
- Production and processing of Amaranthus is now being done by communities working at University of Fort Hare Agri-Park
Beaufort West Hydroponics

CSIR involvement

- Development of Production Processes
- Installation of infrastructure and related works
- Market and business development support (secured Woolworths as main buyer)
Vhembe Fresh Produce Market

Tshakuma - Limpopo

CSIR planned activities
• Development and implementation of agroprocessing facility
• Implementation of Health and Safety systems
• Regulatory compliance
• Product Development
• Market Development
• Enterprise development support
4th Industrial Revolution as it relates to this sector

Nanotechnology in foods:
• Described as the new industrial revolution
• **Nano foods** - nanotechnology already making an impact on the development of functional or interactive foods, which respond to the body’s requirements and deliver nutrients more efficiently.

Nanotechnology in food packaging:
• Developing **smart packaging** to optimise product shelf-life, alert the customer if the food is contaminated, developing active anti-microbial and antifungal surfaces.

Nanotechnology in agriculture:
• Revolutionises agricultural and food industry with **new tools** for the molecular treatment of plant diseases, rapid disease detection, enhancing the ability of plants to absorb nutrients etc.

Robotics and digitization in agriculture and agro-processing:
• Smart sensors & smart delivery systems to help the agricultural industry **combat viruses & other crop pathogens**
• Precision farming - make use of computers, global satellite positioning systems & remote sensing devices to measure highly localised environmental conditions.
• Determining whether crops are growing at maximum efficiency and identifying the nature and location of problems.
20 Future Technology Trends in Agriculture – 2015 to 2050

A study published in 2016 by the STT Netherlands Study Centre for Technology Trends, identified the following 20 future technology trends in agriculture that would influence the Dutch agro and food sector during the period 2015 to 2050:

1. 3D printing
2. 4D printing
3. Smart materials
4. Robotics
5. Autonomous micro-robots
6. Sensor technology
7. Information technology and IT infrastructures
8. Bioinformatics
9. Smart farming
10. Renewable energy
11. Biorefinery and biofuels
12. Genetics
13. Synthetic biology
14. Protein transition
15. Food design
16. Aquaculture
17. Vertical agriculture
18. Conservation technology
19. Transport technology
20. Weather modification
Thank you

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