COMSATS COORDINATING COUNCIL MEETING

# PROFILE

# ON

# COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH INSTITUTES – GHANA

# CSIR-GHANA

**TRIESTE, ITALY**

**MAY, 2010**

# CSIR - Ghana

- Established in 1957
- 13 Research Institutes in agriculture, fishery, forestry, industry, environment and health
- 600 research scientists
- Total staff strength of 3000
- Under the Ministry of Environment, Science & Technology

# CSIR - Ghana

- **CSIR - FORESTRY RESEARCH IN GHANA (FORIG)**
- **CSIR - SOIL RESEARCH INSTITUTE (SRI)**
- **CSIR - BUILDING AND ROAD RESEARCH INSTITUTE (BRRI)**

# CSIR – FORESTRY RESEARCH INSTITUTE OF GHANA






## Brief on Forestry Research Institute of Ghana (FORIG)



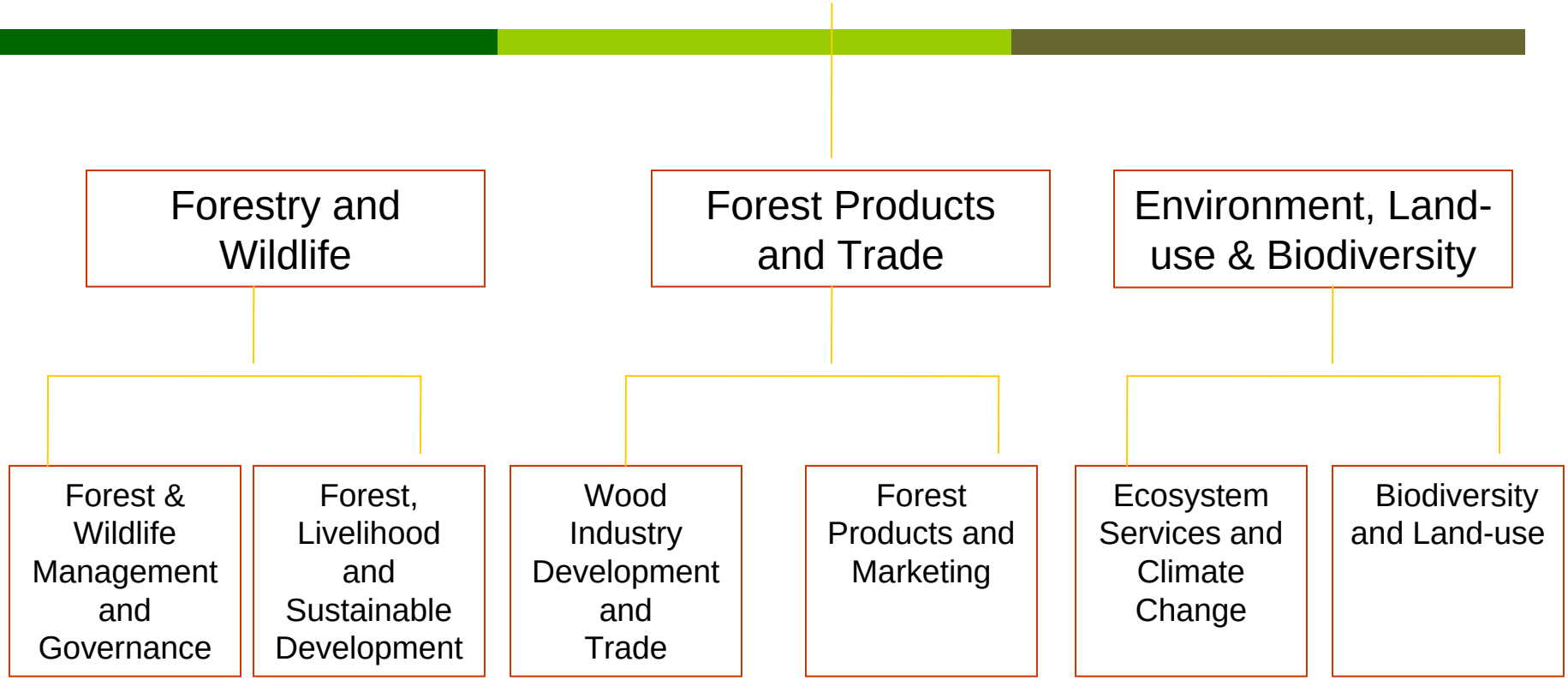








# CSIR- FORIG: Research Programmes



# CSIR- FORIG

- **Forest & Wildlife Management and Governance**
  - **Studies on Illegal logging and chainsaw milling operations.**
  - **Landscape Restoration.**

- **Forest, Livelihood and Sustainable Development**
  - **Strengthening of capacities of public sector agencies and local communities involved in natural resources management**
  - **Diversification and maximization of rural income from natural resources**

- **Wood Industry Development and Trade**
  - **International Trade in Forest Resources**
  - **Promotion of lesser used species, small diameter logs and wood residue utilisation to enhance sustainable resource utilisation.**

# CSIR- FORIG

- Forest Products and Marketing
  - Establishment and functioning of viable small to medium-scale village enterprises
  - Standardisation, Quality Control and grading for products
- Ecosystem Services and Climate Change
  - Carbon Sequestration and Clean Development Mechanism (CDM)
  - Payment for environmental services
- Biodiversity and Land-use
  - Rehabilitation and restoration of mined sites and degraded cocoa landscapes
  - Local Community involvement in protection of biodiversity

# CSIR- FORIG

## Wood residue Utilisation

# CSIR- FORIG

**Rehabilitation of Degraded forest and mined sites**

# CSIR- FORIG

Development of Best Nursery practices

Production of high quality seedlings for plantation development

# Promotion of Non-Timber Forest Products (NTFP's)

Cultivation of mushroom 'Domo' (*V. volvacea*) using agricultural waste developed

Vegetative cultivation of Bamboo and rattan

Taxonomical and anatomical identification key for bamboo and rattan

# Extractives from forest tree species

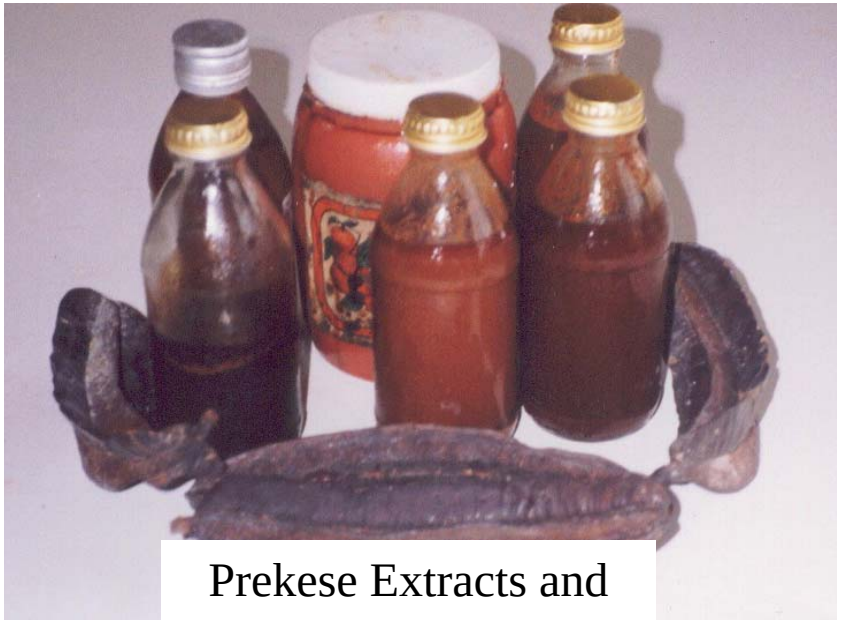
Prekese (*Tetrapleura tetraptera*) Fruits

- Extracts from Prekese Fruit
- A confectionary company has been using Prekese extract as a flavouring for their sweets

Uses

- Spread
- Condiment for cooking
- Flavour in food industry

- Acacia Gum
  - Ghana Cocoa Board has been buying Acacia gum for industrial use.



Prekese Extracts and Fruits


Acacia Gums

# Development of Products from LUS

Round Table produced from coconut tree

**Promoting Lesser Used Species in Ghana for the following products**

- **Furniture and Joinery**
- **Construction**

**Services include:**

- **Strength testing**
- **Study of strength properties for various lesser used species.**

# Cultivation of Pines and Other "Problem" Species

- Mycorrhizal-grown *Pinus caribaea* with improved physical properties developed
- Odum clones tolerant or resistant to the pest *Phytolyma lata* developed
- Mass production of superior genotypes of wawa (*Triplochiton scleroxylon*) by stem cuttings developed

# CSIR- Soil Research Institute

# CSIR-SRI - MISSION STATEMENT

To generate scientific information for planning, development and management of the soil resources of Ghana for increased and sustainable agriculture, industry as well as ensuring safe and sound environment.

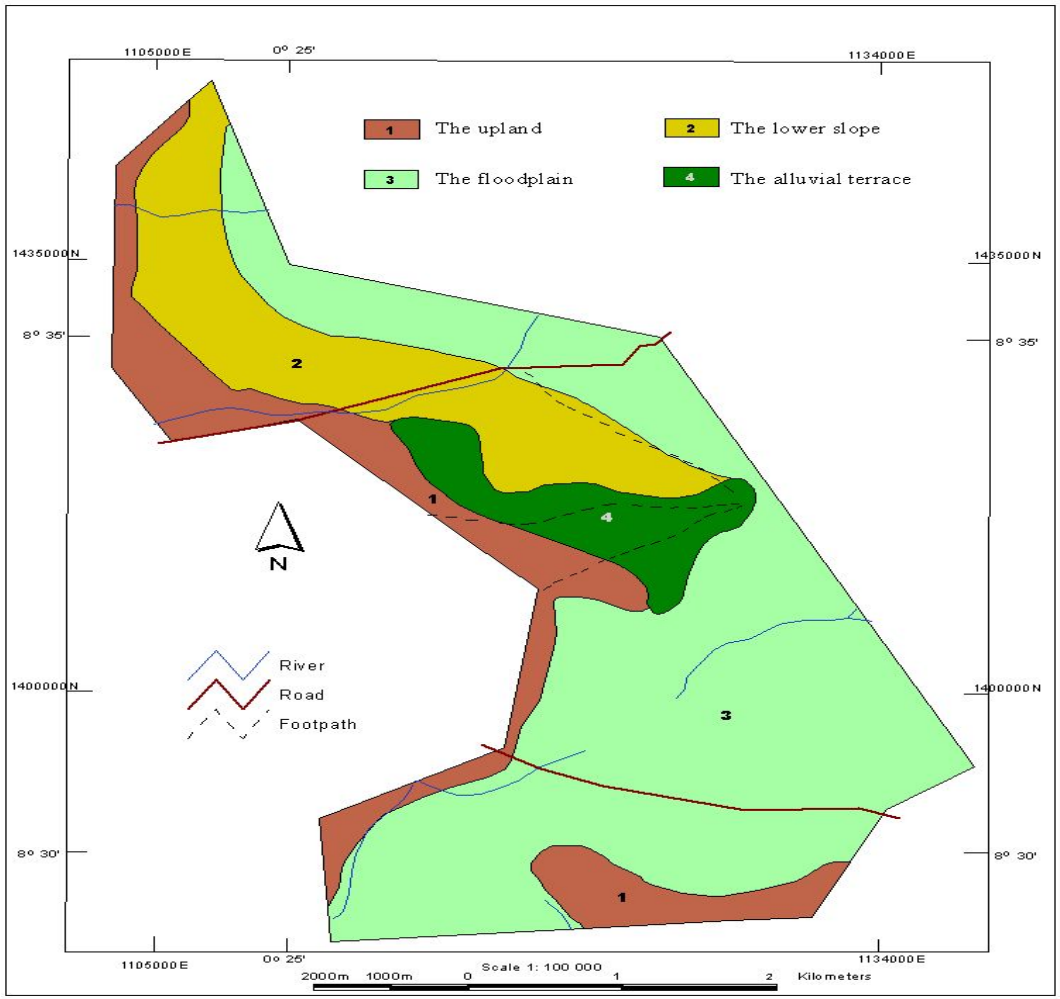
# CSIR-SRI: Objectives

- Develop knowledge for efficient management of the soil resources of Ghana
- Strengthen the institute's delivery capacity for increased agriculture production
- Establish and strengthen linkages with local and international institutions

# CSIR-SRI -RESEARCH PROGRAMMES AND SERVICES

- Land Evaluation
- Soil Fertility Management
- Environmental Management
- Laboratory Analytical Services
- Technology Transfer/Consultancy Services

# Development of Thematic Maps



# Achievements of the Programme

- Soil resources mapped out, described and evaluated.
- Soil suitability assessment done in some areas & management recommendations made for the production of food, cash and non-traditional export crops. e.g. pineapple, cashew, banana, cassava, oil palm, maize & rice.
- Identified benchmark soils in all agro –ecologies for easy technology adoption

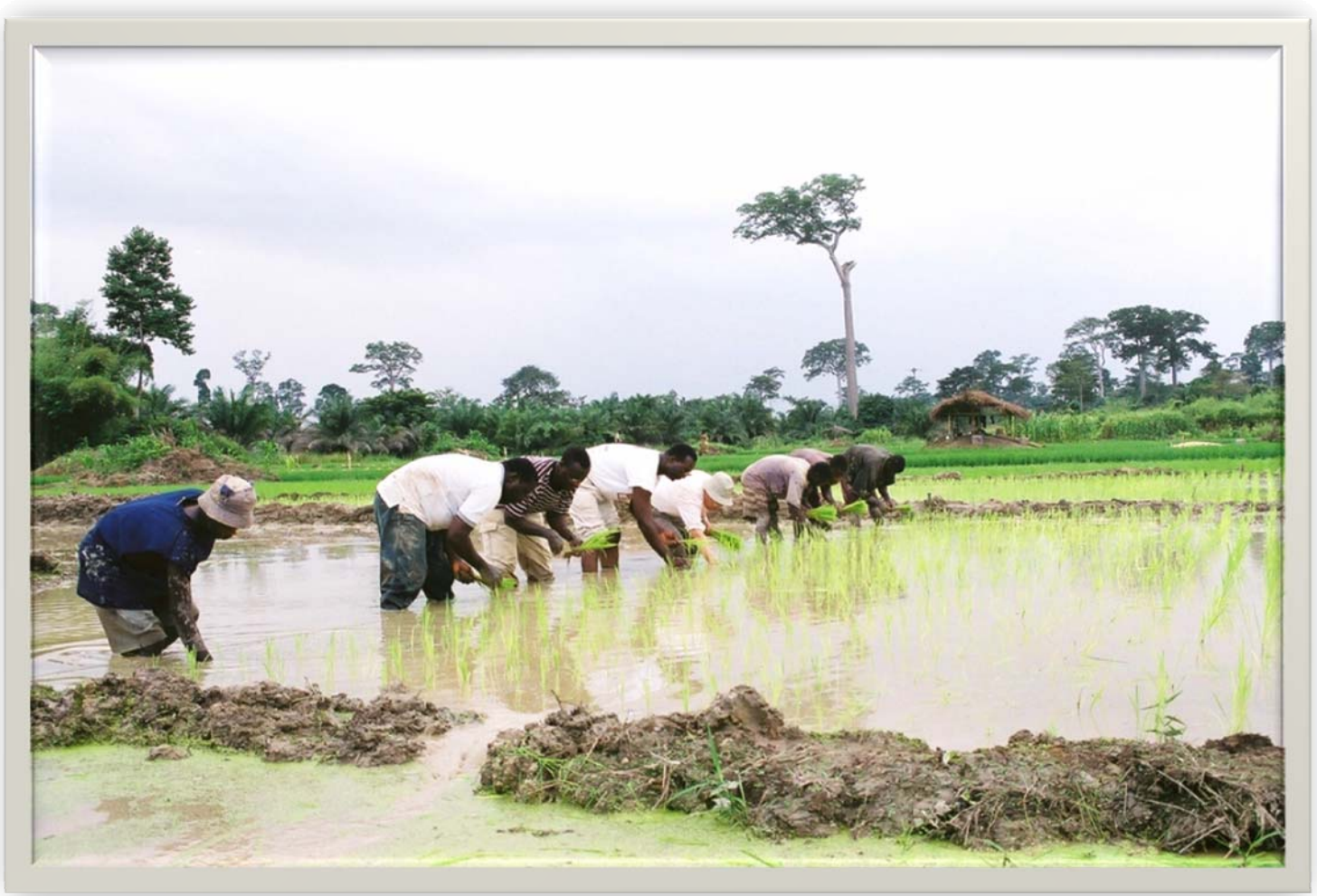
- Digital maps of suitable areas for maize cassava, citrus and oil palm, etc., are available.

- Also in digital format is a database of 369 soil units, which facilitates information reference, retrieval and updating of data on these soils.

# Fertilizer Programme

- Developed the new maize fertilizer (16-16-19 +MgO +S(SO3)+B) which can increase maize yield to about 10 tons/ha
- Effective soil, water and nutrient management (SAWAH Technology) for lowland rice production
- Rice yields increased from 1 to 5 tonnes/ha
- Adopted by Ministry of Agriculture for increased rice production in Ghana

# SAWAH Technology- teaching farmers how to transplant rice



# SAWAH Technology- Improved Rice Fields

# Environmental Management

*Objective*

- Develop capacity to engage in emerging research areas related to sustainable soil management and climate change as a major factor affecting soil productivity and food security.
- Regeneration of natural resources, degradation, pollution, effect of mining and industrial activities on soil health.

# Regeneration of Degraded Lands

# CSIR-Building & Road Research Institute


# MISSION STATEMENT

- To profitably provide research and development products, processes and services to the building and road sectors and for the socio-economic development of Ghana.

# MANDATE

- To undertake research into all aspects of building and road planning, design, construction and maintenance with a view to assisting the construction industry to be more efficient, safe and economical

- To develop local construction materials for increased utilization in construction

# RESEARCH ACTIVITIES - BUILDING

- Evaluation and development of cementitious materials
- **Production of composite cement from Industrial Wastes**
- Mechanical activation of clay pozzolana
- Termite controlling activities of some local plantsImproving the survival of earth buildings against floods: A case study of the Sandema floods in 2007

- Evaluation of clay for development of burnt bricks and tiles for housing
- Fast track cost-saving techniques for housing construction
- Use of bamboo for housing
- Studies on Ghanaian mineral admixtures for masonry mortars

# BURNT BRICKS FOR HOUSING

# RESEARCH – BAUXITE WASTE & CLAY POZZOLANA

- Development and Production of clay Pozzolana for housing construction
  - It can replace up to 40% of cement for construction
  - Reduces the price of cement by at least 18%
  - Improves the resistance of cement against sulphates attack
  - Production being increased from 200 to 300 bags/day
- More than 4000 tonnes have been sold to the building industry

# CSIR-BRRI

- CSIR- BRRI in partnership with a private investor and support from government establishing pozzolana plant which will produce 4,000 bags of clay pozzolana per day.

- Production will start in August 2010 and this will save the country about $20 million dollars per annum in clinker importation

# Composite cement research

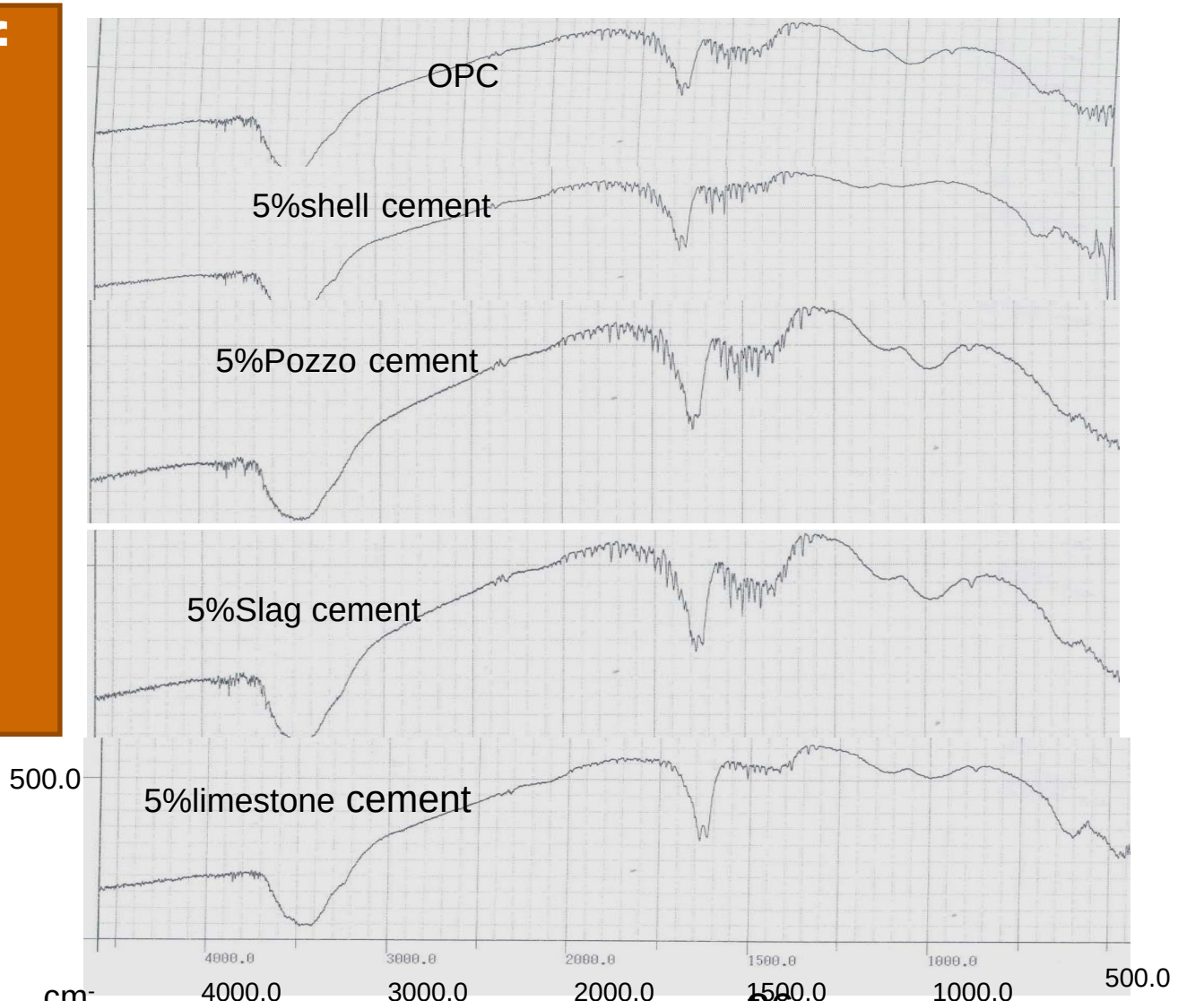
- Materials:
  - Portland cement
  - Steel slag (SS) is an industrial waste resulting from the steel-refining process in a conversion furnace.
  - Limestone ($CaCO_3$ – $CaO$)
  - Clam shells ($CaO$)
  - Clay pozzolana ($SiO_2$)
  - Bauxite waste ($Al_2O_3$ & $SiO_2$)

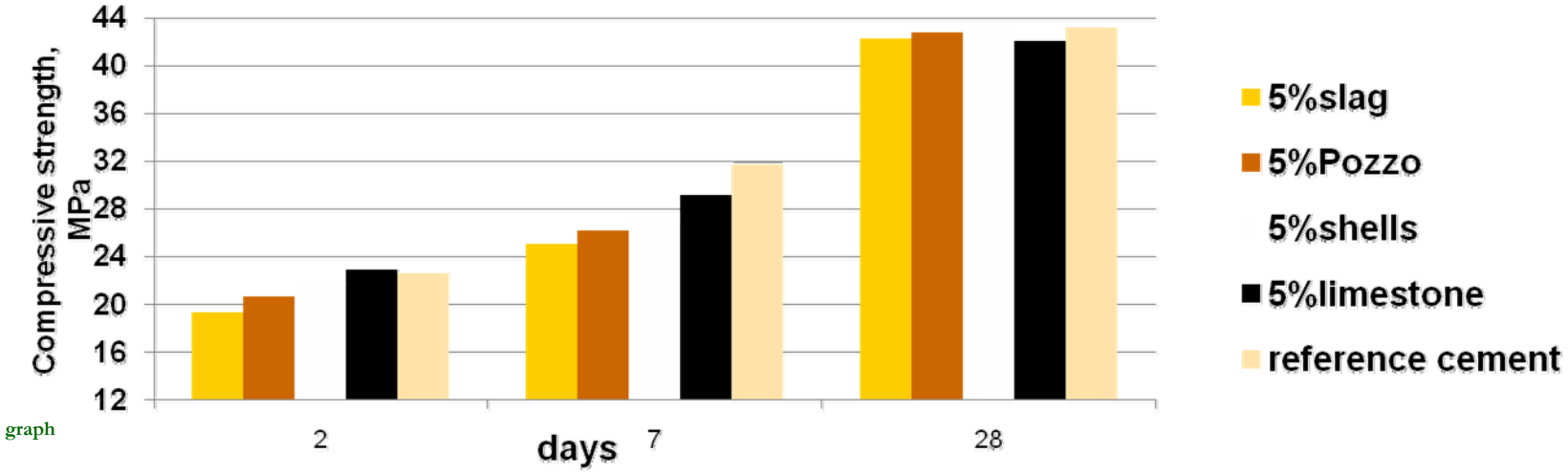
# Mix design of samples

- Binary - 5% sample content (5%L95% cement)
- Ternary – 5%x5%y samples content (5%L5%P90% cement)
- Quarternary - 5%x5%y5%z samples content
- To be used for Housing construction

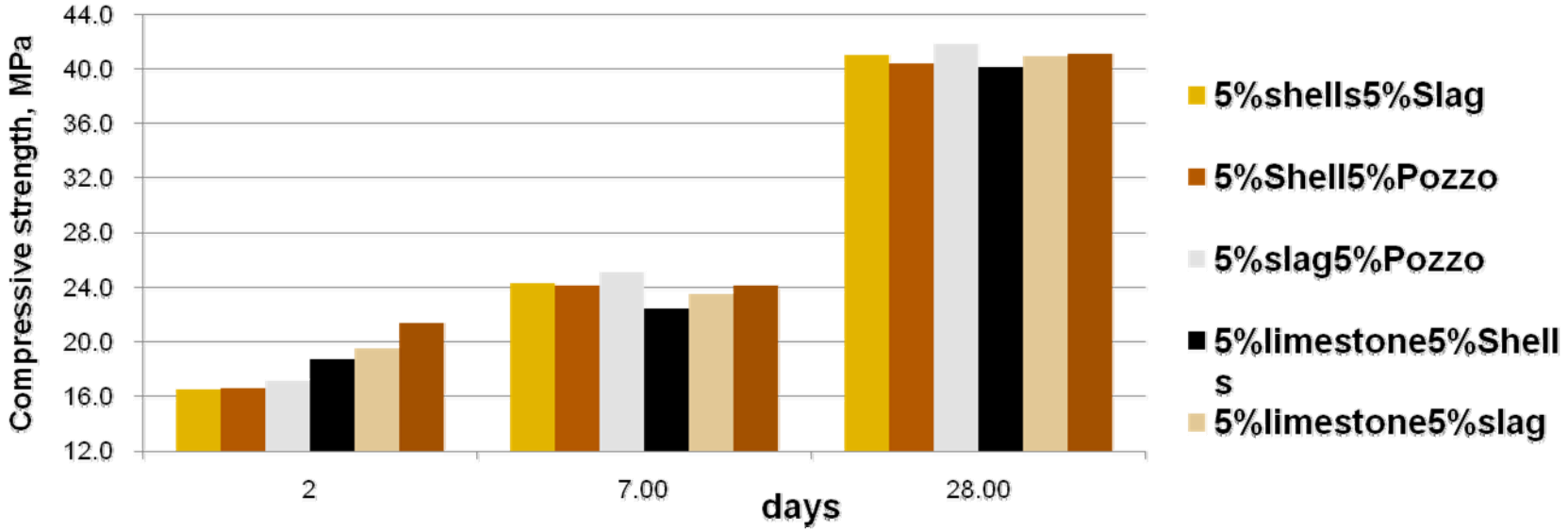
# Infrared

**spectra of hydrated OPC and blended cements at 28 days**




Compressive strength, MPa
44
40
36
32
28
24
20
16
12
2
7
28
days
5%slag
5%Pozzo
5%shells
5%limestone
reference cement

graph


Compressive strength, MPa
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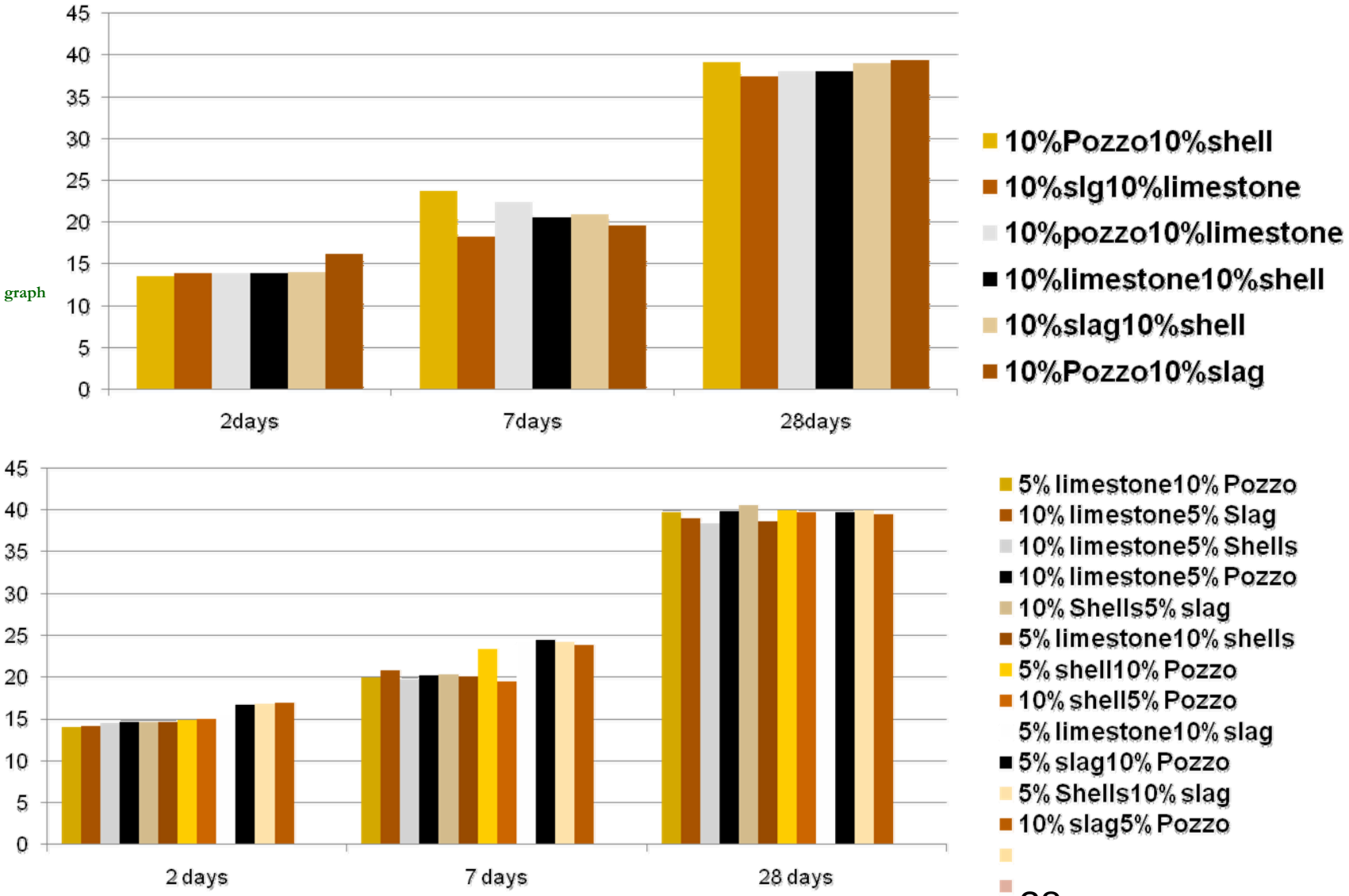
5%Shell5%Pozzo
5%slag5%Pozzo
5%limestone5%Shells
5%limestone5%slag

graph


45
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10%Pozzo10%shell
10%slg10%limestone
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10% shell5% Pozzo
5% limestone10% slag
5% slag10% Pozzo
5% Shells10% slag
10% slag5% Pozzo

# Studies in pedestrian safety in cities and rural population along major highways

# Studies in skid resistance of major roads in Ghana

# New Areas of Research which need collaboration

- Bitumen and Asphalt analysis and development
- Composite Portland Cement
  - Steel slag and limestone
  - Clam shells and slag
  - Pozzolana and slag
- Improvement of marginal materials for road construction
- Skidding resistance of asphaltic surfaces
  - Mitigate/eliminate car crashes

# Thank you