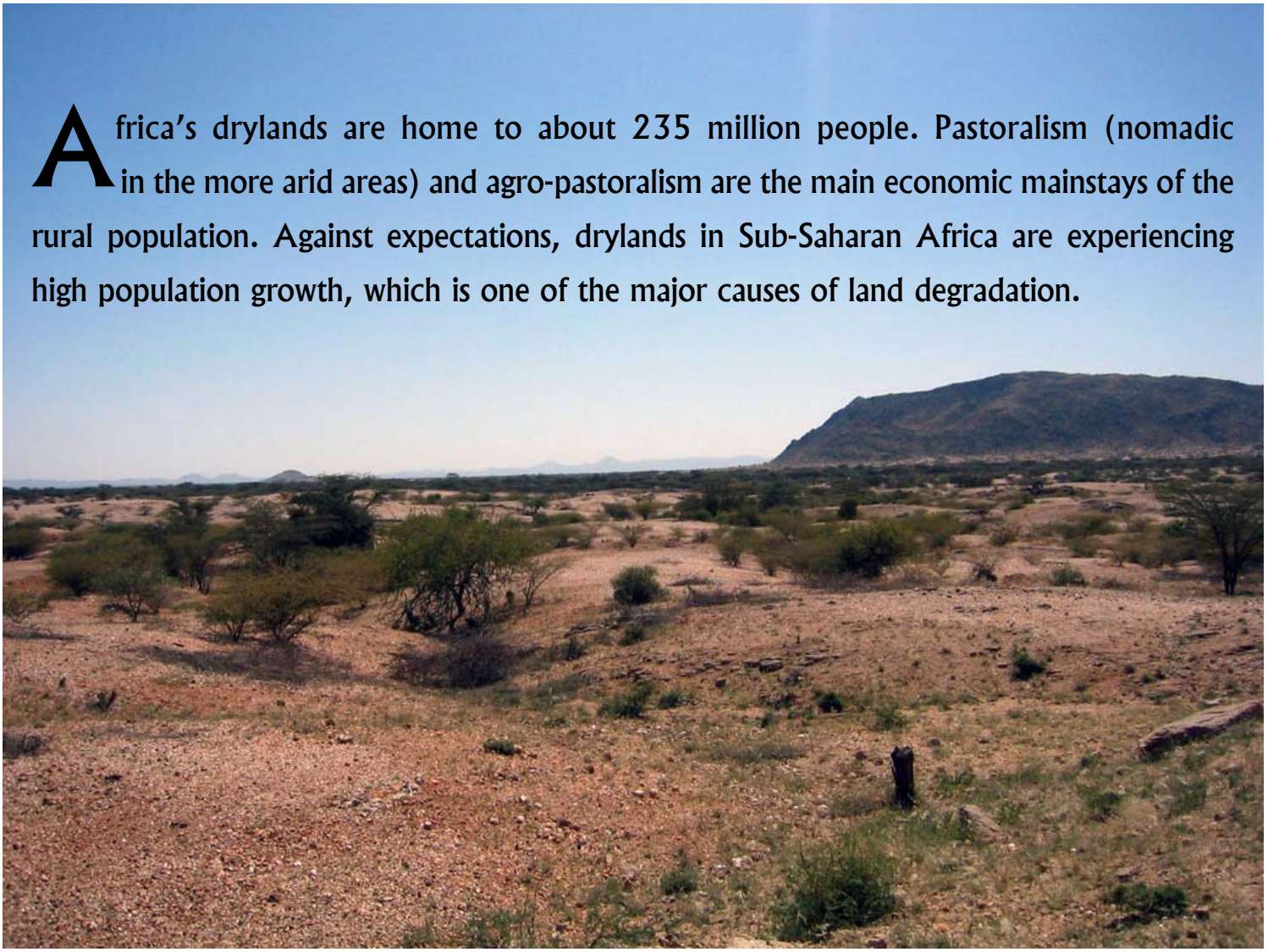
ACACIAGUM

Innovative Management of *Acacia senegal* Trees to Improve Land Productivity and Gum Arabic Production in Arid and Semi-Arid Sub-Saharan Africa

INTRODUCTION

More than half of Africa's land surface (55%) is dryland (dry sub-humid, semi-arid and arid). Drylands are generally characterized by harsh environmental conditions resulting from scant (100-600mm) and erratic rainfall with poor reliability and frequent drought; a high evaporative demand and poorly developed soils. Under these conditions, grasses and bushes/shrubs are the principal types of vegetation.

Africa's drylands are home to about 235 million people. Pastoralism (nomadic in the more arid areas) and agro-pastoralism are the main economic mainstays of the rural population. Against expectations, drylands in Sub-Saharan Africa are experiencing high population growth, which is one of the major causes of land degradation.



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There is an urgent need to mitigate land degradation and desertification in Africa's drylands. One way is to diversify the economic base by recognizing and developing the potential inherent in the plant resources found in these areas. Among the plant resources, is *Acacia senegal*, a highly valued, multi-purpose tree species known for its ability to grow in areas with rainfall as low as 200mm, to restore soil fertility in degraded areas through symbiotic association with micro-organisms and as a source of internationally sought-after gum Arabic.

Recognizing the above potential and the need to sustainably manage the environment and improve livelihoods of communities living in the drylands of Sub-Saharan Africa, the European Union is supporting European and African scientists in equal partnership to combine their expertise, to improve resource, productivity and gum arabic production through an INCO-DEV project code named '**ACACIAGUM**'. The overall objective of **ACACIAGUM** is to combine high gum quality with increased gum production and sustainable tree management for improving rural livelihoods.

SPECIFIC OBJECTIVES

- Documentation of traditional ecological knowledge on the management of *A. senegal* resources for various uses
- Identification of existing marketing networks and development of suitable trade chains for enhanced benefit sharing, especially among the target rural communities
- Understanding tree eco-physiology in relation to gum yield and quality
- Evaluation of the extent of genetic control of gum yield and quality
- Understanding tree-soil interactions for improved gum quality and rehabilitation of degraded sites
- Dissemination of information to inform decision making and improve outcomes for target groups

THE APPROACH

The **ACACIAGUM** project provides a unique north-south collaboration where relevant expertise and resources are being availed for addressing problems of food security and livelihoods faced by developing countries. The European and African partners in a more or less balanced way are sharing the various work packages and tasks. There is thus a strong complementarity between research teams from the two regions resulting in high quality multi-disciplinary research approach.

The participating institutions are:

- IRD (France), CIRAD (France), CEH (UK), Wageningen University (Netherlands)
- KEFRI/NGARA (Kenya), University of Niamey (Niger), PRASAC / IRAD (Cameroon), UCAD (Senegal), ISRA (Senegal)

Various innovative approaches will be implemented:

- Innovative approaches to the study of water-use and photosynthate allocation within trees are particularly apt for this study of an exudate-producing crop. Physiological measurements of tree water use (stem sap flow, leaf gas exchange, soil water content) will be conducted in relation to gum production;
- Tree management (shoot and root) for optimization of gum-arabic production in relation to intercrop growth and soil microbial populations present in the rhizosphere in differing environmental conditions will form an important topic for improvement of the financial profits of the populations concerned in gum-arabic production.
- The innovative linking of genetics with quality attributes of verified A. senegal trees will yield a tool to ensure that future tree plantings produce high quality gum.
- An innovative and novel certified marketing system that provides equitable returns to producers and rural populations and assures importers of the source, bio-safety, hygiene and quality of the product will be developed and proposed to policy makers and commerce.
- The relationship between soil fertility and sustainable gum-arabic production will be developed and quantified with the final objective of producing gum arabic with a 'green' label.
- The dissemination of results and information has been granted particular importance and a work package has been dedicated to dissemination issues to try to maximize impact amongst end users. Dissemination plans will be developed for different audiences: Government Departments in all countries involved in the study, national and international agencies involved in natural resource management, NGOs, all actors in the production/marketing chain from local populations through farmers, and the scientific community.

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