



Australian Government

Australian Centre for
International Agricultural Research

Soil and Land Management

Improving soil and water management and crop productivity of dryland agriculture systems in Aceh and New South Wales

Overview

Rural poverty in dryland farming areas is a major challenge to the development of the agriculture sector in Aceh.

This project aimed to increase the crop yields of dryland farmers in Aceh to help them make a better living. Water and nutrient availability limit the productivity of dryland soil, but there is pressure to increase production. Due to lack of capital, farmers apply very little or no fertiliser to dryland crops, resulting in yields being significantly below their potential.

Previous research showed that growing vegetables and dry-season crops could increase family incomes. The current productivity of these crops is limited due to poor soil fertility and water availability. These production constraints were addressed through research, demonstration, and training activities. The project also helps women farmers grow vegetables for family consumption and income.

Adoption of technologies developed through the project is expected to increase yields of key dryland crops by at least 20%. Farmer annual income is estimated to increase by an average A\$300 per hectare as a result of higher yield and more crop diversity.



KEY FACTS

ACIAR Project No. SMCN/2012/103

Duration: December 2014 to June 2019 (5 years)

Target areas: Aceh, Indonesia and New South Wales, Australia

Budget: A\$1,045,000

Project leader:

Malem McLeod, New South Wales Department of Primary Industries

Key partners

- Assessment Institute for Agricultural Technology, Aceh
- Sylah Kuala University

ACIAR Research Program Manager

Dr James Quilty

Objective

The main objectives of this project were to:

- Examine current practices in dryland cropping systems in the selected districts and identify agronomic constraints for increasing productivity considering the local agroecological and socio-economic conditions.
- Develop integrated soil, water and crop management practices for increasing the cost-effective production of key dryland crops in rotations.
- Develop strategies for dissemination of promising technologies to extension services and smallholders.

Outcomes

Research:

- New scientific data on dryland soils in Aceh are now available, confirming the main production constraints as: low soil carbon and nitrogen contents, and low base saturation of dryland soils.
- Two demonstration sites have supported 16 food crop farmers in Aceh Besar and Bireuen.
- Evaluation of cropping systems confirmed monoculture produced higher yields than multiple cropping.
- Unsyiah is evaluating soil and crop response to different types of biochar (rice husk, coconut husk and wood waste).

Capacity development:

- A total of 43 local field extension officers, 16 food crop farmers and 34 university students have been trained to manage dryland soil to improve soil fertility and crop yield.
- Students and researchers have been trained to use EM38 to measure soil electrical conductivity and soil water.
- Increased research capacity of Unsyiah. Established research facility, technical training, publications, and capacity to access local funds.

Gender:

- The project has supported 725 women farmers in growing vegetables in dryland areas across the Aceh Besar, Aceh Barat, Pidie and Bireuen districts.
- Most of the 725 women farmers supported have reported increased vegetable consumption for their family, improved skills and wellbeing. Seven groups reported benefits of up to A\$499/year/member and have successfully accessed local community funds to continue development and expansion of their gardens.

Partnerships:

- Collaboration between Balai Pengkajian Teknologi Pertanian Aceh and Unsyiah has increased through a joint research proposal to Round 3 of the ad hoc international program titled 'Strategic placement of soil organic amendment for dryland soil in Aceh'.

Benefits to Australia:

- In Australia, the project will add value to on-going work in dryland farming areas of the north-west slopes and plains of NSW to increase yields of the existing pasture in rotation, and evaluate land management practices that minimise negative impacts on soil and water resources.
- Trials in NSW have shown that the improvement in soil carbon, soil nitrogen, available and total phosphorus and soil pH in soil mixtures with biochar persist for at least 6 years.

