World Agroforestry Centre

Australian Government
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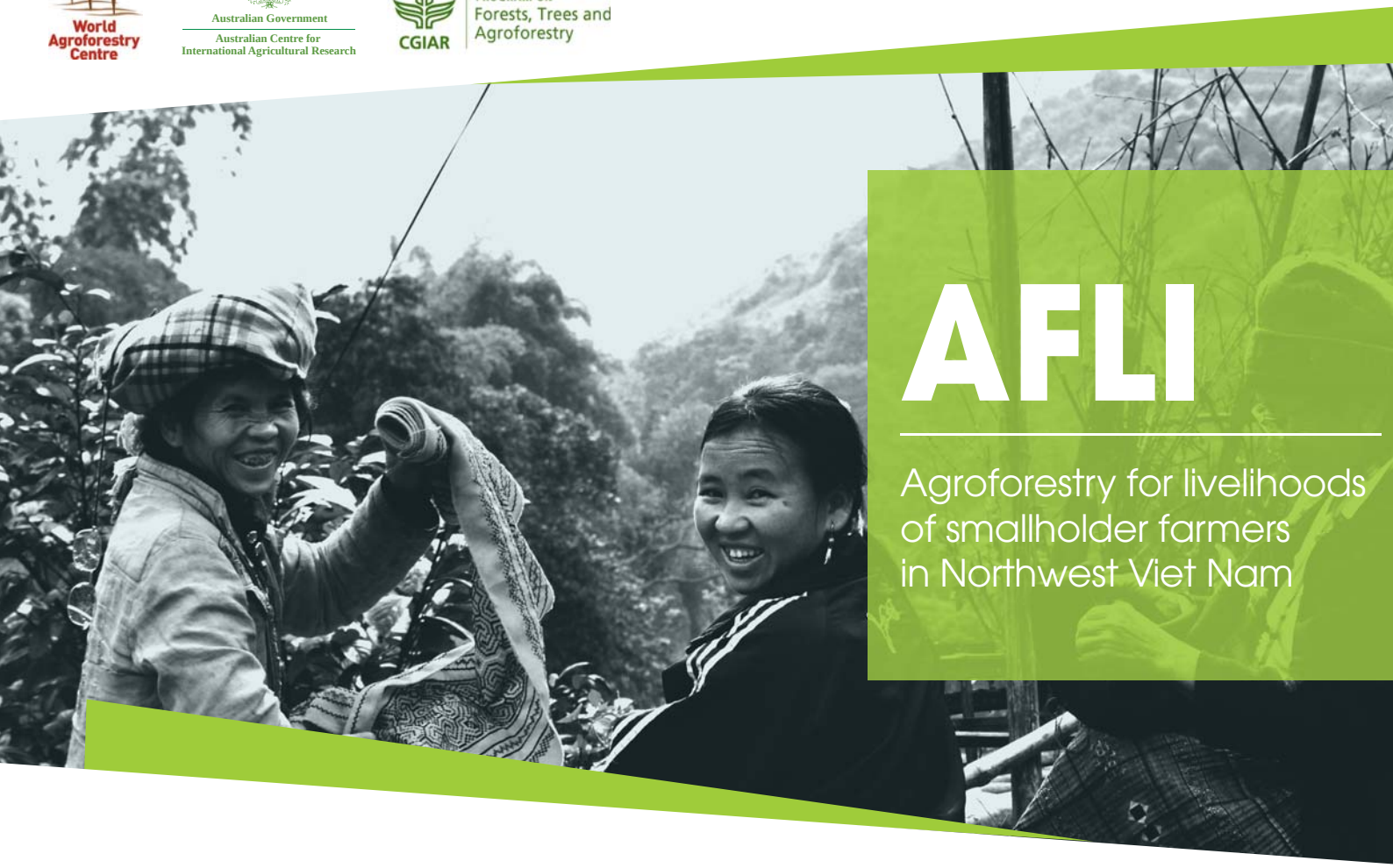
CGIAR RESEARCH PROGRAM ON Forests, Trees and Agroforestry



AFLI

Agroforestry for livelihoods of smallholder farmers in Northwest Viet Nam

AFLI PROJECT

aims to increase the productivity of smallholder farming systems in northwest Viet Nam, while also conserving the natural resource base. The project introduces trees in mono-cropped landscapes through agroforestry to reduce dependence on annual crops, as well as increase and diversify incomes from tree products. A variety of agroforestry options ensure short- and long-term benefits for farmers, while trees provide ecosystem services, such as prevention of soil erosion. Several tree species are currently being tested in agroforestry systems to evaluate their suitability under different agro-ecological conditions across Dien Bien, Yen Bai, and Son La provinces, in northwest Viet Nam.

The problem

MONOCULTURE

Rain-fed monoculture maize, upland rice and cassava on sloping lands leads to loss of top soil during the rainy season, nutrient depletion and declining yields.

INPUT COSTS

Chemical fertilizers are needed to maintain production levels, requiring higher input costs.

HARSH WEATHER CONDITIONS

The harsh weather conditions in the region aggravates yield decline and total crop loss, making soil and water conservation even more difficult.

Benefits from Agroforestry

Agroforestry provides a wide range of benefits. When managed properly, it enhances crop yields, while tree litter add biomass and the roots provide soil anchorage, preventing erosion. Successful agroforestry practices also diversify products and increases incomes for farmers. Additionally, agroforestry provides essential ecosystem services such as carbon sequestration, biodiversity conservation, reduction of wind and water erosion, soil enrichment, and improves the micro-climate. Farmers' interests and participation is an important element throughout the project and ICRAF's work.

INITIAL RESULTS

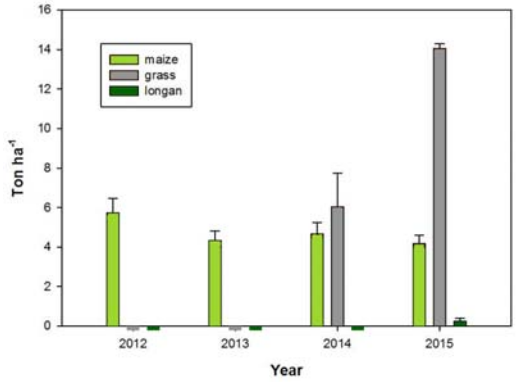
The economic and environmental benefits of each system were evaluated through ex-ante cost-benefit analysis, soil erosion measurement, and soil nutrient analysis.

1 Late fruiting longan - Maize - Forage grass system

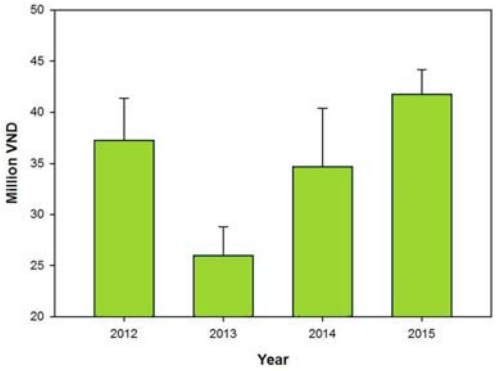
Yield

During the first three years, income was earned primarily from maize and forage grass. Total income in the fourth year was approximately 40 million VND/ha/year:

- Maize: 4 to 5.8 tons/ha/crop - this is not significantly different from monoculture-maize
- Forage grass: 6-18 tons/ha/year, beginning the second year
- Longan is expected to bear fruits on the fourth year



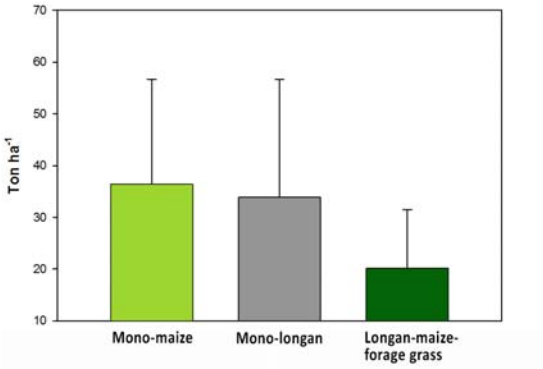
Yield of maize, forage grass and longan from Longan - Maize - Forage grass system



Total income from Longan - Maize - Forage grass system

Ecosystem services

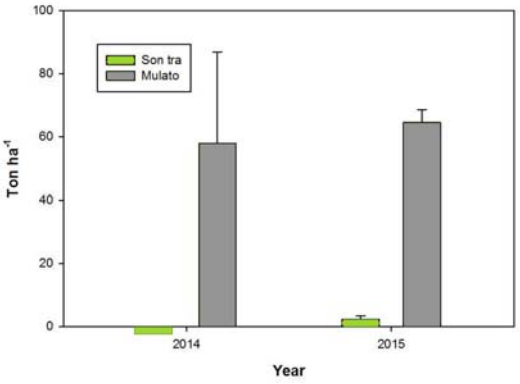
The system has shown effective in controlling soil erosion. In 2015, soil loss was recorded at 20 tons/ha compared to 34 and 36 tons in monoculture longan and maize, respectively. This is equivalent to soil nutrients saved as follows: 140 kg for N, 20 kg for P, and 120 kg for K (equivalent to 250 USD).



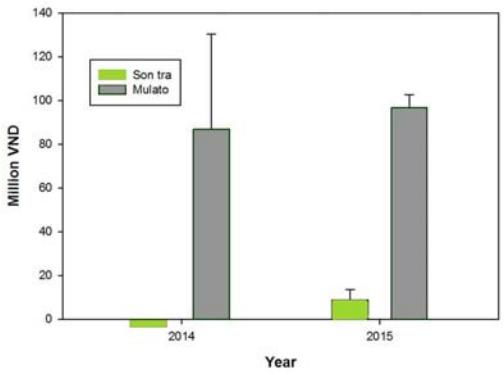
Soil loss in 2015 under monoculture maize, monoculture longan and Longan - Maize - Forage grass system

2 Son tra - Forage grass system

The system was established in June 2013 and did not produce yield that year. Grafted Son tra trees bear fruits after three years, compared to five years if grown from seeds. From the second year, the system can provide up to 60 tons of grass biomass. Net profit was approximately 46-50 million VND/ha/year, during the first three years of the experiment.



Yield of Son tra and mulato grass in Son tra - Mulato grass system



Income of Son tra and mulato grass in Son tra - Mulato grass system

3 Macadamia - Coffee - Soybean system

The Macadamia - Coffee - Soybeans system was established in June 2013 in Son La and Dien Bien. Soybeans yield was 0.2 tons/ha/year. Coffee in this system was harvested in the third year at 4.1 tons/ha/year. Macadamia has not yet produce any yield. The income in the third year mainly comes from coffee and soybean, and was approximately 25 million/ha/year.

Macadamia - Coffee - Soybeans system in Son La
Photo: Nguyen Mai Phuong

4 Domestication of Son tra

Son tra (*Docynia indica*), an indigenous fruit tree species, grown from grafts of selected superior trees have better growth, yield, and fruit quality. The high survival rate and quality fruit yield from grafted trees demonstrate the importance of domestication work in Son tra.

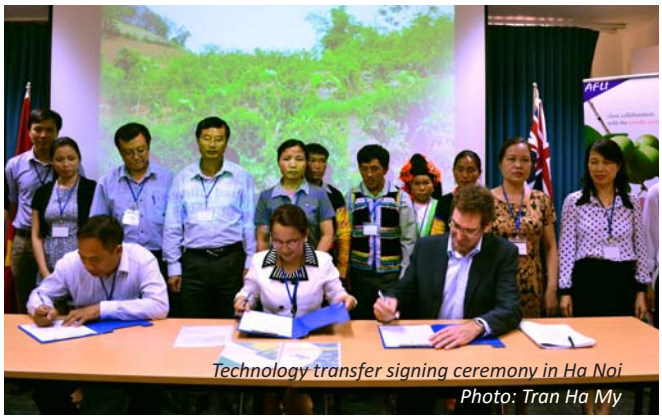
- Grafted trees grow faster, attaining a mean height of 6.6 m and a crown width of 4.1 m at the age of eight years, while trees grown from cuttings grew significantly slower.
- Grafts yielded an average of 38.7 kg of fruit per tree, compared with 28.9 kg per tree for cuttings and 30.7 kg per tree for non-grafted seedlings.
- Grafted trees produced superior fruit quality, with a predominantly yellow colour, uniform size, and a fruit diameter greater than 3 cm compared to fruits from non-grafted seedlings and cuttings.

Son tra fruits from a grafted tree aged 3 years old
Photo: Pham Huu Thuong

5 Research uptake

A study on Son tra's nutrient composition and product development was conducted in cooperation with the National Institute of Medicinal Materials (NIMM). Results showed the presence of substances essential to human nutrition, including polyphenol, tannin, saponin, organic acid, amino acid, and reducing sugar.

A method to process semi-finished Son tra product into a pre-product for instant tea and solid extracts were developed. These research results were transferred to TAFOOD, a Tea Export Processing Company on the 8th of July 2015, to contribute to the promotion of Son tra products and support the livelihoods of H'mong people in northwest Viet Nam.



Technology transfer signing ceremony in Ha Noi
Photo: Tran Ha My

6 Research in development

In addition to on-farm experiments, farmer demonstration trials (FDT) were set up to encourage adoption of agroforestry systems, practices and/or components. Seven group nurseries were established to meet the seedling requirements of the FDTs, and extension materials were produced in various formats, disseminating information on establishing and managing nurseries, grafting techniques, top-working, and pruning.

A Farmers' Field Day was also established to further introduce potential partners to different agroforestry trials and encourage adoption.

H'Mong women were involved in group nursery activities and in setting up the FDT in Yen Bai
Photo: Do Van Hung

Exemplar agroforestry landscape model in Son La
Photo: ICRAF Viet Nam

EXEMPLAR AGROFORESTRY LANDSCAPE

50 HECTARES

ICRAF researchers, 31 households, and the extension centres of Son La province and Mai Son district, jointly established an exemplar agroforestry landscape in Huoi Tan, in Mai Son district. The landscape covers an area of 50 hectares, over which 22,000 trees are to be planted. Species included longan, mango, plum, pomelo, and lemon. Forage grasses were planted along contour lines in sloping maize fields to produce animal feed and control soil erosion. The provincial governments recognize the value of the project, and continue to seek opportunities for meaningful collaboration beyond the project.

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