
Project Title Code: 1.10	Enhanced Capacity and Research in AgroForestry systems for livestock feeding and sustainable land use in Vietnam
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Australian Institution	School of Land and Food Sciences, University of Queensland
Vietnam Institute	Vietnam National University (VNU); Goat and Rabbit Research Centre (GRRC) and Research Centre for Forest Tree Improvement (RCFTI) of the Forest Science Institute of Vietnam
Project Duration	1 st July 2000 – 30 th June 2002

Project Description

The University of Queensland, together with its Vietnamese partner institutions, propose a CARD project to enhance the teaching and research capacity of staff in the three institutions. This will be achieved through a project targeting agroforestry systems for livestock feeding in the northern provinces of Vietnam. The project will focus on the use of adapted multipurpose trees in small holder farming and livestock feeding systems. Via this project, the stakeholders comprising university academics, researchers, rural extension personnel and farmers, will participate in interlinked research, training and curriculum development activities.

The major outputs will be (a) improved research capacity of 10 National staff arising from study of the value of MPTs in local farming systems and appropriate plant propagation technology; (b) improved teaching capacity arising from new courses in agroforestry and the training of 30 local extension agents in the use of MTPs; and (c) the establishment and utilisation of MTPs on more than 100 smallholdings.

Objectives

The major development objective will be to enhance teaching and research capacity in livestock feeding systems. This will be achieved via a program designed to improved productivity and dry season livestock feeding systems in a number of provinces in Vietnam by utilising multipurpose tree legumes growing in an agroforestry context. This will be achieved through a series of interlinked programs involving GRRC, RCFTI and VNU:

- a) Participatory training of extension and research staff, together with selected farmers, so that information and opportunities can be adopted by as wide a group of stakeholders as possible. This participatory training process will lead to the establishment of on-farm demonstration plots with farmers selecting from a range of tree legume species and establishment and management systems to maximise forage production in their situation;
- b) The implementation of an applied research project to augment technical knowledge on the best use of tree legumes in smallholder systems and the development of a reliable, cost-effective means of producing planting material for distribution to farmers;

Curriculum development in agroforestry, which would integrate both local and world developments in agroforestry into the VNU as well as at the School of Land and Food Sciences at QU.

Outputs and Performance indicators

Outputs	Performance Indicators
<ul style="list-style-type: none"> ◆ The enhancement of training/extension and research services on agroforestry systems for sustainable livestock production for Vietnamese farmers ◆ Staff from VNU, NIAH and RCFTI involved in agroforestry for livestock will be identified and trained in a "train-the-trainers" participatory workshop held in one of the provincial locations. Training will be based on participatory research and development methods and problem-solving approaches, utilising PRA manuals developed by the AusAID Forages for Smallholders Project. The presenters for this course will be staff from UQ, VNU, NIAH, RCFTI and other outside agencies with expertise in agroforestry applications. ◆ Following this initial training, training courses of approximately four days duration will be conducted by staff trained in the first workshop in two Provinces per year. These courses will be targeted at local extension staff, NGO groups and innovative farmers. ◆ These courses will be accompanied by the establishment of on-farm demonstration plots in the provinces of Son La, Ha Tay and Hoa Binh. These farms will serve as focal points for the dissemination of information via video, television, radio and posters and will be used for farmer field days and farmer group participation. They will be located on strategic farms with innovative farmers selected through participatory processes, who will be given the opportunity to adopt the technology to their own situation. A range of tree legume species will be made available, which can be tested in the contour in cropping lands and in under-utilised areas of the farm such as farm borders, beside roadways and close to the farm house or animal stalls. 	<p>i) Performance indicators will be the number of VNU, NIAH and RCFTI staff trained in the 'train the trainers' program; the number of local extension advisers who complete the provincial courses; and for farmers, the number of trees successfully established per farm, the number of farm households evaluating MPT technologies, and the number of farmers involved in the field day programs.</p>

<ul style="list-style-type: none"> ◆ Enhanced research capacity leading to the development of reliable, cost-effective techniques for the production of MPT planting materials, and improved understanding of the supplementary feed value of MPTs. Three Vietnamese scientists will visit the University of Queensland in the first year to improve their knowledge and skills ◆ An applied research program will be established at RCFTI under the direction of Dr Ha Huy Think. The expected outputs fro the program will be practical planting material production techniques for a number of promising MPTs and the establishment of a supply of planting materials at relatively low cost. 	<ul style="list-style-type: none"> i) An understanding of the propagation technologies of the chosen species ii) The establishment of production orchards at Ba Vi Field Station and GRRC for a range of MPTs iii) The amount of planting material produced from the orchards, and iv) The number of farmers who receive planting materials during the life of the project
<ul style="list-style-type: none"> ◆ A second applied research program will be conducted at GRRC to study the feed value of MPTs as protein supplements to local low quality feed-stuffs. The expected outputs from the program will be practical information on the relative value of the MPTs offered to farmers. This will complement farmer experience in the on-far demonstrations. 	<ul style="list-style-type: none"> i) The performance indicator for the research program will be improved knowledge leading to practical recommendations for the formulation of best rations for feeding livestock.
<ul style="list-style-type: none"> ◆ The incorporation of agroforestry materials relevant to the farming systems of Vietnam into the curriculum of the VNU Department of Soil Science and Environment. 	<ul style="list-style-type: none"> ii) Completion of the course in agroforestry and its incorporation into the curriculum.

PROJECT COMPLETION REPORT



Submitted by:

School of Land and Food Sciences



THE UNIVERSITY OF QUEENSLAND

Executive Summary

This project has achieved all of the objectives outlined in the project design document due mainly to the enthusiasm and commitment of the staff of the Vietnamese counterpart agencies. Over 70 on-farm demonstration sites have been established in the three target provinces of Ha Tay, Son La and Hoa Binh. In addition, sites were established at the Gia Lam Dairy and Cattle Breeding Centre on the outskirts of Hanoi and in Thu Son district in Bac Ninh province. Four project training courses were held in the three target provinces during the 2 year period. These were attended by over 200 participants consisting of project personnel, local extension staff and farmers. The gender balance at the courses was appropriate with over 40% women attending. At each course participants prepared an action plan for implementation on their own farms. These formed the basis for the on-farm demonstration sites.

The curriculum development program at VNU was very successful and proceeded ahead of schedule throughout the project. Five seminars/lectures were presented to VNU staff and students by UQ staff. Six text books on agroforestry were provided to VNU as part of the project and Prof. Khoa translated these into Vietnamese for distribution to his students. A 25 minute video on '*The Production and Utilisation of Leucaena in Vietnam*' was produced by Vietnam Television in conjunction with Prof. Khoa and his staff. This video is now used as a teaching aid in VNU agroforestry subjects and in future farmer training courses conducted by VNU.

An applied research program was conducted by Drs Dinh Van Binh and Nguyen Thi Mui and their staff at the GRRC on the use of *Leucaena* as a major feed constituent for both goats and cattle. Through these experiments and field days run by the Centre, *Leucaena* and particularly the KX2 hybrid became much more widely accepted as a livestock feed. It was shown that *Leucaena* forage could replace the costly feed supplements that are commonly fed to livestock in this region. The mimosine degrading bacteria *Synergistes jonesii* was taken to the GRRC in March 2001 and successfully transferred to farms in the Ba Vi area.

Dr Thinh and his staff at the Da Chong Forestry Research Station have made an extremely valuable contribution to the project producing over 30,000 KX2 rooted cuttings which were distributed to farmers in the target provinces. Staff at Da Chong refined and perfected the propagation process so they were able to achieve an 80% strike rate by the end of the project. They also developed a hybrid seed production process using *Leucaena leucocephala* K636 and *L.pallida* K748. Over 4 kg of hybrid seed was produced and used in project activities.

A proposal for scaling up project activities to greatly increase impact was presented to AusAID Canberra in February 2002 (see Appendix 2).

1. Project Description

1.1 Background and Preparation

The project arose as a follow up to the ACIAR Project "New Leucaenas for Southeast Asian, Pacific and Australian Agriculture" which had a component in Vietnam.

The original request for the CARD project came from Prof. Le Van Khoa of the Vietnam National University (VNU) in collaboration with Dr Dinh Van Binh of the Goat and Rabbit Research Centre (GRRC) (a research centre of the National Institute for Animal Husbandry) and Dr. Ha Huy Thinh of the Research Centre for Forest Tree Improvement (RCFTI) (a research centre of the Forest Science Institute of Vietnam).

Dr R. Gutteridge from UQ visited Vietnam in February 2000 to help formulate the project in collaboration with staff from the three key institutions. All three institutions had a mandate to assist with disadvantaged rural populations and it was decided to focus the CARD project at these groups in three target provinces in northern Vietnam, viz. Ha Tay, Son La and Hoa Binh.

1.2 Content and rationale.

The central pillar of the Project was the introduction of improved, multipurpose tree species (MPTS) into the farming systems of smallholder livestock farmers in rural communities. This formed the basis for the development of a program in tropical agroforestry, to enhance the capacity for teaching, research and effective extension of the staff from the three institutions. The Project provided a flow-on benefit to these communities through on-farm training and farmer training. In this context, the Project developed strong links with the Moc Chau Dairy Enterprise in Son La Province and the Gia Lam Dairy Cooperative in the greater Hanoi district. Both agencies greatly facilitated Project activities in their areas. In addition, Mrs Ngo Thi Don of the World Food Program is coordinating a project in the Ba Vi district of Ha Tay province and the CARD Project was able to supply MPTs for her upland development component.

1.3 Project objectives and scope at design

The overall aim of the project at the outset was to implement a program to introduce adapted multipurpose trees for use in smallholder farming and livestock feeding systems in three northern provinces of Vietnam. This was achieved through three primary activities:-

1. A series of training courses aimed at staff of local extension agencies and institutions who ultimately supervised the establishment and utilization of MPTs on farms. This was in line with policy initiatives of the Government of Vietnam (GOV) and AusAID to direct more resources to disadvantaged rural communities.
2. On-farm and on-station research activities to a) quantify the benefits of agroforestry feeding systems (undertaken by Dr Binh and his staff at GRRC), and b) develop an effective method for vegetative propagation of *Leucaena* KX2 hybrid (undertaken by Dr Thinh and his staff at RCFTI).
3. Improved teaching capacity of staff at the Vietnam National University through agroforestry curriculum development.

These activities were linked, with VNU staff and students, and GRRC and RCFTI staff integrally involved in training courses and on-farm demonstrations. The activities were participatory in design and farmers were encouraged to contribute ideas and information throughout Project implementation.

1.4 Implementation arrangements

The University of Queensland had overall responsibility for project management. In Vietnam, VNU was the lead agency and had direct responsibility for the distribution of project funds. VNU organized all the training activities with support from the other 2 institutions and coordinated the establishment of the on-farm demonstration sites. GRRC had a major role in on-farm research and the development activities in Ha Tay province. RCFTI had a key role in developing propagation techniques for the major multipurpose tree species used in the program.

2. Appropriateness of Project Design and Objectives

2.1 Appropriateness of Objectives

Objective No.	Objective Description	Approp' Rating	Comments
1.	Participatory training of extension and research staff.	4	Participatory methods of research and development are now well accepted as being most effective in achieving sustainable and appropriate interventions Applied research was required to overcome problems specific to biophysical and socio-economic characteristics of new target communities On-farm demonstrations involving farmers in the development of the new agroforestry systems were an excellent method for adaptation and extension An important long-term objective but unlikely to impact significantly over the implementation period
2.	Implementation of applied research program to augment technical knowledge on the best use of multipurpose trees.	4	
3.	Establishment of on-farm demonstration plots.	4	
4.	Curriculum development in Agroforestry at VNU	3	

2.2 Appropriateness of Design

Design Feature No.	Description	Approp' Rating	Comments
1.	Selection of institutions	5	Selection of highly motivated colleagues/institutions working as a team towards a common goal was highly significant to project success. Agroforestry systems are only recently becoming important in improved subsistence/commercial livestock production systems. The potential contributions of agroforestry are substantial The promoted technologies were appropriate to smallholder farmers that require minimal cash outlays but result in significant cash income for concentrate feeds are most
2.	Selection of R and D staff for project implementation	4	
3.	Importance of agroforestry systems to livestock industries of Vietnam	3	
4.	Low input technology	5	

3. Implementation Performance

3.1 Project Components and Outputs

Component No.	Component Description	Outputs	Performance Indicators	Performance Rating
1.	Study tour to Australia and Philippines by three Vietnamese project staff	Study tour completed	Tour report submitted by project staff	4
2.	“Train-the-trainers” participatory workshops and training courses.	4 training courses completed	Over 200 staff and farmers trained	4
3.	Curriculum development in Agroforestry at VNU.	Text books translated, video produced, lecture notes provided	Increased enrolment in relevant courses	4
4.	Establishment of on-farm demonstration plots.	78 plots established in target provinces	On-farm plots being utilized by farmers	5
5.	Applied Research project in assessing feeding value of new MPTs.	Research trials completed	Information used to formulate feeding systems for farmers	4
6.	Applied Research project in developing new vegetative propagation techniques for MPTs.	New propagation techniques developed	Over 30,000 rooted cuttings produced for distribution	5

3.2 Project Outcomes

Overall this project has been very effective due largely to the enthusiasm and input from the Vietnamese institutions. Prof. Khoa and his staff from VNU organized the 4 training courses where over 200 staff and farmers received training in the use and role of MPTs in local farming systems. Seventy-eight on-farm demonstration plots were established under the project. This included several additional plots in the province of Bac Ninh and in Gia Lam district.

The R & D programs initiated by the GRRC have provided vital information to the local farmers and initial uptake of the results has been very encouraging. Feed rations for livestock were formulated using *Leucaena* forage as a substitute for costly protein supplements. The mimosine degrading bacteria *Synergistes jonesii* was taken to GRRC, effectively inoculated into goats at the Centre and subsequently transferred to livestock in target villages. This bug enables ruminants to utilize *Leucaena* without suffering from mimosine toxicity.

Staff of RCFTI have developed an efficient and well organized vegetative propagation production process to provide rooted KX2 cuttings as the backbone of project activities. Well over 30,000 cuttings were produced and distributed during the 2 year period. RCFTI have also developed an efficient hybrid seed production system from which produced over 4kg of seed (approximately 70,000 seeds) for project activities.

3.3 Sectoral Impact

Over 40% of the trainees in the four training courses were women as they play a vital role in livestock management in smallholder farming systems.

In all three target provinces, minority communities including Hmong, Thai and Dao were involved in project activities. The Mai Chau district of Hoa Binh Province contains some of the poorest villages in Vietnam. Here the GRRC has a small goat dissemination program in the Thai ethnic village of Go Lao. The CARD project supported this program by providing MPTs including *Leucaena* to the farmers to provide high quality forage for their goats.

3.4 Costs and Financing

Cost estimates for the Vietnam component of the budget were reasonably accurate and there were no significant discrepancies between budgeted and actual expenditure over the 2 year period. In the UQ component there was a 51% under expenditure in the travel section of the budget due to an overestimation of the cost of airfares from Australia to Vietnam. The savings made in this section were balanced by an over expenditure in the personnel section due to an increase in support activities in Australia and an increase in award payments for UQ staff in 2001.

3.5 Monitoring of project

At the commencement of the project an implementation document was drawn up with input from all project members on the role and responsibilities of all groups within the project. This document set down project targets and deadlines to be achieved and also determined how the finances were to be distributed among the 4 institutions.

During the life of the project monitoring occurred through the regular visits of UQ personnel to the project sites in Vietnam. At each visit project progress was assessed in relation to targets set down in the design document. Problems and issues were discussed with Vietnamese staff and in most cases resolved “on the spot”. All issues were documented in aide-memoire style reports drafted by the UQ staff and circulated to all project staff. These reports formed a record on which the staff could act if necessary. The reports were sent to ITC and AusAID. This system worked very well as all project members knew how things were progressing at all times.

3.6 Technical Assistance, Training and Capacity Building

The project has greatly assisted in capacity building in the three Vietnamese institutions. Four training courses were held during the project attended by over 200 participants. At all courses Project staff from the four collaborating institutions presented lectures and practical sessions, whilst other staff attended as participants. The courses strengthened the capacity of research and extension staff to effectively communicate with farmers and promote the MPT technology being developed by the project.

Curriculum development at VNU proceeded ahead of schedule due to the enthusiasm of project staff. Six text books on agroforestry were provided to VNU as part of the project and Prof. Khoa translated key sections of these into Vietnamese for distribution to his students. A 25 minute video on ‘*The Production and Utilisation of Leucaena in Vietnam*’ was produced by

Vietnam Television in conjunction with Prof. Khoa and his staff. This video is now used as a teaching aid in VNU agroforestry subjects and farmer training courses conducted by VNU.

Specific courses in agroforestry are currently being developed by VNU in addition to agroforestry components currently contained in land resource and utilisation subjects.

The working relationship between UQ staff and the lead Vietnamese agency VNU was always very good. This relationship developed in the previous ACIAR project and was strengthened during the CARD project. Part of the success was due to the design document drawn up at the outset which outlined the responsibilities of all parties.

3.7 Management of Constraints, Issues, Risks and Change

There were very few difficulties encountered during the life of the project. There was a slight slippage in scheduling the second and third training courses but these were held in October 2001 and were very well attended.

3.8 Project Management

The management of the project provided by staff of the School of Land and Food Sciences, University of Queensland has been fully satisfactory (4) over the life of the project. Staff members visited Vietnam on a regular basis to assist with the training courses, assess project progress and formulate plans for future activities.

The management and inputs provided by the three Vietnam institutions have been excellent throughout the life of the project (5). Prof. Khoa from VNU was overall coordinator of the project and did a magnificent job in organizing the training courses and liaising with the other institutions to ensure the efficient implementation of project activities. He also worked effectively to integrate CARD technologies into other local and regional development programs including those run by the World Food Program, the Moc Chau Dairy Enterprise and the Gia Lam Dairy Cooperative. Dr Dinh Van Binh and his staff at GRRC did an excellent job in organizing the on farm demonstrations in Ha Tay Province and running the applied research program on forage evaluation. The RCFTI, under the leadership of Dr Ha Huy Think, contributed greatly to the project by developing techniques to propagate the major MPTs used in the project.

4. Performance and Outcomes

4.1 Assessment of Performance Against Objectives and Design

This project has achieved the objectives outlined in the design document. This has largely been due to the commitment and enthusiasm of the staff in the Vietnamese counterpart agencies. The aims and objectives of the Project matched the objectives and the mandate of the Vietnamese institutions, staff recognised the benefits and appropriateness of the Project technologies and enthusiastically implemented project activities.

There was a slight shortfall in the number of on-farm demonstration sites that were established over the 2-year period but this could be attributed to inertia at the start of the project. It is expected that project activities will continue with SAS project funding after the finish of the CARD project so the momentum generated in the last 2 years will be sustained.

It is important that the goals and expected outcomes of the project should not be too ambitious. CARD projects are limited to a 2-year implementation period, so there are limits to what can be achieved in that time. We consider the objectives within our project were achievable.

4.2 Sustainability

All indicators of the long-term sustainability of the project point to a highly satisfactory outcome (4). From an institutional point of view the curriculum development at VNU will have a long-term impact, with agroforestry subject matter being incorporated into existing subjects and VNU staff being trained in agroforestry research and development. Lecture materials and textbooks developed/presented through the project will remain current for approximately 5 years, but will require eventual updating. Women were under-represented among collaborating staff from the collaborating organisations, a factor unable to be altered by the Project. However, Dr Nguyen Thi Mui and Mrs Nguyen Thi Xuyen provided key inputs into training courses, on-farm demonstrations and research activities, and ensured that women farmers had access to Project information and initiatives.

Existing on-farm demonstrations should be sustainable providing that some nutrients are returned where cut and carry harvesting is practiced. Economically, the agroforestry systems provide clear benefits. A significant number of women (>40%) attended and enthusiastically participated in Project training courses and on-farm activities.

The scaling up of on-farm development activities will require continued back-up support by research and extension specialists. Significant changes in feeding systems, such as were introduced by the Project, commonly require extended periods of institutional support to become accepted. There is potential for such support in Moc Chau and Gia Lam, where industry support is already established and a critical mass of farmers are utilising the new forages.

4.3 Development Impact

The project will have a substantial development impact in the 3 target provinces as well as in other areas where MPTs are likely to be used in farming systems to provide high quality fodder for livestock. For example, the GOV has placed a high priority on the development of a viable dairy industry in the country and will provide funding for its expansion in appropriate areas. In the Moc Chau district it is planned that dairy cattle numbers will increase from the current 2000 head to 6000 head in 5 years. This will mean that over 1000 families will own cattle within this period. The supply of high quality forage for these animals is a major requirement to achieving this target and maintaining or improving the current milk yield per cow. *Leucaena* and other MPTs are seen as a major source of low-cost high-quality feed and under this scheme its use in Moc Chau and other dairying districts, such as Gia Lam, is poised for rapid expansion. There is potential for dairy farmers to earn an additional USD250/cow/year through reduced feed costs. The economic benefits to meat producers have not been quantified, but should be approximately USD20/ weaner goat.

5. Conclusions

5.1 Overall Assessment

The value of *Leucaena* and other multipurpose tree species to the farming systems of northern Vietnam has been widely promoted by project activities.

Many smallholder farmers now realize the benefits these species can bring to their livestock enterprises.

Nucleus plantings have occurred in the target districts and these can now be expanded to benefit many more livestock producers.

The research capacity of the three Vietnamese institutions has been significantly enhanced under the project.

The Vietnam National University can now offer improved courses in agroforestry.

The success of this project can largely be attributed to the choice of Vietnamese counterpart institutions as mentioned above. Staff of these institutions will continue Project activities with funding assistance from the AusAID SAS scheme and from GOV sources.

A follow-up project aimed at greatly increasing the scope and impact of these technologies has been drafted and was submitted to AusAID in February 2002 (Appendix2). This draft included substantial input from the three Vietnamese institutions.

5.2 Lessons Learned

The main lesson learned from this project was the importance of selection of appropriate counterpart agencies and individuals who are enthusiastic and committed to the aims and objectives of the project. It is also important to clearly outline the roles and responsibilities of all parties early in the life of the project so that everyone knows what is expected from them at the outset. It is also vital to set realistic targets, achievable within the time frame of the project.

Interventions should be simple and well-proven if widespread adoption by smallholder farmers is to be achieved. An effective applied research component is essential so that specific technology adaptation issues can be rapidly overcome.