



DURAS Final CGS Project Completion Report

Project ID No.		Report Period:	16/06/2005 - 31/03/2008
Project Title:	The implication of local knowledge in the increasing integration of animal husbandry in the farming systems of disadvantaged communities		
Reported by:	Paulo Salgado (CIRAD)		

Overall Project Status:	Green
Critical Success Factors (CSF):	CSF Status:
CSF1. Meeting stated project objectives	Green
<p>The main objectives of the 2-years project were achieved.</p> <p>The local knowledge of farmers about fodder production and livestock integration was evaluated during the first meetings at the beginning of DURAS project (August/December 2005). The dialogue with farmers and communal extension staff during the project implementation and especially during the field visits helped researchers to understand better the local know-how and main difficulties concerning livestock integration.</p> <p>From the beginning, farmers were implicated in the choice of forage species and they managed the on-farm tests and the experimental plots. The evaluation of the experimental results was carried out by research team in strong linkage with farmers. The evaluation of the successful forage species after the first year of DURAS project indicates that Oats (<i>Avena strigosa</i>) was the best forage species to be implemented. The majority of farmers were interested to continue this activity during the second (and third) year of the project.</p> <p>The main objective of the second year was the extension of Oat surfaces in Luong Son district and to evaluate the farmer adoption. The total number of farmers participating in temperate forage activities increased every year from 40 in 2005/2006, to 270 in 2006/2007 and finally to 300 in 2007/2008. Five new communes of Luong Son district joined the temperate forage project from the second year of DURAS activities. Around 45 hectares of land were mobilized by this activity. However, not all farmers obtained good results in their fields with temperate forages. The main reasons were related to a bad choice of land to cultivate the temperate grasses and also to a poor management during the important steps of grass production (seeding, irrigation, harvesting and land protection).</p> <p>Another important objective was related to the improvement of farmers' knowledge regarding technical aspects of forage cultivation. Although farmers were free to use their own technique to grow and manage the forage field, the research team carried out trainings and several visits about this subject. A documentary film (25') about the production and utilization of temperate grass in North Vietnam was made with the cooperation of farmers and extension staff.</p>	

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CSF2. Project implementation progressing as scheduled	Green
<p>Globally, all foreseen activities were implemented as detailed in the initial work plans. The first year corresponded to the experiments with temperate forage species and subsequent evaluation by farmers. The field activities including, collection of data and forage samples, as well as the field participatory activities (seeding fodder and monitoring the experiments) progressed without significant delays. The laboratory analysis of forage samples was carried out during the first months of the second year of DURAS project.</p> <p>The evaluation made by farmers concerning the integration of temperate forage in their farming system was carried out at the end of each year and a synthesis of opinions and comments was presented in the following meetings. The meetings and trainings sessions about forage production, animal husbandry and crop-livestock integration were organized as scheduled. University trainings were also performed in agreement with the work plan. More than 10 field visits were organized in Luong Son district to present the experiences to other colleagues and sharing the lessons with farmers and participants.</p> <p>During the second year, the distribution of forage seeds to approximately 300 farmers was accomplished at the beginning of winter season and the follow-up (monitoring survey) of forage fields made by extension staff followed the agreed working plan. A scientific report with a synthesis of the agronomic indicators related to the use of Oat forage in Luong Son district and a documentary film about the use of temperate forage in the North Vietnam are already complete.</p>	
CSF3. Functional Involvement of stakeholders in project implementation	Green
<p>The farm diagnosis carried out at the beginning of the DURAS project was made by a participative approach. The interest of farmers related to animal husbandry and fodder production was significant as confirmed by their high participation during all the project implementation period.</p> <p>The farmers were directly involved in the temperate forage activities because most of the experiments were done in their own lands and the survey of forage fields was made by farmers in close linkage with extension staff and research team. Since the beginning of the process, which included the choice of forage varieties, the selection of the area to cultivate grass, the cuts of forage and the final evaluation of results, the participation of farmers was motivated and constructive. Farmers used an opened dialogue with the research team about their results and main issues. The permanent participation of farmers and the discussion about the results allowed the research team, together with farmers, to evaluate the successful strategies and set-up the plan for the next periods. We observed that the obtained results in terms of grass production were very dependent of the involvement of farmers in the project. Some farmers did not follow the suggestions of extension staff and research team and consequently some of them obtained poor results with forage development.</p> <p>The extension staff of agricultural office of each commune played a key role in the scaling-up steps of the forage activities. Due to an important number of farmers (around 300) in the second (and third) year of DURAS project, it was impractical for the research team to attend all of the farmers and so, the extension staffs play an important role in this process. Anyway, we provided a regular field support to extension staff and to some key farmers.</p> <p>Some farmers participate actively with the research team during the film production.</p> <p>Our good results were linked with the close association of farmers from the beginning of the experiments. This confirms that the technical innovations are appropriate and adapted to the initial demand of farmers.</p>	



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CSF4. Scientific Outputs	Green
<p>The two species of Oat (<i>A. strigosa</i> and <i>A. sativa</i>) represent, from an agronomic and feeding point of view, an interesting solution to solve the fodder deficit in winter. After 3-years, we adapted the technical protocol for Oat production to the agro-climatic conditions of North Vietnam. The fresh grass production potential in Luong Son district was on average around 18 tons/ha. If we consider the average value produced during the 3.5 months, the quantity of grass obtained per day was approximately 170 kg. This amount of fresh grass is adequate to fed fourteen young beef calves (starting from 100 kg body weight) during their growing period and without any other feed supplement.</p> <p>The quality of forages is evaluated by its chemical composition (total proteins, cellulose, etc.) and its nutritive value (energy UFL and proteins PDI) which define the way in which cattle can use the plant's nutrients. The fiber and raw cellulose content are also important characteristics because they restrict digestion and influence the animal's ingestion capacity. Oat forage has a very high nutritive value to balance correctly the feed ration of ruminants during winter.</p> <p>The cost of one unit of energy or protein is significantly lower with Oat forage than with concentrate feed or other conserved grass resources (silage). This aspect has an immediate effect in the reduction of the feeding costs for livestock and thus contributes to increase the incomes of farmers.</p>	



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1. SUMMARY

The achievements of the first activities were to identify the main problems related to animal husbandry integration and to evaluate the knowledge of farmers related to forage and animal production, and the ways as these questions should be managed by the research team. During the first meetings, it was possible to identify the fodder species chosen by farmers as well as the area of land that farmers will use for the on-farm experiments.

The participation of farmers during the setting up of experimental plots and the consequent monitoring demonstrated that the fodder subjects have a particular interest. The experiments in plot and on-farm with temperate forage species showed very interesting and promising results to solve the forage deficit during winter period and will allow a better nutritional status of animals along the year. Grass yield values diverge from very low quantities (less than 5 tons/ha) to more than 20 tons of fresh matter per hectare. The major difficulties were related to the lack of funds to buy fertilizers, a bad protection of fields and consequent attack by other animals (chickens, free grazing buffalos, etc), and the lack of irrigation system, especially in the uplands areas.

More important than the quantitative data, was the farmer's adoption of this new forage technology using temperate grass species in the winter season. The information from field visits and from the dialogue with farmers about forage development were correctly documented and used for the forage plan strategy. The discussions about the main issues identified by farmers during the installation and management of the forage, as well as the solutions they founded to solve these difficulties were important achievements of DURAS project.

The intermediate meetings to present and discuss field results were helpful for both farmers and research team. For farmers, these meetings were the opportunity to present all their questions and concerns about forage production; for research team, the discussions were useful to improve and adjust some ideas in order to achieve the whole objectives of farmers concerning forage cultivation.

The impact of the first year results with temperate grass "wake-up" the neighbour communes of Tien Xuan to develop temperate grass during winter in order to improve the feeding status of their animals. According to the great number of farmers (around 300) from 5 new communes interested to sow oats and to join the forage DURAS activities, we conclude that the main objective of widening the surface of oats in the winter season was achieved in Luong Son district. Even if all communes participating in DURAS project are neighbours, we identified different approaches and strategies concerning the forage development which have an impact in the results and further adoption. Globally, farmers well appreciated oats forage because of its high feed value for the animals, significant germination rate, good growth capacity during winter and the easy farming technique. Only 16% of farmers were not satisfied with the production of temperate grass in their fields. The main inconvenient with Oat forage were related to difficulties to carry out the irrigation process, low regrow capacity after 1st cut and short period of forage development. However, the majority of farmers were satisfied and wish to continue the production of oats in the next winter seasons.

The research team continues the support action in the field, jointly with communal extension staff who take also part in the forage project, in order to improve awareness of farmers regarding technical aspects of temperate forage. The documentary film prepared with the participation of key farmers will be used as an important tool for training sessions and for extension of temperate forage technology. More trainings sessions are still needed in order to improve the technical skills of farmers with this forage species and to create more awareness about animal feeding.



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2. UPDATE ON PROJECT ACTIVITIES

Project Activities <i>as detailed in project document</i>	Progress made to date	Stakeholders involved and their role	Findings/Outputs
Activity 1 - Identification of spontaneous innovative practices through local community-base knowledge	The identification of farmer's practices concerning forage cultivation and animal feeding were assessed during the first year of DURAS project. The introduction of new fodder species adapted to local conditions was a selected solution to solve the deficit of fresh grass to cattle. The knowledge of farmers was followed in the field and this was useful to implement the new temperate forage species. Temperate forage management is similar to agricultural techniques used with tropical grasses. This fact facilitates the adoption of new grass species by the majority of farmers involved in temperate forage activities.	Farmers are involved in this activity in three major ways: (1) selecting the new forage species to be used in their fields; (2) taking care and making use of forage to feed their own animals; and (3) given their opinion and comments to the research team during the regular field visits, common meetings and training sessions. Extension staff and local village leaders were also perfectly involved with this new activity.	Forage production during winter period is being a more important constraint due to an increasing number of animals in the region. However, not all farmers are worried with the lack of grass during this period because they still obtain enough feed resources from the forest. Two temperate fodder species (<i>Avena sativa</i> , <i>Avena strigosa</i>) were chosen for the on-farm scaling-up experiments. Farmers need more technical information about the relation between animals and forage.
Activity 2 - Definition of appropriate farming systems to southeast Asian mountain conditions	The farmers confirmed that the lack of fresh grass in winter is an obstacle to future development of cattle in Luong Son district. The grass cultivation (mainly tropical species) is an interesting opportunity to the sustainable use of sloping lands. Temperate grass species complete the annual forage resource supply and are better adapted to lowland conditions or used together with tropical species in mountain conditions. Technical adoption of forage Oats (<i>A. strigosa</i> and <i>A. sativa</i>) as winter forage was successful.	Farmers were involved in the setting up of the experimental plots and were implicated in monitoring the experiments. They also participated in the field visits giving their suggestions to improve grass production protocol, as well as contributing to the final evaluation of forage results. Extension staff of each commune participates actively in the field survey, results assessment and in the documentary film about temperate grass.	Oat forage species proved to be an interesting solution for feeding animals in winter period. Technical protocol is easy to perform and appropriate to the local agrarian system. Despite this, some farmers did not follow the technical guidelines presented by the research team and their results were poor. Globally, the forage production in Luong Son district was around 18 tons FM/ha. Compared to other regions, progresses are still possible in terms of management and care of temperate forage fields.



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Activity 3 - Extension of these new appropriate agricultural practices to poor farmers in the region	The extension of temperate forage activities from the second year of DURAS project was completely achieved. Approximately 300 farmers were mobilized by seeding <i>Avena</i> grasses and more than 40 hectares were sowed. Five new communes joined Tien Xuan commune for the second (and third) year of temperate forage activities.	Farmers and extension staff of six communes participated in the activities related to the forage development. The role of extensions staff was crucial for the scaling-up of this agricultural innovation.	The majority of farmers were satisfied with the use of Oat forage as feed for ruminants in winter period. However, some farmers have not yet felt the need to produce these grasses during winter.
Activity 4 - Build capacity (training sessions)	Several training sessions (theoretical and practical), about fodder production, ruminant breeding and feeding were organized in some villages during the 2-years project. A student from the Hanoi Agricultural University, Mr. Nguyen Danh Vinh, made his training period in Luong Son district.	The participation of farmers to the training sessions was good and they were always motivated to improve their knowledge skills. The dialogue between farmers and research team helped to understand better the local know-how and main difficulties concerning livestock integration. Farmers participated in a hopeful way with the student training subject and field work.	The farmers had the opportunity to clarify ideas about fodder production and feeding animals and to learn about how to produce temperate fodder species. However, the level of knowledge still needs to be improved as some “confusing ideas” are persisting in the opinions of farmers.



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3. EMERGING CONTRIBUTION TO SUSTAINABLE DEVELOPMENT

Contribution to SD	INDICATOR	Status to date	
		Before Project	End of Project
Economic dimension: Growth with equity <ul style="list-style-type: none"> Contribute to rural poverty reduction Formulation of public policies Facilitating technology-policy interface leading to generation of public goods Facilitating access to market and enhancing trading opportunities Facilitating farmers' and/or local communities' access to financial resources Improving competitiveness of local enterprises Minimizing cost of agricultural production 	Income generated by cattle	Limited	Increased due to higher forage availability and consequently higher income from cattle activity
	Opinion of local leaders	Unaware of grass production during winter	Better knowledge about real potentialities of grass production and more confidence in livestock integration policies
	Efficiency of land use	During winter period, some farmers did not use their available land to produce agricultural goods	Better annual agricultural yield production by cultivating available land during the winter period
Environmental dimension: Maintenance of ecological integrity <ul style="list-style-type: none"> Conservation and enhancement of (agro)biodiversity Facilitating access to genetic resources Rehabilitation of degraded ecosystems Improvement/management of soil fertility Use of appropriate technology in addressing issues of intensification and increasing agricultural production 	Number of grass species (biodiversity)	Only few tropical forage species	Two more forage species (temperate) with high quality value and good yield potential
	Access of new varieties	Forty (40) farmers used the new temperate forage species	More than 300 farmers have access to seeds
	Temperate forage technology	Inexistent	Higher grass availability in winter which allows an increase in cattle production
Social dimension: People Empowerment <ul style="list-style-type: none"> Building local capacities in resource management Combining local and scientific knowledge in addressing resource management issues Facilitating information sharing and cross-country learning Facilitating multi-stakeholder interaction and action Promotion of people- and farmer-centered research programs 	People trained in forage technology	Inexistent	Ten meetings and training sessions with more than 350 farmers and extension staff involved
	Experimental sites	Inexistent	Set up a combination between local and scientific knowledge which make better understanding of farmers about research results and allowed a ideal interaction between farmers and researchers

4. STAKEHOLDERS INVOLVED

Stakeholder Group	Local (Number)	National (Number)	Sub- regional (Number)	Regional (Number)	Global (Number)	Total (Number)
Research Institutes		1			1	2
Universities		1				1
Farmers Organizations						
Individual farmers	306					306
Non-government organizations (NGOs)						
Community-based organizations (CBO)						
Small and medium enterprises/private sector		1				1
Individual entrepreneurs						
Advanced Research Institutions						
International agricultural research centers					1	1
Total	306	3			2	311

5. PUBLICATIONS & EXCHANGES

Total number of publications and works produced by the project to date		8
Number of public publications to date	Published by the CGS project about the project	2
	Published by external entity about the project	5
	Reference made to the CGS project in an external publication	1
Number of projects to produce Class A publications to date		
Details of Publications		
Orange D. and Salgado P., 2006. Gestion de la fertilité et production de fourrages. Extension flyer about DURAS project joint activities of IRD and CIRAD (French).		
Salgado P., 2006. Implication des connaissances locales dans l'intégration de l'élevage dans les montagnes du Sud-Est Asiatique. Annual report of PRISE platform activities in 2005, CIRAD, 63 p. (Vietnamese and French).		
Salgado P., Tran Van Thu, Nguyen Thi Hoa Ly and Le Hoa Binh, 2006. Introduction of New Forage Technology in North Vietnam Using Participatory Approaches: Experiences and Lessons Learned. 47-52. Strengthening linkages among researchers, educators, businesses and farmers in animal production and veterinary medicine. 2006/10/03-04, Hanoi Agriculture University, Vietnam.		
Salgado P. Tran Van Thu and Nguyen Thi Hoa Ly, 2006. Oat: Good productive grass and high quality during winter. Technical leaflet about the production and utilization of oat grasses in North Vietnam. Printed at 500 copies (Vietnamese).		
Salgado P., 2006. Implication des connaissances locales dans l'intégration de l'élevage dans les montagnes du Sud-Est Asiatique. Annual report of PRISE platform activities in 2006, CIRAD, 75 p.		

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(Vietnamese and French).
Salgado P., Le Hoa Binh, Tran Van Thu and Le Huy Luat, 2007. Research and development of temperate forage in North Vietnam. Documentary film - 25 minutes (Vietnamese subtitled in French).
Salgado P., Le Hoa Binh, Vu Chi Cuong, Tran Van Thu and Nguyen Thi Hoa Ly, 2008. Production et utilisation de l'avoine fourragère (<i>Avena strigosa</i> et <i>Avena sativa</i>) au nord du Vietnam: une solution pour résoudre le déficit fourrager en hiver. Scientific report, 93 p. (Vietnamese and French).
Orange D., Tran Duc Toan, Salgado P., Nguyen Duy Phuong, Clement F. and Le Hoa Binh, 2008. Local-knowledge and technical innovation for income improvement and soil fertility management in upland agricultural system within disadvantaged communities. (Submitted to ILEIA magazine).

Number of seminars or conferences held by the project to date	
Please provide details of all seminars or conferences held during the reporting period.	

Details of Missions and/or Exchanges
1. Cuts of tropical fodder; <i>Brachiaria</i> spp. tested in the experiment of the present year were cut and samples analysed; 16 June, 26 July and 31 August 2005; CIRAD and NIAH research teams and farmer in charge of the survey; Dong Cao village.
2. Presentation of fodder results (experiment 2004/2005); After the first year fodder experiment in Dong Cao village, the results were presented in the People Committee of Luong Son district; 22 July 2005; CIRAD and NIAH research teams, farmers and development agricultural agents; Dong Cao village.
3. Theoretical training session; presentation of the advantages and the inconveniences of the temperate and the tropical fodder species; a list of farmers interested in testing new fodder species was made; 24 September 2005; CIRAD and NIAH research teams and farmers from the three villages concerned by the project (Dong Cao, Qua Vai and Dong Dao); Dong Cao village.
4. Agreements with village responsible; a visit to the three villages and discussions with the village chiefs were made in order to obtain the final agreements for fodder experiments and to identify the date for seeds distribution; 18 October 2005; CIRAD and NIAH research teams and village chiefs from the three villages concerned by the project; Dong Cao, Que Vai and Dong Dao villages.
5. Distribution of temperate seeds to farmers; the distribution of seeds (<i>Avena sativa</i> , <i>Avena strigosa</i> and <i>Avex</i> mixture) was followed by a demonstration training session in the field (seed production experiment) about the particularities of sowing; the total surface distributed to farmers was up to 2.2 hectares; 26 October 2005; CIRAD research team and farmers (40) from the three villages concerned by the project; Dong Cao village.
6. Setting-up experimental plots; two experimental sites with 300 m ² were installed in Que Vai and Dong Dao villages; in each site 12 fodder plots were used with two tropical (<i>Brachiaria hybridum</i> and <i>Panicum maximum</i>) and two temperate (<i>Avena strigosa</i> and <i>Avena sativa</i>) species; 27 and 28 October 2005; CIRAD research team and farmers; Que Vai and Dong Dao villages.
7. Setting-up experimental plot; one experimental site with 2 000 m ² was prepared in Dong Cao village and will be used for fodder production and erosion control studies together with the NISF and IRD research teams; six fodder plots (150 m ²) were used with two temperate species (<i>Avena strigosa</i> and <i>Avena sativa</i>); 8 November 2005; CIRAD research team and farmers; Dong Cao village.
8. Survey of experimental fields (on-farm) and sites; the first survey was the opportunity to fruitful discussions with farmers concerning the first impressions about the development of temperate fodder species; 23 November 2005; CIRAD research team and farmers; Que Vai, Dong Dao and Dong Cao villages.
9. Survey of experimental fields (on-farm) and sites; the <u>second</u> survey was the opportunity to introduce Mrs. Hoa Ly, veterinary researcher, who will be on charge to take experimental measurements and conduct surveys with farmers concerning their impressions about the development of temperate fodder species; 6 December 2005; CIRAD research team and farmers; Que Vai, Dong Dao and Dong Cao villages.
10. Discussion with farmers; the <u>third</u> field survey was more oriented to the discussions with the 22 families that are cultivating temperate fodder species. Their comments about plant germination, grass production and several questions about technical aspects of grasses were noted by Mrs. Hoa Ly; 16 December 2005; Mrs. Hoa Ly and farmers; Que Vai, Dong Dao and Dong Cao villages.
11. First cut of grass in the experimental plots of Dong Dao and Que Vai; temperate grass species in the experimental plots were cut in order to determine the fresh matter production and samples were collected to be analysed in the feed analysis laboratory of NIAH; 30 December 2005; Mrs. Hoa Ly and farmers; Que Vai and Dong Dao villages.
12. Field visits and discussion with farmers; the objective of the <u>fourth</u> field survey was to prepare a Table with an overview of the development of temperate grass in Luong Son and to identify the propositions of farmers to the next experiments with grass; 3 January 2006; Mrs. Hoa Ly and farmers; Que Vai, Dong Dao and Dong Cao villages.
13. First cut of grass in the experimental plot of Dong Cao; temperate grass species in the biggest experimental plot (Dong Cao) were cut and samples were collected; 12 January 2006; Mrs. Hoa Ly and farmers; Dong Cao village.
14. Field visits and discussion with the local responsible person; the <u>fifth</u> survey was the opportunity to work with Mrs. Hien



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who is in charge to take the measurements of grass development locally; <i>15 January 2006</i> ; Mrs. Hoa Ly and Mrs. Hien; Dong Cao village.
15. Field visits; the objective of the <u>sixth</u> survey was to complete the Table with the experimental forage data; <i>26 January 2006</i> ; CIRAD research team and farmers; Que Vai, Dong Dao and Dong Cao villages.
16. Second cut of grass (Dong Dao and Que Vai) and University Agricultural student presentation; temperate grass species were cut and samples were collected. During this visit, a student from the Hanoi Agricultural University, Mr. Nguyen Danh Vinh, was introduced to farmers and commune leaders and participate in the field activities; <i>14/15 February 2006</i> ; CIRAD research team and farmers; Que Vai and Dong Dao villages.
17. Field visits; the <u>seventh</u> field survey was the opportunity to research team to meet the farmers and give more explanations about the results observed. Several questions about further development of grass experiments (tropical and temperate species) were asked by farmers; <i>28 February 2006</i> ; CIRAD research team and farmers; Que Vai, Dong Dao and Dong Cao villages.
18. Second cut of grass in the experimental plot of Dong Cao; temperate grass species were cut and samples were collected; <i>3 March 2006</i> ; Mrs. Hoa Ly, student and farmers; Dong Cao village.
19. Meeting to present to the farmers involved in the project the first field results in the three villages (Que Vai, Dong Dau and Dong Cao); this meeting was organized to present the results of forage adaptation, development and production in the three villages. A two hours discussion followed the presentation and farmer's comments were noted. The needs for training about livestock production were identified and the plan to develop the tropical forage was assessed; <i>16 March 2006</i> ; CIRAD research team, students, farmers, extensionists and local authorities; meeting room in Dong Dau village.
20. Field visit with DURAS coordinator, Dr. Oliver Oliveros, and all the project partners in Vietnam (NISF, NIAH, IRD, CIRAD); the first visit of Dr. Oliveros to the field where the activities of DURAS project are implemented was the opportunity to the research teams to present the advance of the field actions and the farmers implication in the project; <i>17 March 2006</i> ; Dr. Oliveros, research teams (NISF, NIAH, IRD, CIRAD) and farmers; Que Vai, Dong Dau and Dong Cao villages.
21. Field visits; the objective of the <u>eighth</u> survey was to meet some farmers present in the last meeting and give more explanations about the results observed in their field; <i>26 March 2006</i> ; Mrs. Hoa Ly, student and farmers; Que Vai, Dong Dau and Dong Cao villages.
22. Third cut of grass (Dong Dau and Que Vai experimental sites) and student surveys; temperate grass species were cut and samples were collected. The student filled out a Table with information of farmers concerning their evaluation of the forage development and the projection for the next winter season; <i>from 3 to 7 April 2006</i> ; CIRAD research team, student and farmers; Que Vai, Dong Dau and Dong Cao villages.
23. Seed production evaluation; the seeds of the experimental site especially designed to test the local potential of seed production were collected and the first operations to clean the seeds had been carried out in the field with the help of farmers; <i>11 April 2006</i> ; Mrs. Hoa Ly, student and farmers; Dong Cao village.
24. Third cut of grass (Dong Cao experimental site); temperate grass species were cut and samples were collected; <i>17 April 2006</i> ; Mrs. Hoa Ly, student and farmers; Dong Cao village.
25. Soil samples collection; soil samples from all the experimental sites and some of the farms were collected in order to determine the main chemical characteristics of soils (pH, Nitrogen, Phosphorus and Potassium levels, exchangeable ions and cations, etc.); analysis will be carried out in NISF laboratory; <i>5 May 2006</i> ; Mrs. Hoa Ly, researchers from NISF and farmers; Que Vai, Dong Dau and Dong Cao villages.
26. Evaluation surveys; the last comments of farmers concerning the final evaluation of experiments on-farm with temperate forage were collected; <i>from 10 to 16 May 2006</i> ; CIRAD research team, student and farmers; Que Vai, Dong Dau and Dong Cao villages.
27. Conclusion of temperate forage experiments in the 2005/2006 season; the experiments with temperate forage (Avena and Avex mix) were concluded in the three experimental sites and in the farmer's fields; the available land in the experimental plots was used to install additional experiments with tropical forage; <i>19 Mai 2006</i> ; CIRAD research team; Que Vai, Dong Dau and Dong Cao villages.
28. Field visit; one-day visit was organized to present the field activities of DURAS project to CIRAD colleagues. An interesting discussion was undertaken with two farmers about the project results; <i>13 June 2006</i> ; CIRAD research team, Dr. Emmanuel Camus (director of Animal Production and Veterinary Medicine department of CIRAD), Dr. Gilles Saint-Martin (director of European and International Relations department of CIRAD), farmers and IRD students; Dong Cao village.
29. Meeting to present the final results of the first year cultivating temperate forage in the three villages (Que Vai, Dong Dau and Dong Cao); this meeting was organized to present the final results of forage species in the three villages. An interesting discussion followed the presentation and farmer's comments were very positive. The work plan for the next season was discussed with farmers and with the coordinator of the project (Dr. Toan). The plan to develop the temperate forage in bigger and new areas was assessed and defined; <i>23 June 2006</i> ; Dr. Toan (DURAS Coordinator), CIRAD research team, students, farmers, extension staff and local authorities; meeting room in Dong Dau village.
30. Logistic preparative for buffalo training session; the training method, time and place was discussed and planned with the ideas and agreement of Mr. Bon (representative farmer) and local authorities of the three villages were informed; <i>14 July 2006</i> ; Mrs. Hoa Ly and Mr. Bon; Dong Cao village.
31. Registration of farmers interested to plant temperate forage; the objective was to prepare a system to identify and register the farmers interested in using the temperate forage in the next season. A list of names, addresses and available land will be done in the next days. Invitation letters to the training session about buffalo breeding were distributed in the three villages; <i>17 July 2006</i> ; Mrs. Hoa Ly and farmers; Que Vai, Dong Dau and Dong Cao villages.
32. Buffalo breeding training session; the training about buffalo breeding was organized and the main subjects were the following: feeding, reproduction and genetics; animal health and prevention; <i>1 August 2006</i> ; Mr. Nhi (NIAH; trainer), CIRAD team, local village leaders and more than 40 farmers; Dong Dau village.
33. Meeting with local leaders; several meetings were organized in four communes of Luong Son district to get the list of farmers interested in temperate forage production in the winter season; <i>23 September 2006</i> ; CIRAD research team, commune leaders and extension staff; Tien Xuan, Dong Xuan, Yen Trung and Yen Quang communes.
34. Visit of experimental sites; this visit was prepared in collaboration with Mr. Didier Orange (IRD partner). The objective of the visit was to present the experimental plots with tropical forage to the IRD colleague from Laos; <i>26 September 2006</i> ; Mr.



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Didier Orange, Mr. Thierry (IRD Laos), Mrs. Hien and Mrs. Hoa Ly; experimental plot in Dong Cao village.
35. Meetings with farmers; the objective was to visit some farms in the new communes where the temperate forage development will take place and to answer to the questions of farmers concerning the preparation of land and seeding techniques for temperate seeds; <i>29 September 2006</i> ; Mr. Le Hoa Binh, Mrs. Hoa Ly and farmers from three communes; Dong Xuan, Yen Trung and Yen Quang communes.
36. Meeting with farmers of Gho Che village; the objective was to answer the questions concerning the potentialities of temperate forage in this village. The local leader contact the research team to organize the meeting; <i>12 October 2006</i> ; Mrs. Hoa Ly, Mrs. Hien and farmers; Gho Che village.
37. Distribution of temperate seeds to farmers; prior the distribution of temperate seeds (<i>Avena strigosa</i>) a theoretical session in the office and a demonstration training session in the field about the particularities of sowing was organize in each commune concerned by the project; the total surface distributed to farmers was up to 26 hectares; <i>19 October 2006</i> ; Mr. Paulo Salgado, Mr. Tran Van Thu, Mrs. Hoa Ly and farmers (200) from the four communes concerned by the project; Tien Xuan, Dong Xuan, Yen Trung and Yen Quang communes.
38. Meeting in Colvert farm; the owner of the Colvert farm located in Luong Son district ask the research team to support the neighbor farmers to plant temperate forage; <i>24 October 2006</i> ; Mr. Didier Orange and Mrs. Hoa Ly; Colvert farm.
39. Distribution of temperate seeds to farmers (second phase); second distribution period of temperate seeds (<i>Avena strigosa</i>) to farmers of Yen Trung commune; First check of seeding and germination of temperate grass in the four communes; <i>7 November 2006</i> ; CIRAD research team and farmers (200) from the four communes concerned by the project; Tien Xuan, Dong Xuan, Yen Trung and Yen Quang communes.
40. Meeting in Colvert farm; the second visit of Colvert farm was organized to determine the surface to be used for temperate forage development; <i>10 November 2006</i> ; Mrs. Hoa Ly; Colvert farm.
41. Survey of temperate forage fields; the <u>first survey</u> was the opportunity to fruitful discussions with farmers concerning the first impressions about the development of <i>Avena strigosa</i> ; <i>15 November 2006</i> ; Mr. Paulo Salgado, Mr. Tran Van Thu, Mrs. Hoa Ly and farmers; Tien Xuan, Dong Xuan, Yen Trung and Yen Quang communes.
42. Distribution of temperate seeds in Colvert farm; distribution of temperate seeds (<i>Avena strigosa</i>) to farmers around Colvert farm; <i>2 December 2006</i> ; Mrs. Hoa Ly and farmers (3); Colvert farm.
43. DURAS Meeting; balance meeting organised by the local DURAS coordinator, Mr. Tran Duc Toan about the activities supported by DURAS project in Tien Xuan commune in 2006; <i>8 December 2006</i> ; DURAS partners, local leaders and farmers; meeting room of Dong Dau village.
44. Visit to Colvert farm; first survey of temperate forage germination in the farms around Colvert farm; discussion with farmers; <i>19 December 2006</i> ; Mr. Didier Orange and Mrs. Hoa Ly; Colvert farm.
45. Survey of temperate forage fields; <u>second survey</u> of <i>Avena strigosa</i> fields in order to assess the number of farms with good, medium and bad development of forage in the first month after seeding; discussions with extension staff of each commune about data recover; <i>21-22 December 2006</i> ; Mr. Tran Van Thu, Mrs. Hoa Ly and farmers; Tien Xuan, Dong Xuan, Yen Trung and Yen Quang communes.
46. First cut of grass in selected farms; temperate forage samples were cut in each selected farm (good, medium and bad development) in order to determine the fresh matter production and samples were collected to be analysed in the feed analysis laboratory of NIAH; <i>26-27 December 2006</i> ; Mr. Tran Van Thu, Mrs. Hoa Ly and farmers; Tien Xuan, Dong Xuan, Yen Trung and Yen Quang communes.
47. Make film about temperate forage development in Vietnam; a documental film about all the technical aspects of temperate forage and utilisation of grass by animals are being produced to be transmitted in Vietnamese television; Luong Son district area is part of the film scenes; <u>third survey</u> of <i>Avena strigosa</i> fields; <i>19 January 2007</i> ; Mr. Paulo Salgado, Mr. Le Hoa Binh, Mr. Tran Van Thu and staff of film company; Tien Xuan and Yen Trung communes.
48. Survey of temperate forage fields; <u>fourth survey</u> of <i>Avena strigosa</i> fields and recovers data about forage development get by extension staff of each commune; <i>1 February 2007</i> ; Mr. Tran Van Thu, Mr. Le Hoa Binh and extension staff; Tien Xuan, Dong Xuan, Yen Trung and Yen Quang communes.
49. Meeting to present the first forage results in the four communes (Tien Xuan, Dong Xuan, Yen Trung and Yen Quang); this meeting was organized to present the results of forage adaptation, development and production in the four communes involved in the DURAS project. A friendly and open discussion follows the presentation of results and farmer's comments were noted; <i>13-14 and 22 March 2007</i> ; Mr. Tran Van Thu, Mr. Le Hoa Binh, local leaders, extension staff and farmers; Tien Xuan, Dong Xuan, Yen Trung and Yen Quang communes.
50. Recuparate field data about temperate grass development in the four communes (Tien Xuan, Dong Xuan, Yen Trung and Yen Quang); this meeting was organized to discuss with local leaders about the end of the temperate forage season and to obtain the information (data) from field recovered by the extension staff in each commune; <i>14 May 2007</i> ; Mr. Tran Van Thu, Mr. Bon, local leaders, extension staff and farmers; Tien Xuan, Dong Xuan, Yen Trung and Yen Quang communes.
51. Visit of experimental site in Dong Cao village; this visit was prepared in collaboration with Mr. Didier Orange (IRD partner). The objective of the visit was to evaluate the activities performed by NIAH and IRD team in the joint experimental plot. Relevant data obtained by both team were orally presented. We have defined a joint-calendar with the IRD team to present and analyze data from this plot; <i>1st June 2007</i> ; Mr. Didier Orange, Mr. Pascal Jouquet, Mr. Le Hoa Binh, Mr. Tran Van Thu, Mrs. Hoa Ly and Mr. Paulo Salgado; experimental plot in Dong Cao village.
52. Confirm field data about temperate grass development in the four communes (Tien Xuan, Dong Xuan, Yen Trung and Yen Quang); several meeting were organized to confirm quantitative data related to the use of land surface and seeds distributed by DURAS project in October 2006; <i>2 and 3 July 2007</i> ; Mrs. Le Hoa Ly, extension staff and farmers; Tien Xuan, Dong Xuan, Yen Trung and Yen Quang communes.
53. Four meetings to present the final results of the first year cultivating temperate forage in the four communes (Tien Xuan, Dong Xuan, Yen Trung and Yen Quang); this meeting was organized to present the final results of Oat forage (<i>Avena strigosa</i>) scaling-up experiments in four communes of Luong Son district. An interesting discussion followed the presentation of results. A first draft of the documentary film was presented to farmers and comments were used to improve the clarity of the film. The work plan for the next season was discussed with farmers and with the coordinator of the project (Dr. Toan); <i>24 and 25 July 2007</i> ; Dr. Toan (DURAS Coordinator), CIRAD research team, farmers, extension staff and local authorities; meeting room in Dong Dau village.



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<p>54. Meetings with extension staff; several meetings were made with extension staff of each commune to identify the seeds demand for the second year experiments in the four communes. Two more communes of Luong Son district ask to participate in the temperate forage activities of DURAS project. Briefs explanations about temperate grass potential were made to new participants; <i>6 September 2007</i>; Mr. Tran Van Thu and Mrs. Hoa Ly; <i>Tien Xuan, Dong Xuan, Yen Trung and Yen Quang</i> communes.</p>
<p>55. Distribution of temperate seeds to farmers; prior the distribution of temperate seeds (<i>Avena strigosa</i>) a technical leaflet was distribute to each farmer and a DVD copy of a documentary film about technical aspects of temperate grass production was offered to the extension staff of each commune concerned by the project; the total surface distributed to farmers was up to 21 hectares and a total of 350 farmers. Two more communes of Luong Son district participate in the temperate forage activities of DURAS project in 2007 (total of 6); <i>2-3 and 12 October 2007</i>; Mr. Tran Van Thu, Mrs. Hoa Ly, extension staff and farmers from each commune concerned by the project; <i>Tien Xuan, Dong Xuan, Yen Trung, Yen Quang, Yen Binh and Cu Yen</i> communes.</p>
<p>56. Meeting with local leaders and farmers; one day visit was organized to meet the local leaders and farmers and discuss about the sowing and first development of temperate grass. This visit was also the opportunity to organize a field-day, one week later, in the frame of an AUF scientific journey in Tien Xuan commune; <i>2 November 2007</i>; Mr. Paulo Salgado, Mr. Tran Van Thu, local leaders and farmers; <i>Tien Xuan and Dong Xuan</i> communes.</p>
<p>57. Field visit; the MSEC and DURAS Crop-livestock organized a field trip in the frame of an AUF (Agence Universitaire de la Francophonie) scientific journey. The thematic items were: Fertility transfer along the sloping land, water and fertility management, integrated modeling of farming ecosystems within hills and small mountains in SEA; <i>8 November 2007</i>; all the DURAS Crop-livestock teams; <i>Dong Cao village, Tien Xuan</i> commune.</p>
<p>58. Meetings with extension staff; several meetings were made with extension staff of each commune to identify the main problems related to the choice of land and sowing technique of temperate grass. Explanations about temperate grass potential were made to new participants; <i>15 and 16 November 2007</i>; Mr. Tran Van Thu; <i>Tien Xuan, Dong Xuan, Yen Trung, Yen Quang, Yen Binh and Cu Yen</i> communes.</p>
<p>59. Meeting with farmers; the main objective of this mission was to organize a field-day, one week later, with the Research and Strategy Director and the Regional (SEA) Director of CIRAD; <i>28 November 2007</i>; Mr. Paulo Salgado and Mr. Tran Van Thu; <i>Tien Xuan</i> commune.</p>
<p>60. Field visit; the objective of this visit was to illustrate one of the research and development activities of CIRAD in Vietnam. The Research and Strategy Director (Etienne Hezelin) as well as the Regional Director of CIRAD in SEA were present; <i>6 December 2007</i>; CIRAD, NIAH and IRD teams; <i>Dong Cao village, Tien Xuan</i> commune.</p>
<p>61. Meetings with extension staff; the objective was to obtain data from the extension staff; <i>6 January 2008</i>; Mr. Tran Van Thu; <i>Tien Xuan, Dong Xuan, Yen Trung, Yen Quang, Yen Binh and Cu Yen</i> communes.</p>
<p>62. Field visit and meetings with extension staff; the objective was to identify the main problems related to forage production in this winter season; <i>15 March 2008</i>; Mr. Tran Van Thu; <i>Tien Xuan, Dong Xuan, Yen Trung, Yen Quang, Yen Binh and Cu Yen</i> communes.</p>

Others



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6. Project's REGIONAL BENEFITS

The first benefit corresponds to the improvement of the knowledge of farmers about forage production and livestock integration. The documentary television film and the technical leaflets about Oat production are essential tools to scaling-up at regional level the results of crop-livestock DURAS project.

In a context of limited natural resources and significant pressure on land, the intensification of grass production using temperate grasses will allow the utilization of available surface of land during winter season. This will create more benefits for farmers using this technology. In addition, farmers are not obligate to go to the forest to obtain grass resources and will promote the sustainability of natural resources in mountainous areas.

The feeding costs using Oat forages in ruminant production was lower than other alternative resources (concentrate feed, conserved grass, etc) and contributes to increase the incomes of farmers. In addition, the higher forage availability during winter will permit a stronger development of cattle activity resulting on a higher income of farmers.

Finally, the production of Oat forage during winter is in full coherence with the political strategy of Vietnam for the livestock production, in particular with regard to the initiatives to improve forage resources and ruminant performances.

7. FUTURE OPPORTUNITIES and CHALLENGES

It will be very useful to characterize the soil of each area in order to select the best places adapted to an optimal production of temperate forage. Actually, a significant part of agricultural surfaces in North of Vietnam are available during winter season and can potentially be used for Oat production during this season. In addition, it would be judicious to evaluate the production of temperate species planted together (between lines) with tropical forage. It is also important to continue the research activities on seed production locally in order to better control the specificities of seed technical protocol.

As expected, the forage development and grass production in the on-farm experiments was not similar in all communes or farms. The differences were directly related with the characteristics of soils, climate and the management of farmers (fertilisation, irrigation, etc.). The loss of farmer's motivation due to some bad results can negatively affect the adoption of temperate fodder species. Training sessions seemed to be an important way to clarify the ideas and to implement an interesting dialogue with farmers. The majority of farmers are interested to continue the forage activities in the next years.

The challenges concerning the temperate forage cultivation are:

- To assist farmers in order to obtain temperate seeds at the right period (September/October);
- To guarantee the involvement of decision-makers to highlight the beneficial impact of the new agricultural practice for the target farmers' communities;
- To evaluate the contribution of this new appropriate forage technology in the development of sustainable agricultural production in sloping lands;
- To obtain the integration of Oat species in the official list of forage plants in Vietnam and to encourage a commercial commodity chain for temperate forage seeds.