SPECIAL FINAL REPORT- SOME KEY FINDINGS, FUTURE ISSUES AND INTERVENTIONS FOR THE LAO COFFEE INDUSTRY

FAO-LAO TCP/LAO/2903 (A) Phase I &
TCP/LAO/3101 Phase II
Coffee Project

Compiled by

Anthony Marsh, Jacques Op De Laak,
Staff of Lao Coffee Research Experimentation Centre,
Edward Winston, Keith Chapman

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DISCLAIMER

FAO Regional Office for Asia and the Pacific
39 Phra Artit Road
Banglamphu 10200
Bangkok Thailand

Tel: 66-2-6974000
Fax: 66-2-6974445
Email: FAO-RAP@FAO.ORG

Website: www.fao.org/world/regional/rap/highlights.asp

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PREFACE

Coffee quality improvement and value-adding to coffee in Lao-PDR to improve livelihoods and income generation of smallholder farmers has been a key target of the FAO-Lao TCP/LAO/2903 Phase I and TCP/LAO/3101 Phase II Coffee Project entitled, ***Enhancing Livelihoods and Income Generation of Lao Coffee Smallholders through the Development of Value-added Coffee Improvement Interventions***.

The project has introduced, at the request of the Government of Lao, new technologies to the Lao coffee industry via the Ministry of Agriculture and Forestry (MAF), National Agricultural and Forestry Research Institute (NAFRI), Coffee Research Experimentation Centre (CREC), to provincial and district staff and farmers of Champasaak Province on the Bolovens Plateaux of southern Lao and the private coffee stakeholders.

During the trials, surveys, capacity building, training and evaluation of Lao Arabica and Robusta coffee a number of targeted interventions were made via FAO technical assistance inputs. In the course of this work many new key points, issues and facts emerged concerning coffee quality and coffee production and processing improvement, along with key issues concerning the Lao coffee industry its future vision, strategies, policies and markets. For example, inexpensive, simple semi-wash pulping/demucilaging technologies with good enhanced rapid drying have been shown to produce consistently higher quality Robusta and Arabica coffee by smallholders, which will attract much higher prices in the world market for Lao.

This final publication of the FAO-LAO TCP Coffee Project summarises many of the findings and key outcomes of interventions and raises issues for GOL and all coffee industry stakeholders to address. The information in this publication supplements the Arabica Coffee Manual for Lao-PDR, and the Farm Notes produced as extension information for farmers in Lao language, also produced by this FAO-Lao Coffee project.

We trust that you will find the publication useful in extending the knowledge on coffee and in providing solutions to problems and that it helps help pave the way to a profitable and sustainable future for high quality Lao Arabica and Robusta coffees.

Keith Chapman
Industrial Crops Officer
FAO Regional Office for Asia and the Pacific
Bangkok Thailand

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INTRODUCTION

The FAO TCP/LAO/2903 project entitled, "Enhancing Livelihoods and Income Generation of Lao Coffee Smallholders Through the Development of Value-added Coffee Improvement Interventions," was designed and implemented by the FAO Regional Office for Asia and the Pacific (FAO/RAP) at the request of the Government of Lao-PDR. The project was approved officially for funding and implementation by December 2003. A Phase II, TCP/LAO/3101 follow-up supplementary project was used to conclude the overall project.

The **Overall Objective** of the project was:

Improved incomes and livelihoods of smallholder coffee producers in Lao PDR, through technical interventions to add value to coffee via quality improvement and enhanced, diverse, sustainable farming systems and practices established with research, information, training and outreach programmes.

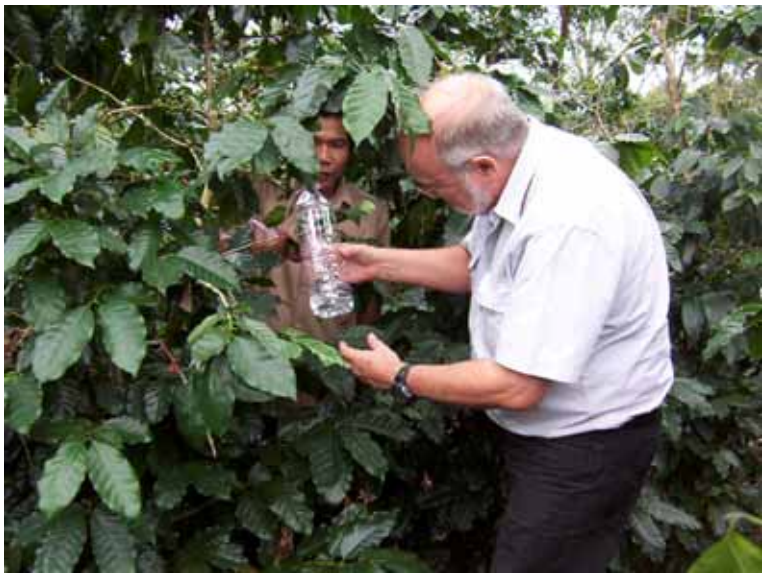
Key Outputs of the project were:

1. A review of the role of the NAFRI Coffee Research and Experimentation Centre (CREC) and NAFES, in line with GOL strategies and policies to produce high quality valued added coffee via improved, sustainable, diversified smallholder farming systems and practices.
2. A complete review of the Arabica and Robusta coffee research, and the establishment of a comprehensive, applied coffee research and development programme in line with industry needs and CREC capabilities.
3. Coffee processing methods assessed, and evaluated to establish industry standards for processing of Arabica and Robusta coffee in the Bolovens Plateaux region. A clear outreach extension model developed to deliver interventions and wet processing equipment to farm level.
4. A range of appropriate high quality Arabica coffee varieties introduced from abroad and established for performance and quality evaluation, under shade, at the NAFRI Coffee Research and Experimentation Centre (CREC) in Ban Itou, Paxong district, Bolovens Plateaux.
5. An established coffee quality/cup tasting laboratory facility at the NAFRI Coffee Research and Experimentation Centre (CREC), with key staff, GOL agencies and industry personnel trained in cup tasting and basic coffee analysis.
6. A coffee based library and information resource and training centre facility established at the NAFRI Coffee Research and Experimentation Centre (CREC), Ban Itou, in Pakxong.
7. A marketing strategy established with defined activities for the improved international marketing of high quality, Specialty Lao coffee.

During the course of the project many new technologies, designed to improve coffee quality and reduce OTA contamination, were developed and tested with respect to coffee processing, drying and storage and coffee industry practices on-farm were surveyed. This report presents findings of these trials and surveys along with key additional information.

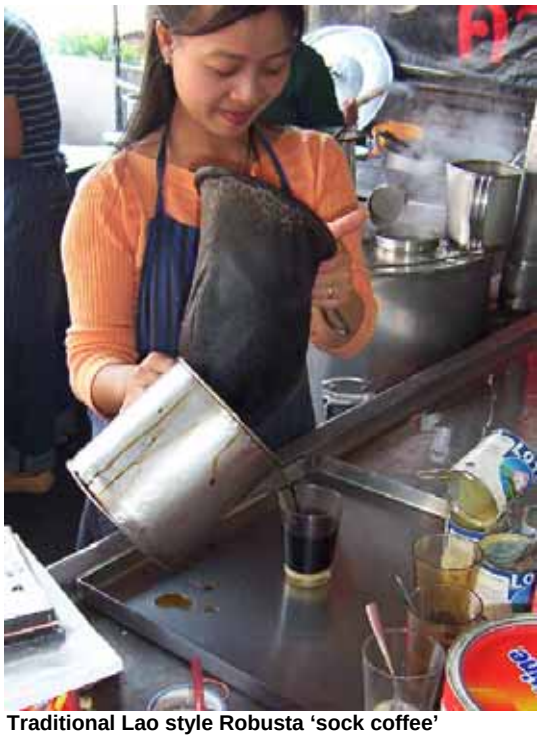
The report begins with an assessment of the quality of Lao Coffee and its potential and how it may be realised with new processing technologies. It then proceeds to examine the marketing of Lao coffee and the policies, strategies and enabling environment needed to develop the coffee industry, and concludes with a new expanded role for the CREC and specific information on varieties and farmer soil and leaf analyses.

The report has been compiled with national counterparts, international consultants and coordinated, jointly written and edited by the FAO Regional Office for Asia and the Pacific Industrial Crops Officer.



Checking for Coffee Berry Borer

Demucilaging parchment coffee to enhance quality



Traditional Lao style Robusta 'sock coffee'

Heavy yielding, high altitude Robusta

LAO COFFEE QUALITY – THE CUP TASTING PROCESS

Coffee quality is subjective and often has very personal appeal. In an effort to standardize the process of evaluating the cup quality of coffee samples, the FAO project has chosen to use the systematic quality evaluation process described in the *Coffee Cuppers Handbook* written by Ted Lingle (Third Edition, 2001) and published by the Specialty Coffee Association of America (SCAA) to evaluate Arabica and Robusta coffees in Lao.

The sensory evaluation process of a coffee's quality is divided into five evaluation steps, with each step scoring from 1 to 10 points. A sixth step is added to give the coffee a "Cupper's Points" or Balance score from –5 to +5. For convenience, 50 points are then added to the resulting score to give a score out of 100 for each coffee assessed. Details of the complete process are given below.

Sample Preparation and Roasting Process

Samples of dry coffee to be cup tasted were hulled and all dry cherry skin and parchment removed leaving a green bean ready for roasting. A small laboratory VINACAFE huller capable of 200grams per run was used. Once hulled the green bean is winnowed and any major bean defects removed.

Samples (100 g) of green bean are then roasted in a sample roaster. This is a Probat roaster designed to specifically roast small samples of coffee and which gives similar results to larger commercial roasters. The sample roaster used in the CREC laboratory is a Probat twin barrel electric roaster. The roast normally takes between 5 to 7 minutes. A thermal probe measures temperatures inside the roasting drum. The starting temperature of the roaster is adjusted to 230°C as the green bean is poured into the roaster. The temperature drops to approximately 180°C as the coffee beans absorb the heat from the roaster, then increases again toward 230°C as the beans begin to roast.

Coffee roast type is based on changes in during roasting. As the beans heat they go through two expansion stages, like popcorn, where two distinct popping stages are heard from inside the roast drum. Sample coffees are roasted until the second "pop" is heard. This gives a consistent development of the roasted bean and generally gives a very consistent colour. The target colour is a medium dark roast with no oil apparent on the surface of the bean.

An even roast of beans is important in coffee cup tasting assessment, as the amount and colour of roast can have a profound effect on the cup taste. Light roasts will produce much more acid in the cup with less flavour development while a dark roast can develop more complex flavours and less acidity.

Hulling coffee samples

Sample grading screens


Roasting coffee samples

Cup Tasting Process

Roast coffee samples are displayed on the cupping table along with the green bean. Fifty grams of the roast bean are ground to a fine espresso grind and 10 grams of the ground coffee are placed in a 150 ml cupping bowl. A minimum of two bowls per sample are prepared to check for consistency and quality. Often, three or four bowls may be prepared for each coffee sample to check variation.

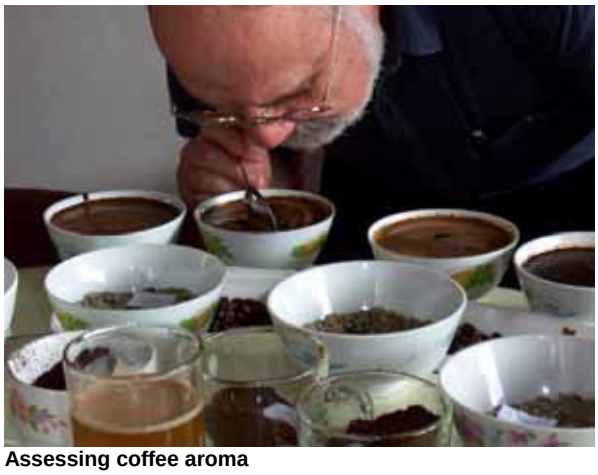
Once all samples are on the table, the first step in cup tasting is to evaluate the green bean and the roast bean colour and smell, and to smell the “fragrance” of the ground roast coffee. Differences in green bean and roast appearance are noted and the fragrance is scored.

Filtered, near boiling water (150 ml) is then added to each cupping bowl completely immersing the coffee grounds and allowed to steep for approximated 3 to 5 minutes, until cool enough to taste. During this process all bowls are smelt again to assess the “aroma” and each sample is scored. Once sufficiently cooled, the crust of coffee grounds floating on top is skimmed off and the coffee is ready for tasting.

Tasting involves the vigorous sipping or slurping of coffee to spray the coffee liquor all over the palate and to “chew” the coffee liquor, taking the aroma up in the olfactory membranes at the back to the nose. Coffee is assessed and scored on four main characteristics: “acidity”, “flavour”, “body”. Normally the cupper will spit the coffee out and the coffee is also assessed on the “aftertaste” left in the mouth. Finally the coffee is rated for its overall “balance”, the “cuppers point”.

To the ratings for the six sample characters, 50 points are added to give a score out of 100 for each sample.

Skimming the cup ready for tasting



Assessing coffee aroma

	Characters	Ranking on	Rating	Scale range
1	Fragrance of the ground coffee plus Aroma of the coffee liquor	Preference	1 to 10	very poor to outstanding
2	Acidity of the liquor	Intensity	1 to 10	very flat to very bright
3	Flavour of the liquor	Preference	1 to 10	very poor to very bright
4	Body of liquor	Intensity	1 to 10	thin to heavy
5	Aftertaste of the liquor	Preference	1 to 10	very poor to outstanding
6	Cuppers Points or Balance	Taster's overall preference	-5 to +5	very poor to outstanding

Scoring and Rating Coffees

There are a range of verbal descriptors for coffee. However, as this can be very subjective between tasters, the SCAA system of scoring gives a single number to each coffee. This allows coffees to be rated against one another in a systematic way.

As a guideline, the SCAA scoring system should correlate to the SCAA Green Coffee Classification Chart where:

- Class 1 "Specialty Grade" should receive 90 to 100 + points
- Class 2 "Premium Grade" should receive 80 to 89 points
- Class 3 "Exchange Grade" or "Commercial" should receive 70 to 79 points
- Class 4 "Below Standard Grade" should receive 60 to 69 points
- Class 5 " Off Grade" should receive 50 to 59 points

During the two years of tasting Lao coffee under the FAO project, all well-processed Lao Arabicas have been rated between high 60s to low 80s by the CREC cupping laboratory and by international tasters. At this time, it would appear there are few, if any, Lao Arabica coffees that meet "Premium Grade" and none that meet "Speciality Grade". If Lao Arabica is processed well, it is a mild and pleasant generally well-balanced coffee.

Dr Ty Phomasack, Vice Minister, MAF and Mr Khamdy Atsayavong, Director of CREC

CREC tasting team

Tony Marsh and Keith Chapman tasting Lao Arabica coffee with Sora Hamada, Japanese buyer

Jaques Op De Laak, Mike Ashram and Keith Chapman assessing Arabica coffees from many locations on the Bolovens Plateaux

CUP QUALITY ASSESSMENT OF LAO ARABICA COFFEE

Summary

Thirty-four samples of Arabica collected from 17 locations during the 2005/06 season were clean and cupped well with only one lower altitude sample showing some cup taint due to CBB damaged beans. Overall, quality was lower than 2004/05 and none of the coffees could be considered a "Specialty Coffee", as all lacked body, acidity and general complexicity. This decrease in quality was attributed to unusual climatic conditions and is similar to the variation of vintages in wines. Coffee scores ranged from 60/100 to a maximum of 81/100. The Java variety grown at 1065 m.a.s.l., was rated as the best coffee and a Premium Grade. Catimors were more easily differentiated from the Typicas than in 2004/05 survey, as the Catimors in the 2005/06 survey had a dull cup exhibiting an unpleasant sour taste. The survey found that there was no commercial difference detected between the two processing techniques used to produce washed Arabica — mechanical washing using a pulper/demucilager (Process A) and sun-dry, versus the traditional pulp, ferment, hand-wash and sun-dry (Process C). All coffees assessed met Commercial or Exchange grade.

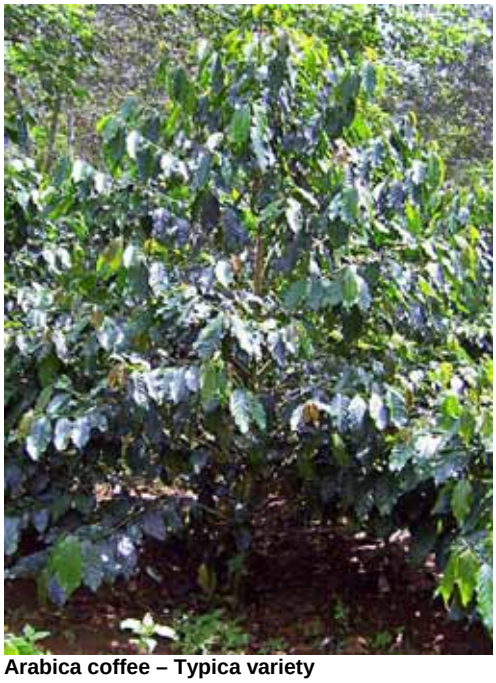
In 2004/05 season, 12 samples of fresh Arabica cherry were collected from across the Bolovens Plateaux. These samples were wet processed and the resulting cup quality assessed by the CREC cupping lab and by 5 international coffee companies. The aim of this survey was to evaluate the commercial value and possible pricing for these coffees in the world coffee market. Survey results were presented in the *Arabica Coffee Manual for Lao PDR* and are repeated in the results section of this report. The 2004/05 trial found that there were differences in the cup quality of the 4 varieties of Arabica tested. (Catimor Lao, Catimor Viet Nam, Typica, Java) A variety called Java was clearly the preferred coffee. The 2004/05 results also showed that often the international companies could not differentiate between the Arabica varieties of Catimor and Typica . All the coffee samples tested were found to be an Exchange or Commercial Grade of coffee with Java approaching Premium Grade. While well-processed, clean and balanced, the coffees had a few outstanding features but did not have true Specialty coffee characteristics.

All international quality assessments varied considerably hence the case for a taste panel assessment and averaging of scores, as done at CREC, is very strong.

Introduction

A range of Arabica coffee has been planted on the Bolovens Plateaux since the start of the French colonial era — some Arabicas originate from plantings made 70 years ago. A number of varieties were provided to farmers during donor-funded extension programmes in the 1990s and some varieties were brought in to Lao by private growers over the last 5 years. There has been little study of the potential cup quality of the different Arabica varieties planted in different climatic environments under different management conditions on the Bolovens Plateaux.

Cupping of Arabicas in the past, grown without shade and marginal management at the Coffee Research Experimantal Centre (CREC) at 860 m.a.s.l., are essentially meaningless due to lower elevation and growing conditions. To assess true potential characters of these coffees, they must be tested at high elevation (1100 to 1300 m.a.s.l.).



Arabica coffee – Typica variety

A more detailed and systematic survey was undertaken in 2005/06 where Arabica cherry samples from 17 sites across the Bolovens Plateaux were collected. These samples were processed as washed coffee in two ways — machine washing and traditional ferment and hand washing. This survey aimed to determine, (1) if there were any differences in cupping qualities of Arabica coffee across the Bolovens Plateaux, and (2) if there were significant differences in the cup quality of the traditional ferment and hand washed process compared to the new machine washed technology.

Arabica, Catimor variety

Arabica, Java variety

Materials and Methods

Two hundred kilos of good quality fresh Arabica cherry coffee were collected from a range of farms or farmer groups around the main coffee growing areas of the Bolovens Plateaux. Arabica variety, farm management, soil type and altitude were recorded for each farm source and cherry was transported to the CREC facility for processing.

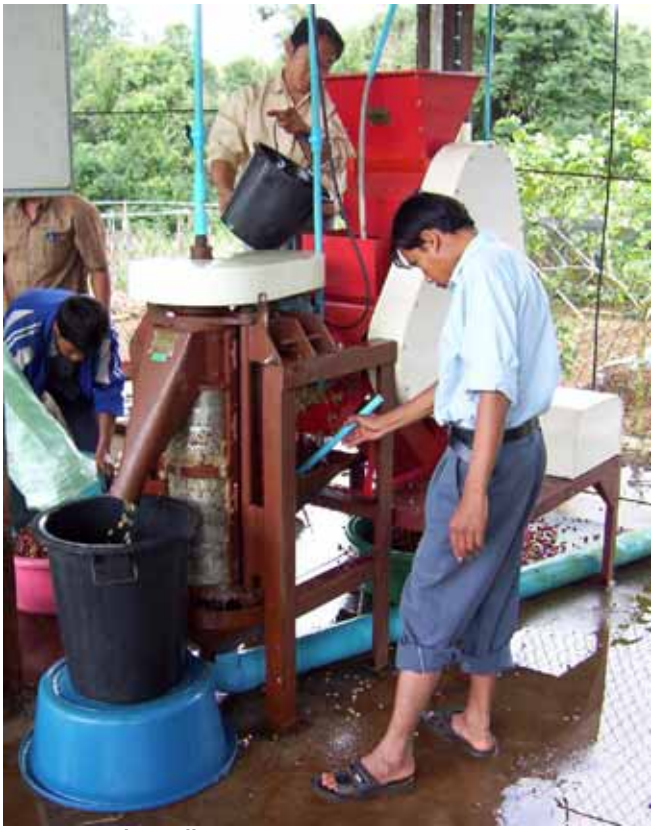
Each of the samples was sorted and floaters removed by immersing the coffee cherries in water. The remaining sound coffee was then divided equally by weight and each of these lots processed by one of two ways:

Machine washed. (**Process A).** The imported VINACAFE pulper demucilager, pulped each 100 kg batch of cherry coffee, then the mucilage was immediately removed by the second-stage demucilaging unit. Within one hour, the resulting wet parchment was spread to dry at a rate of 20 kg/m^2 on the mesh drying trays.

Traditional hand washed **(Process C).** The imported VINACAFE machine was used to only pulp the 100 kg batch of cherry coffee, and the resulting wet parchment was stored in a free-draining plastic container for 18 hours. The next day, the fermented parchment was washed by hand in clean water until free of mucilage, and spread to dry at 20 kg/m^2 on the drying trays.

Parchment was raked four times per day at 09.00 hr, 11.00 hr, 13.00 hr and 15.00 hr. Trays were covered with tarpaulins through the day if raining but left exposed if sunny or overcast, and were covered each night and uncovered early each morning When each treatment reached 12% moisture (in the green bean), it was weighed and bagged in a single, clean, new, odour-free jute sack (approx 20 kg of dry parchment). Sacks of samples were stored on pallets in the dry coffee storage building.

VINACAFE demucilager (close-up)



VINACAFE demucilager

Pulping coffee

Fermenting coffee

Hand washing coffee

Drying trays

Coffee store with samples for testing

CREC staff cupping coffee

After three months in storage, the 34 samples from 17 locations were evaluated in the CREC cup tasting lab from the 22 to 26 February 2006 by a team of cup tasters led by Mr Anthony Marsh and Mr Keith Chapman (FAO Project). Parchment samples were hulled, roasted and cup tasted using the SCAA standard evaluation techniques. Scores were awarded to each sample by each cupper. Scores were then averaged to achieve the final score.

Results and Discussion

Table 1. Arabica cherry coffee data used for 2005/06 Arabica survey

Sample No.	Farmer name	Village name	Altitude masl (m)	Variety	Harvest date	Weight of fresh cherry (kg)	Weight of floaters (kg	Weight of sorted cherry for process A & C (kg)
1	Intha Group	Paxong, Attepeau Road	1065	Cat	14/11/05	213.5	17.5	A 98 C 98
2	Dau Heaung	Paxong, Attepeau Road	1083	Cat	15/11/05	200	16	A 92 C 92
3	Mr Phet	Nongkali	1240	Cat	16/11/05	200	26	A 87 C 87
4	Mr Song	Katuat	1175	Cat	17/11/05	200	14	A 93 C 93
5	Mr Phou	Nongleang	1180	Typ	18/11/05	179	16	A 81.5 C 81.5
6	Champa	Phoumakor	1120	Typ	19/11/05	179	13	A 83 C 83
7	Intha Group		1065	Java	21/11/05	200	11	A 94.5 C 94.5
8	Mr Mar	Phou Ooi	1310	Typ	21/11/05	142.5	6.5	A 68 C 68
9	Mr Dam	Thongset	1225	Cat	24/11/05	197.5	16.5	A 90.5 C 90.5
10	Mr Soy	Katuat	1175	Typ	25/11/05	218.5	22	A 98.5 C 98.5
11	Mr Phet	Being	1245	Cat	27/11/05	223.5	19.5	A 102 C 102
12	Mr Phet	Being	1235	Typ	28/11/05	191.5	18	A 86.75 C 86.75
13	Mr Than	Heouiseng	954	Java	28/11/05	218.5	20.5	A 99 C 99
14	Mr Kham	Benglieng	1210	Typ	29/11/05	215.5	18	A 98.75 C 98.75
15	Mr Souk	Thongkatai	1200	Typ	30/11/05	208	16.5	A 97.75 C 95.75
16	MrPengkeo	Phoumone	967	Cat	01/12/05	213.5	17.8	A 97.8 C 97.8
17	Mr Kham	Thongset	1225	Typ	03/12/05	200	15.5	A 92.25 C 92.25

Data show floaters consistent at around 5% to 10%. All coffee was collected between November 14 and December 3, 2005.

Table 2. Processing details and cup tasting results of 34 samples of Arabica in the 2005/06 survey

Sample No	Weight of sorted red cherry for process A & C (kg)	Process date mach wash A & fullwash (C)	Days to dry	Weight of dry parchment A & (C)	Moisture content of dry coffee (%) G.B.	Cup quality score (SCAA) from CREC team	Variety	Cup quality comments
1	A 98	15/11/05	13	17.5	11.5	68	Catimor	Slightly Sour, Flat
	C 98	15/11/05	13	15.2	11.5	70	Catimor	Flat
2	A 92	16/11/05	13	17.8	12.0	73	Catimor	Slightly bitter, Flat
	C 92	16/11/05	13	16.5	12.0	72	Catimor	Flat
3	A 87	17/11/05	13	16.0	12.0	73	Catimor	Clean
	C 87	17/11/05	13	18.5	12.0	72	Catimor	Clean
4	A 93	18/11/05	11	19.5	11.5	79	Catimor	Slight acidity and body
	C 93	19/11/05	11	18.7	11.5	78	Catimor	Slight acidity and body
5	A 81.5	20/11/05	12	17.2	11.0	78	Typica	Clean
	C 81.5	20/11/05	12	14.8	11.0	76	Typica	Clean
6	A 83	22/11/05	13	19.2	12.0	73	Typica	Thin, sweet
	C 83	22/11/05	13	16.4	12.0	76	Typica	Thin, sweet
7	A 94.5	22/11/05	13	17.3	12.0	78	Java	Good body, sweet
	C 94.5	22/11/05	13	16.5	12.0	81	Java	Sweet, good body
8	A 68	22/11/05	9	14.0	11.6	75	Typica	Thin, metallic
	C 68	22/11/05	9	14.3	11.6	74	Typica	Thin metallic
9	A 90.5	25/11/05	10	21.5	11.5	70	Catimor	Slightly Sour, Bitter
	C 90.5	25/11/05	10	19.8	11.5	69	Catimor	Slightly Sour, Metallic
10	A 98.5	26/11/05	10	15.8	12.0	76	Typica	Clean, Mild
	C 98.5	12/11/05	10	18.8	12.0	77	Typica	Clean, Mild
11	A 102	28/11/05	8	19.1	12.0	71	Catimor	Slightly Bitter
	C 102	28/11/05	8	17.6	12.0	71	Catimor	Slightly Bitter,
12	A 86.75	29/11/05	9	13.2	11.4	78	Typica	Some body and acidity
	C 86.75	29/11/05	9	15.3	11.4	78	Typica	Some body and acidity
13	A 99	29/11/05	9	17.2	11.5	75	Java	Soft smooth sweet
	C 99	29/11/05	9	13.8	11.5	67	Java	Defect. CBB
14	A 98.75	30/11/05	8	19.5	11.7	75	Typica	Thin, mild
	C 98.75	30/11/05	8	18.2	11.7	75	Typica	Thin, mild
15	A 97.75	01/12/05	9	19.1	11.3	80	Typica	Slight body and acidity
	C 95.75	01/12/05	9	16.2	11.3	79	Typica	Slight body and acidity
16	A 97.8	02/12/05	9	16.0	11.5	69	Catimor	Sour
	C 97.8	02/12/05	9	16.4	11.5	69	Catimor	Sour
17	A 92.25	03/12/05	9	15.0	11.5	73	Typica	Slightly sour
	C 92.25	03/12/05	9	16.8	11.5	76	Typica	Slightly sour

Data show that quality scores for 34 samples varied from high 60s to 81. The quality range was not large and overall quality was as not high as 2004/05. Catimors were more easily identified in 2005/06 as most were dull and had a sour finish.

Table 3. Comments on seven selected Arabica samples from the 2004/05 survey

Sample	Lao Mountan coffee	Ecom	Holland Coffee	CAFECONTROL Viet Nam	Illy Café Assessed as Espresso coffee	Thanksgiving Coffee
A Catimor Dau Heuang 1083m	80/100	60.2/100 Flat, no character at all	Acidity: Low Body:Medium Prep:Good Flavour: Astringent, slightly dry not very good	Flavour: Grassy Acidity:medium No.5	Very good aroma, little defects in the beans	74/100 Dry rubber, Earthy Woody
B Catimor Katuat Village 1175m	78/100	74.8/100 Slightly fruity	Acidity: Low Body:medium Prep:overdried/faded Flavour: Flat, nothing special	Flavour:medium Acidity: high No.6	Good taste, no significant defective beans	79/100 Spice, Citrus,Sweet, ffruity,lively citrus
C Catimor Thong Katai village 1205	88/100	74.4/100 pleasant, round	Acidity: Low Body:Medium Prep:Good Flavour: Best of samples, floral, sweet, clean, pleasant	Flavour: medium(woody) Acidity:Medium No.7	Good taste, no significant defective beans	79/100 Fruity citrus Sweet yellow Raisins
D Typical Being village 1200m	81/100	63/100 Smooth but thin/flat	Acidity: Low/Medium Body:Medium Prep:Good Flavour: Metalisc grassy, dusty unpleasant/defective	Flavor: Good Acid: High Best of samples No.1	Good coffee, similar to “A” but less aroma	79/100 Woody, musty
E Typica Thong set village 1225m	83/100	63.6/100 no comments	Acidity: Low Body:medium Prep:Good Flavour: sour, not pleasant	Flavour: Slight Good Acidity: Quite high No.4	No defects, no particular body	Not Tested
F Typica Katuat village 1175	72/100	73.4/100 pleasant, balanced	Acidity: Low Body:medium Prep:Good Flavour: Second b4est, little sweetness, clean pleasant but a little thin.	Flavour: slight Good Acidity: Quite High No.3	Unfortunately “green”. Probably fresher than other coffees	79/100 Woody, Musty
G Java Intha group Paxsong Attepeau Road 1063m	88/100	71.6/100 higher acidity, fruitiness, divided options between cuppers.	Acidity: Low/Medium Body:Medium Prep: starting to fade Flavour: Little grassy, other wise OK, little sweetness.	Flavour :Good Acidity: High Second best of samples No.2	Woody taste	80/100 Floral, Sweet, fruity

Data from the 2004/05 survey for the seven selected coffees, showed that coffees scored ranged from low 60s to low 80s. All coffees would meet exchange or commercial coffee grade with some, including Java and Typica, in the Premium Grade.

It is clear from the results of commercial roasters that preferences vary considerably between them. The case for using a tasting panel of four to six people, tasting to one standard (SCAA) and averaging the scores, is therefore very strong and should be mandatory for consistant overall assessment of coffees.

Acknowledgements

We would like to thank the coffee companies that provided valuable time and expertise to evaluate the samples and to provide comments and advice during this survey. Specifically we would like to thank Mr Steve Feldschneider of Lao Mountain Coffee, Mr Oliver Tichit of Ecom Coffee, Mr George Willekes of Holland Coffee, Mr Le Anh Tuan of Cafécontrol, Mr Turello Luca of Illycaffe and Mr Paul Katzeff of Thanksgiving Coffee.

CUP QUALITY ASSESSMENT OF LAO ROBUSTA COFFEE

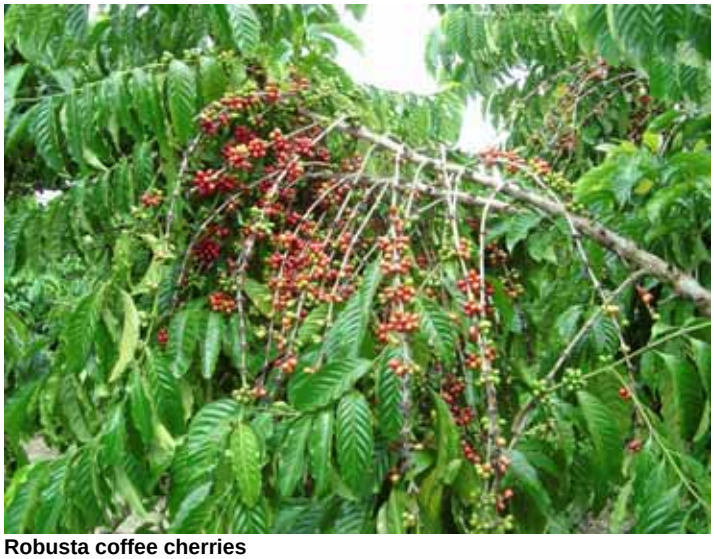
Summary

All samples were clean and cupped well. Overall quality of washed Robusta in 2005/06 was excellent and better than 2004/5. Samples had a clean cup, good body with little harsh Robusta taste. Samples showed a great deal of potential to be marketed as a Specialty Lao Washed Robusta.

There was little difference between the two processing styles of machine washing (Process A) and traditional ferment and hand washing (Process C). Samples have been sent to a range of buyers for further commercial evaluation.

It is estimated that the additional cost to produce a Washed Robusta using the VINACAFE pulper/demucilager would be US$22/MT of green bean.

Robusta coffee flowers



Robusta coffee cherries

Introduction

Robusta is grown on the Bolovens Plateaux at relative high altitudes of between 600 to 1300 m.a.s.l. There is potential for this Robusta to show “mild” cup qualities, which will be of interest to the Speciality Robusta buyers. It is higly likely that washed Robusta will be a viable alternative to the traditional natural dry cherry processing.

During the 2004/05 season a simple trial was conducted to evaluate the quality potential of Robusta coffee from the Bolovens Plateaux by processing Robusta from 3 altitudes — 600, 800 and 1200 m. Robusta samples were processed three ways: as a natural dried cherry, as a split fresh cherry and as washed parchment using a VINACAFE pulper/demucilager.

When cup tasted, all samples of natural coffee were very fruity and harsh, which is typical of natural processing. Splitting and drying of the fresh cherry gave similar results to the natural process. Because of the harsh and fermented flavours inherent in the natural processed coffee, it was difficult to find variations due to altitude. The washed Robusta coffee gave a much cleaner cup without the fermented flavours and the harsh Robusta flavours. There was also a marked improvement in cup flavour and brightness at higher altitudes. The conclusion was that a more detailed assessment of high altitude Lao Robusta was warranted.

During the 2005/06 season a more detailed study of washed Robusta was conducted.

Natural coffee

Split cherry

Parchment

Drying trial 2004/05

Materials and Methods

In the 2005/06 season, 200 kg of good quality fresh Robusta cherry coffee were collected from three farms in the main coffee growing areas of the Bolovens Plateaux. Information on farm management, soil type and altitude was recorded for each farm. The coffee samples were brought to the CREC facility for sorting and processing. Each of the samples was sorted and floaters removed by immersing the coffee cherries in water. The remaining sound coffee was then divided equally by weight. Each of these lots was then processed in one of two ways:

Machine washed. (**Process A)**

The VINACAFE pulper/demucilager pulped the 100 kg batch of coffee and the mucilage was immediately removed by the second stage demucilaging unit. Within one hour, the wet parchment was spread to dry at a 20 kg/m^2 on the mesh drying trays.

VINACAFE demucilager

Mucilage being removed

Traditional Ferment and hand-washed **(Process C)**
The VINACAFE machine was used to pulp the 100 kg batch of coffee. The wet parchment was then stored in a free draining plastic container for 36 hours (Robusta mucilage is more difficult remove than Arabica and requires a longer ferment). The fermented parchment was washed in clean water by hand until free of mucilage and spread to dry at 20 kg/m^2 on the drying trays.

Parchment was raked four times per day at 09.00 hr, 11.00 hr, 13.00 hr and 15.00 hr. Trays were covered with tarpaulins through the day if raining but left exposed if sunny or overcast, and were covered each night and uncovered early each morning When each treatment reached 12% moisture (in the green bean), it was weighed and bagged in a single, clean, new, odour-free jute sack (approx 20 kg of dry parchment). Sacks of samples were stored on pallets in the dry coffee storage building.


Pulped coffee


Fermenting coffee


Hand washing coffee


Sample store


Drying trays

The six samples from three locations were evaluated in the CREC cup tasting lab from the 22 February to the 26 February by a team of cup tasters lead by Mr Anthony Marsh and Mr Keith Chapman (FAO Project). A range of other Robusta samples was sourced from two local coffee projects for comparison. Parchment and cherry samples were hulled, roasted and cup tasted using the SCAA standard evaluation technique. Scores for each sample were an average of the scores awarded by the various members of the tasting teams.

Results and Discussion

Table 1. Details of three high altitude Robusta coffees used for the 2005/06 survey

Sample No	Farmer name	Village name	Altitude m.a s.l.	Harvest date	Weight of fresh cherry kg	Weight of floaters kg	Weight of sorted red cherry A & C kg
1A	Mr Tongsi	Paxong	1300	20/01/06	200	19.0	94.50
1C							94.50
2A	Mr Phetamon	Nonkali	1240	23/01/06	200	10.5	94.75
2C							94.75
2A	Mr Phet	Being	1215	26/01/06	200	9.5	95.50
2C							95.50

Data show that sample1 had double the amount of floaters than samples 2 and 3. The three samples were from high altitudes.

Table 2. Details of Robusta coffee processed for 2005/06 survey

Sample No	Weight sorted red cherry A & C (kg)	Process date machine-wash A & hand-wash C	Weight of wet parchment A & C (kg)	Weight of washed parchment C (kg)	No of days to dry	Weight of dry parchment A & C	Moisture content of dry parchment	Date into store
1A	94.5	20/001/06	52.0	-	9	20	12.0	28/01/06
1C	94.5	20/01/06	72.0	49.5	9	19	12.0	31/01/06
2A	94.75	23/01/06	53.5	-	9	20.5	11.5	31/01/06
2C	94.75	23/01/06	70.5	48.5	9	18.5	11.5	02/02/06
3A	95.5	26/01/06	50.0	-	9	19.5	12.5	03/02/06
3C	95.5	26/01/06	71.0	49	9	19	12.5	05/05/06

Data shows that similar amounts of dry parchment were produced by each sample

The six high altitude Robusta coffees produced at the CREC were cup tasted using the standard SCAA cupping method. Seven other locally produced Robusta coffees were cup tasted and compared with these six coffees.

Table 3. Cup taste results for 13 Robusta coffees evaluated in 2005/06 trial (6 samples – CREC, 7 samples – outside sources)

Sample No	Farmer	Village	Altitude m.a.s.l.	Process method	Quality score	Comments
1A	Mr Tongsi	Paxong	1300	A	72	Clean, mild, good body
1C	Mr Tongsi	Paxong	1300	C	73	Clean, mild, good body
2A	Mr Phetamon	Nongkali	1240	A	73	Clean, mild, good body
2C	Mr Phetamon	Nongkali	1240	C	74	Clean, mild, good body
3A	Mr Phet	Being	1215	A	73	Clean, mild, good body
3C	Mr Phet	Being	1215	C	74	Clean, mild, good body
4	Oxfam	Longnam	950	A	70	Clean, fair body
5	Oxfam	Longnam	950	natural	61	Fermented, fruity
6	Jhai 1	Nongluoangi	1100	A	72	Clean, mild, good body
7	Jhai 2	Nongluoang	1100	C	73	Clean, mild, good body
8	Jhai 3	nongluoang	1100	soaked	70	Odd flavour, baggy, sour
9	Average traded coffee	Paxong	1000	natural	58	Fermented, unclean, typical Robusta flavour
10	Average traded coffee	Ban Itou	800	natural	54	Very fermented, unclean, foul

1. “A” process is the pulp/ demucilage process using the VINACAFE Demucilager and immediate drying.
2. “C” process is pulp and ferment for 2 days then hand wash with water to remove mucilage before drying.
3. Jhai processed the coffee, not done at CREC.
4. Oxfam processed coffee, not done at CREC.
5. “Average traded coffee” was coffee typical of farmer produced Robusta coffee normally traded on the Bolovens Plateaux.

No significant cup quality differences were detected between Process A and Process C for the CREC coffee. The six CREC processed Robusta coffees were all very sound, clean and full bodied. The washed coffee produced by Jhai, CFC and Oxfam were also good clean coffees. Natural coffee produced by Oxfam had distinctive unclean and fermented flavour which is characteristic of natural Robustas. The two Average Traded coffees were very fermented and unclean and both were unacceptable for use in anything but an Industrial Off Grade coffee.

A sample of the CREC washed Robustas will be sent to a number of buyers to establish any commercial interest in the high altitude washed Robusta as they show very good promise as a clean full-bodied coffee, ideal for blends requiring more body or straight Robustas. Washed Robusta from high altitude is a viable value-added option for Lao.

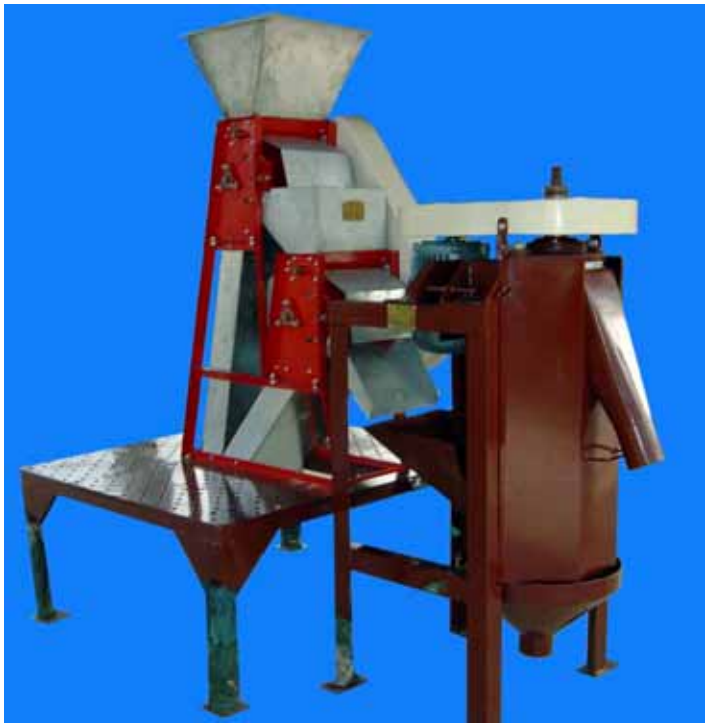
Acknowledgements
We sincerely acknowledge the assistance of Will Tomlinson of Jhai Coffee Farmers Cooperative and Mr Impanh Vensomphet of Oxfam Farmers Cooperative for supplying coffees for cup tasting.

EVALUATION OF VINACAFE PULPER/DEMUCILAGER

Summary

Trials producing washed coffee conducted at the CREC in 2005/06, compared traditional fermented and hand washed coffee to machine washed coffee for Arabica and Robusta. There was little difference detected in cup taste evaluations between the two processing styles of machine washing (Process A) and traditional ferment and hand washing (Process C) for both Arabica and Robusta. The additional cost to machine wash (pulp and demucilage) using the VINACAFE pulper/ demucilager (US$900) is US$22/MT of green bean. Thus the cost is small to produce an excellent washed coffee from high altitudes in Bolovens Plateaux.

The paper focuses on physical characteristics and performance of the VINACAFE pulper/demucilager.



VINACAFE pulper/demucilager

Introduction

A series of coffee quality trials were conducted at the CREC, at Ban Itou KM 35 Paxong using the imported VINACAFE Pulper/Demucilager. The aim of the trials was to assess this new system to produce a washed coffee using a pulper/demucilager compared to the traditional systems of pulping, fermenting and hand washing. Arabica and Robusta coffees were both produced using the traditional pulp, ferment and hand wash methods (Process C) and by the VINACAFE pulper/demucilager (Process A). The coffees produced were cup tasted and evaluated for quality in the CREC cupping laboratory.

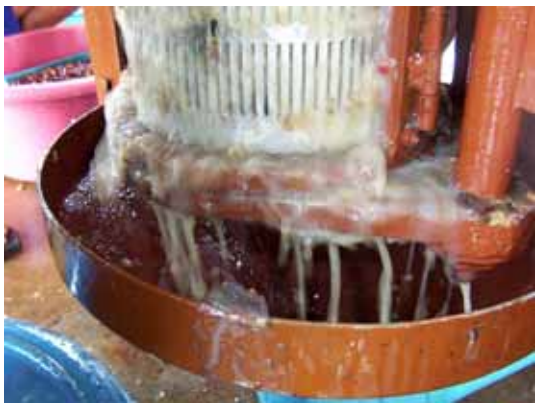
Detailed analyses of the quality results from these trials are found in *Arabica Quality Trials and Robusta Quality Trials* in this publication. This report focuses on some of the physical characteristics and performance of the VINACAFE pulper/demucilager.

Machine Details

The VINACAFE MXT Drum Pulper and MDN-0.5 Demucilager is an imported machine from Viet Nam consisting of a standard drum pulper feeding into a vertical demucilaging unit to produce parchment coffee with approximately 95% mucilage removed. The pulper uses a 1.5 hp single phase

motor and the demucilager uses a 3 hp three phase motor. The unit requires from 5 to 10 L water/kg of fresh cherry for good pulping and demucilaging. The cost of the machine delivered to Lao is US$900. During the trials the processing through-put of the machine was adjusted to 300 kg/hour of fresh cherry and water input was adjusted to a constant 10 L/kg of cherry to give good demucilaging.






VINACAFE pulper/demucilager

Materials and Methods

Arabica and Robusta trials produced both machine washed and traditional hand washed coffee. In each comparative trial, 200 kg of fresh cherry coffee from 17 areas for Arabica and 3 areas for Robusta were collected. Each 200 kg sample of coffee was divided into two lots — 100 kg each for Process A and Process C.

Machine washed (**Process A).** The imported VINACAFE pulper demucilager pulped the 100 kg batch of coffee and the mucilage was immediately removed by the second stage demucilaging unit. Within one hour, the wet parchment was spread to dry at a 20 kg/m^2 on the mesh drying trays.

VINACAFE demucilager

Mucialge being removed

Traditional hand-washed (Processes C). The VINACAFE machine was used to pulp the 100 kg batch of coffee. The wet parchment was stored in a free draining plastic container for 18 hours (Arabica) and 36 hours (Robusta). The fermented parchment was washed in clean water by hand until free of mucilage and spread to dry at 20 kg/m^2 on the mesh drying trays.

Pulped coffee

Fermenting coffee

Hand washing coffee

Wet demucilaged coffee (left) compared with hand washed coffee (right)

Dry demucilged parchement (left) compared with dry hand washed parchment (right)

Results and Discussion

Table 1. VINACAFE processing of Arabica cherry versus hand washed (cherry to parchment ratios)

Sample No	Weight of sorted red cherry for process A & C kg	Process date semiwash A & full wash C	Weight of wet parchment A & C kg	Weight of washed parchment C kg	No of days to dry	Weight of dry parchment A & C	Moisture content (wb) of dry green bean %	Out turn ratio cherry to dry parchment
1 A	A 98	15/11/05	38	-	13	17.5	11.5	5.6
1 C	C 98	15/11/05	43	33	13	15.2	11.5	6.4
2 A	A 92	16/11/05	38	-	13	17.8	12.0	5.1
2 C	C 92	16/11/05	49	38.5	13	16.5	12.0	5.5
3 A	A 87	17/11/05	38.5	-	13	16.0	12.0	5.4
3 C	C 87	17/11/05	56	45	13	18.5	12.0	4.7
4 A	A 93	18/11/05	45	-	11	19.5	11.5	4.7
4 C	C 93	19/11/05	55	45.5	11	18.7	11.5	4.9
5 A	A 81.5	20/11/05	35.5	-	12	17.2	11.0	4.7
5 C	C 81.5	20/11/05	47	36	12	14.8	11.0	5.5
6 A	A 83	22/11/05	37	-	13	19.2	12.0	4.3
6 C	C 83	22/11/05	53	43	13	16.4	12.0	5.0
7 C	A 94.5	22/11/05	41	-	13	17.3	12.0	5.5
7 C	C 94.5	22/11/05	54	38.5	13	16.5	12.0	5.7

Sample No	Weight of sorted red cherry for process A & C kg	Process date semiwash A & full wash C	Weight of wet parchment A & C kg	Weight of washed parchment C kg	No of days to dry	Weight of dry parchment A & C	Moisture content (wb) of dry green bean %	Out turn ratio cherry to dry parchment
8 A	A 68	22/11/05	33	-	9	14.0	11.6	4.8
8 C	C 68	22/11/05	42	30	9	14.3	11.6	4.7
9 A	A 90.5	25/11/05	36.5	-	10	21.5	11.5	4.2
9 C	C 90.5	25/11/05	41	32	10	19.8	11.5	4.5
10 A	A 98.5	26/11/05	39.5	-	10	15.8	12.0	6.2
10 C	C 98.5	12/11/05	42	35	10	18.8	12.0	5.2
11 A	A 102	28/11/05	48	-	8	19.1	12.0	5.3
11 C	C 102	28/11/05	57	46.5	8	17.6	12.0	5.8
12 A	A 86.75	29/11/05	38	-	9	13.2	11.4	6.6
12 B	C 86.75	29/11/05	47	39	9	15.3	11.4	5.6
13 A	A 99	29/11/05	43	-	9	17.2	11.5	5.7
13 C	C 99	29/11/05	55	40.5	9	13.8	11.5	7.2
14 A	A 98.75	30/11/05	40.5	-	8	19.5	11.7	5.1
14 C	C 98.75	30/11/05	49	36	8	18.2	11.7	5.4
15 A	A 97.75	01/12/05	38	-	9	19.1	11.3	5.1
15 C	C 97.75	01/12/05	46.5	34	9	16.2	11.3	6.0
16 A	A 97.8	02/12/05	39	-	9	16.0	11.5	5.9
16 C	C 97.8	02/12/05	48	35	9	16.4	11.5	6.0
17 A	A 2.25	03/12/05	36	-	9	15.0	11.5	6.2
17 C	C 2.25	03/12/05	44	33.5	9	16.8	11.5	5.5

Data show that for any given amount of fresh cherry the output of parchment for A is less than C. This difference represented the amount of mucilage removed from the parchment in Process A was more, and some mucilage still adhered to the parchment in Process C. When Process C was washed, the resulting weight was similar to A for that sample. For the 17 pairs of samples, the washed parchment of Process A was heaviest for 11 samples while washed parchment of Process C was heaviest for 6 samples. It is not possible to determine if this variation was due to variation between the processes or experimental errors. The expected out-turn ratio for cherry to parchment for Arabica coffee is 5:1. In this trial, the ratio varied from 7.2 to 4.2. It was not possible to determine if this variation was due to variation between the coffee samples, the difference in processing system or experimental errors.

The results show an approximate average out-turn ratio for all samples of 5.42. For machine washed Arabica, the out turn ratio was 5.32 (cherry to parchment) and 5.51 for hand washed.

Table 2. VINACAFE processing of Robusta cherry versus hand-washed (cherry to parchment ratios)

Sample No	Weight of sorted red cherry A & C kg	Process date semi-wash A & full wash C	Weight of Wet parchment A & C kg	Weight of washed parchment C kg	No of day to dry	Weight of dry parchment A & C	Moisture content (wb) of dry green bean %	Out turn ration cherry to dry parchment
1 A	94.5	20/001/06	52.0	N/A	9	20	12.0	4.7
1 C	94.5	20/01/06	72.0	49.5	9	19	12.0	5.0
2 A	94.75	23/01/06	53.5	N/A	9	20.5	11.5	4.6
2 C	94.75	23/01/06	70.5	48.5	9	18.5	11.5	5.1
3 A	95.5	26/01/06	50.0	N/A	9	19.5	12.5	4.9
3 C	95.5	26/01/06	71.0	49	9	19	12.5	5.0

Data show that the out turn ratio of fresh cherry to dry parchment for the machine washed Robusta was 4.7 and for hand washed, 5.0. This result may be insignificant in terms of output of green bean

which was not overall assessed as the preference is to store and hold parchment. The result may simply mean more mucilage or rubbish adhering to the dry parchment in the hand wash processing.

Costings

Costs to produce washed Robusta by traditional fermentation and hand washing are high due to the large amounts of labour, water and fermenting and washing infrastructure required. As an estimate based on time and labour cost in Lao, it may cost an additional US$50/MT to pulp, ferment and hand wash Robusta over the cost of natural processing to produce washed Robusta green bean.

The additional cost to produce washed Robusta coffee by a VINCAFE pulper demucilager is calculated at approximately 2.2 cent/kg or US$22/MT green bean more than for natural dry processing. This is based on the following assumptions.

- Capital cost and depreciation of the purchase price of the VINACAE machine at US$900 is calculated 0.6 cents/kg of green bean. The cost of the machine is averaged over 15 years and is assumed to produce 10 tonnes of green bean per year.
- Electricity cost is calculated at 0.6 cents/kg of green bean based on electricity consumption of 3 kwhr for processing fresh cherry at 300 kg/hour and an electricity cost of 10 cents /kwhr.
- Labour cost to produce wet parchment is calculated at 0.7 cents/ kg of green bean based on 2 labourers/day at US$3/day, processing 6 MT of cherry to produce 1 MT of green bean equivalent.
- Water cost is calculated at 0.1cent/kg of green bean based on water use of 10 L/kg of cherry.
- Maintenance cost for the pulper/demucilager is estimated at 0.2 cents/kg green bean equivalent.
- Based on the trial results, fresh Robusta cherry is assumed to convert to dry green bean equivalent at the ratio of 6 kg of fresh cherry to produce 1 kg of dry green bean at 12% moisture.

Drying Efficiencies

Drying efficiencies were not calculated in the Lao trials. However, trials conducted by FAO at coffee research centres in Viet Nam and Thailand showed that apart from benefits of improved quality, coffee dried as washed parchment dries twice as fast as coffee dried as natural cherry coffee. Alternatively, only half the drying space is needed to dry the same amount of coffee if it is processed to washed parchment. Figures from FAO trials in southern Thailand and southern Viet Nam showed that under sunny conditions, concrete slabs had bean drying efficiencies of approximately 1 kg/m^2/day for washed parchment drying and approximately 0.5 kg/m^2/day for natural cherry.

Recommendations

If the international market confirms that Lao washed Robusta is of interest and there is a price incentive above the cost to produce washed Robusta, this valued added Robusta coffee should be investigated via some small commercial shipments. More focus on developing the proto-type VINACAFE machines will be required since engine driven models or electric generators would be needed for remote areas without electricity, and water pumps to provide water pressure for the demucilager are essential. A village level model would be need to be developed to ensure high quality washed Robusta is produced. Farmers at present are not processing Robusta coffee with a view to improving quality as no high quality washed Robusta market prospects are now just being explored. Early international assessments confirm that high grown washed Robusta from Lao is a very high quality product.

Machinery Manufacturer

VINACAFE Pulper/Demucilager and VINACAFE Splitter
VINACAFE Engineering Entrprise
05 Truong son St Binh tan Industrial Zone
Nha Trang City, Khanh Hoa Province, Viet Nam

Email: ckvinacafe@dng.vnn.vn

THE LAO COFFEE INDUSTRY – A MARKET ANALYSIS FOR ROBUSTA AND ARABICA

Summary

Lao produces both Robusta and Arabica coffee. Both crops have different production economics and are marketed and consumed in different ways. This requires that the marketing of each be addressed separately.

Robusta

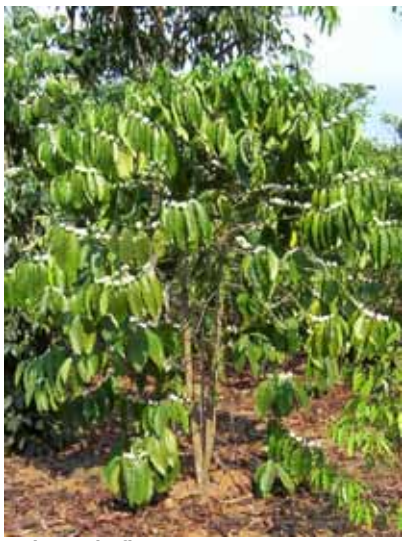
On a world scale, Lao is a relatively small producer of Robusta coffee, producing on average 15,000 MT/year. In comparison, Viet Nam produces 600,000 MT/year, Indonesia 400,000 MT/year and Thailand 50,000 MT/year. Lao Robusta is a small but viable industry and a niche market could be developed for it. The industry needs a clear strategy to enhance and value-add to the crop.

Little has been done to improve the quality and international image of Lao Robusta coffee over the past 10 years. It is produced as a "Natural" coffee and the industry is based on traders, processors and exporters who buy the product and sell it up the market chain for a margin, adding little value for farmers.

Lao needs develop a clear image of its unique high grown, washed, high quality, Specialty Robusta, coupled with a quality programme driven by price incentives to farmers. At present to there is no price incentive for Lao farmers to produce better quality Robusta. A range of strategies is required to address the production / processing / marketing chain to help farmers to value-add and to develop the image and direction of the industry by better processing and targeting new markets, which could lead to better price of Lao Robusta coffee.

In addition to these problems, Robusta exports from Lao have declined severely in the last two years. The reasons for this decline are not clear. Climatic conditions affecting flowering and a newly arrived pest, Coffee Berry Borer (CBB) are suggested as the cause. These issues need urgent attention.

Robusta coffee, heavy crop at high altitude



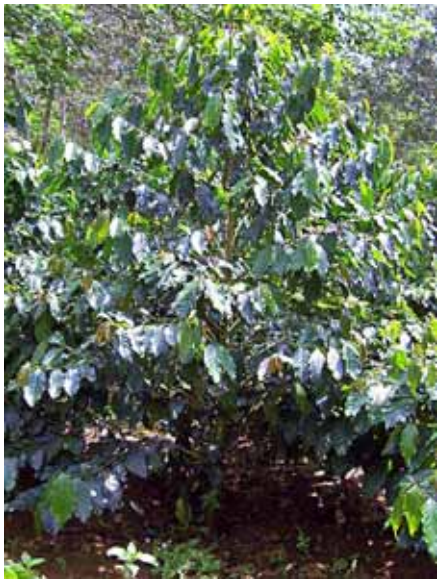
Robusta in flower

Arabica

Lao is a tiny producer of Arabica coffee on a world scale now producing 2000 MT/year in a world market of 4 million MT of Arabica coffee, or about 0.05% of world Arabica production. It has virtually no international reputation and this tiny but increasing volume needs a clear strategy for development based on country or origin uniqueness.

Arabica production is on the rise and has increased from 300 to 2000 MT in the last 3 years. Some of this rise is attributed to one large coffee plantation owned by Dau Heuang at Paksong, which has produced up to 500 MT in 2004.

Premiums are being paid for small volumes of the older Arabica variety Typica, compared to the newer Catimor variety, by some Speciality or Premium quality coffee buyers. Another Arabica variety Java, grown in small volumes in Lao, has been identified as having very good cup characteristics. The farm economics and long-term market opportunities for Typica and Java compared to Catimor needs more study so that clear planting and marketing recommendations can be given to farmers.



Arabica coffee; Java (right)

Recommendations

The recent FAO coffee project has identified a key opportunity for Lao Robusta coffee by value adding through producing machine-washed Robustas from high altitudes (1200 to 1500 m.a.s.l. areas). These Robusta coffees have a unique, mild and appealing flavour, due to the high altitude growing conditions on the Bolovens Plateaux and the wash process.

The Arabica coffees were found to be sound, Premium but mostly not Speciality quality and thus it is more difficult to make a very high value Arabica coffee.

In most situations in Viet Nam, farmers have found that that even though Robusta prices are lower than Arabica, the increased production and ease of management of Robusta makes it a more profitable crop than Arabica. Oddly, Robusta production is declining in Lao and Arabica production is increasing. A more detailed review of the production and marketing of Lao coffee is needed to understand this trend, especially considering the potential for producing high grown, washed Specialty Robustas. Lao should promote both high quality, high grown Robustas and high quality, high grown Arabicas based on uniqueness of origin.

Robusta

Government policy:

- The Government of Lao (GOL) urgently needs to establish clear Policy and Strategies for the Robusta industry as the direction of the industry appears to be largely driven by a few private exporters with little recognition or reward for high quality. To date, no Policy and Strategies exist.
- Government policy is needed to encourage traders, processors, and exporters to focus on improving coffee quality and prices and not just trading Lao Robusta coffee for a small margin of profit. If there are few incentives or profits for farmers the industry will decline.

- The *Agence Francaise de Developpement* coffee project needs to be closely linked to and coordinated with Government Policy and Strategies for the Lao Robusta coffee Industry.

Technology:

- New washed coffee technology should be promoted at farm level to help boost Lao Robusta coffee into higher quality, higher value, niche markets.
- Traders, processors and exporters and donors need to be encouraged to actively participate in the programmes to address technical problems in the field such as coffee berry borer (CBB), declining yields, lack of regenerative pruning and old trees. Production issues should not be treated independently.
- The reasons behind the decline in Robusta exports, need to be thoroughly investigated and addressed. Robusta can still be a very profitable crop for Lao.
- Promote new plantings of Robusta at high altitude (1100 to 1300 m.a.s.l.) to capture the high quality, specialty, washed Robusta potential.

Marketing strategy and quality assurance:

- The Lao Coffee industry needs to develop and implement a system of coffee export grading and quality assurance and monitoring that builds a reputation of quality for Lao coffee.
- The practice of merely trading Lao Robusta, needs to be replaced with a value-adding approach by processors and exporters to increase profitability for farmers.
- Establish and promote a clear identity for high quality, high grown, Speciality washed Robusta from Lao.

Coffee stakeholder representation:

- A functioning and inclusive Coffee Association is required to allow all stake holders to actively participate in the growth of the Robusta coffee industry. The current status of the Lao Coffee Association represents only exporters.

Arabica

Government policy:

- The Government of Lao needs clear Policy and Strategies on the direction for the new growing Arabica industry — to date, none exists.
- The *Agence Francaise de Developpement* coffee project needs to be closely linked to and coordinated with Government Policy and Strategies for the Lao Arabica coffee Industry.

Technology:

- Promote on-farm, new water efficient washed coffee technology for Arabica introduced by the FAO-Lao TCP coffee project.
- Investigate the advantages and economics of various Arabica coffee varieties (particularly Catimor, Typica and Java) and give clear recommendations for planting Arabica in line with industry strategies for high quality coffee.
- Promote high grown, high quality Arabica to capture the premimum and sometimes specialty coffee market opportunities.

Marketing Strategy and Quality Assurance:

- Develop a system of coffee export grading, assurance control and monitoring, that builds a reputation for Lao coffee.
- Develop a clear identity for high quality Lao Arabica coffee.

Stakeholder Representations:

- A functioning and inclusive Lao Coffee Association is required to allow all stake-holders to actively participate in the growth of the Arabica coffee industry. The current status of the Lao Coffee Association represents only exporters.

Production

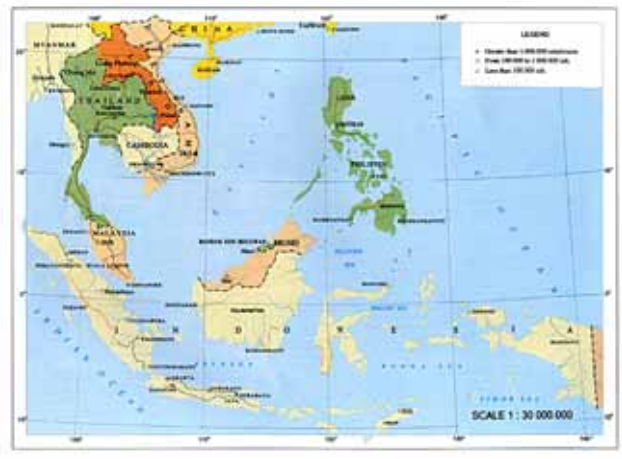
Arabica and Robusta coffee are normally grown in different locations, as each crop requires slightly different climatic conditions. Normally Robusta requires a warmer, wetter climate than Arabica. Lao is somewhat different in that Arabica and Robusta are grown in the same location (up to altitudes of 1100 to 1300 m.a.s.l.) on the Bolovens Plateaux, where climatic conditions overlap for these two crops. Cup tasting has shown that this climate does not produce the high acid or rich, bold, big bodied Arabicas normally required for Specialty Arabicas but it does produce milder, very good, high quality washed Robustas at higher altitudes.

Southern Provinces of Saravan, Sekong, Champasaak and Attepeau, produce about 95% of all coffee in Lao — Champasaack Province alone produces approximately 75% of this. While there is coffee production in other provinces, the major focus of any market orientated quality improvement programme, should be on these four provinces, centred on the Bolovens Plateaux.

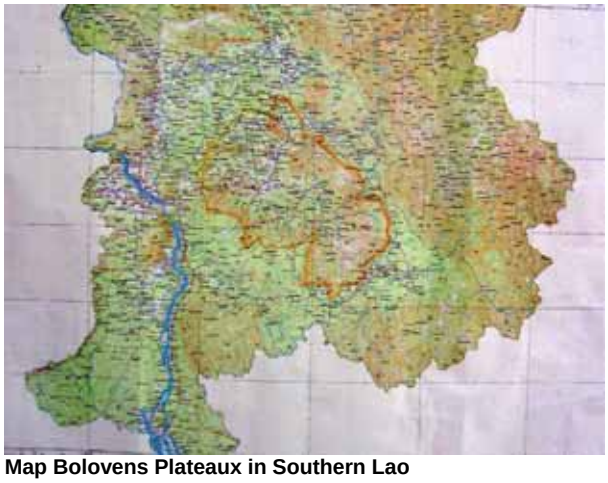
With unique climate and unique coffee in an area of approximately 600 km^2, the Bolovens Plateaux is an ideal place to easily coordinate and manage a high quality coffee industry producing both high quality Arabica and Robusta coffees.

Coffee Exporters Association data show that Robusta exports have declined severely over the last two years from 23,000 MT in 2004 to 8500 MT in 2005. Exports for the year 2006 are predicted to be 7000 MT. The reasons for this decline are unclear and need more investigation. Two reasons given for this decline are climatic conditions during the flowering in 2004 and 2005 and the arrival of Coffee Berry Borer (CBB). These issues need urgent study and attention.

Coffee Exporters Association data show that Arabica exports are increasing rapidly. Production prior to 2004 was only 300 tonnes while in the last two seasons this has increased to over 2000 tonnes.



Map or Lao in SE Asia



Map Bolovens Plateaux in Southern Lao

Exports

Major markets for the Robusta crop have been East European countries such as Poland, Hungry and Germany who were the major buyers during the communist trade block era. The markets are much wider now, but Europe is still the major destination for Lao Arabica and Robusta.

At present, three companies dominate Lao Robusta exports. It appears that these companies have few quality improvement programmes at farmer levels and there are few incentives or opportunities for farmers to improve Robusta quality.


Farmers preparing high quality Arabica for export

Table 1. Summarised export data (Calendar year)

Year	Total exports Robusta (MT)	Total exports Arabica (MT)	Total exports Excelsa (MT)	Total exports all species (MT)
1995*	8320	149	n/a	8320
1996*	7,320	192	n/a	7,515
1997*	13,000	312	n/a	13,312
1998*	13,800	296	n/a	14,096
1999*	14,000	195	n/a	14,195
2000^	n/a	n/a	n/a	19,743
2001^	n/a	n/a	n/a	22,634
2002^	n/a	n/a	n/a	19,207
2003*	13,591	294	126	14,011
2004*	20,615	2,494	473	23,507
2005*	6,077	2,255	246	8,578

*Data Source: Lao Coffee Exporter's Association

^Data Source: Champasack Province Dept of Ag and Forestry (data only includes 4 southern provinces)

Notes: n/a = data not available.

Local coffee consumption is estimated at between 500 to 1000 MT/year. Predictions for the coming year are that exports may be down to 7000 MT. More detailed information is available for the past three exporting years in Tables 2, 3 and 4.

Table 2. 2003 Calender year Lao coffee exports by company

Company	Robusta ton	Arabica ton	Excelsa ton	Total
Societe Lao Import-Export	1,171	-	-	1,171
Champasak Development Agriculture	72	-	-	72
Seun Trading Import-Export Company	427	-	-	427
Udomsab Import- Export Company	883	-	-	883
Agricultural Product Development Company	4,711	72	-	4,783
Dao- Heuang Import Export Company	4,670	222	126	5,018
Thong Moue Kankaseth Company	435	-	-	435
Phet Kham Say Company	30	-	-	30
Perrini	1,190	-	-	1,190
Total Lao coffee exports	**13,591**	**294**	**126**	**14,011**

Source: Coffee Exporters Association (figures rounded)

Table 3. 2004 Calender year Lao coffee exports by company

Company	Robusta ton	Arabica Ton	Excelsa Ton	Total
Societe Agro Industrielle	-	22	-	22
Societe Lao Import-Export	1,804	5.76	-	1,809
PhoneSilik Trading Company	1,144	93		1,237
Champasaak Development Agriculture	777	26	-	803
Seun Trading Import-Export Company	1,686	13	-	1,692
Udomsab Import- Export Company	1,236	26	-	1,262
CBF Pharma	-	208		208
Agricultural Product Development Company	3,895	664	38	4,597
Dao- Heuang Import Export Company	9,158	1,363	298	10,819
Thong Moue Kankaseth Company	358	-	-	358
Phi Dao Company	554	-	61	615
PKS Phet Kham Xay	-	54	-	54
Total Lao coffee exports	**20,615**	**2,494**	**397**	**23,507**

Source: Coffee Exporters Association (figures rounded)

Table 4. 2005 Calender year Lao coffee exports by company

Company	Robusta ton	Arabica Ton	Excelsa Ton	Total
Societe Lao Import-Export	134	-	-	134
Champasaak Development Agriculture	442	167		609
Seun Trading Import-Export Company	40	-	-	40
Udomsab Import- Export Company	806	115		921
Agricultural Product Development Company	1636	414	38	2,088
Dao- Heuang Import Export Company	1715	902	132	2,749
Thong Moue Kankaseth Company	74	37	-	111
Delta Agriculture	4	4	-	8
Phi Dao Company	921	364	38	1,323
Phet Kham Say Company	15	230	38	283
Sivilay Rading Import Export	288	19	-	307
Total Lao coffee exports	**6,077**	**2255**	**246**	**8,578**

Source: Coffee Exporters Association (figures rounded)

Export price has varied widely over the last five years as world prices have fluctuated. It is difficult to compare specific Lao contract prices to competing origins in the regions. It is generally reported that Lao Natural Robusta is often discounted by US$100 to 150/MT to equivalent Grade 3 Robusta coffee from Viet Nam.

Lao export data do not specify grade so it is not known what quality is being exported in each contract. A simple analysis of the export data has been done for the years 2003 to 2005. In this analysis very low prices have been excluded as this is probably sortings and low-grade coffee. The analysis gives some idea of price ranges for Lao Arabica and Robusta over these three years. However it should be noted that price range is often more than 100%.

- During 2003 most Robusta export prices ranged from US$600 to US$700 /MT, and most Arabica export prices ranged US$550 to US$650 /MT.
- During 2004 most Robusta export prices ranged from US$550 to US$750 /MT, and most Arabica export prices ranged from US$900 to US$1500 /MT.
- During 2005 most Robusta export prices ranged from US$750 to US$1200 /MT and most Arabica export prices ranged from US$1500 to US$2000 /MT.

These ranges indicate a clear increase in Arabica prices over the last three years with less increase in Robusta prices over that period. The increases are due to a number of factors including a general increase in world coffee prices in 2005 that has improved Arabica prices, but a little less for Robusta. Also, improved processing of Arabica from "natural" to "washed" processing and better marketing of this higher quality Arabica has improved prices.

Roast Coffee

There is a small Roast coffee industry in Lao supplying the local market. There are a number of companies who are contemplating the packaging and export of Roast coffee. While the concept is logical, there are very few companies in producing countries that have been able to successfully export roast coffee. Roast Coffee is a perishable product and consuming countries usually prefer to have roasting and packaging done in their home country to ensure freshness, quality control and correct flavour profiles when blending.

There are also plans for one major coffee exporter to construct a large instant coffee plant in Lao to supply instant coffee to the Asia region. It is unclear whether this will be of benefit and value-add to the Lao coffee industry or if Lao will simply be used a source of cheaper coffee.

In Lao, Robusta coffee is mostly consumed as a filter type coffee, made in a muslin bag or "sock" and sweetened with condensed milk. Such coffee is superior in flavour and quality to most instant coffees and "three in one" mixes. Consequently, the establishment of instant coffee in Lao may be very challenging.

POLICIES AND STRATEGIES FOR DEVELOPING AN ENABLING ENVIRONMENT FOR A SUSTAINABLE ARABICA AND ROBUSTA COFFEE INDUSTRY IN LAO

Introduction

Robusta exports have declined severely over the last two years with expected exports for the year 2006 predicted to be only 7000 MT. The reasons for this decline are unclear and need investigation. Two reasons suggested for this decline are climatic conditions during flower in 2004 and 2005 and Coffee Berry Borer. Arabica exports are increasing rapidly with production prior to 2004 at only 300 MT while in the last two seasons this has increased to over 2000 MT.

The Government of Lao requires a clear set of policies and strategies in place to ensure the Arabica and Robusta coffee industries seek out opportunities in the world coffee markets and to be able to address issues that arise in the Lao coffee industry in a timely manner.

Understanding the importance of coffee quality

Quality starts with well selected seed for planting

Well-managed Arabica coffee plantation in Lao

Recommendations

In order for the Lao coffee industry to grow, to benefit from opportunities in the world market and to be able to address problems in the Lao coffee industry, the Government much strive to create the correct support environment. The key role of Government is not to control the coffee industry of Lao but to create an **Enabling Environment** for the industry to prosper, through well-considered Policies and Strategies.

At present, there are no clear Government Policies or Strategies for the coffee industry in Lao. Three or four companies dominate Lao coffee exports and it is these companies that set the course for the direction of the industry. It appears that these companies have few quality improvement programmes at farmer level and there are few incentives or opportunities for farmers to improve quality and profitability. The Government of Lao needs to address this deficiency with some simple well-defined and clear policies, which will help to guide and support the industry development.

Coffee Berry Borer in Arabica parchment

Old Robusta trees

The information below outlines activities which stakeholders and Government should consider undertaking to develop the basis of these policies. Key outcomes from this development process would be strategies and policies on areas such as:

- **National Coffee Policy**: An overall vision of the coffee industry
- **Coffee Research, Extension, Information and Training Policy and Strategies**: The role that Research and Extension will play in the industry and how the two are inter-linked and supported.
- **Coffee Marketing Policies and Strategies**: The Lao coffee industry must strive to understand Specialty coffee market requirements. The Government of Lao must develop a 'market driven' coffee industry, which provides coffee that meets the demands of this market. Developing and implementing coffee export standards and quality certification to give consistency to the coffee exported from Lao is vital and essential.
- **Market Information Policies and Strategies**: The Government of Lao should investigate methods to improve communication about the world coffee market and technological information to Lao coffee growers. A practical Market Information System is needed.
- **Coffee Stakeholder Association Policies and Strategies**. A Lao Coffee Association is a good mechanism to create dialog and participation in the coffee industry. Participants could include producers, exporters, government departments and local roasters.
- **Donor Involvement Policies and Strategies**: Identify ways that donors can constructively contribute to the clearly defined Lao coffee industry strategies, rather than one-off, ad-hoc interventions.

LAO Coffee Policy and Strategy Development activities

Activity 1: Review of existing coffee policies and present status of Lao Coffee Industry

- Policies
- Decrees, Policies and Regulations on Coffee.
- NGPES
- Agricultural Vision Documents

Define and describe the existing Lao coffee industry and gather industry data:

- Producers, processors exporters,
- Other stakeholders.
- Size, makeup, production, consumption, exports.

Activity 2: Define where GOL would like the Coffee industry to go. What is the GOL Vision for the coffee industry?

- **Size:** What contribution should it make to the economy?
- **Make up of Industry**: Small holders, large plantations, local investors, regional investors, international investors.
- **Structure and Focus of Coffee Industry**: High quality industry or low quality / high volume industry.

Activity 3: Plan how to achieve the GOL Vision of the future Lao coffee industry?

SWOT analysis of the industry could be a useful starting point**.** What is possible? Some ideas below:

Strengths

- Focused geographical area for industry development (Bolovens Plateaux).
- Ideal climate to produce quality Arabica and Robusta.
- Land is available for further planting.
- Relatively good road infrastructure linking production area to ports and other countries.

Weaknesses

- Land availability for new plantings at high altitude may be a limitation – investigate.
- Lack of knowledge and technology by farmers and processors to produce consistent, high quality coffee – existing weakness to be overcome.
- Medium term (5 years) time frame to become established as a reliable partner to supply consistent high quality coffee.
- Lack of experience in coffee industry in quality and consistency control of product standards.
- Industry mostly experienced in low quality coffee at present.
- At present little incentive for quality improvement via processing.
- Minimal coffee industry planning.
- Limited experienced coffee RD&E staff.
- Minimal policy and regulation developed for the coffee industry.
- Limited coffee research and information on coffee in the past.
- Limited farm extension capability by the key GOL agencies — a major limitation.

Opportunities

- There is a rapidly increasing demand in the world market for consistent Premium and Specialty high quality coffee.
- Marketing has a key role in price and desirability of coffee. Lao has good potential to develop market niches for high quality, washed Arabica and Robusta.

Constraints

- It will take up to five years for large Speciality coffee buyers to fully commit to buying Lao coffee on a consistant basis above the standard market prices.
- Reliability as a partner must be proven.
- Buyers will look at the whole market chain from producer to export to see where the system might fail.
- Buyers will not pay above standard prices until the whole chain is reliable and can guarantee quality in each shipment.

Activity 4: Review what has happened in other coffee industries successes / failures/ problems?
Review regional countries and learn from each situation. Summaries to be prepared on:

- Viet Nam
- Thailand
- Indonesia
- East Timor – similar size to the Lao industry.

Review coffee programmes in other regions of the world.

- ICO documents on Speciality Coffee Projects etc.,
- Other coffee programmes or projects including Specialty Coffee Asociation of America (SCAA).

Activity 5: Consider the components of GOL Policy and Strategies to achieve the GOL Vision.
GOL coffee policy and strategy has key role in creating the **Enabling Environment** for the coffee industry to grow.

GOL can manage the Enabling Environment through policy, regulation and legislation to encourage development of the coffee in the right directions with assistance and incentives via:

- Private investors.
- Donors.

Individual components of GOL Coffee Policy and Strategy may include:

- National Coffee Policy,
- Coffee Research Policy and Strategy,
- Coffee Extension, and Information Strategies,
- Coffee Industry Training and Communication Strategies.
- Role of exporters association.
- Role of producer associations.
- Donor involvement plan.
- Ensure vision meets with existing agricultural plans as set down in NGPES.
- Ensure there is funding to drive the Vision.
- GOL funds, levy, taxes on exports to generate RD&E support.
- Investment by Local, Regional or International investors should contribute to development of industry.
- How to make investment in industry desirable to investors?
- Tax benefits.
- Access to land / resources.
- Concessions, incentives etc.

LAO COFFEE RESEARCH INFORMATION TRAINING AND EXTENSION CENTRE-PROPOSED FUNCTIONS AND SUPPORT

Summary

During the course of the Lao-FAO TCP/LAO/2903 Coffee Project and the review of the role of the Coffee Research Experimentation Centre (CREC) it was proposed by the FAO project team, in consultation with counterparts of MAF, NAFRI and NAFES, that the centre be given an expanded role as the **Coffee Research Information Training Extension Centre (CRIETC)** or a "One-stop Shop for Coffee," in Lao PDR. This proposed expanded role for the centre, including more outreach to farmers and private sector and donor and NGO projects, was supported strongly by H.E. Vice Minister Dr. Ty Phomasack at the final Steering Committee meeting of the project at CREC on 21 February 2006.

At the conclusion of the FAO-LAO TCP/LAO/2903 Coffee Project many new technologies have been introduced to CRIETC and the coffee sector. What now remains is to concentrate on a large, expanded training and extension programme role develop information to train more farmers provide them with appropriate information to improve yields and coffee quality.

The CREC centre at Ban Itou, KM 35 on the Pakse/Paxong road is at an elevation of 860 m.a.s.l., which is fine for testing of Robusta coffee, but is too low to bring out the best characters of high value Arabica varieties. These varieties need to be grown at 1100 to 1300 m.a.s.l, to bring out the true cup tastes and full potential quality. Thus while the centre can conduct very useful trials on shade, ground covers, pruning etc., at CREC, varietal testing of Arabica coffee must be done off-station and on-farm at high altitudes nearer to Paxong at 1100 to 1300 m.a.s.l. CRIETC will have a key role in GOL support to improving the enabling environment for the Lao coffee industry.

Proposed Functions of CRIETC

Key functions of the new Coffee Research Information Training Extension Centre (CRIETC) should be:

1. Coordination and conduct of agronomy trials, varietal trials and plant protection initiatives in the field at CRIETC and off-station.
2. Maintenance and expansion of the coffee cultivar collection at CRIETC.
3. Production of seed and/or seedlings for sale of known, recommended varieties of Arabica for coffee industry expansion and maintaining a nursery for coffee seedlings, selected shade trees, fruit trees and ground covers for sale.
4. Maintaining the wet processing areas and the sample roasting and cup tasting facilities established at CRIETC and processing of coffee, tasting and quality assessment of samples from private sector on a fee for service basis.
5. Providing small amounts of high quality roasted coffee for sale to tourist visitors and promotional activities.
6. Fee-for-service testing of coffee quality samples for export, once firm grade standards are in place for Robusta and Arabica coffee.
7. Fee-for-service testing of soil pH and water and soil salinity/conductivity.
8. Maintaining and expanding the Library Information Centre at CRIETC for use by the centre and farmers etc.
9. Provision of direct day to day advice to farmers, processors, buyers, and roasters on demand.
10. Development of extension materials for hand-outs in the form of Farm Notes leaflets to farmers, donor projects etc., in Lao language.
11. On-going training of trainers in DAFO's, PAFO's, and training of farmers, key NGO and project personnel at CRIETC on both production and processing of coffee.

12. Mandatory firm linkages established with all coffee initiatives set up by PAFO's, DAFO's, donors and NGO's and private sector in Lao and the Lao Coffee Association.
13. Firm on-going linkages established with the Champasaak Agricultural College and the new Champasaak University in both practical hands-on field training and curriculum development.
14. Expanded operations to assist with development of fruit trees including lychee, longan, macadamia, avocado, custard apple etc.
15. A final suggestion is that an Agri-Tourism Enterprise be established at CRIETC, making use of the very scenic location of the centre and accommodation facilities, while building a café/restaurant and capitalising on roasted and cup sales of coffee. Tourists can be guided through the centre and the way in which coffee is produced and processed. It is envisaged that this would be a private/public sector joint venture with some benefits accruing to CRIETC to subsidise GOL funding of CRIETC activities.

Resources

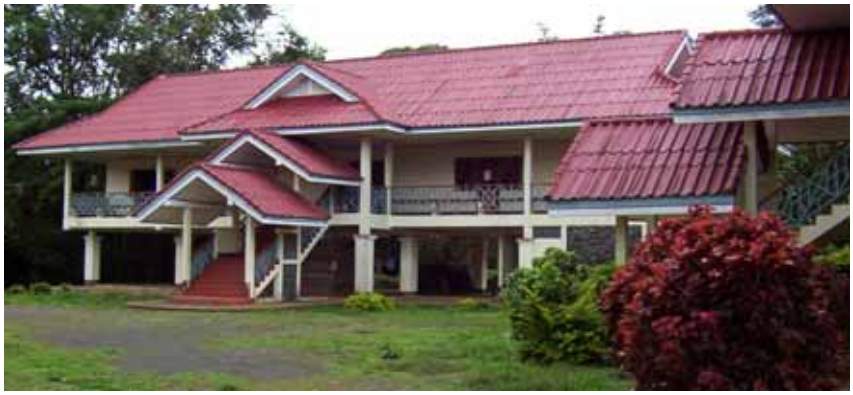
Currently, funding of CREC is totally inadequate to cover their existing mandate which is predominantly R&D and provision of seedlings of coffee, shade and fruit trees for sale and maintenance of cultivar collections.

To adequately resource full-time functioning of a new proposed role for CREC as a CRIETC would require funding of at least USD60,000 – USD70,000 per year or about 30 times the current yearly budgetary allocation. The budget back in 2003 for CREC was close to USD40,000 per year. GOL would need to increase support to a new CRIETC and/or seek funding from private sector Agri-Tourism, coffee export levy, sales of plants, or donor support.

Staffing

Currently, CREC is suffering from a lack of tertiary qualified staff with the majority of staff derived from diplomates of agricultural colleges. To bolster staffing, sufficient to undertake an expanded role, at least four additional graduate staff are needed — one technology transfer information and training specialist, two extension officers and one fruit tree agronomist.

Processing facility at CREC



Main building at CREC

COFFEE VARIETY COLLECTION AT CREC AND CULTIVAR TRIAL AT DAO HEAUNG FARM

The Coffee Research Experimentation Centre (CREC) at Ban Itou has an established collection of Arabica and Robusta varieties of coffee. The FAO-LAO TCP/LAO/2903 Coffee Project added to this collection with a range of new high quality varieties. Also, the existing collection was relocated to a new block which now holds existing and new varieties introduced. This block is under irrigation to ensure good establishment and survival. The block is also evaluating new shade tree species and ground covers crops. Details are below.

In addition a cultivar/varietal trial was set up at the Dao Heaung private coffee farm at Paxong, off the Attepeau road. This was done to get a true evaluation of the Arabicas at around 1160 m.a.s.l., **as the altitude at CREC, Ban Itou, KM 35 at 860 m.a.s.l., is too low to properly and adequately assess good high quality Arabicas for quality and disease resistance.** The trial was planted in May 2003 and needs to run for about 6 more years to properly evaluate yield, disease tolerance and cupping quality, over at least three harvest seasons. Then new varieties may be recommended for production by farmers. Trial layout is below.

Coffee Varieties

From the Highland Coffee Research and Development Centre in Chiang Mai, Thailand, four promising Arabica cultivars were introduced to CREC and added to the CREC collection.

These varieties are:

- **SL 28**, a high-yielding, high quality, drought resistant Arabica variety from Kenya.
- **H 306**, a Catimor (Caturra x Hibrido de Timor) derivative backcrossed to SL 28.
- **H 528/46**, a Catimor derivative backcrossed to Catuaí Amarillo.
- **C 1669-31**, a Catimor hybrid of a cross between Caturra and a Costa Rica coffee variety Vila Sarchi.

Another source of coffee seed was the Chiang Mai Royal Agricultural Research Centre (CMRARC) in Chiang Mai. The Centre provided seed of the following cultivars:

- **H 420/9**, highly productive and of good quality and rust resistant in evaluations and screenings by CMRARC staff
- **H528/46**, equally productive, rust resistant and of outstanding quality according to CMRARC staff.

Arabica coffee varieties in CREC nursery ready for planting

LIST OF ARABICA AND ROBUSTA VARIETIES AT CREC

Arabica Cultivars

Cultivar	Description/Origin
BO2 and BO3	Selected off-spring of Catimor T 8667
P 86	Direct Catimor ex-Colombia, introduced via Kenya and Thailand
P 88	Like P 86
P 90	Like P 86
LC 1662	Straight Catimor introduced from Thailand
T 8667	Catimor ex-Costa Rica
T 5175	Catimor ex-Costa Rica
SJ 133	Catimor ex-Costa Rica
Java 1	Typica ex-Indonesia
S 795	Typica ex-India
San Ramon	Dwarf variety ex-Costa Rica
Cat. H373/24	Ex-IRCC Portugal/Brazil/Montpellier
Cat. H373/8	Like Cat. H373/24
Cat. H528/46	Like Cat. H373/24
Cat. F5	Like Cat. H373/24
Cat. F6	Like Cat. H373/24
Cat. 1702.2	Like Cat. H373/24
Cat. 1668	Like Cat. H373/24
Sarchimor F5	Like Cat. H373/24
Catuaï vermelho	Like Cat. H373/24
Catuaï amarillo	Like Cat. H373/24
Catuaï C14.136.5	Like Cat. H373/24
Catuaï C14.133.9	Like Cat. H373/24
Caturra vermelho	Like Cat. H373/24
ET2, ET3, ET5, ET6, ET9, ET10, ET17, ET19, ET21, ET24, ET25, ET28, ET29, ET31, ET32, ET33, ET35 d.c4, ET35 c.c7, ET40, ET49 and ET57	Ex-Ethiopia

Robusta Cultivars

The Robusta clones B5/461, B11/107, J21/126, C6/182 and M5/197 are claimed to originate from IRCC/Cameroon, whereas other clones such as H 865, 200/Y1, HB, K 26, 503/149, 259/S/56, 1S/6, 477/J32/69, 505/B60/177, LD 1, NC 8 and NC 1 have their origin in countries like Cameroon, Togo, Madagascar, Ivory Coast, Indonesia and New Caledonia.

Arabusta Cultivars

Over a decade ago Arabusta clones were introduced from Togo and Ivory Coast, but according to staff none have survived to date. The new **variety collection plot** at CREC was planted in April 2005, and consists of three blocks of which two have been fully planted and the third one contains eight varieties. The open space in Block 3 is kept for future planting of Robusta, Excelsa and Liberica selections, as well as additional Arabica genotypes. For details see table below.

Block 1	Block 2	Block 3
o o o o o o o o o o	o o o o o o o o o o	o o o o o o o o o o o
o o o o o o o o o o TYPICA	o o o o o o o o o o CATIMOR B 02	o o o o o o o o o o o
o o o o o o o o o o TYPICA	o o o o o o o o o o CATIMOR B 02	o o o o o o o o o o o
o o o o o o o o o o JAVA	o o o o o o o o o o CATIMOR SJ 133	o o o o o o o o o o o
o o o o o o o o o o JAVA	o o o o o o o o o o CATIMOR SJ 133	o o o o o o o o o o o
o o o o o o o o o o ET 35 c.c.7	o o o o o o o o o o CATIMOR P 90	o o o o o o o o o o o
o o o o o o o o o o ET 35 c.c.7	o o o o o o o o o o CATIMOR P 90	o o o o o o o o o o o
o o o o o o o o o o ET 35 d.c.4	o o o o o o o o o o CATIMOR P 88	o o o o o o o o o o o
o o o o o o o o o o ET 35 d.c.4	o o o o o o o o o o CATIMOR P 88	o o o o o o o o o o o
o o o o o o o o o o ET 49	o o o o o o o o o o CATIMOR P 86	o o o o o o o o o o o
o o o o o o o o o o ET 49	o o o o o o o o o o CATIMOR P 86	o o o o o o o o o o o
o o o o o o o o o o ET 32	o o o o o o o o o o CATIMOR LC 1662	o o o o o o o o o o o
o o o o o o o o o o ET 32	o o o o o o o o o o CATIMOR LC 1662	o o o o o o o o o o o
o o o o o o o o o o ET 29	o o o o o o o o o o CATIMOR H528/46	o o o o o o o o o o o
o o o o o o o o o o ET 29	o o o o o o o o o o CATIMOR H 528/46	o o o o o o o o o o o
o o o o o o o o o o ET 25	o o o o o o o o o o CATIMOR H373/24	o o o o o o o o o o o
o o o o o o o o o o ET 25	o o o o o o o o o o CATIMOR H373/24	o o o o o o o o o o o
o o o o o o o o o o ET 24	o o o o o o o o o o CATIMOR H377/8	o o o o o o o o o o o
o o o o o o o o o o ET 24	o o o o o o o o o o CATIMOR H377/8	o o o o o o o o o o o
o o o o o o o o o o ET 21	o o o o o o o o o o CATUAI c14.133.9	o o o o o o o o o o o
o o o o o o o o o o ET 21	o o o o o o o o o o CATUAI c14.133.9	o o o o o o o o o o o
o o o o o o o o o o ET 19	o o o o o o o o o o CATUAI c14.136.5	o o o o o o o o o o o
o o o o o o o o o o ET 19	o o o o o o o o o o CATUAI c14.136.5	o o o o o o o o o o o
o o o o o o o o o o ET 17	o o o o o o o o o o CATUAI AMARELO	o o o o o o o o o o o
o o o o o o o o o o ET 17	o o o o o o o o o o CATUAI AMARELO	o o o o o o o o o o o
o o o o o o o o o o ET 10	o o o o o o o o o o CATUAI VERMELHO	o o o o o o o o o o o BOURBON
o o o o o o o o o o ET 10	o o o o o o o o o o CATUAI VERMELHO	o o o o o o o o o o o BOURBON
o o o o o o o o o o ET 3	o o o o o o o o o o CATURA AMARILLO	o o o o o o o o o o o TYPICA AUSTRALIA
o o o o o o o o o o ET 3	o o o o o o o o o o CATURA AMARILLO	o o o o o o o o o o o TYPICA AUSTRALIA
o o o o o o o o o o H 410/9ML 2/4 -5 –13	o o o o o o o o o o Ca T 5175	o o o o o o o o o o o ARUSHA
o o o o o o o o o o H 410/9ML 2/4 -5 –13	o o o o o o o o o o Ca T 5175	o o o o o o o o o o o ARUSHA
o o o o o o o o o o H 528/46ML/87 – 84	o o o o o o o o o o Ca C1668	o o o o o o o o o o o TYPICA HAWAII
o o o o o o o o o o H 528/46ML/87 – 84	o o o o o o o o o o Ca C1668	o o o o o o o o o o o TYPICA HAWAII
o o o o o o o o o o C 1669 – 31	o o o o o o o o o o B 03	o o o o o o o o o o o CATIMOR T8667
o o o o o o o o o o C 1669 – 31	o o o o o o o o o o B 03	o o o o o o o o o o o CATIMOR T8667
o o o o o o o o o o H 306	o o o o o o o o o o SARCHIMOR	o o o o o o o o o o o CATIMOR c1702.2
o o o o o o o o o o H 306	o o o o o o o o o o SARCHIMOR	o o o o o o o o o o o CATIMOR c1702.2
o o o o o o o o o o H 528	o o o o o o o o o o SAN RAMON	o o o o o o o o o o o CATIMOR F6
o o o o o o o o o o H 528	o o o o o o o o o o SAN RAMON	o o o o o o o o o o o CATIMOR F6
o o o o o o o o o o SL 28	o o o o o o o o o o S 795	o o o o o o o o o o o CATIMOR F5
o o o o o o o o o o SL 28	o o o o o o o o o o S 795	o o o o o o o o o o o CATIMOR F5
o o o o o o o o o o	o o o o o o o o o o	o o o o o o o o o o

NEW CULTIVAR COLLECTION BLOCK CREC BAN ITOU

Date planted: 19/04/05 Total area: 4.000 m^2

Block 1 : 20 varieties
: 20 trees per variety
: Melia as shade tree
: Only this block planted so far

Block 2 : 20 varieties
: 20 trees per variety
: Calliandra as shade tree

Block 3 : So far only 8 varieties available, but other varieties and species will be added later
: Cassia as shade tree

Spacing: :Coffee 2 x 2 m
:Shade trees 6 x 6 m

o **Guard Row**

Cultivar/Variety Evaluation Trial at Dao Heaung Farm, Paxong

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
	x			x			x			x			x			x	
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
	x			x			x			x			x			x	
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
	Catuai			**Caturra**			**Java**			**Typica**			**S 795**			**SL 28**	
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
	x			x			x			x			x			x	
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
	x			x			x			x			x			x	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PATH BETWEEN BLOCKS

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
	x			x			x			x			x			x	
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
	x			x			x			x			x			x	
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
	H 306			**H 528/46**			**LC 1662**			**C 1669-31**			**SJ 133**			**P 88**	
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
	x			x			x			x			x			x	
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
0	x	0	0	x	0	0	x	0	0	x	0	0	x	0	0	x	0
	x			x			x			x			x			x	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ROAD BETWEEN HOUSE AND OFFICE

Recommendations

None of the varieties of Arabica in the CREC Ban Itou variety collection have been properly evaluated for cup quality, disease resistance and yield as the tests have been done only at CREC where the altitude is too low to properly assess these characters of Arabica coffee. At this lower altitude and because the varieties were simply evaluated without shade and good management, the data collected are largely worthless.

It is recommended that over time that known high quality Arabica varieties be properly evaluated at an elevation of 1100 to 1300 m.a.s.l., around Paxong, under shade and good management. Yield, fruit quality, pest and disease resistance, bean quality and size and cup quality, must be evaluated over at least three cropping seasons. Trials conducted by the FAO/Lao Coffee Project have shown that cup quality is variable from year to year even at high elevations of 1100 to 1300 m.a.s.l. in Paxong district.

LAO SOIL AND LEAF ANALYSIS SURVEY OF ARABICA COFFEE-CHAMPASAK PROVINCE

In early May 2004, soil and leaf samples were collected from 15 Arabica coffee farms, using the standard sampling procedures for collection as described in the *Arabica Coffee Manual for Lao,* 2005. Soil samples were taken from two depths, 0 to 15 cm and 15 to 30 cm, from each farm, and one set of leaf samples (25 to 30 leaf pairs) per farm. For the Intha farm, two lots of samples were collected — one set from the Java variety block and one set from the Catimor variety block. Sixteen leaf samples and 32 soil samples in all were collected.

Samples were dried and sent to Mae Jo University in Chiang Mai, Thailand for analyses, using the standard methods prescribed for coffee. Table 1 below list the farms and locations with, altitude, farm size, sample areas and variety. Annex 1 contains full analysis details.

Table 1. List of Farms for soil and leaf sampling near Paxong, Champasak Province, Bolovens Plateaux, southern Lao

Sample No	Farmer	Village (Ban)	Altitude (m)	Farm area (ha)	Sample area (ha)	Variety
1	Itha Group		1158	136	1	Catimor& Java-2 samples
2	Dao Heuang		1115	250	1	Catimor
3	Mr Mon	Nongkali	1240	2	2	Catimor
4	Mr Phonkeo	Phoumon	1033	0.1	0.1	Caturra
5	Mr Phetsyamphon	Beng	1270	0.5	0.5	Catimor
6	Mr Don	Katuat	1230	2	2	Catimor
7	Mr Dam	Thongset	1235	0.5	0.5	Catimor
8	Mrs Syvilay	Km 45	1112	0.5	0.5	Typica
9	Mr Choung	Km 5	1200	1	1	Catimor
10	Mr Sybounseng	Thongkatai II	1205	1,2	1,2	Catimor
11	Mr Houh	Thongkatai I	1205	0.6	0.6	Catimor
12	Mr Somboun	Katuat	1280	1.7	1.7	Catimor
13	Mr Somwang	Katuat	1282	0.5	0.5	Typica
14	Mr Bounsy	Kongtoun	1046	0,5	0,5	Catimor
15	Mr Chanh	Beng	1231	1.5	1.5	Catimor

Table 2 below summarises the general overall comments for soil and leaf sample analyses contained in Annex 1, based on optimum levels for soil and leaf analyses for Arabica coffee.

Table 2. Summary of comments on Lao soil and leaf analyses

Test	Optimum	Comments
pH	5.5 - 6	Range 4.2 – 5.2. Generally much too low. to see pH pH 5.5 or 6 is ideal. Need either lime or dolomite applications or combination, based on Ca and Mg, levels.
Organic matter	1-3%	Results good to very high. Expect some surface leaf litter was included in samples.
N soil	>20 mg/kg or 20 ppm	Extremely high. Must have included leaf litter. An odd unexpected result.
N leaf	2.5 – 3%	Generally quite good, but some low and need N. Would have expected lower but maybe good after early rains which made extra N available.
P soil	60-80 mg/kg	Most farms are basically deficient. Indicator plants and low pH would also indicate low P. Need P applications as expected
P leaf	0.15-0.2%	Very good readings. Might have expected lower as there are no soil reserves. Still need P applied to soil, because of P tie-up in red soils and low pH is always a problem.

Test	Optimum	Comments
K soil	>0.75 mg/100 g or >290 ppm	Most were much too low. Again not unexpected as little if any K is applied on most farms and there is heavy removal in the crop.
K leaf	2.1 – 2.6 %	All much too low. If trees were carrying a good crop of coffee, overbearing dieback could be expected to result. Need plenty of K for bean filling.
Ca soil	3-5 meq/100 g or 600-800 ppm	Some are very low, some not bad and some excessive. Results in cases with high Ca indicate recent application of Ca as pH was still low.
Ca leaf	0.75 – 1.5%	Good leaf calcium despite low soil Ca.
Mg soil	> 1.6 meg/100 or > 190 ppm	Many low. Easy to identify those farms where Mg has been applied.
Mg leaf	0.25 – 0.40%	Good results. Usually coffee can extract what Mg is needed from soil.
S leaf	0.12 – 0.30%	Most were satisfactory.
Zn soil	2 – 10 mg/kg	Many are too low. Some good.
Zn leaf	15 – 30 mg/kg	All much too low. Deficiency symptoms observed in a number of instances.
Mn Soil	< 50 mg/kg	Generally good
Mn leaf	50 – 100 mg/kg	High side but not unexpected. Not a concern.
Fe soil	2 – 20 mg/kg	Mostly on high side. Low pH and wet soil. Also soil type.
Fe leaf	70 – 200 mg/kg	High side but generally O.K.. A couple of samples very high. Low soil pH and wet soil. Along with soil type affects Fe levels.
Cu soil	0.3 – 10 mg/kg	OK
Cu leaf	16 – 20 mg/kg	Leaf mostly low, lack of sprays, deficiencies have been observed.
Leaf Boron	40 – 100 mg/kg	All are deficient. Low B has implications for producing distorted growing points and poor mobilisation of sugars will seriously affect bean filling and yields.
Ca:Mg Ratio	3 – 5	Results were mixed, some good, others need more Calcium. One sample needs more Magnesium. Indicates the need to apply more lime overall and less Magnesium for many farms. Need to check each result to see what is best for each farm.
Cation exchange capacity (CEC)	3 – 5 sandy soil >10 heavy soil types	Most are on the low side. Expect actual readings much higher as Al not measured and soils have a low pH soil. Still most farms need calcium applications.

Additional Comments

Soil results were generally as expected, although soil organic matter and N higher than expected, probably because leaf litter was included in sample. Normally leaf litter is removed before sampling. N readings were much higher than normally expected, based on plant observations.

Most farms are too low in phosphorus, potassium, calcium, magnesium, and zinc. It is easy to see who has applied lime or dolomite. Some farms need lime, some dolomite, but most a mixture. Most farms need superphosphate and potassium. Leaf P is good. This perhaps not expected due to very low soil readings Plants are basically deficient in leaf zinc and boron. These trace elements need to be applied for correction.

Liming requirement

- **Dolomite:** 400 kg of Dolomite/ha are needed to raise pH by 0.1 unit. This is a figure used for normal soil. Clay soils need a higher amount. However, in correcting pH it is inadvisable to apply more than around 2 MT/ha of dolomite at any one time. Induced deficiencies of other elements may result. If more than 2 MT/ha is needed apply over a period of 2 years.
- **Lime**: For Lime stone (Calcium Carbonate) 240 kg of lime are needed to raise pH by 0.1 unit. Again do not apply more than 2 MT/ha in any one application.
- Based on Ca/Mg ratios found, some farms need more lime and others more dolomite.

ANNEX 1. LAO COFFEE LEAF/SOIL ANALYSES FROM FARMER SURVEY

Leaf analyses

CODE	Farmer	Totals (ppm)									
Code LAB No.	Farmer	%N	P	K	Ca	Mg	Zn	Mn	Fe	Cu	Boron
213	Itha Group	2.74	2154	5516	10512	5476	8.59	217	181	12.3	5.83
214	Dao Heuang	2.78	2222	7587	9596	4074	11.4	368	173	8.7	5.97
215	Mr Mon	2.78	2088	5419	6599	3363	10	233	139	7.5	10.52
216	Mr Phonkeo	2.17	1929	7542	15543	4991	12.1	157	283	3.5	6.53
217	Mr Phetsamphon	2.69	1855	5538	11537	4038	10.5	185	121	4.01	7.66
218	Mr Don	2.62	1683	5426	18026	6667	13.4	262	399	2.3	10.7
219	Mr Dam	2.57	1842	5423	9085	3510	11.2	102	160	1.12	7.75
220	Mr Syvilay	2.70	2057	7558	9771	3540	14	127	164	5.51	8.52
221	Mr Choung	2.22	1391	3538	14270	3945	11.1	154	165	1.9	8.18
222	Mr Sybounseng	2.97	2212	5551	8561	3860	13	212	140	10.3	9.3
223	Mr Houh	2.78	1930	7257	10396	4142	16.8	218	239	1.4	8.38
224	Mr Somboun	2.26	1909	6500	8200	3920	12.7	189	503	11.8	11.88
225	Mr Somwang	2.10	1593	5347	6717	3106	10.4	157	190	3	11.3
226	Mr Bounsy	2.50	1774	5710	6680	3448	13.1	195	146	8.9	9.45
227	Mr Chanh	3.13	1976	6271	10081	4116	7.6	426	185	5.3	10.24

Leaf analysis

Soil analysis

Soil analyses from Lao coffee survey

Code	Sample		Dolomite			Available P	Extractable forms ppm.						EC		Texture
No. Lab	Soil	pH	kg/rai	%OM	%N	ppm	K	Ca	Mg	Zn	Mn	Fe	Cu	uS/cm	
181	1 Itha Group Top-soil Catimor	4.54	1613	12.47	0.62	5.07	80	216	119	0.65	23.41	65.2	3.4	96.8	Clay
182	1 Ithal Group Sub-soil Catimor	5.19		8.11	0.41	0.28	107	76	22	0.61	36.17	75.5	5	37.8	Clay
183	1 Itha Group Top-soil Java	4.33	1613	7.48	0.37	2.83	223	52	18	0.68	31.07	78.6	5.25	208	Clay
184	1 Itha Group Sub-soil Java	4.43	1478	9.35	0.47	2.12	53	52	13	0.3	21.65	77.1	5.36	112.6	Clay loam
185	2 Dao Heuang Top-soil Catimor	5.00		8.11	0.41	51.23	113	92	5	0.62	32.17	71.7	4.12	73.5	Clay
186	2 Dao Heuang Sub-soil Catimor	4.07	1345	9.98	0.5	5.52	236	40	12	0.48	23.57	68.6	3.52	217	Clay loam
187	3 Mr Mon Nongkali Top-soil Catimor	4.49	1747	11.23	0.56	6.8	132	388	76	5.67	28.55	81.3	4.05	175.8	Clay
188	3 Mr Mon Nongkali Sub-soil Catimor	4.87	1613	7.48	0.37	3.53	68	12	2	0.59	35.85	74	4.56	70.4	Clay
189	4 Phoumon Top-soil Caturra	6.02		7.48	0.37	4.06	258	2324	292	1.94	43.51	56.7	5.75	45.9	Clay
190	4 Phoumon Sub-soil Caturra	5.66		4.37	0.22	4.9	522	2913	382	2.67	55.03	62.2	6.4	125	Clay
191	5 Ban Beng Top-soil Catimor	4.76	1613	9.35	0.47	3.8	96	88	27	0.56	19.93	78.1	6.24	67	Clay
192	5 Ban Beng Sub-soil Catimor	4.87	1613	12.47	0.62	8.72	88	444	92	1.3	18.87	78.7	4.85	90.6	Clay
193	6 katuat 1230 Top-soil Catimor	5.15		11.43	0.56	2.52	131	1272	135	1.79	35.17	62.8	6.1	124.1	Clay
194	6 Katuat 1230 Sub-soil Catimor	5.59		9.98	0.5	2.87	89	876	83	1.27	46.45	59	6.89	42	Clay
195	7 Thengset Top-soil Catimor	5.01		11.23	0.56	8.13	113	724	132	3.65	24.61	74.5	8.95	163.3	Clay loam
196	7 Thengset Sup Soil Catimor	5.11		8.11	0.41	4.33	102	136	52	1.16	31.19	69	9.13	61.4	Clay
197	8 Km 45 Top-soil Typica	5.51		8.11	0.41	13.66	264	1292	238	13.8	44.37	71.1	9.13	150.1	Clay loam
198	8 Km 45 Sub-soil Typica	4.81	1747	8.73	0.44	13.54	184	440	110	14.1	38.87	76.8	10.3	113.1	Clay

Code	Sample		Dolomite			Available P	Extractable forms ppm.						EC		Texture
No. Lab	Soil	pH	kg/rai	%OM	%N	ppm	K	Ca	Mg	Zn	Mn	Fe	Cu	uS/cm	
199	9 Km 5 Top-soil Typica	4.55	1747	11.85	0.59	2.56	110	288	68	2	10.27	77.4	6.32	145.3	Clay
200	9 Km 5 Sub-soil Typica	4.49	1747	7.48	0.37	1.28	49	2368	293	0.63	2.07	74.1	6.97	72.7	Clay
201	10 Thongkatai Ii Top-soil Typica	4.55	1747	11.85	0.59	2.08	83	84	22	2.61	10.57	77.4	5.83	124.7	Clay loam
202	10 Thongkatai Ii Sub-soil Typica	4.77	1478	9.35	0.47	1.63	45	452	90	0.82	10.77	75.7	5.92	64.1	Clay loam
203	11 Thongkatai I Top-soil Typica	4.38	1747	14.34	0.72	1.86	72	24	3	1.91	13.25	76.6	6.72	90.9	Clay loam
204	11 Thongkatai I Sub-soil Typica	4.62	1613	10.6	0.530	1.02	50	20	2	0.49	6.45	71.2	5.6	45.2	Clay loam
205	12 Katoad (SB) Top-soil Catimor	4.69	1747	8.11	0.41	3.67	159	412	76	1.1	27.83	72.4	6.59	144.7	Clay loam
206	12 Katoad (SB) Sub-soil Catimor	4.64	1613	9.35	0.47	3.05	86	216	46	0.66	17.95	67.1	6.17	80	Clay loam
207	13 Katoad (SB) Top-soil Typica	4.75	1747	12.47	0.62	4.77	242	708	125	2.95	20.17	71	5.76	176.8	Clay
208	13 Katoad (SB) Sub-soil Typica	4.61	1613	11.85	0.59	2.92	119	180	38	0.79	18.15	67.5	6.44	132.9	Clay loam
209	14 Kongtoun Top-soil Catimor	4.22	2016	10.6	0.530	8.24	129	48	20	1.06	21.53	75.7	3.25	110.5	Clay
210	14 Kongtoun Sub-soil Catimor	4.11	1882	15.59	0.780	2.96	69	28	1	0.28	14.91	63.5	3.49	96.7	Clay
211	15 Beng Top-soil Catimor	4.41	1882	11.23	0.56	6.18	107	236	56	5.75	35.09	77.3	6.07	157.7	Clay
212	15 Beng Sub-soil Catimor	4.63	1882	11.23	0.56	3.71	84	76	17	0.63	25.37	75.2	5.6	84.4	Clay