

Cotton cultivation in Laos

Cotton cultivation has long been established in Laos, where it is based on largely self-sufficient cottage industries. It is practiced in small units nationwide and is well integrated in farming systems that have rice as the major crop.

The current situation

Cotton is most commonly found as an intercrop, with several hundred square metres of cultivation being sufficient to satisfy the weaving needs of one household. Local cotton varieties yield 200–800 kg of seedcotton/ha and have ginning outturns of between 20 and 33%. The short coarse fibres provide a rough-textured cloth for everyday use.

For the typical household, 60 to 80 kg of seedcotton suffices. The surplus is exchanged in the village or made up into coarse cloth or nonwoven thick blankets, which are sold at the local market—one cover requires 4 kg of fibre and sells at twice the price of the raw material. In northeastern Laos, such covers can be exchanged for mountain-bred pigs or chickens. Traditionally, ginning is performed manually with a small, wooden, roller-type gin resembling the Indian *charka*. One to 2 kg of fibre for spun cotton is the result of one long day of ginning (3–6 kg of seedcotton).

Prabang province); the well-drained foothills of Muang Fuang and Vang Vieng (Vientiane province); the deep and weakly acidic black colluvial soils of Paklay (Sayaboury province); the clearings of the plains of Vientiane and Savannakhet where the soils are sandy and acidic (*hay* soils); and the rich and deep embankment alluvium found in several provinces (Vientiane, Savannakhet, Champasak, etc.).

Farmers have adapted the farming cycle to rainfall conditions. The rainy season (*grosso modo*) occurs from May to October (annual rainfall, 1 000–1 600 mm) (Figure 2). Where rain is too abundant during this period, planting is delayed. In the south, farmers sow cotton as an off-season flood-plain crop. Further north

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A nationwide activity

Despite the great diversity of ecosystems, smallholders have been successful in locating the conditions best adapted to cotton (Figure 1): the steep slopes with shallow soils found in the region of Pak Ou (Luang



—in Muang Fuang, Vang Vieng, and Kasi (Vientiane province)—cultivation of upland rice precedes “fog cotton”, which is sown in the dry, cool season (September–February).

Crop rotations

In gardens not far from farm households, small-scale cotton cultivation is practiced with complex crop

associations. However, true crop rotation is possible on the main plains (Figure 2). In year 1 following “slash and burn”, upland rice is cultivated, possibly with a cotton intercrop. In year 2, upland rice is continued—with or without cotton—if the farmer judges soil fertility and weed infestation to be favourable. In year 3 (or perhaps 2), groundnut, and possibly cotton, are sown, sometimes followed by a crop of watermelon. Finally, the land is left fallow for four years maximum to complete the rotation. The decision to apply this crop sequence is based on soil fertility, labour availability, and product marketing conditions.

On shallow soil slopes, such as in the valley of the Nam Ou, upland rice sown after “slash and burn” is followed in year 2 by a pure stand of cotton; the land is then left fallow for several years.

In the regions of Muang Fuang and Vang Vieng, upland rice is followed by a “fog cotton” catch crop.

These associations between cotton and groundnut or upland rice fit precise farming objectives for which the major limiting factor is the labor productivity of the family unit. The crops are established before the arrival of the heavy rains, which mobilise the entire labour force in the paddyfields (Figure 2). Early sowing limits risks of erosion on the sandy plain, where the soils are prone to leaching.

Cultivation practices

Common practice is to sow cotton by broadcast in May and June; the intercrop—upland rice or groundnut—is sown using a dibbling stick. Typically, the cotton stands are not dense (about 1000 plants/ha), but 30 000 hills are possible on the fertile, well-drained hillocks and termitaria. The seed requirement scarcely exceeds 6 kg/ha. Hills are rarely thinned out, but weeding always coincides with the weeding of other crops.

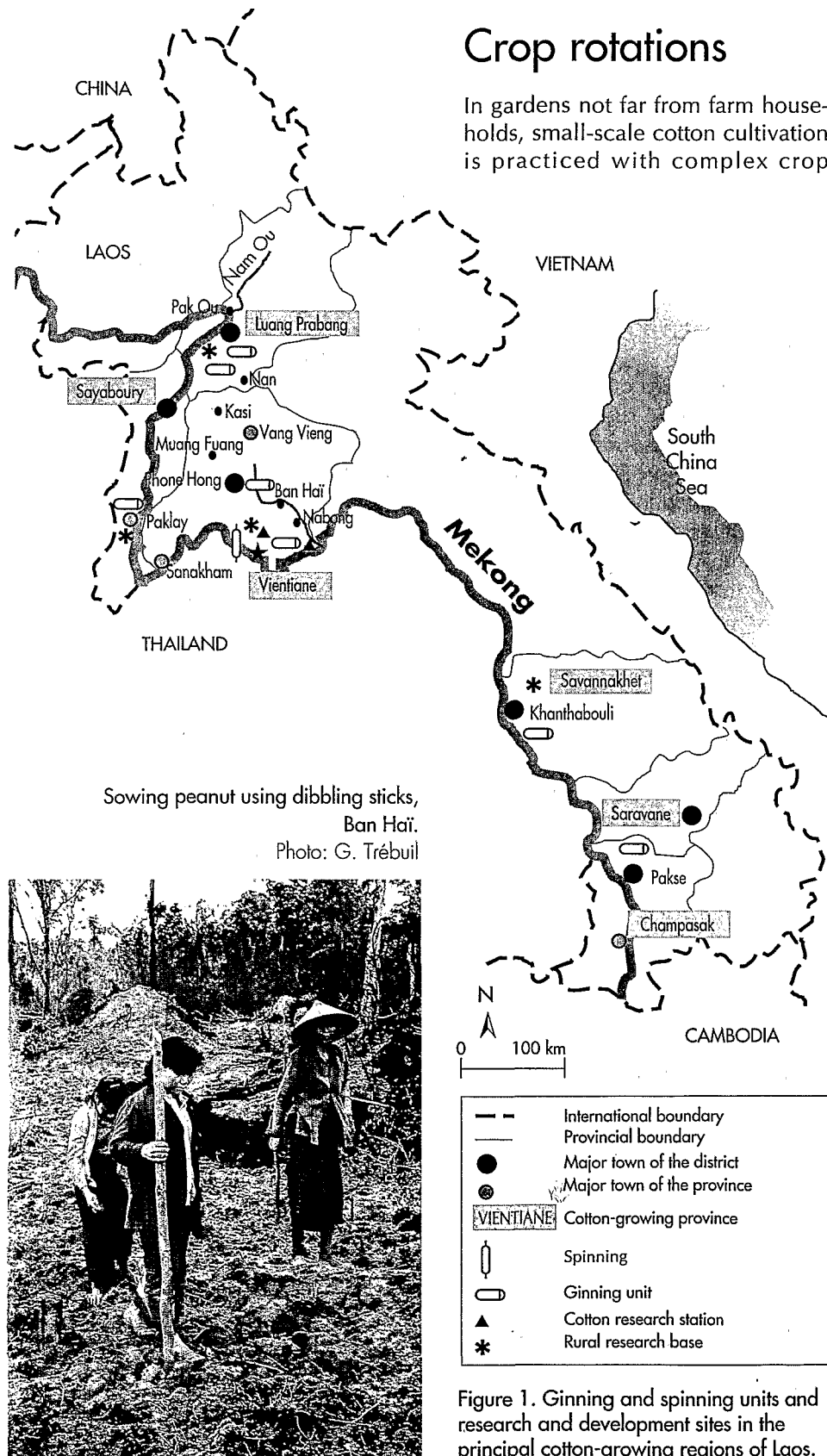
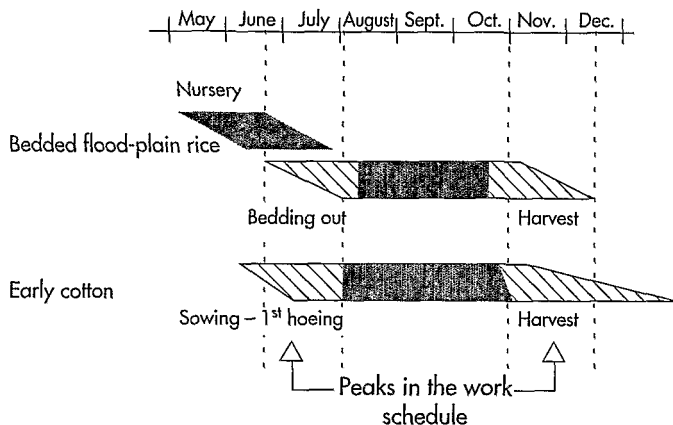


Figure 1. Ginning and spinning units and research and development sites in the principal cotton-growing regions of Laos.

Province of Vientiane



Provinces of Savannakhet and Sayaboury

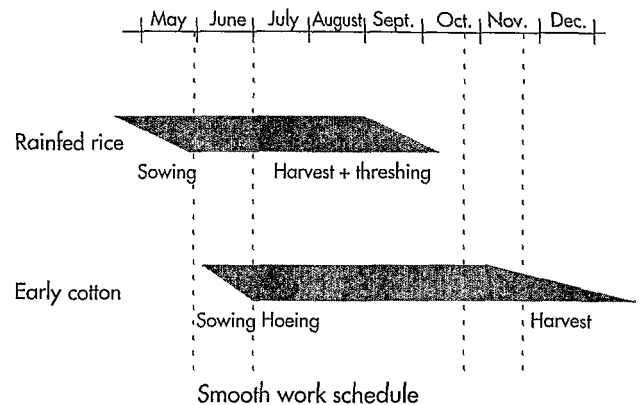


Figure 2. Alternative farming calendars for rice and cotton in Laos.

In the main plains of Vientiane and Savannakhet, and especially where lowland rice is the major crop, the most common association is groundnut-cotton. Groundnut is ready for harvest in August—the crop residues are left on the soil. The cotton harvest extends from November to January. As the rice harvest is performed in October, this timing is advantageous. If selected early varieties of cotton were distributed, the labour force would face an overcharged schedule: the first weeding would clash with the priority task of rice transplanting, and the cotton harvest with the rice harvest.

However, in the region of Paklay, for example, where upland rice cultivation predominates, the farming calendar is more flexible. Here, cotton is sown using a dibbling stick in July, well after upland rice planting and it is harvested from November to January after rice threshing.

Where conditions are suitable for cultivation of "fog cotton", the local variety, Eay Mok, is sown very densely by broadcast or dibbling stick once the upland rice has been harvested. The straw is cut and spread as mulch on the seedlings. The soil is then weeded once or twice before the cotton harvest, which takes place between December and February. Pure stands of cotton are sometimes sown by dibbling stick (3–5 seeds per planting hole, 12 kg/ha of hand-selected seeds). A fairly extensive area is given over to cotton cultivation in the northern province of Luang Prabang. Here, dense sowing (about 33 000 hills/ha) by dibbling stick begins in mid-April. The crop areas are weeded three times and the harvest, which begins in September, takes place with at least three pickings 4.5 to 6 months after sowing.

In all cases, the cotton is harvested in the morning when the dew has evaporated, but before the leaves become too dry and flaky—this prevents soiling of the seedcotton. After being dried for several days on mats, the cotton is then ginned by hand.

Peanut-cotton crop association on *rai* in Ban Hai.
Photo: G. Trébuil





Second year "fog cotton" in Muang Fuang.
Photo: G. Trébuil

It is not common practice to use organic fertilisers or to apply pest control. Local varieties are well protected against jassids, because of their hairiness, while cotton bollworms are not yet a major problem. "Intensive" cotton cultivation is being reintroduced in the northwest (Sayaboury province), 20 years after the first attempt at development, which was backed by the *Compagnie française pour le développement des fibres textiles*. This is the result of deals clinched with Thai traders who purchase the harvest and sell the inputs, but also "recommend" non-adapted cropping techniques.

The varieties cultivated

Besides the so-called "improved" cultivars—the progeny of Reba B50 or Thai varieties of the Sri Samrong type—five major types of traditional cotton are cultivated in Laos. The local varieties provide fibre of mediocre quality, but they are hardy and tolerant to insects.

Fay Niay (*Gossypium hirsutum*) is an annual type grown in the rainy season. It is highly vegetative—at least eight branches appear before the first fruit-bearing branch. It has broad, hairy leaves and small bolls, and provides short fibres [length, 2.5% span length (SL) = 23 mm]. The maximum ginning outturn is 33%. The mean field production is 600 kg/ha of seed-cotton; production never exceeds 1 500 kg/ha. However, this variety is difficult to gin, because of its "sticky" fibre. It is often cultivated in a mixture with Fay Noy (*G. arboreum*), another very common variety, especially in the north.

The Fay Noy variety is highly branched, and grows 2 m tall. The fruit-bearing branches are short, and the leaves small and extremely hairy. The small bolls that form hang rather than remain upright. The ginning outturn is 28%, and the fibre is 21 mm long (2.5% SL). This variety is reputedly easy to gin by hand.

Fay Mouy (*G. arboreum*) resembles Fay Noy morphologically. It is an annual, producing very short (2.5% SL: 18 mm) sable or khaki coloured fibres. Small amounts of Fay Mouy are present in traditional mixes of Fay Niay and Fay Noy.

Fay Mok, or "fog cotton", (*G. arboreum*) resembles Fay Noy. However, it is an early variety, and adapts well to off-season cultivation, at the forest edge where a high relative humidity is maintained. Fruiting and vegetative growth are limited.

Finally, Fay Djan (*G. barbadense* race *vitifolium*) is a shrub-like cotton that is lopped annually. It is cultivated in garden hedges, and flowers late. Its leaves are broad and hairless. Fay Djan is a "kidney" cotton with linked seeds. Its fibres vary in length (2.5% SL) from 23 to 27 mm, and the ginning outturn, from 20 to 29%. Manual ginning of this variety is very straightforward.

Research into mass breeding of these local varieties has provided no useful results. Nevertheless, their hardiness and tolerance to insects suggest that deeper investigation of the interspecific hybridisation *G. herbaceum* x *G. arboreum* may be merited. Improved Indian cultivars of *G. arboreum*, introduced to Laos in 1992, are currently under trial.

The introduction of selected varieties is liable to be compromised as a result of difficulties in accessing insecticides, which have to be imported and for which farmers have no access to credit. Nevertheless, inevitable changes in the Laotian cotton sector necessitates investigation of cultivars having fibres that are technologically superior to those of local cotton. Of all varieties tested, only S 295 and SR1F4 (cultivated in Chad) and G 319-16 (Côte d'Ivoire) adapt well to Laotian ecosystems. But the Indian cotton variety *G. hirsutum* (known as Kham Khao 1 in Laos)—which is extremely hairy and behaves very well in the field—offers the best results (about 2 500 kg/ha of seed-cotton with intensive crop protection).

Bilateral Laos-French cooperation project

The bilateral Laos-French cooperation project concerning development-oriented research on fibre crops was launched in 1985 with broad objectives. Diverse fibre and oilseed crops were investigated at the request of the Laos government, which wished the country to produce the raw materials for projected processing units—spinning mills, oil works, and gunny bag plant—in Vientiane. However, limited resources prevented in-depth sectoral studies.

In 1987, following installation of the first semi-industrial spinning mill in Laos on the Vientiane premises of the Laotian Women's Pilot Textile Project (*Union des femmes laotiennes*), the project's mandate was narrowed to cotton research.

A knowledgeable and efficient team of Laotians manage the project's research cell, with the support of the French comité de coopération avec le Laos (CCL) and scientists belonging to the Annual Crops Department of the Centre de coopération internationale en recherche agronomique pour le développement (CIRAD) and to the Laboratory for Agrarian Studies of the Institut français de recherche scientifique pour le développement en coopération (ORSTOM). The cell has provided better descriptions of the traditional farming systems, and trials in different ecosystems have made it possible to evaluate entomological problems and to define technical itineraries for cotton cultivation. Finally, smallholders—particularly from the region of Paklay—participated in a pilot development action.

Experimental work was limited to Vientiane province until 1990. However, as a result of collaboration with the agricultural college of Nabong, research was extended to other provinces (Luang Prabang, Sayaboury, Pakse, Savannakhet, and Champasak) from 1991.

At present, the project operates within the DORAS programme for regional cotton development in Cambodia, Laos, Thailand, and Vietnam.

Thai traders

Between 1966 and 1970, the *Compagnie française de développement des fibres textiles* introduced the mid-length fibre variety Reba B50 (native to Chad) to the Laotian border regions of Thailand. Although the experiment was halted because of war, smallholders were apparently interested in the new variety, as production improved from 500 to 2 000 tonnes of seedcotton over the period 1966–1968.

Today's higher performance cotton cultivars, probable descendants of Reba B50, are reminders of this endeavour. Other smoothleaf Thai varieties are also cultivated, but for these, insecticides are indispensable, as their aerial hairless vegetative systems are susceptible to sucking insect pests.

It is common for certain farmers to use these varieties in combination with others such as the Thai variety Sri Samrong 2. Traders from Thailand sell seeds, fertilizers, pesticides, and even growth regulators on credit. They then buy the harvest—as seedcotton—and set part of this against the credit. Project researchers are of the opinion that many of the inputs are inappropriate and of mediocre quality. The corresponding investment is equivalent to 500 kg of seedcotton/ha.

The traders divide the seedcotton into two price categories: in 1990, for example, 1 kg of improved seedcotton collected K300 (\$0.50 US), whereas local cotton (Fay Niay) collected K230 (\$0.35 US). In effect, the traders were paying only slightly more for the mid-length fibres than for the local short fibres.

The relative success of these deals ought not obscure the risks involved: in the long-term the farmers may reject the traders' terms and turn away from cotton cultivation definitively in search of a more lucrative livelihood. Nevertheless, the traders do provide the only means for farmers to obtain credit for inputs. The net result is that the fibre production



Hand ginning in the village (Savannakhet).
Photo: G Trébuil

of Laos serves as a cheap source of cotton for Thailand. At present, about 600–800 tonnes/year of Laotian fibre leaves the country in this way.

Market strategy

As much of the cotton produced in Laos is intended for household and craft activities, it is difficult to evaluate the areas given over to cotton cultivation, harvests, and outlets. In addition, variations between statistics from different sources are even more pronounced because cotton is largely cultivated in association with other plants. Current estimates for all types of farming system suggest that cotton is cultivated on 30 000 ha, providing a maximum of 14 000 tonnes of seedcotton and about 4 600 tonnes of cotton lint.

The Laotian Women's Pilot Textile Project spinning mill in Vientiane, which was launched in 1987, is financed by the United Nations

Development Programme. At present, it provides Laos with its only national spinning unit outside household weaving, and can process 70 tonnes of lint annually. If the number of work teams were increased, 210 tonnes of lint could be processed. But the Union is working well below its capacity.

Only 18.6 tonnes of lint from diverse producer regions were spun in 1991; 43.2 tonnes were spun in 1992

(Figure 3). The Union offers much higher prices for fibre of equivalent quality than do the Thai traders; their pricing system is strictly based on fibre length (Figure 4). However, it has not yet the means to allow farmers credit.

Laos has the possibility of opening its rather restrictive national market towards Thailand, and perhaps Vietnam, on condition that it develops production of the medium long fibre varieties demanded by cotton manufacturers. To illustrate the potential in these outlets, Thailand processed 377 000 tonnes of lint, including almost 90% imported fibre, in 1991, while Vietnam, consumes 70 000 tonnes of lint annually.

The current socioeconomic climate is favourable for the expansion of cotton cultivation—farmers are receptive, national and international markets exist, and the Laotian economy has recently become less restrictive. It is essential to create a national organisation to coordinate production input procurement, and purchase of smallholders' harvests.

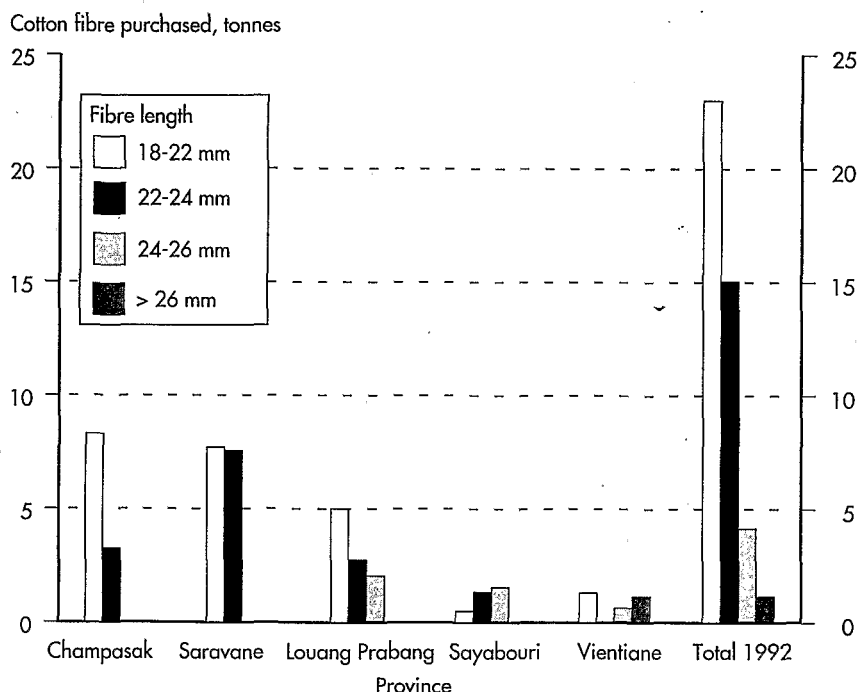


Figure 3. Fibre purchased by Vientiane's spinning mill as a function of fibre length and production zone (1992).

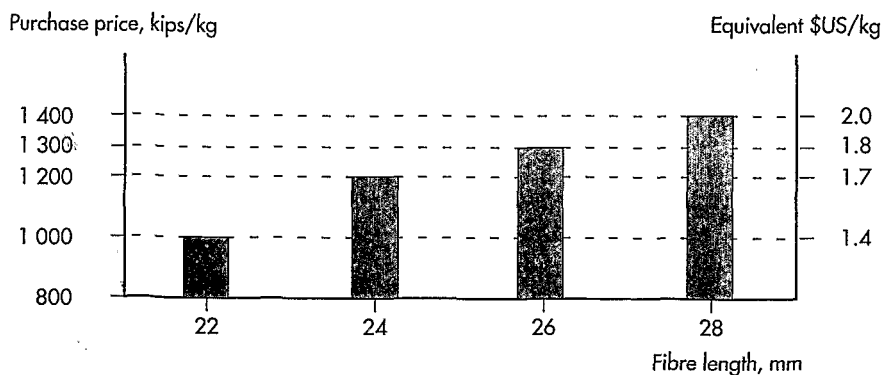


Figure 4. Price paid for fibre by Vientiane's spinning mill as a function of fibre length (1992).

Crop management and economic assessment

The Laos-French project has several operational sequences concerning the two commercial outlets—the national cottage industries, which require short fibres, and the export market, which demands medium long fibres.

The production of short fibres (18–22 mm) for local crafts and spinning in Vientiane is being investigated using low-input operational sequences. Tests involve

intercropping of, essentially, the late cottons Fay Niay and Fay Noy, with neither inputs nor seasonal credit.

The productive itinerary concerns improved, longer fibre (27–30 mm) varieties for export to neighbouring countries. Varieties include introduced *G. hirsutum*, such as SR1F4 (native to Africa) and Kham Khao 1 (native to India), which are early varieties planted in pure stands requiring fertilizer and crop protection applications. Farmers must therefore have a certain level of technical knowledge.

Calculations of economic margins (Table 1) demonstrate the real profitability of cotton cultivation, and provide a basis for farmers' interest in the activity. The farmers' main motivation is to optimize family labour productivity.

Local ginning and pressing of cotton lint

There is no industrial ginning unit in Laos to supply Vientiane's spinning enterprise. This relies on the purchase of seedcotton directly from the producer villages. The seedcotton is ginned using roller-type mechanical gins in village units, which ensure that the first conversion of the cotton harvest occurs in the production zone.

Manual ginning is a slow and fastidious task reserved for the farm household, which requires about two weeks to gin the 70 kg of seedcotton required to satisfy its needs.

There are insufficient ginning and pressing units to cope with the cotton production of Laos. In addition,



The children and cotton harvest of Ban Khon-Kham (Louang Prabang).
Photo: G. Trébuil

conversion of the harvest is restricted to the production zone due to the insufficiencies of communication channels. Transport of the pressed fibre—a nonperishable, easy to store, high-value (up to 2 000 kips/kg) commodity—is straightforward.

The Laos-French project introduced roller-type gins of Thai manufacture in 1986. These are small, robust, not very costly, and easy to maintain. They run on electricity or diesel (5 horsepower), and can process 20–25 kg of fibre/h. At present, 17 roller gins are located in nine ginning units created under different projects countrywide.

An autonomous activity

Each seedcotton processing unit creates dry-season employment for a limited production zone including the host village and some neighbouring hamlets. From December to April, each unit can process 130–140 tonnes with a labour force





working 6–8 h/day. Low-cost materials available locally are used to construct these units, which are equipped with:

- two or three, 1 m long roller-type gins;
- a locally constructed baler for handling 40 kg of fibre;
- a clean, sheltered, and ventilated area for storing the seedcotton, with separate sections for seedcotton originating from seed multiplication, fibre bales, and sacks of cottonseed (Table 2).

The processing unit acts as a promotional interface between the producer and the market. Here, the farmer

learns the importance that manufacturers place on lint quality, and that quality is better remunerated. They learn that farming practices can affect the technological characteristics prized on the market:

- cleanliness (conditions and care taken at harvest and during drying);
- colour (varietal purity and end-of-cycle pest control);
- length (choice of variety and seed purity).

By ginning separately seedcotton produced as a result of seed multiplication of distinct cultivars, the unit can guarantee both choice of variety and the quality of the seeds with which the producers are supplied.

Table 1. Economic results for three technical itineraries applied to cotton cultivation, Laos (1990-1991). K700 = \$1. US

	Flood-plain cropping	Value (K'000/ha)	Traditional cropping	Value (K'000/ha)	Intensive cropping	Value (K'000/ha)
1. Gross income cottonseed	400 kg/ha	92	800 kg/ha	184	1500 kg/ha	450
2. Inputs	0	0	seeds (25 kg/ha)	5	seeds (20 kg/ha) labour + harrowing fertiliser (16-20-0 + urea) insecticide (7 treatments) herbicide (2 l/ha)	4 45 27 111 4
Total inputs		0		5		191
3. Gross margin (1 - 2)		92		179		259
4. Fixed capital used	hoes	1	hoes	1	hoes Sprays + parts	1 1
Total fixed capital		1		1		2
5. Net margin value added (3 - 4)		91		178		257
6. Labour	70 days		90 days		160 days	
Family						
Salaried	24 days at 800 kips/day	19			40 days at 1 000 kips/day	40
7 Productivity Value added per day (5/6)		1		2		1.3
8. Social distribution of the value added						
Farm taxes (2% of gross income)		2		4		9
Interest on loans		0		0	(5% per cycle)	7
Salaried work		19		0		40
Total		21		4		56
9. Disposable farm income per hectare (5 - 8)		70		174		217

Flood-plain cropping: smallholder cotton crops cultivated in a flood-plain system without inputs for the Thai market. Levees of the Xe Bang Hieng, Savannakhet province.

Traditional cropping: smallholder cultivation of local varieties, without labour, for farm household consumption. Paklay region, Sayaboury province, and Nam, Luang Prabang province.

Intensive cropping: intensive smallholder cultivation of introduced varieties for the Thai market salaried labour used solely at harvest time. Valley of the Nam Ngum in Ban Hai, Vientiane province.

Table 2. Cost of village ginning unit depreciated over 10 years.

Investment	Cost (K'000)
- construction of the unit	2920
- two gins	3650
- one baler	730
- installation of electricity	511
Total investment	7811
Item	Annual cost (K'000)
depreciation	781
maintenance of the unit	438
Total annual cost	1219



This practice contributes to standardising lint quality, and hence to obtaining the best purchase prices from manufacturers. This is essential for Laos, to limit the amount of cotton that is ginned across the border in Thailand.

The first stage of development

A cotton ginning sector well integrated in the country's economy relies on the creation of village units. Local farmers' organisations whose members have a considerable stake in the sector could coordinate a number of activities: collection of output, unit management, negotiation of deals with manufacturers, and production and distribution of quality seeds. In the medium term, provided that the democracy of these organisations is assured (i.e. free membership, priority given to issues of mutual interest, and open management), they could perceivably be responsible for the supply of inputs, and, even manage members' seasonal credits.

In addition, the benefit margins from the ginning units could be earmarked for local development actions

— working capital for seasonal credit and bulk purchase of inputs, a cooperative store, acquisition of transport, etc. The cotton sector could thus become a driving force in the socioeconomic development of the village.

The small number of units already in operation demonstrate that it is possible to adapt systems to the local context—respecting household production and farmers' groups—to enhance farming activities in an appropriate way.

Now the State must develop socioeconomic conditions at regional level to motivate the rural community to become more productive and better organised.

Further information

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Abstract... Resumen... Résumé

G. TREBUIL, J.-C. CASTELLA, B. CHANTHARAT, S. THIRASACK — Cotton cultivation in Laos.

Laos has a tradition of cotton, and farming systems are adapted to many ecological systems. They include in particular rice, cotton and peanut. In order to develop a true cotton sector providing a source of foreign currency earnings for the country, research by the bilateral Franco-Laotian cooperation project on fibre crops has concentrated on improved farming systems including fertilisers and pesticides, better cultivation techniques, and productive varieties. Artisanal ginning and fibre pressing facilities are being organized in villages and the first spinning factory has been installed in Vientiane. In certain frontier regions in Thailand, cotton growing with improved varieties is developing as a cash crop for export.

Key-words: cotton, peanut, rice, farming systems, varieties, technology, economy, Laos, Asia.

G. TREBUIL, J.-C. CASTELLA, B. CHANTHARAT, S. THIRASACK — El algodón en Laos.

Laos es un país de tradición algodонера con sistemas de cultivo adaptados a situaciones ecológicas múltiples, que incluyen, en particular, arroz, algodón y cacahuete. Con objeto de desarrollar una verdadera actividad algodонера, fuente de divisas para el país, las investigaciones del proyecto de cooperación bilateral franco-laosiano de investigación y desarrollo relativo a las plantas de fibra han estudiado sistemas de cultivo mejorados que comprenden abonos y pesticidas, técnicas de cultivo más eficaces y variedades productivas. En los poblados, se organizan estructuras artesanales de desgrane y prensado de la fibra. Además, se ha instalado la primera hilatura en Vientiane. En algunas regiones fronterizas de Tailandia, el cultivo algodонера de renta se desarrolla con variedades mejoradas con fines de exportación.

Palabras clave: algodón, cacahuete, arroz, sistemas de cultivo, variedades, tecnología, economía, Laos, Asia.

G. TREBUIL, J.-C. CASTELLA, B. CHANTHARAT, S. THIRASACK — Le cotonnier au Laos.

Le Laos est un pays de tradition cotonnière, dont les systèmes de culture sont adaptés à de multiples situations écologiques. Ils comprennent en particulier le riz, le cotonnier, l'arachide. Afin qu'une véritable filière cotonnière, source de devises pour le pays, puisse être développée, les recherches du projet de coopération bilatérale franco-lao de recherche-développement sur les plantes à fibre ont porté sur des systèmes de culture améliorés, comprenant engrais et pesticides, techniques de culture plus performantes et variétés productives. Dans les villages, des structures artisanales d'égrenage et de pressage de la fibre s'organisent, en plus de l'usine de filature installée à Vientiane. Dans certaines régions proches de la Thaïlande, la culture cotonnière d'exportation se développe avec des variétés améliorées.

Mots-clés: cotonnier, arachide, riz, système de culture, variété, technologie, économie, Laos, Asie.

Agriculture développement

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