SON TRA (DOCYNIA INDICA) VALUE CHAIN AND MARKET ANALYSIS

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Summary

The practice of shifting cultivation and monoculture maize, rice and cassava have caused severe soil erosion and degradation in the sloping highlands lands of the northern provinces of Son La, Yen Bai, and Dien Bien of Vietnam[1], posing threats to household food security and environmental integrity. Agroforestry was identified as a viable option to address these issues.

Among others, Son tra (*Docynia indica (Wall) Decne*) was selected as a target species for promotion in the highlands of Son La, Yen Bai, and Dien Bien. The 'Agroforestry for Livelihoods of Smallholder Farmers in the Northwest region of Vietnam' (AFLI), a project funded by the Australian Centre for International Agricultural Research (ACIAR) and implemented by ICRAF and research and extension partners in the northwest region, has identified Son tra as a promising agroforestry tree species to be tested in on-farm trials. Son tra also has been published by Vietnam Records organization as one of 50 specialty fruits in Vietnam. Son tra grows in areas with altitudes above 800 meters above sea level (masl). In the past, the tree can only be found in the wild, but quite recently, it is increasingly used as a reforestation species. Local people collect fruits from existing trees inside natural forests and in government-supported plantations to sell to local collectors and traders. Today, Son tra is increasingly recognized as an important source of income for households[2], which can suit well in agroforestry systems. However, there remains a big gap on the knowledge of how the trees are planted, how fruits are harvested, processed, and marketed. A study was therefore needed to gain an understanding of existing market value chain, so as to identify interventions necessary to improve its performance. Facilitated by ICRAF, a team of researchers and extension workers in the northwest conducted a participatory market value chain analysis for Son tra between July and December, 2012.

Overall, the production area and market value chain for Son tra has grown over the last years. People buy Son tra because it is believed to be healthy, able to control cardiovascular disorder, high blood pressure and cholesterol level. Fruits are sold to local collectors, traders, retailers, and small industries like a fruit juice and wine factory. In the northwest, Son tra can be found in fewer districts, creating a Son tra zone across the provinces of Son La, Yen Bai and Dien Bien. The total area of harvested Son tra in the three provinces is approximately 3,200 ha with a total production volume of about 6,500 tons /year, of which 4,000 tons come from Yen Bai, 2,000 tons from Son La and 500 tons from Dien Bien. Some districts have plans to expand the size of existing plantations, which could run the risk of oversupply if the demand is not simultaneously improved and expanded.

The structure of the Son tra value chain is similar in all three provinces, with a slight difference only in the organization of the distribution channel. The key actors in the chain are farmers, collectors, traders, processors, and consumers. Farmers attempt to sell fresh Son tra fruits directly to traders with a farm gate price range of 3,000-15,000 VND/kg. Each actor in the chain adds up approximately 4,000 VND/kg, such that the price at the end of the chain is between 15,000 and 25,000 VND/kg. In general, profits are uniformly

[1] Project Proposal to ACIAR – "Agroforestry for Livelihoods of Smallholder Farmers in North-West Vietnam", Hoang Minh Ha, World Agroforestry Centre (ICRAF) Vietnam and Ann Degrande, ICRAF-West and Central Africa region, 22 Sep 2011: shown in the Table 2, shifting cultivation happens in the land area at high elevation of more than 600m; mono-cropping is carried out at places with elevation of less than 600m

[2] http://danviet.vn/56684p1c34/trung-mua-tao-meo-dan-phan-khoi.htm/

distributed across the value chain; however, wholesaler and retailers' gross profits are affected by trade volumes, which could range from 10 to 200 tons.

Individual or household level Son tra production is still new, as evidenced by poor planting, management and harvesting techniques. There is no quality control of planting material, since Son tra is used as a forest protection species--as such, it is considered a non-timber forest product (NTFP). Seedlings produced for reforestation purposes are usually of poor quality, resulting in low quantity and quality fruits. This also relates to the problem of communal plantation management and free harvesting of fruits in natural forests. As a common-pool resource, Son tra is collected often hastily due to competition among community members, leaving the trees without care and maintenance. This situation points to the need for domesticating Son tra as an agroforestry tree species, where it can be better managed. Moreover, the general processing technique for Son tra is still quite traditional. Research has been carried out for making Son tra wine or juice, but commercial production is still in a development stage. Large-scale production of Son tra wine has proven difficult due to high initial investment, low competitiveness against existing alcohol and beverage products, and gaps in marketing and branding.

Nevertheless, the market potential for Son tra products particularly wine and beverage is vast. With improved production and harvesting techniques, adequate support for transportation and post-harvest management, market information and organized marketing support, price stabilization and investments in product development, a vibrant Son tra industry can be created with smallholder producers breaking-through and securing a niche in the market.

The market value chain analysis concluded with recommendations for immediate actions. Given the above issues, the development of Son tra value chain must be approached in three stages: **Stage 1:** Improving the production capacity at household level and resource management at provincial/district level; **Stage 2**: Increasing farmers' marketing capacity, organizing activities to capitalize on improved skills, and supporting the distribution of high quality Son tra through supermarket distribution channels; and **Stage 3**: developing processing techniques in parallel with marketing activities to facilitate market penetration of higher value-added Son tra products, especially those which can potentially bring more benefits to smallholder farmers.

1. Background

About 3.4 million people (4% of Vietnam's population) live in the five north-western provinces made up of 30 ethnic groups. The landscape is characterized by rolling hills and mountains. Agriculture is predominantly subsistence with paddy production in the valleys and steep slopes. Maize is the most important food and fodder crop for most ethnic groups in this region. Rapid agricultural expansion and widespread practice of shifting cultivation has resulted in the degradation of agro-ecosystems, forest destruction and fragmentation, and threatened environmental sustainability and food security.

In response, ICRAF Vietnam is collaborating with national and local partners to implement the project, 'Agroforestry for Livelihoods of Smallholder Farmers in North-West Vietnam', which aims to improve the performance of smallholder farming systems in North-West Vietnam through agroforestry. The project seeks to increase the productivity of associated crop and livestock systems, leading to more diverse and sustainable production systems and better income from tree products (Hoang et al., 2011, project document - AFLI).

Agroforestry
In essence, the project aims to promote the development of tree-based systems that have potential economic value to farmers. From an environmental perspective, agroforestry can reduce soil erosion while improving soil nutrient status and agro-biodiversity (Young, 1989). To encourage farmers to adopt tree-based systems, and hence to curb land degradation and deforestation, a pro-poor value chain approach has been chosen in order to identify opportunities to add value to agroforestry products and to bring farmers to mainstream markets.

Selection of Son tra as a target agroforestry product
Son tra was suggested as a target agroforestry product to be promoted in the project site for two reasons: (i) it is an indigenous tree species that grows naturally at elevations greater than 800 masl; and (ii) it has been used in reforestation programmes and by H'mong people as multi-purpose species. Normally, the tree is planted as a plantation crop that provides fruit and timber and environmental services. Market demand for Son tra has increased in recent years, which can be seen from widespread selling of Son tra in various locations in Son La, Yen Bai, and Dien Bien. Thus, Son tra appears to fit well as a product to be promoted in agroforestry systems.

The need for market value chain analysis and involvement of local stakeholders
Despite its potential, there is lack of knowledge on different operational aspects of the Son tra value chain. Little is known on whether the chain is running efficiently and effectively, and if there are opportunities, especially those related to market access improvement, to enhance the sector's performance. More importantly, a better understanding of the economy at smallholder level in terms of value, sustainability, and drivers is needed, as it is a critical input for the identification and implementation of specific interventions to create, maintain, and enhance farmer adoption of Son tra-based agroforestry system.

To ensure the implementation of recommended actions, local stakeholders were involved in a participatory market value chain analysis, to enhance their understanding of the chain, and thereby, seek ways and means to improve it.

2. Methods

A team composed of a lead consultant and selected members from different partner organizations and agencies in Son La, Dien Bien, and Yen Bai carried out the study of Son tra value chain in a sequential manner. It began with training of the team members on basic value chain development, followed by surveys in various locations across the three provinces. The team interviewed key informants, surveyed farmers, analyzed the data together and discussed potential interventions. The phases and methods employed are summarized below.

2.1 Phase 1: training on value chain development activities

Because promoting the development of Son tra value chain through delivery of specific activities is one of the project's main activities, local partners who will be involved in project implementation were involved in the design process to establish a common understanding of what actions need to be carried out and why. In addition, from a sustainability perspective, by participating in all stages of the value chain development cycle, local staffs are capacitated, and hence able to carry out other value chain activities on their own in future.

Given the limited experience in value chain development of the provincial project team, a 3-day training session was initially provided, covering key issues of value chain mapping, value creation and distribution, linkages between players, rules and requirements, technology, and knowledge and skills. Each concept/issue was illustrated with practical examples of specific chains in Vietnam to enable trainees to relate theory to practice in the learning process.

2.2 Phase 2: field survey

Activities and organization in the field

Before the field trips, data to be collected from different stakeholders was identified and interview questionnaires were designed.

- The questionnaires and information needed was reviewed and discussed with the provincial team. This activity enabled participants to understand what info is to be looked for and why it is needed. In order to accommodate local reality and culture, adjustments to the structure of the questions were also made, according to comments by participants.
- Selected players in the Son tra areas were interviewed. This was largely implemented by the provincial project team, under assistance of the consultant. Internal discussion in between interviews helped the team to unveil more insights from data/info collected on the field;
- Key findings were summarized, consolidated and participants agreed on the next actions.

Son La was chosen as the first practice site among the three provinces because of its more advanced level of VC development than others in respect to market linkages and product volume. The province is also strategically located, making the logistics more efficient. A representative from Dien Bien was requested to attend the exercise. Later, data collection in Dien Bien was conducted by the Dien Bien' study team with assistance from the Son La team, based in the North West University.

The second trip to Yen Bai was not only to gain the same information of Son tra supply chain in the context of Yen Bai as planned, but also to further understanding of the distribution channel of Son tra to other markets through Yen Bai. A separate third trip for data collection in Dien Bien was conducted by a staff from the North West University, to support the Dien Bien team while improving local capacity of Son La.

Desktop review

Following the training session, a desktop study by the lead consultant provided inputs for sampling. The literature review helped to preliminarily identify the principal production areas for Son tra in the three provinces. Processing businesses and main commercial centers where Son tra is traded were also ascertained in the desk-study. Key informants, as well as other related local agencies to interview, were suggested by the project team staff in each of the provinces.

Field locations

Son La: there are three major production centers in Son La: Thuan Chau District, Muong La, and Bac Yen. Among these, Bac Yen emerges as a Son tra powerhouse, having apart from significant plantation, a prominent Son tra wine maker in the district. The Son tra communes in Bac Yen are Lang Cheu, Ta Sua, Xim Vang, and Hang Chu. They are located in areas of increasing altitudes, and can only be accessed through the same road--their production environments are also similar; hence, one commune can best represent the characteristics of the entire area. The selected commune for a field visit was Ta Sua.

To obtain a full picture of Son La province, Thuan Chau, the district where Son tra is least developed was also selected for a field trip. The specific location for data collection in Thuan Chau was Co Ma commune.

Yen Bai: Son tra in Yen Bai is planted mainly in two districts: Tram Tau and Mu Cang Chai. Due to perceived differences in these two (probably because of the distance of 140 km from Tram Tau to Mu Cang Chai), both of these districts were visited, and in particular the communes of Ban Cong and Nam Co.

Dien Bien: Tuan Giao district is the only district having Son tra in Dien Bien. Therefore, data collection was carried out in the communes of Tuan Giao: Hua Xa A, Ban Long, Ban Xa, Hang Tau, and locations on the Pha Din summit.

Interviews with key informants

Interviews with key informants and particularly with actors participating in Son tra value chain, including farmers, collectors, and traders at all levels, and relevant governmental agencies were carried out at survey locations. In total, more than 50 farmers were interviewed, various traders, and government staff, using both formal and informal meetings, phone call discussions, and follow up queries.

Focus group discussions (FGD): were conducted with a group of farmers, selected randomly from the list of households having Son tra plantations. The purpose of the FGDs was to inquire information about the situation of Son tra production and marketing.

Structured interviews with questionnaires were carried out with farmers to capture detailed information needed. The results of these interviews complemented the information obtained from the focus group discussions.

Semi-structured interview: was applied for businesses and local government officers at district and provincial level to obtain necessary information on the scale of Son tra

production, policy issues related to Son tra plantation development and distribution network.

Observation: to complement the information acquired from semi-structured interviews with traders and retailers, observation of Son tra trading activities, as well as the attitude of the interviewed traders/collectors has been made. Observation technique was also used during the discussions with farmer groups, where the interactions between farmers gave different meanings to the information provided on production and sales.

2.3 Phase 3: analysis

Led and facilitated by the consultant, the study team reviewed the performance of the Son tra value chain, based on the information gathered and observations made from the field trips. The consultant took on a facilitation role in the analysis, and when needed, added some points to deepen the discussion and manage the quality of analytical outcomes. The interventions identified were based on available project funding and the need to deliver tangible outputs.

2.4 Limitations

- There is a trade-off between study depth/scope and the need for capacity building. On the one hand, the study had to be sufficiently detailed to derive a full picture of the sector's performance. On the other hand, given the starting level of project staff in value chain development, study activities had to be simple and straightforward to make on-the-job training practical and effective. When needed, in-depth analysis was conducted by the lead consultant. But a certain compromise on the field was inevitable.
- Compounded with the above was the instability of local participants who were also taken by other commitments required by the functional agencies. As a result, a lot of time was consumed for reiterating/ debriefing the progresses/issues. Full understanding of participants was thus difficult to achieve.
- Son tra is not confined within the three provinces. The chain operation reaches out to many other provinces and cities. Info on markets outside the project zone was obtained only from some selected places or using secondary sources.

3. Results and discussions

3.1. Son tra distribution and production volume

Son tra plantations are concentrated in fewer districts across the provinces of Dien Bien, Son La, and Yen Bai, forming a 'Son tra zone' (Figure 1). The total area of matured Son tra trees both within natural and plantation forests in the three provinces is 3,200 ha with a production volume of about 6,500 tons, or an average production of 2 tons/ha (Table 1). Due to limited data on Son tra production, this output was estimated based on current trade volume. Son tra fruits are transported from villages to different places within and beyond the three provinces, and to other regions and the capital, Hanoi. Consumers are aware of the sources of Son tra fruits, and accordingly, fruits from Yen Bai are considered of better quality and taste than from Dien Bien and Son La.

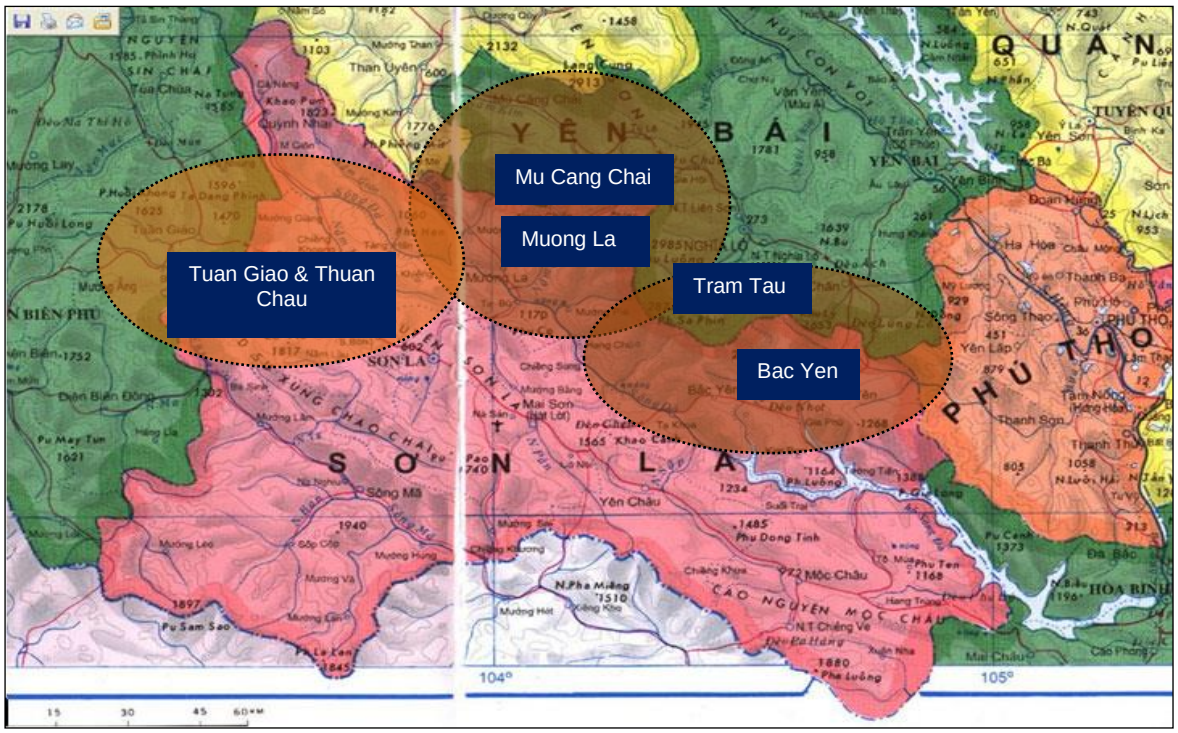


Figure 1- Main production zone of Son tra across three provinces

Table 1- Estimated production output of Son tra in three provinces

	Dien Bien	Son La	Yen Bai	Total
Estimated production area	270 ha	1,000 ha	1,930 ha	3,200 ha
Estimated production output	500 tons	2,000 tons	4,000 tons	6,500 tons

Depending on forest ownership allocation, Son tra trees are either managed by individual households or by communities. Newly established Son tra plantations are privately owned as farmers plant the trees in areas where they could claim ownership. Community-based management is challenging because community members tend to focus more on harvesting, not on planting. Without agreed harvesting rules and a harvesting schedule, farmers compete in harvesting Son tra fruits, resulting in a situation where even young or unripe fruits are harvested, bringing about poor quality (low value) fruits and lower returns.

Son La

In Son La, Son tra is concentrated mainly in three districts, namely Bac Yen, Thuan Chau, and Muong La with an estimated total area of 1,000 ha, and an annual production output of 2,300 tons or 2.3 tons/ha (Fig 2). This figure does not include newly-established plantations shown in Table 1. In terms of production volume, Bac Yen has significantly higher production compared to Thuan Chau and Muong La. Bac Yen has been the distribution center for Son tra during harvesting season. By comparison, residents in Muong La realize more financial value from the tree than those in Thuan Chau.

Son tra is grown only at high altitude across three provinces, showing the climatic requirement of this species. It is widely known that Son tra trees grown in communes at higher altitudes have better quality, and bear more fruits.

Figure 2- Location of Son tra plantations in Son La

Even though Son tra's economic potential is generally recognized across the provinces, reliable data on distribution and production are lacking. Information regarding Son tra production from different sources is often contradictory. This is understandable since it is considered as a forestry species managed by the Provincial Forestry Division (PFD). The only data available since 2006 is the location of new Son tra plantations (Table 2). Obviously, there has been no inventory of the natural forest area of Son tra in the province in the past.

Table 2- Area of Son tra plantation established under Programme 661 and other projects from 2006 to 2011, in Son La province

	2006	2007	2008	2009	2010	2011	Total
New plantation (ha)	241.50	74.70	159	164.17	53.40	110.40	**803.50**

Source: Son La's Forestry Division of DARD

The above data is understood to be the plantation area developed under the 5 million hectare reforestation programme, otherwise known as Program 661. In addition, a 200 ha private plantation was reportedly established in 2011 by Thanh Thung Enterprise. Also, an undetermined area of Son tra plantation was reportedly established by the KFW7 Project funded by BMZ in 2010-2011. Both the district governments of Thuan Chau and Bac Yen are planning to expand their existing Son tra plantations; the former reportedly plans to invest on a 400 ha plantation in 2012.

Yen Bai

In Yen Bai, Son tra plantations can be found mainly in Mu Cang Chai and Tram Tau districts (Fig 3). Mu Cang Chai has 1,490 ha while Tram Tau has 440 ha, respectively. Obviously, Mu Cang Chai is the main supplier of Son tra fruits, accounting to about 75% of total provincial supply. Table 3 shows the distribution and area of Son tra within and outside natural forests in the two districts. In the table below, the year indicates the documentation of these areas rather than the year they were established.

The available data in Yen Bai suggests a gross provincial production of 4,000 tons, which coincides with the reported volumes flowing through key collection centres in Mu Cang Chai and Tram Tau (3,000 – 4,000 tons in Mu Cang Chai and 500 tons in Tram tau).

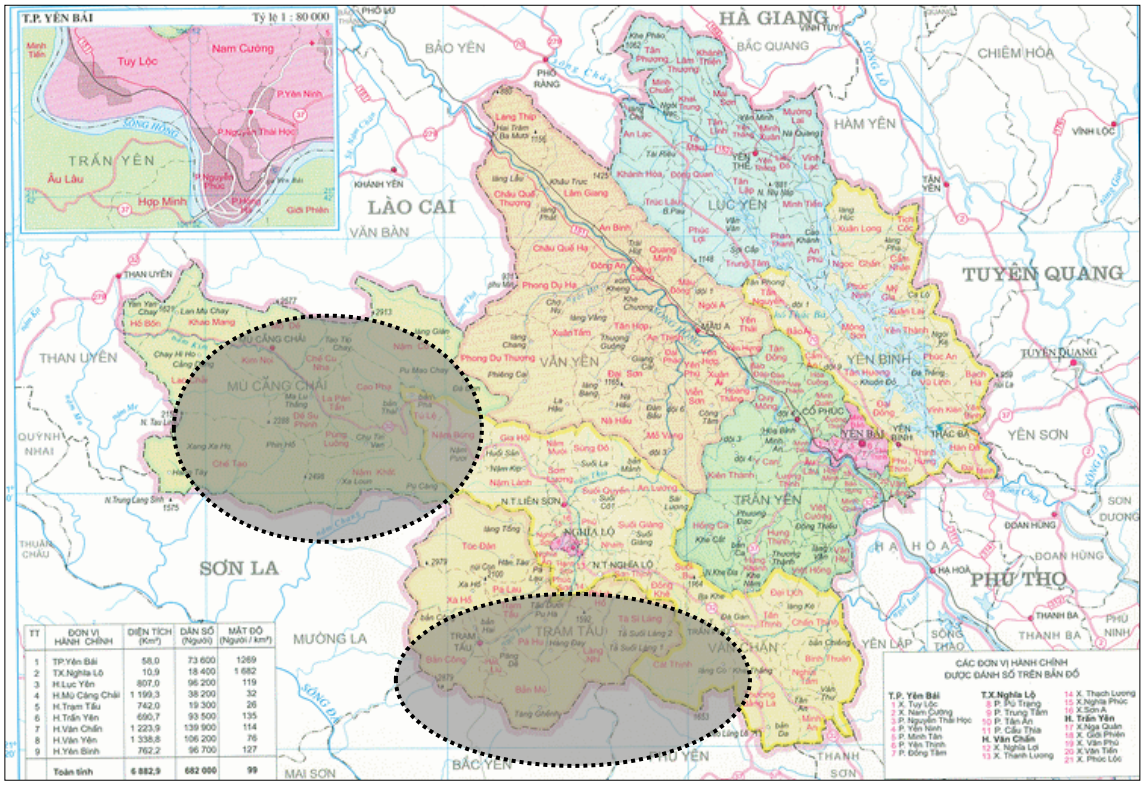


Figure 3- Location of Son tra plantation in Yen Bai

Table 3- Area and distribution of Son tra plantation reported from 2008 to 2010 in Yen Bai

	2008	2009	2010
TOTAL	**1.207**	**1.523**	**1.930**
Mu Cang Chai	1.105	1.260	1.490
1. Nậm Có	350	370	400
2. Khao Mang	50	50	50
3. Mồ Dề	30	50	100
4. Chế Cu Nha	40	60	80
5. Lao Chải	130	145	160
6. Kim Nọi	40	55	80
7. Cao Phạ	50	70	100
8. La Pán Tẩn	110	130	150
9. Dế Su Phình	65	65	70
10. Chế Tạo	70	85	100
11.Púng Luông	50	50	50
12.Nậm Khắt	120	130	150
Trạm Tấu	102	263	440
1. Xà Hồ	40	85	160
2. Làng Nhì	13	63	100
3. Bản Công	34	55	80
4. Bản Mù	15	60	100

Dien Bien

In Dien Bien, Son tra is planted mainly in Tuan Giao district, specifically in Toa Tinh and Tenh Phong communes. Compared to Son La and Yen Bai, Dien Bien has the smallest Son tra plantation of only 270 ha, of which 150 ha is in Toa Tinh while 120 ha is in Tenh Phong--the total estimated production output is 500 tons; however, traders reported that current trade volume is only 2/3 of 500 tons, suggesting that a significant portion of the produce were either spoiled or consumed at household level. These plantations were established by the Management Board of Protection Forest between 2000 and 2005. Son tra population within the natural forest is reportedly small--the fruits are greenish with an undesirable taste; hence they are not harvested for the market. Figure 4 shows the location of Son tra in two districts of Dien Bien.

Figure 4- Location of Son tra plantations in Dien Bien

Due to the increasing economic value of Son tra, both communes are planning to add at least 75 ha to their existing plantation. Other communes such as Tuan Giao, including Muong Thin, Mun Chung, Phinh Sang, and Quai To have also expressed interest on establishing Son tra plantations. Some organizations, particularly the North West University are helping Dien Bien to develop Son tra products, through testing of different varieties and cultivation techniques.

3.2. Government policy

Son tra fruit is in essence a non-timber forest product (NTFP). Activities related to the species, from planting, harvesting, processing, and distribution, are thus subject to current regulations on NTFPs. A look at the legal framework on NTFPs shows that there are incentives for developing NTFPs through production, harvesting, processing, and marketing.

At the local level, having recognized the livelihood potential of Son tra, district authorities strongly support its development especially in mountainous areas where cash crop options are limited to maize only. For example, the district of Bac Yen targets at least 2 ha of Son tra plantation for each household; however, it is not clear how this will be met and when. Government staff, in a discussion, all agrees that further development of Son tra is going to be a major undertaking.

The government's decision to expand Son tra plantation was primarily based on apparent market potential than a thorough market analysis. This assumption could run the risk of over-supply of Son tra fruits once additional volumes are generated from new plantations. With an average yield of 2 tons/ha, an aggregate area, for example of 1,000 ha of new plantations in the three provinces would mean an increase in current production by up to 30%--whether this volume could be comfortably absorbed by the market remains uncertain.

Support for the development of new Son tra plantations generally consist of provision of seedlings, fertilizer, and possibly financial subsidies, while technical and/or financial support for improving production, processing and distribution of Son tra fruits by households are missing.

3.3. Son tra production activities by households

In general, Son tra production is a totally new enterprise to farmers. Farmers have not learnt planting and harvesting techniques. The tree grows naturally in the forest, and is only recently planted by farmers under Progamme 661. Fortunately, Son tra is increasingly recognized as an important commodity driven by a demand for its fruit to process into a healthy drink. As a result, it received more and more attention from farmers and local governments.

Son tra varieties

The sources of planting materials for Son tra are mainly households and local government agencies. Farmers would select the best fruits, basically the good-looking and large ones, to extract seeds for seedling production; while the government, through its reforestation programmes, produces seedlings in nurseries and distribute them for free. In this case, it is impossible to trace the origin of the tree in the plantation.

Furthermore, there has been no quality control for Son tra seedlings. As the purpose is reforestation, the government is not bothered with the quality or taste of the fruit, whereas farmers are more interested with the quality and quantity of fruits. As a result, farmers normally collect big fruits to command a good price, leaving the smaller ones for propagation. If left unattended, this practice may lead to total elimination of quality germplasm or good Son tra variety.

Even though Son tra could bring income to farmers, most of the interviewed farmers expressed no interest in buying seedlings from reliable suppliers to improve productivity, since they expect the government to provide them with free quality seedlings. This behaviour is unfortunately widespread across the farming community, from the poorest to the better-off households due to the following reasons:

- They could not afford to invest in quality planting material;
- The long gestation of Son tra trees takes away their interest on improving productivity;
- They can produce seedlings on their own at no cost; and
- The benefit from buying good planting material from commercial nurseries is not yet known.

Plantation and cultivation

Plantation techniques were provided by local agencies that supply seedlings for reforestation. However, this contrasts with what was observed in the field where Son tra trees seem to be planted spontaneously without proper or uniform density. Maintenance is limited only to weeding which is carried out 1-2 times in a year. On average, 1 ha requires 5-7 person-days for weeding. Other basic tree management practices such as pruning, fertilization, and pests and diseases control are not or only rarely implemented.

Even though no significant diseases have been experienced so far, pest was reported as a serious issue. However, farmers appear to have no idea of measures to control or manage pest infestation. Fertilizer is perceived necessary for productivity improvement, but is seldom applied because of lack of money.

Harvesting

Harvesting appears to be the hardest part in the production process. It is entirely manual and therefore time consuming. Some farmers climb the trees to pick ripe fruits by hand. Others may try to shake the tree for Son tra fruits to fall down. Practically, 20-25 days are

required to harvest fruits in a 1 hectare[3] plantation.

Harvesting before the fruits become fully ripe is pervasive in community-managed areas. In such areas, ownership cannot be assigned to individual households, leaving the management of the resource in the hands of the community. This means everybody in the community can claim ownership of the fruit. As a result, farmers rush to be the first to harvest the Son tra and as much as possible, even when fruits are not yet ripe. The price of immature Son tra is significantly lower than mature ones (VND 1000 - 2000 per kg for immature fruits versus VND 6,000 – 8,000 per kg for ripe ones).

Individual ownership of Son tra plantations has been identified as a solution to the issue of indiscriminate harvesting. Although this has been apparently successfully applied in some communes, the issue remains unsolved in various locations of Tram Tau, Yen Bai and Bac Yen, Son La[4]. Our first field trip in July 2012 witnessed how unripe Son tra fruits were sold in large quantities by road vendors in Bac Yen town, implying that the scale of early harvesting practice is probably sufficient to warrant attention, if the chain's performance is to be upgraded.

Extension services

Like in many other places across the country, the Extension Service under the provincial DARD in the three provinces is responsible for providing technical assistance to farmers, but due to limited resources, it focuses only on primary crops, such as maize, rice and cassava. Supplying seedlings, coupled with minimum technical advice, is the most visible aspect of development service to farmers; however, since Son tra is primarily a reforestation species, extension support has been limited, resulting in farmers' lack of production skills.

Actors in the value chain

The structure of actors in the Son tra value chain is similar in all three provinces, with some slight differences, mainly in the organization of the distribution channel and depending on particular local context of access to market information, proximity to main roads, and production volume. Map of groups of key players in Son tra value chain is provided as in the Figure 5.

[3] Harvesting volume is 100 kg/ day for a labor day on average. Given productivity of 2-2.5 tons/per ha, total harvesting time for ha is 20-25 labor days.

[4] Mr. Ky – Head of Bac Yen's Department of Agriculture and Rural Development suppose 1/3 of the resource area in Bac Yen suffer from early harvesting in community- managed area. No other reliable source of data can be used to consolidate this info.

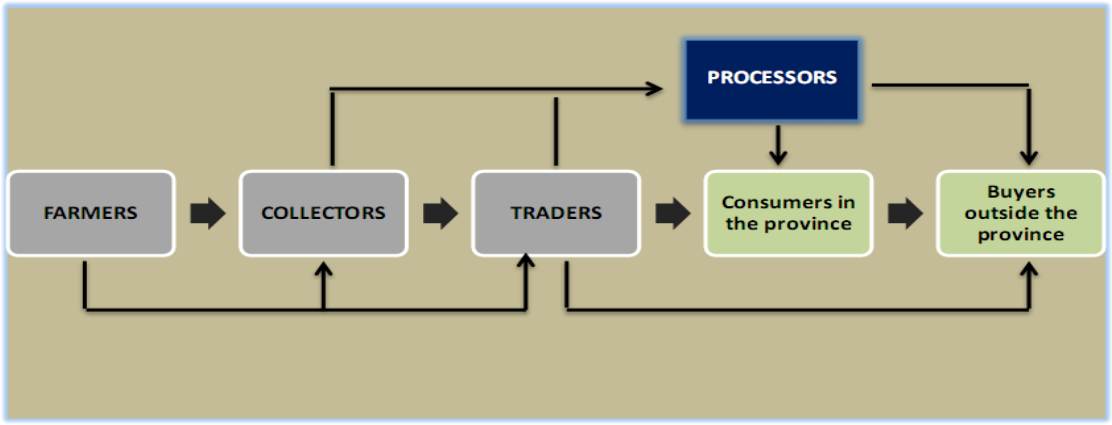


Figure 2: Map of actors in the Son tra value chain

While planting and harvesting of Son tra is carried out by farmers, the fruit distribution is controlled by a network of collectors and traders. Collectors are usually based in the area. Meanwhile, traders are located outside the Son tra production zone, usually closer to the main road where inter-province busses passing by on a daily basis. Normally, harvested fruits flow from farmers to collectors, then to traders. However, in some cases, traders bypass the collectors and buy the fruits directly from farmers, in order to increase their profit margin. Most of interviewed farmers have never thought of the idea, or even tried to sell directly to traders. Waiting for buyers to sell Son tra fruits at farm-gate price is common among farmers. An attempt was made by one farmer to sell Son tra fruits directly to a trader, hoping to get a better price, but he found no difference between the farm gate price and the trading price. By comparison, selling at farm gate is better because no costs are incurred for transportation, and it is more convenient.

Collectors tend to be the smartest actor in the value chain, capable of gathering sufficient quantity ordered by traders. In case of shortage, they may source additional supplies from other areas nearby to close the supply gap. In this sense, collectors are traders in their own right. Two types of traders were noted--one that is located permanently in one area of trading place, and another who travels around the area to deliver Son tra fruits to retailers far from the production zone. For logistical reasons, retailers are normally located along the national highway, especially in bus stops.

Following the distribution channel, traders sell Son tra to buyers in other provinces, such as Lao cai, Hoa Binh, and Hanoi, and to small-scale processors for producing wine or fruit juice. In Bac Yen, Bac Son is the only existing Son tra wine and fruit processing company, which buys 50 to 100 tons of Son tra fruits per year, directly from traders or collectors. Their products are distributed through a network of sales agents with outlets in Hanoi market. The Son tra juice line is still experimental, in which the taste and flavour is varied to determine the market's preference.

In reality, the provincial market demand for fresh Son tra fruits is marginal. In Son La, the estimated sale is only about 100-120 tons[5] per year, while it is double in Yen Bai (200 – 250 tons/year). As a special product in the three provinces, dried Son tra is often bought by provincial customers as a gift to friends and relatives outside the region. It is also not usually consumed straight away by the end-user; habitually, they are made into syrup or alcohol at household level. Traders or collectors may also do some processing, but to a

[5] Distribution to final consumers in Son La town is through four major marketplaces, each of which has total sales of 20 tons, divided between 3-4 agents with individual sales volume of 5-10 tons per year on average. Provincial customers not from Son La town are assumed to account for 30% of total consumption of the province.

lesser extent.

3.5. Linkages and relationship between actors

Linkages

The organization of actors and linkages between them in the Son tra value chain is very hierarchical. Each level has been formed for reasons justified by operational conditions.

Firstly, local collectors are important players because the long distance from plantations to distribution outlets requires collection of sufficient quantity to optimize transportation cost; and farmers usually do not sell collectively. Local collectors exist as direct contacts of external traders regarding the volume demand and timing of delivery. The collector therefore plays a bridging role between farmers and traders. In reality, collectors are often farmers, who have entrepreneurial skills, capable of collecting fruits from households and processing market information.

Secondly, local traders are located close to the main road so that they can deliver the fruits to other traders/retailers easily. Local traders rarely travel to collect Son tra directly from plantations, since by tradition, farmers only accept the price offered by collectors who often are village leaders or other trusted farmers. Traders also tend to offer low prices to farmers to recover their transportation cost and some fees paid to the Commune Management Board. Local traders may thus play the role of collectors, but collectors do not play the role of traders.

Another striking issue is poor market access due to lack of public transport facilities. Farm-to-market roads may exist, but public transport rarely does, so only traders with personal means of transport have access to plantation areas. This one-way access is in fact, a major constraint to farmers in reaching the market.

Buyers from local traders, basically traders at the next level, pick up Son tra at places close to bus stops by the road, as collectors do not normally have sales outlets. Depending on the road condition, traders may play the role of collectors if they are able to set up a storage facility near the plantations, which are accessible by trucks.

Local processors, like the wine/ juice manufacturer in Bac Yen, play a similar role as the local trader, in the sense that they also source Son tra directly from either collectors or farmers, and pay the same amount as well.

Thirdly, local traders use ‘travelling’ traders who then pass Son tra on to retailers in various market places in other provinces. The role of travelling traders is indispensable, extending the local distribution network of Son tra out of Son La, Dien Bien, and Yen Bai. In essence, this may be viewed as a development service for transportation in the Son tra value chain.

An illustrative example of the linkages between actors can be seen in Nam Co commune. The commune is the largest in Yen Bai district and has about 400 ha of Son tra plantation. The road can be accessed by trucks only up to a local bridge, beyond which all transportation must be done by motorcycle. Here, a group of local collectors have self-organized and set up storage facilities near the bridge, where they collect Son tra fruits that were delivered directly by farmers to their storage. The Son tra fruits are then transported by trucks and sent by ‘travelling’ traders from Yen Bai/Van Chan or by daily inter-district buses. In this case, collectors play dual roles, that of a trader as well.

Linking farmers with the business sector

In Thuan Chau, Son La, a local company, Thanh Tung enterprise, has cooperated with farmers to plant 200 ha of Son tra. Akin to a contract-growing scheme, the company provides farmers with seedlings, fertilizers, and labour subsidy. In exchange, farmers are obliged to sell harvested fruits to Thanh Tung at the 'market' price. How the market price will be set and to what extent the business will stick to its commitment to buy the entire harvest is not clearly defined in the agreement. Whether this out-growing scheme will work remains to be seen. The business sees its ability to convert Son tra fruits into higher value products demanded by the market as a key factor to success.

Power balance

Even with the large number of traders and collectors participating in market value chain, power relationship is relatively balanced between actors in the value chain, including farmers and buyers. The number of traders/collectors varies throughout the year. During the Son tra production season, many merchants would switch to Son tra. In spite of the competition among traders, and maybe collectors, the farm-gate price remains low. The selling price at the level of traders/collectors is within the range of VND 8,000 –24,000 per kg [USD 0.39-1.15]. Meanwhile, the maximum price that farmers could get is VND 7,000-8,000/kg during peak seasons. Collecting the required quantities, transportation, and availability of supplies when orders are placed are perhaps the main barrier for farmers to reach out to traders and vice versa.

A market structure with many participants at each level is likely to create competition between buyers in favour of producers, but farmer-producers in the region have not benefited from this due to their lack of business or marketing skills, especially the ability to negotiate and coordinate the supply in large quantities.

3.6. Market specification of Son tra fruit and other requirements

Product classification

Son tra is classified into three types of fruits according to size and appearance: large, medium, and small. Sorting Son tra fruits into these types is done manually by collectors or farmers. At the beginning of the production season, prices at collectors' level are VND 6000, 7000 and 9000 for small, medium, and large fruits, respectively. However, the price could change over the season subject to market demand and supply.

However, some farmers sell Son tra to collectors/traders at a uniform price, regardless of the size of the fruit. In some places, such as in Thuan Chau of Son La, only large fruits are accepted, leaving the undersized ones unused or abandoned. By experience, the ratio of large to medium and small fruits is 5/2.5/2.5 respectively. Hence, if only large fruits are sold, then 50% of total production is of no value. However, fruits not sold for whatever reason can still be sliced, dried and sold later. This is largely done by traders and to a lesser extent by farmers. It helps traders to utilize all defect fruits left over after sorting.

Son tra fruits are also distinguished between green (immature) and mature fruit and between sweet and acrid fruit. Those harvested too early are green and sold at prices significantly lower than ripe Son tra fruits. The sweet varieties can be eaten as fresh fruit while the acrid ones have to be processed before consuming.

Market requirements

In general, the requirements for Son tra are not very demanding from a market angle. Packaging, information on origin, or health safety requirements is not critically necessary. While the Son tra wine maker prefers green fruits, individual consumers who use Son tra as ingredient for making alcohol or syrup/vinegar, do not have any specification. No specific technical requirements in the production of dried products have been identified yet. But as observed in stores along the national highway from Son La to Hanoi, some dried Son tra on the shelves have been infected with fungus, which is an evidence of inadequate drying. The shelf-life of Son tra has also not been clearly established.

Dried Son tra

Ripe Son tra

Unripe green Son tra

3.7. Processing

Commercial processing

Techniques for processing Son tra are both traditional and advanced. Research has been carried out to process Son tra into wine. Analysis of the fruit[6], in terms of chemical substances has clearly shown that Son tra is good for fermentation.

Notwithstanding the above, commercial production of Son tra wine from Son tra is still a young enterprise. There are only two Son tra wine producers in Son La, one of which closed down due to sustained losses. The other producer, Bac Son, based in Bac Yen has expressed difficulties in creating market niche for Son tra wine. Bac Son is currently, operating at 30% of its total capacity, which is equal to 30,000 l annually or an equivalent of 30 tons of Son tra fruit.

Bac Son Wine

The company is selling its wine primarily in Hanoi, through a network of sales agents who work on commission basis. The market for wine is generally big, but Bac Son has difficulties in making profits. Several challenges to industrializing Son tra wine were mentioned as follows:

- The high initial investment- the initial investment of Bac Son was estimated at nearly VND 7 billion or 336,000 USD;

[6] Research on the effect of some factors on *Docynia indica* wine fermentation process has been conducted by the National University of Hanoi using samples of *Docynia indica* from Yen Bai and Son La. Its conclusion is that *Docynia indica* from these provinces are a suitable source for wine fermentation

- Market for wine and drinks in general is competitive in Vietnam. Defining the right business and marketing strategy, including branding, and effective implementation of such strategy is necessary to secure a market position for Son tra wine.

Besides wine, Bac Son is testing its second product line of Son tra juice in the market. Son tra juice is contained in bottles with packaging very similar to the current famous Green Tea 0 Degree. This is intended to lure consumers into the product, but this approach has not worked so far, perhaps because the quality is not at par with existing brands or the branding was inadequate. Compared with making wine, juice drink requires lesser investment[7], and uses more fruits; if successful, Bac Son will require 200 tons of fruits to produce the tradable volume of juice--this is much higher than the 30 tons requirement for wine processing. But again, marketing and branding is a critical factor to success.

There has been no business venture for Son tra wine or fruit juice reported in Yen Bai. The Mu Cang Chai –based Management Board of Protection Forest revealed that in the past, it has sold hundreds of tons of Son tra fruits per year to external wine makers, namely two well-known brands Thang Long and Anh Dao. Unfortunately, the demand reduced gradually, and currently, the business is at the verge of closure.

Traditional processing

Soaking Son tra in water with sugar or in alcohol is a very common processing technique used by local consumers. To make Son tra syrup, 2 kg of ripe Son tra fruit are mixed with 1 kg of sugar in water, after which, the colour will gradually change--this process takes 6 months. To prepare Son tra vinegar, unripe Son tra is soaked in water, and left to ferment for one month. Different people may have slightly different ways of traditional processing of Son tra, but in general, simple processing techniques have proven effective, and probably this is one of reasons why Son tra is still in-demand locally. Son tra soaked in alcohol and water for syrup and vinegar is shown below.

[7] Bac Son investment in juice production line is estimated at VND 200-300m and receives technical assistance of the Institute of Bio-chemistry Science Technology

3.8. Price of Son tra and profits

Profit

Although the net profit per kg is the same across the collector, trader, wholesaler, and retailer, gross profit is driven by trade volumes which vary significantly among players ranging from 10 tons to 200 tons (Table 4). Retailers at Son La city disclosed that they only sell 10 to 20 tons annually, while about 100 tons are flowing on average through collectors in the Nam Co commune of Yen Bai.

In spite of the use of advanced processing technique, the wine/juice business is not easy, as evidenced by the demise of business operations, particularly the Bac Son Company. In another case, the Mu Cang Chai–based Protection Forest Management Board had to cease its sales of Son tra fruits to domestic wine factories because the market price of Son tra exceeded VND 7,000 /kg, a price at which, it would be unprofitable for Son tra wine production.

In general, the profit at farm level is driven by access to the main road. Villages with poor access suffer from low prices. In those areas, farmers can sometimes only sell large fruits, leaving the smaller ones rotting in the field.

Table 4- Estimated Cost and Gross Profits of Players in the Son tra Value Chain

No	PLAYERS	INPUT COST	SALES/KG	ESTIMATED GROSS PROFIT/KG	REMARKS
1	Farmers	Only labour cost incurred Estimated labour cost: VND 1,000/kg	VND 3,000 – 15,000; depending on harvesting time & quality of fruits (size basically)	VND 2,000 – 15,000; depending on sales price	
2	Collectors	Management cost for coordination; Spoilage cost: VND 1,000	Usually, VND 3,000 on top of purchase price	VND 2,000	Spoilage rate estimated at 10-15%, some of these are dried up for sales later
3	Traders	Management and financial costs; Transportation cost: on average: VND 1,000 – 2,000 /kg depending on the distance	Usually, VND 3,000 – 5,000 on top of the purchase price; pricing depends on balance between supply & demand, & competition	VND 2,000 – 4,000	
4	Wholesalers	Rental cost for the stalls at the centre market Management & financial cost	Usually, VND 2,000 – 4,000 on top of purchase price	VND 2,000 – 3,000	Difficult to work out rental cost per kg as wholesalers sell various products
5	Retailer at other markets	Rental cost for the stalls; Labour cost for sales woman	Usually, VND 5,000 on top of purchase price	VND 3,000	

3.9. Market demand for Son tra

From a market point of view, the main product of Son tra supply chain is fresh fruits, and to a much lesser extent, dried fruits. In practice, there are other products derived from Son tra, i.e. wine and juices. But these products have not yet secured a solid ground in the market, consequently reducing the demand for fresh Son tra[8].

The value of fresh harvested Son tra fruits stems from its practically proven health benefits. Specifically, Son tra is claimed to be good for heart and blood pressure control, improving metabolism, cholesterol management, and so on. Soaking Son tra in alcohol or in sugar water makes its taste more pleasant, but in essence, such consumption is ultimately for improving one's health. Besides the claim on health benefits, the demand for Son tra is expected to grow over the next years for various reasons:

- Increased purchasing power of the Vietnamese people because of sustained economic growth;
- Change in Vietnamese people's attitudes and awareness of health issues;
- Increasing presence of unhealthy foods with chemical substances, inciting consumers to switch to products from wild fruits like Son tra;
- Development of a flourishing food industry in search of local fruits, such as Son tra, to diversify their product portfolio; and
- Development of retail networks that enable the distribution of Son tra to larger markets in Vietnam.

The above arguments can be correlated with the consumption volume of Son tra over the last 10 years. Whereas the ethnic minority people found it very difficult to sell Son tra back in 2003 –2005, the fruits are easily sold these days. In Mu Cang Chai district of Yen Bai, the farm-gate price of Son tra soared from VND 5,000/kg in July to VND 15,000/kg at the end of August because of the shortage in supply, which usually happens towards the end of the season.

More value may be added to Son tra through extracting substances in a more consumer-friendly 'ready-to-use' form, so that no further processing is required by end consumers. This is already widely developed for herbal plants, including cardamom and cinnamon which can be consumed in either raw or powder/oleoresin form. The tea bag is another value-adding product that makes tea drinking more convenient by reducing the preparation work. However, strong presence of domestic bio-tech or food processing industry to process Son tra in different ways is a key consideration.

Besides health benefits, Son tra can potentially tap into Vietnam's growing wine market, if successfully made and marketed. The total demand for wine in Vietnam is now estimated at 54 million liter, of which only 13 million liters are produced by some domestic manufacturers, such as Lam Dong, Da Lat, and Thang Long[9]. The opportunity for utilizing huge volumes of Son tra to make wine thus exists. To illustrate, to produce 1 million liter of Son tra wine will require about 2,000 tons of fresh fruits. However, understanding market preference and marketing capacity is critical to make this happen. What is lacking is a wine manufacturer with strong commitment to develop a brand name for Son tra wine.

[8] Less than 100 tons by Bac Son, a local business in Son La

[9] http://doanhnhansaigon.vn/online/cam-nang/tu-hang-ganh-den-sieu-thi/2011/07/1055786/vang-ngoai-o-at-vao-viet-nam/

Similar to wine, branded juice drink is another product option for Son tra. The juice market offers an ocean of opportunities in Vietnam, despite strong competition of various businesses in different market segments. Again, the role of marketing in parallel with available technology that produces the products that match the market demand is primordial.

Besides wine and syrup, opportunities for developing higher value products are highly foreseeable based on the fact that end users, particularly in provincial areas could process the fruits into different products. Examples of processing techniques applied to medicinal herbs suggest that the substances in Son tra, which have positive effects on human health, may be extracted or distilled into forms more convenient for final use. These products could also be potentially applied in the making of various other products in different industries. The pathway for the development of Son tra products towards achieving increased value is shown in Figure 5 below.

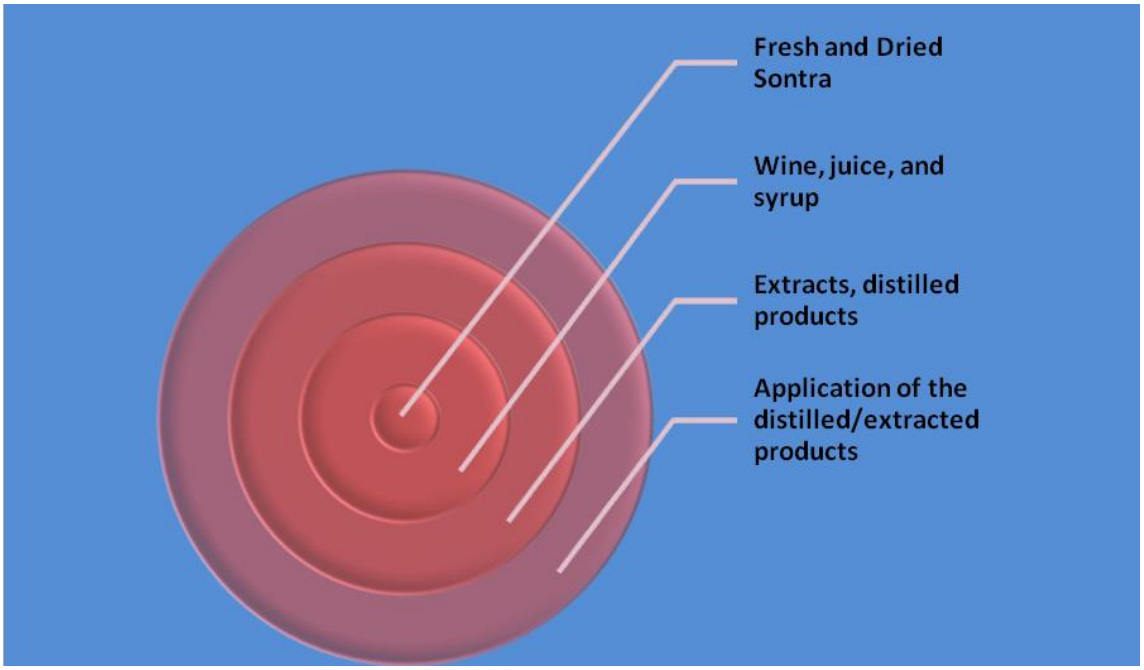


Figure 5: Development pathways of Son tra fruits

3.10. Son tra market projection

Market "projection" aims to estimate future values based on past and present trends, thanks to linear regression. "Predictions" take into account the maximum number of factors influencing the market to predict future data statistically. In the present case, given that available data covered only a period of 5 years (2007-2012), the projections could not be carried beyond 2018. For the longer term projections, a simple analysis of the mechanisms and factors influencing trends are proposed.

Short-term projection (2012-2018)

Production/supply: Using current area under Son tra plantation in the 3 producing provinces and estimated production per tree, the production over the last 5 years was calculated. From that production growth (34.7% over past 5 years), production growth for next 5 years (2013-2018) was estimated as follows:

- Scenario 1(maximum scenario): planting dynamics remain the same (2200 ha more): 18.7% growth (*High*)
- Scenario 2 (minimum scenario): planting stopped in 2011: 12.8% growth (*Low*)
- Scenario 3 (middle scenario): external support continues but at slower rate: 16.0% growth (*Medium*)

Demand: to estimate the growth of the demand, leading processors and Hanoi traders were surveyed. Based on sales over the last 5 years (growth rate of 41.4%), projections were made up to 2018. However, it was more complicated to analyze the demand trend in provincial markets (disparity of traders and lack of accurate data on a suitable time scale) and therefore the growth rate in the provinces was revised downwards.

- Scenario 4 (optimistic): 15.4 % growth (*High*)
- Scenario 5 (pessimistic): 11.8% growth (*Low*)
- Scenario 6 (average): 13.6% growth (*Medium*)

Models developed from different combinations of growth in supply and demand are shown in table 5 and figure 6. Whatever the scenario is, production remains lower than demand at least until 2017.

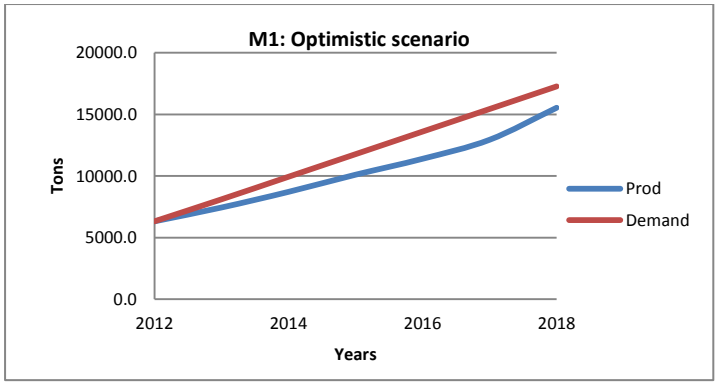
Table 5: Different supply and demand projection models

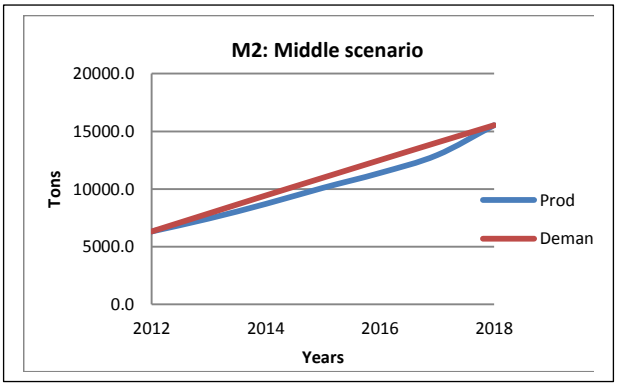
Model	Demand growth	Supply growth
M1	H	M
M2	M	M
M3	L	M
M4	H	L
M5	L	H

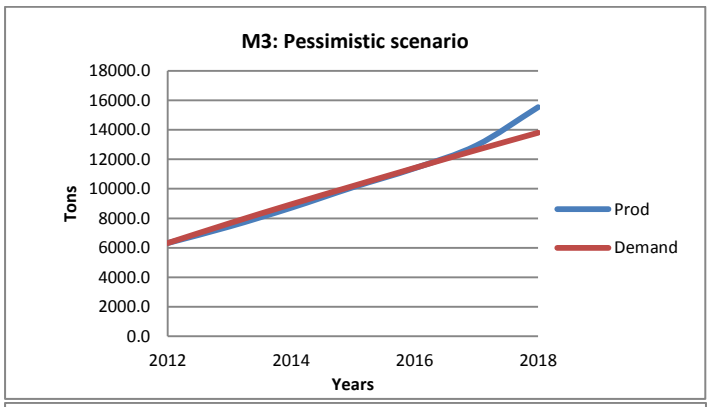
Long-term projection (>2018)

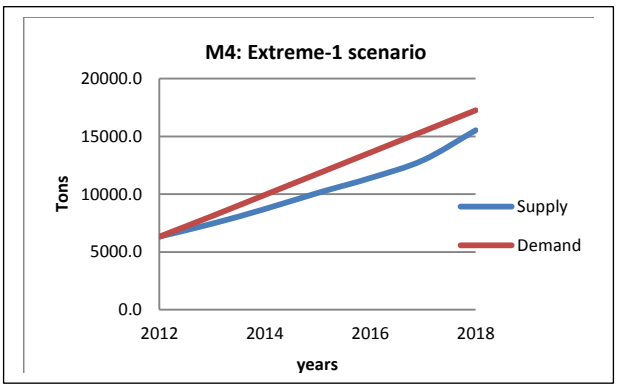
Analysis of mechanisms and factors influencing long-term trends in supply and demand for Son tra in Vietnam is summarized in table 6.

Indeed the demand is increasing and is expected to continue to grow in the future. However, the market expansion will necessarily require product development, promotion and improved communication about the product, otherwise it will be quickly saturated. Moreover if the demand continues to grow in the next few years, we may see new exchanges between provinces or even between China and Vietnam.









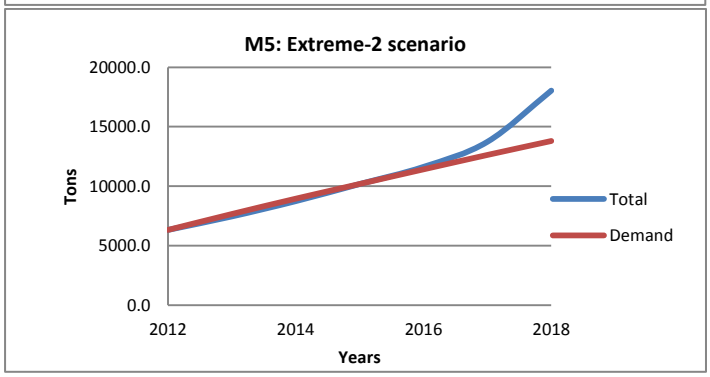


Figure 6: projections of supply and demand under different scenarii

Table 6: Factors influencing supply and demand of Son tra in long term

Variables	Factors influencing the market demand or the production	Current trend of the factor	Short term trend	Long term trend
Government project production	- Politic (government or project) - Transport price	↗ ↗	↗	→
Natural forest production	- Development of the production	↗	↗	↘
Individual production	- Available area - Selling price	↘ ↗	↗	↘
Provincial market in production area (Yen Bai, Son La, Dien Bien)	- Incomes - Price elasticity - Structuration of the MVC and transport	↗ Normal ↗	↗ → ↗↗	↗ → →
Hanoi market	- health concern - Price of other ingredients required for processing (sugar/ rice alcohol…)	↗ ?	↗ ↗↗	
provincial market outside production area	- product distribution	↗		

4. Summary and recommended interventions

4.1. Summary of Son tra supply chain in the three provinces

Even though Son tra's supply chain is still under-developed in many aspects, including product diversity, processing technology, production and harvesting, and resource management, the chain has been well established in terms of market demand which is satisfied by a distribution network with different levels of players that have wider reach in Vietnam. While strong demand for Son tra is an important development factor, the distribution network is definitely valuable in bringing Son tra from very remote mountainous areas to major market centers in Vietnam.

As a native species growing under natural forest conditions, and more recently as a reforestation species, supply of Son tra is characterized by a number of weaknesses that need to be strategically addressed associated with pressures from the demand side, including quality control of Son tra varieties, poor cultivation and harvesting techniques, and low yields. Upgrading the Son tra value chain should therefore necessarily focus on consolidating production, to contribute to the goal of sustainably developing tree-based income generation at the household level.

At the macro level, Son tra management needs to be intensified/ consolidated to create an environment conducive to production by smallholder farmers. Policies that support and stimulate farmers to produce better quality and higher yields are needed. These do not

imply the application of a supply-driven approach for the development of Son tra. The sale of Son tra has been pretty easy so far, thus, encouraging a demand-driven approach as an underlying principle may suffice. In addition, opportunities for improving market linkages still exist, especially for farmers. Initially, farmers need to be capable of marketing their products, to which marketing-related skills are fundamental. Producer groups, in collaboration with other players in the chain, should be encouraged for collective and niche marketing in order to enter the mainstream market.

Improving processing techniques is important, but challenging. Advanced processing techniques need to be identified and disseminated not separately but simultaneously with the implementation of other marketing activities, which include the study of products and consumers' behavior, market segmentation, and establishment of a commercial brand name. A necessary condition is the development of bio-tech business and commercial companies that are committed to developing different commercial methods to processing Son tra into high value products. This is unfortunately not satisfied in the current settings in all three provinces, and therefore should be a future focus.

In summary, the interventions are suggested to be approached in three stages:

- Stage 1: Improve production at household level and resource management at provincial/district level;
- Stage 2: Increase farmers' market capacity and organizing activities to capitalize on these skills;
- Stage 3: Depending on availability of resources, develop processing techniques in parallel with market activities to enable for market penetration of higher value products made from Son tra.

4.2. Detailed analysis of specific interventions

A detailed analysis of issues/ opportunities at various stages in the Son tra value chain is provided in the table below. The analysis is to point out potential interventions and the rationale behind them.

	CURRENT STATUS	ISSUES/ IMPACTS	Impact Extent			OPPORTUNITIES	PROPOSED SOLUTIONS/ INTERVENTIONS & REMARKS
			H	M	L		
I	**PRODUCTION**						
1	Planting material: • Self-supply • Large fruit for sales leaving small fruits left for provision of seedlings • Provided by the government for reforestation purposes and not for fruit production • No professional nursery • Mentality to wait for government support	• Supply of planting material is not controlled leading to low productivity • Demand for seedlings not satisfied in terms of quantity • Low quality fruits				Increase productivity through improvement of Son tra planting material	**Farmers** • **Develop system for supply of good quality material, i.e. varieties suitable to market needs – identification of varieties, support for establishment of nurseries, creating market/ mechanisms to facilitate farmers' access to varieties;** • **Provide farmers with training on production/harvesting techniques. This can be done through private development service providers, governmental functional agencies, national programs, and support by other NGOs (if any)** **Resource Management** • **Implement relevant measures to support expansion of resource area. For instance, reforestation**
2	Plantation area: • Forest area assigned to households • Community-managed forest • Long distance to national highway Available data from Yen Bai, no solid data from Son La and Dien Bien	Limited cultivation activity Premature harvesting Difficult transportation				Opportunity for expansion of plantation area	
3	Cultivation • Farmers have insufficient knowledge and skills on cultivation of Son tra • Mainly weeding and harvesting • Fertilizer, pruning, and other tree management practices not applied • Pests reported, but no solutions • Lack of understanding of fertilizer's effect • Limited financial resources	Low yield Low/ inconsistent quality of harvested fruits				Provision of training on production techniques to increase farmers' knowledge and skills	
4	Harvesting • Simple techniques: manual picking by climbing, cutting down the whole branch, shaking so that the fruits fall on the ground • Harvesting before the fruits become fully ripe	• Spoiled fruits • Low economic value, discouraging households to invest • Unsustainable exploitation				Design and production of harvesting tools to improve productivity and harvested fruits' quality	

							management board is supplied with right varieties, and leveraged somehow (in terms of resource) to give farmers technical assistance for cultivation in addition to the planting material
II	**PROCESSING ACTIVITY**						
5	**End-consumers (households)** – traditional processing: • Simple processing of fresh fruits • Soaking in alcohol/ syrup for drinks	Consumers have to do some additional processing, cannot consume the fruit straight away				Production of extracted/ pressed Son tra for straight use of valued elements without the need for processing	• **Conduct research and development to derive extracted/pressed products of Son tra to enable users' immediate consumption upon purchase without the need for traditional processing (to create added value)** • **Support improvement in drying/ preservation techniques** • **Facilitate market penetration by industrial processors (if any) through promotion of technology and associated economic feasibility assessment**
6	**Farmers/distributors:** • Only drying in the sun • Spoiled fruits are dried to facilitate sales • Fungus on dried fruits • No universal instructions/guidelines/ practices for drying	Short storage time Dried fruits may suffer from fungus Inconsistent quality of fruits				Improve drying technique	
7	**Industrial processors:** • 2 main products so far: Son tra wine and juice; • Only one business, Bac Sơn in Son la, manufacturing wine at 30.000 litres /year • Complicated technology required for wine making – assisted by a Research Organization specialized in food processing technology • Proposals for making Son tra juice by MARD	Low share of Son tra production is used for making high value product; No competition between processors – no significant impact on farmers				Give info about processing technology to potential investors; Policies to enable businesses to make investment	
III	**DISTRIBUTION OF INCOME BETWEEN PLAYERS**						

8	**Farmers' income**: VND 2-15,000/kg; Net profit: the above minus VND 1-2000 /kg for weeding – the only cost						**Not much can be practically carried out here since the income distribution is pretty fair reflecting participants' contributions to the value chain**
9	**Collectors' income:** VND 3-4,000/kg						
10	**Traders' income (driven by transportation distance)** • Traders' sales price: VND 3 – 4,000/kg added on the top of input cost; For instance, income of retailers at Son La 10-20 tons x VND 2million = VND20-40m/year • Transportation cost: on average VND 100K/ bag of 50-70kg – less than VND 1,000/ kg						
	LINKAGE BETWEEN COMPONENTS IN THE CHAIN						
	Structure of distribution system: Levels: farmers, collectors, traders at different levels - at district, transportation of Son tra by bus, retailing at central market places High number of collectors and trades Industrial processors: one player in Son La	Competition between buyers ensuring that farmers are not disadvantaged; Son tra is brought to locations far away from the production sites				Multi-level distribution system pushes up the cost. Possibility for intervention to shorten distribution channel. Channel to supermarkets not yet established	**Support for bringing Son tra to super markets, promote high quality – understand super market's needs and develop actions to satisfy these needs**
	Roles of collectors in the linkage: • Collecting sufficient volume to reduce transportation cost • Coordination: ensure requested timing, manage financing for the deal, info processing **Roles of traders and retailers in the linkage:** • Distributing to end consumers at locations across the country • Financing for resource inventory **Roles of farmers in the linkage:** • In charge of production only • Many farmers relying on local collectors for sales • Limited market skills/ info	Low income to farmers because they are not in a position to sell directly to traders – no skills for doing so				Opportunity for farmers to enhance income through collective sales/business actions	• **Farmers may be empowered to take on the roles of collectors to realize more benefits. But training on marketing is required upfront** • **At this stage collective action of farmers in sales transaction will be promoted**
	Model of linkage between farmers and businesses does not exist so far						

	REQUIREMENTS ON PRODUCTS & COMPLIANCE						
	Products • Fruits are sorted by size: small, medium, and large, • Mature fruits are preferred for alcohol soaking • No requirement on packaging	Harvesting before fruits are fully ripe realizes low economic value		■		Techniques to control for fruit size by vegetative propagation exist & respect of harvesting time ensures fully mature fruits	• **Promote application of general set of production techniques – could be instructions/guidelines** • **Other activities related to farmer training and collective action are suggested above**
	Distribution: • Being end product, extensive network for distribution is required • No specific standards on quality of output products	High distribution cost; Challenge to improve product quality			■	Improve distribution system; Promote application of universal quality management	
	Requirements to farmers • Finance: VND 5m investment per ha or no financing needed for self-supply of varieties • Understanding of plantation and harvesting techniques • Access to market information	Difficulties as to varieties and market information result in negative impacts on sales of Son tra				Most households living in high mountains are well positioned to develop the plantation (if supply of varieties & other technical requirements are met)	
	Requirements to collectors • Ability to coordinate • Access to market information	Collectors may abuse weak position of farmers in negotiation		■	■	Opportunity for farmers to conduct collective actions	
	Requirements to traders • Business outlet be located at places convenient for transportation, for instance, locations by road where buses are passing • Access to financial capital	Difficult for farmers to take up the roles of traders due to long distance from villages to main roads			■	Establishment of trading business, e.g cooperative based at the district or near a commercial centre	
	Requirements to industrial processors • Master processing technology • Adequate financial capacity – The wine making production line of Bac Son enterprise in Son La worth VND 5-7 b • Strong marketing capacity to compete in a market with perfect competition	Difficult to develop an industry that processes Son tra into high value products			■	No opportunity established unless a leading business is identified	
	ENABLING POLICIES & SERVICE DEVELOPMENT PROVIDERS						
	• Limited extension service for the Son tra	Farmers' limited production	■			Policy improvement	**Integration of Son tra**

	• Provincial policies: ○ Mainly in the framework of reforestation program ○ Support for development of Son tra resource ○ Incomplete data on area under Son tra and quantities produced for Sơn La and Điện Biên ○ Lack of overall policy for the development of Son tra	capacity - low quality/ yield; Plantation goal is focused on reforestation, not realization of economic value; Risk of imbalanced demand and supply; Low attraction to invest in Son tra processing facilities					**development objective into extension activity and district's economic & social development plan;** **Inform decision makers on appropriate policies for development of the resource based on demand and supply;** **Cooperate with the MARD in dissemination of technologies and information or in R&D**
	Some proposals made by the MARD for R&D on technology to preserve and process Son tra					Develop knowledge of industrial processing	

4.3. Proposed interventions

The following are factors that need to be considered in developing interventions to upgrade the Son tra value chain:

i) Focus on production, which is still embryonic at the household level.
ii) Activities related to improvement of planting material, for example the creation of high-quality, high-yielding varieties, are extremely important because they drive productivity and the realization of economic benefits. These activities are being carried out in another component of the AFLI project (objective 2). Nevertheless, outcomes of specifically identified varieties will not be available before at least two-three years' time.
iii) The channel to bring Son tra to more differentiated markets through super markets is to be established.
iv) Limited resources of the project will allow for only few actions to be carried out.

Given the above, implementation of selected **pilot** action(s) is strongly recommended. As a result of a group discussion with those that will be involved in the implementation of interventions, the following priority activities have been proposed:

	ACTIVITIES GROUP	IMPLEMENTATION TEAM	RATIONALE
(1)	• Identify one pilot group of Son tra producers • Provide a full package of support for this pilot group of producers • The support package covers: production techniques and training; drying techniques & dryers[10], and marketing assistance • Other activities may be supplemented later to respond to emerging reality on the ground	Consultant will work closely with Yen Bai team in cooperation with ICRAF obj. coordinator	Production of Son tra in professional way has been revealed from analysis as a priority issue in long term Implementation of this activity requires involvement of people at village & district level. Networking at local level is therefore critical. The Yen Bai team appears having access and comfortably connected to local villages, and so greatly facilitate entry; There is no major concern of Yen Bai's capacity as well. In contrast with Yen Bai, linkage of Son La team to local partners at district and village level is believed not strong enough, which is a major concern
(2)	Piloting actions to bring Son	Son La –	Son tra has been distributed

[10] It is practically not effective for farmer to replicate / apply if demonstration of drying technique is not associated with a real dryer

	ACTIVITIES GROUP	IMPLEMENTATION TEAM	RATIONALE
	tra to super markets in Hanoi Diagnosis trip to target supermarkets needs to be made to test market's responses to Son tra and also to understand what else specifically is needed for the fruits to be eligible on the shelves of supermarkets Further actions are to be decided after the diagnosis	Consultant will work closely with TBU team in cooperation with ICRAF obj. coordinator	as a commodity, but through normal market places. The acceptance of the fruit into supermarkets is evidence recognizing the possibility to generate high value by differentiating in certain ways. Mr. Binh from Son La is an academic lecturer of the North West University specialized in market analysis and development.
(3)	Research on nutritional components of Son tra and its positive effect on human health, and other values (if any). Development of value-added products that can be produced by local farmer. Research on technologies to extract/ press out the active substances to enable straight use without additional processing by the end consumers, enhancing the product's value. These technologies are to be highly commercialized (These activities cannot be implemented during the project cycle since they need the involvement of the private sector) Disseminate the recommended technologies to target businesses to attract investment	Working in cooperation with National Institute for Medicinal Materials	A potential opportunity to enhance Son tra value is to cut down the traditional processing after the purchase so that buyers can use its valuable components straight away. Simple technologies that are easily commercialized are needed support the development of the processing