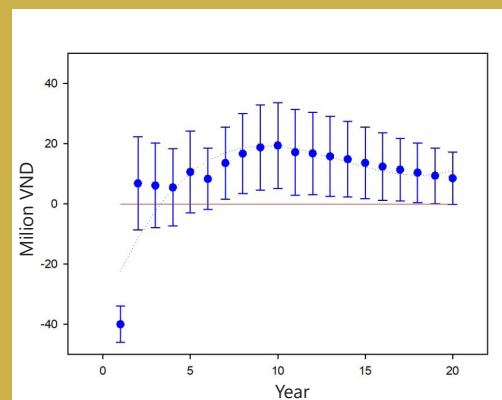
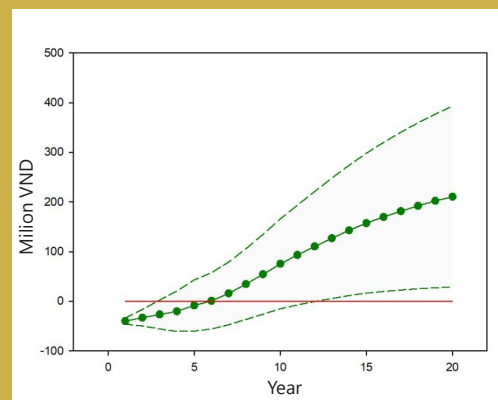


## ECONOMIC EFFICIENCY

Total investment cost of the agroforestry option is 35 million VND per ha (containing materials and labor cost) and the agroforestry option could pay back of the loan/credit to farmers from the 5<sup>th</sup> year to 6<sup>th</sup> year. The first 5-years of data have been used for simulations up to 20 years based on different scenarios. The results have showed that this agroforestry option is possible to bring average profit approximate 17 million VND per ha per year (from Shan tea and grass) in the 7<sup>th</sup> to 10<sup>th</sup> year, and 13 million from the 11<sup>th</sup>-20<sup>th</sup> year (from Shan tea).



*A profit simulation of the agroforestry option over 20 years*



*A cumulative profit simulation of the agroforestry option over 20 years*

## REFERENCE

- Decision 208/QĐ-SNN: Technical process promulgation of planting high tea trees in Dien Bien province (Ban hành quy trình kỹ thuật trồng chè cây cao trên địa bàn tỉnh Điện Biên). 2013. Dien Bien DARD.

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RESEARCH  
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## PESTS AND DISEASES PREVENTION

Shan tea in the Northwest normally do not suffer from many pests and diseases. To prevent, need to do proper pruning and management techniques such as periodically weeds, grubbing soil and hilling up the tree.

## HARVESTING

### 1. FORAGE GRASS

- The forage grass (mulato or guinea) can be harvested from three months after planting. When grass reaches 60-70 cm in height, the harvest is implemented by cutting the upper part of the grass leaving only about 10 cm length of the grass stems from the ground. Grass yield in this agroforestry option reaches the highest in the second and third year, up to 25 tons/ha /year. In Northwest, grass can be harvested once every 30 days in the rainy season and 45 days in the dry season. Harvesting frequency depends on the number of cattle of each household, however, it is recommended to avoid late harvesting to minimize loss of nutrients in stem and leaves after the grass has flowered. Grass yield can reduce gently from the fifth year. So that, replanting after five year and stop planting from the 9<sup>th</sup> year to manage Shan tea.

### 2. SHAN TEA

- Harvesting Shan tea could begin from the 5<sup>th</sup> year when there are about 30% of buds qualified. Only the upper leaf bud and the next two leaves, the youngest ones of a sprout ('two leaves and a bud') are collected. Picking one batch per 10-15 days. Each picking batch is suitable to demand of processing factory.
- In Spring season, from March-April, pick the bud + two leaves, keep two normal leaves + fish leaf, then pruning to create a flat canopy.
- In Summer-Autumn season, from May to August, take the bud + 2 leaves, keep one normal leaf + fish leaf.
- Late season from September to October, pick all the blind shoot and fish leaf.



1. Spring season harvesting

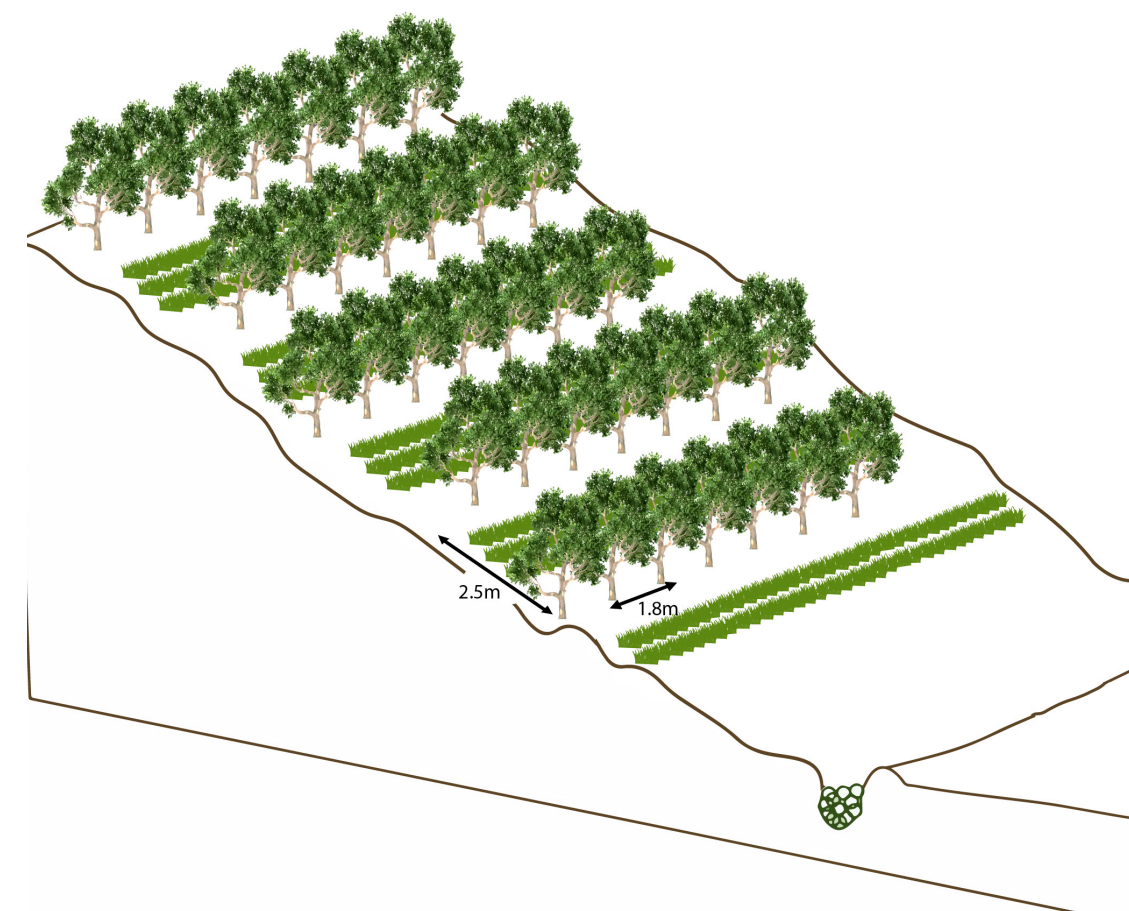


2. Summer-Autumn season harvesting



3. Late season harvesting

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AGROFORESTRY TECHNICAL MANUAL



## OPTION: SHAN TEA - FORAGE GRASS

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## INTRODUCTION

Shan tea (*Camellia sinensis* var Shan) is woody species, broadleaved, with elongate dentate leaves, with the upper leaves sharply pointed, leaf surface rough and wavy. It adapts well to a range of temperature from 18-25°C, moist is about 75-80%, annual rainfall varies 1,500-2000 mm. It requires soil that is rich in organic matter, deep, well drained, and acidic, with a range of pH 4.5 - 5.5.

In Vietnam, Shan tea is found naturally in high mountains (called Shan Tuyet tea). The mountainous region that contains many ancient tea trees is Ha Giang and neighboring provinces such Yen Bai, Lao Cai, Lai Chau, Dien Bien and Son La. In natural conditions, Shan tea can grow into a tree up to tens of meters high and hundreds of centimeters in diameter, with a large emergent canopy. Its branches are strong and grow quickly. Shan tea has long life cycle, up to hundreds of years (Northern Vietnam). It is a pure tea and provides high quality flavor, and could bring a great value if grown and processed correctly. Shan tea is a multipurpose tree (agriculture, forest tree and for pharmaceutical purpose). Producing Shan tea as a special tea is very suitable for sustainable agriculture, convenient for intellectual, economic, social condition and cultivation practices of ethnic minorities.

Shan tea grows slowly, usually is harvested after five years of planting. Thus, to compensate for farmers in some first years, there is a need to introduce some crops or trees that can bring earlier income.

## DESIGN

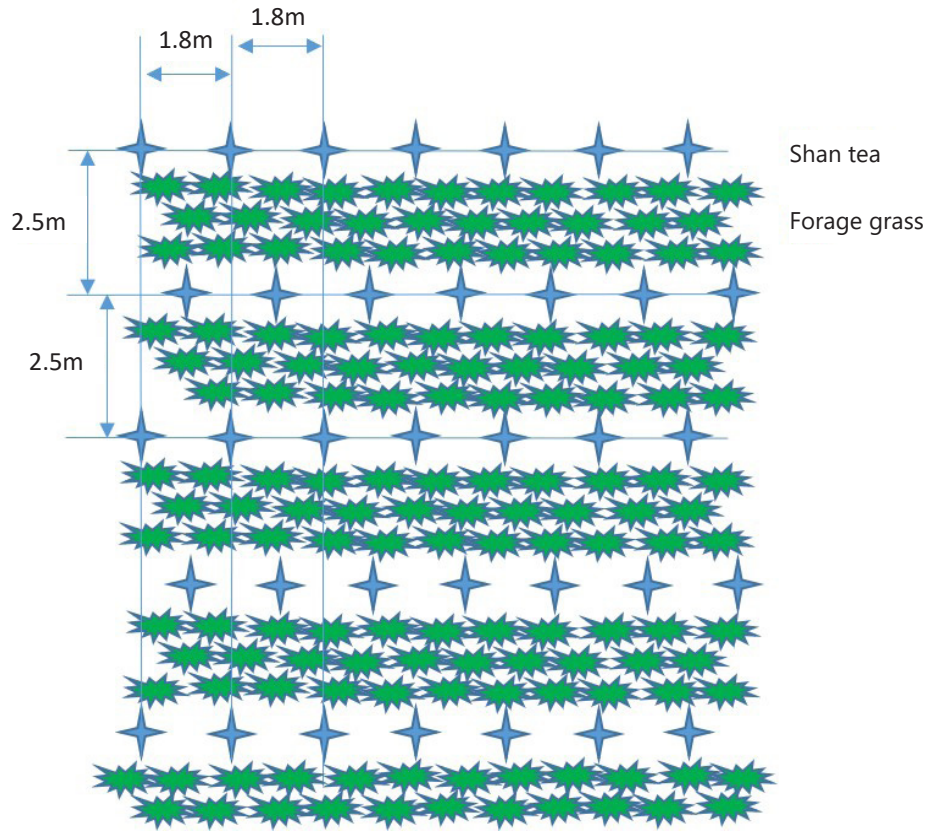
The agroforestry option of Shan tea and forage grass is designed to provide early income from grass for feeding livestock while Shan tea has not yet produced. Furthermore, grass in the agroforestry option can quickly provide a physical barrier to prevent erosion on sloping land.

Shan tea and grass are planted on the contour line to be more efficient in soil erosion prevention. Tea row spacing is 2.5 m and distance between tea tree is 1.8 m (tree density is 2.240 tree per ha).

Between two rows of Shan tea are three rows of forage grass, in which, distance from the first/last grass row are 65 cm to the tea row. Spacing distance of grass rows is 60 cm x 60 cm (about 2.5 tons of grass/ha). Grass could be grown by seed, however, to reach a high performance, it should be sown as rice then plant on field as designed above.



*Shan tea in Tram Tau district, Yen Bai province*



*Distance and layout of trees and crops in Shan tea - Forage grass option*

## PLANTING TECHNIQUES AND FERTILIZING (1)

### 1. SHAN TEA

Planting hole: The size of a hole is 40 cm x 40 cm x 40 cm.

Basal fertilizer application: Apply 2.5-3 kg manure, 0.15-0.18 kg Superphosphate, 0.5 kg Microbial fertilizer per hole before planting 30 days and cover the hole by soil.

Top dressing fertilizer application:

- When the tree is young, apply twice per year in March-April and November-December accompanied weeding, grubbing and keeping the tea base moist. The first year: 27 kg of Urea + 27 kg Potassium chloride per ha; the second year: 34 kg Urea + 67 kg Superphosphate + 31 kg Potassium chloride per ha; the third year: 40 kg Urea + 100 kg Superphosphate + 34 kg Potassium chloride per ha.
- Harvest years: Do weeding, grubbing and hilling up the tree three times per year in March-April, June-July and October-November. Additionally apply Microbial fertilizer once after three years in amount of 2 kg per tree for best growth and development.



*Shan tea - Forage grass option in Tua Chua district, Dien Bien province*

## PLANTING TECHNIQUES AND FERTILIZING (1)

### 2. FORAGE GRASS

- Dig a grassy trench 20-25 cm deep on the contour lines, which is below Shan tea rows. The forage grass grow very fast, it therefore will be prevented the nutrients and fertilizers run following along the slope.
- The forage grass can utilize nutrients and fertilizers from runoff; it is unnecessary to apply fertilizer for grass.

## PRUNNING AND CANOPY FORMATION

- The 1<sup>st</sup> time: When the tree reaches to 1.2-1.5 m height, cutting the top of main branch at the height of 0.9-1 m.
- The 2<sup>nd</sup> time: After planting two years and a half to three years, cut off main branch at the height of 0.9-1 m.
- Harvest years: After harvesting season in November-December, cut off main branch at the height of 1 m.