

# **“The effectiveness of vetiver grass hedgerows for soil and water conservation on the highland of northern Thailand”**

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## **Abstracts :**

During 2002-2004 The Technical section Office of Land Development Region 6, Land Development Department in collaboration with Royal Project Foundation have launched the research project in the title of The efficiency and effectiveness of vetiver strip to other soil conservation methods on the highland. The project aims to ; 1) study of efficiency of difference soil and water conservation measured on the soil erosion control, 2) study on soil moisture on vetiver hedgerows compared with the other methods and 3) evaluated an economic return from the treatments tested. The experimental design was RCBD (Randomised Complete Block Design) with 3 replications and 5 treatments. The treatments were as fallow., 1)farmers' practice, 2) cropping in between hill side-ditch, 3) cropping between vetiver hedgerows, 4) cropping between an integrated of vetiver hedgerows and hill side-ditch and 5) alley cropping with leuceana and pegion pea hedgerows. The results showed that all four soil conservation treatments provided cabbage yield higher than that of farmer plot. The highest yield was 7.3 ton/rai from hill-sidtch treatment, compared to farmer practice obtain 6.3 ton/rai. Soil and water conservation treatments also provided effective control measure. Soil-loss was only 0.8 ton/rai from SWC treatments compared to 2.8 ton/rai from farmer practice plot. The benefit of SWC treatments also provide more soil moisture content compared to control plot. Vetiver grass hedgerows across the slope can obtained soil moisture down throught the roots profile more than no soil conservation treatment.

## **Introduction :**

The effective of soil and water conservation measures is mean not only reduce soil erosion but also provide more soil moisture conservation cropping system on the sloping lands area. Especially the drought periods the condition during rainy season. Vetiver hedgerows for soil and water conservation is more widly adapted on sloping land of northern Thailand. The comparision of vetiver hedgerows with any soil and water conservation methods are necessary to investigated to find an appropriate methods on the sloping lands.

The objectives of this study is to compared the effective of vetiver hedgerows for erosion control, moistured conservation, crop yield and economic return with the other methods and the farmer practices

## **Research Plan :**

Randomize complete block design with five treatments and three replications were undertaken on farmer field at Baukjan village, Sameang District, Chiagmai province in northern Thailand. Vetiver grass hedgerows treatment (V) compared with hill-side ditch (H) an in-tregrated vetiver grass hedges and hill-side ditch (I), alley cropping (A) and farmers practices(F).

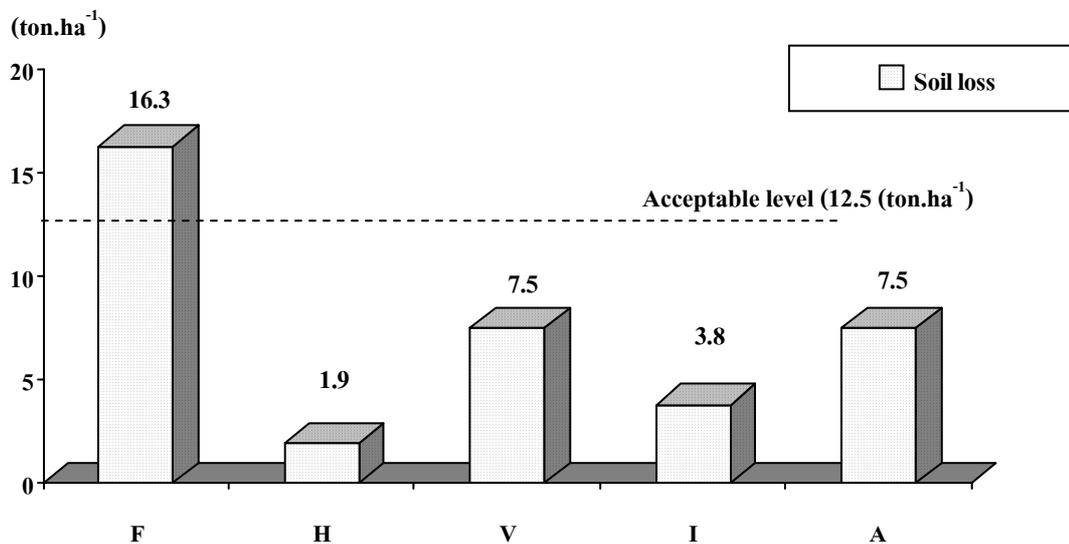
### Data Collection:

Accumulation of soil moisture measured by Neutron probe at 0-30, 30-90 and 90-180 cm. Soil sediment were collect and measure at the end of rainy season to evaluated the effectiveness of erosion control. Crop yield economic return and B/C ration are also collected.

### Results and Discussion :

#### Soil Erosion Control

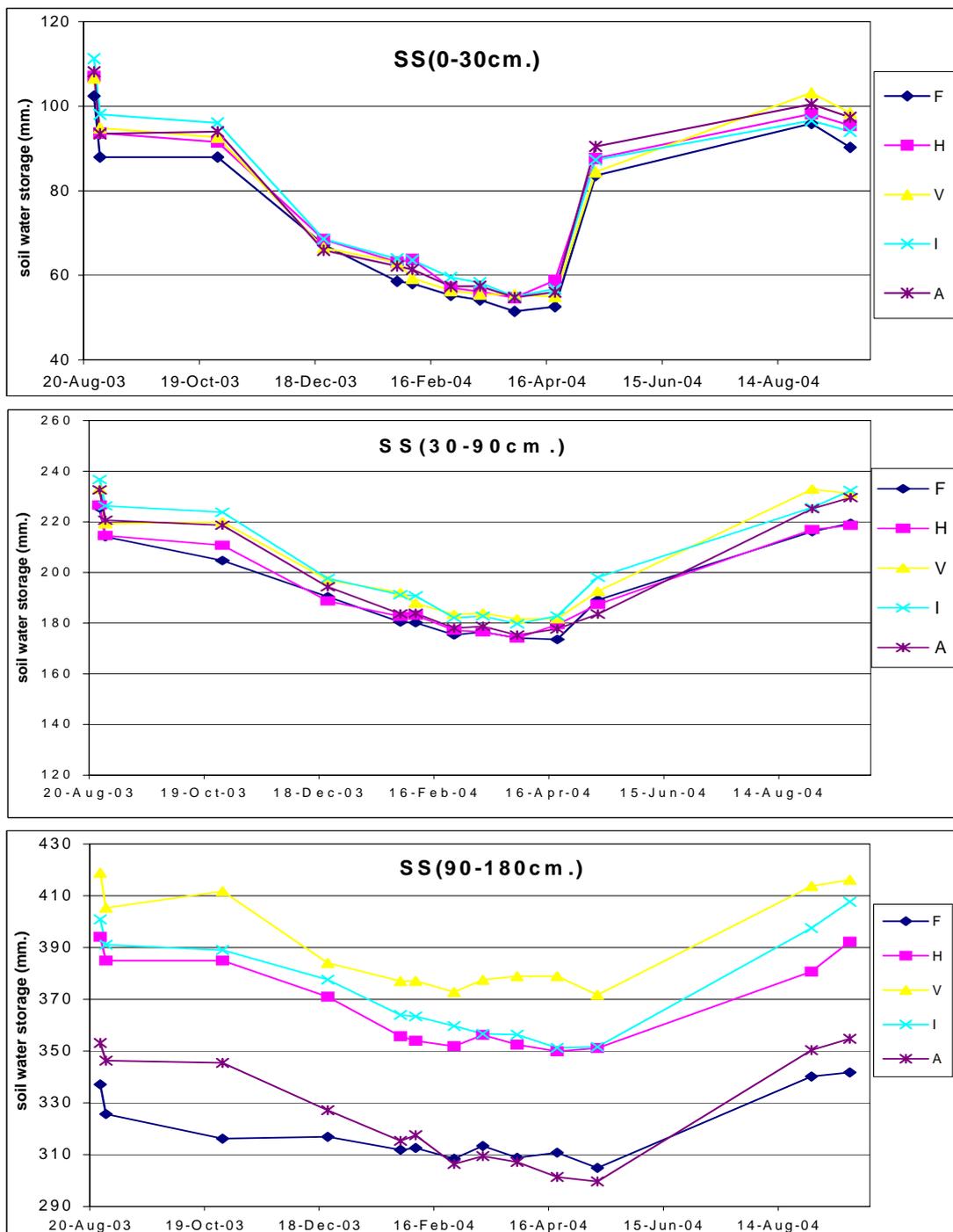
The results showed that, farmers practice treatment (F) obtained the highest soil loss with an average of  $16.3 \text{ ton.ha}^{-1}$ , where, the vetiver grass hedgerows (V) have only 40% of farmers practice treatment (Figure 1). The others soil conservation treatments also provided very effective erosion control gave soil loss significantly lower than farmers practice treatments.



**Figure 1:** Average soil loss ( $\text{ton.ha}^{-1}$ ) from different treatments during 2002-2004  
 F = Farmers practice, H = Hill side-ditch, V = Vetiver grass hedgerows  
 I = Integrated vetiver grass hedgerows/hill-side-ditch, A = Alley cropping

#### Accumulation Moisture Conservation

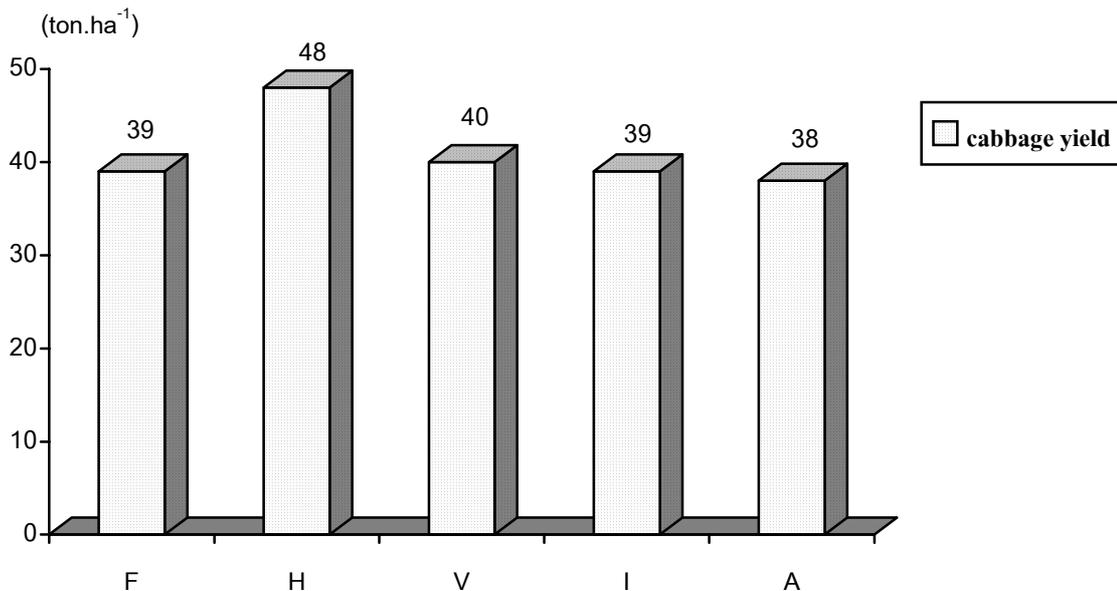
Accumulation of storage of soil moisture by neutron probe technique was measure at the 0-30, 30-90 and 90-180 cm. It was found that, there were not different soil moisture between the treatments during the rainy season 0-30 and 30-90 cm. during dry season (January to March, 2003). It was found that the vetiver hedgerows plot obtained more soil moisture at 90-180 cm than farmers practices plot (Figure 2). This indicated that, vetiver hedgerows can slow down run-off water and infiltrate through the root profile to deep sub-soil and accumulated more than farmers' practice plot.



**Figure 2:** Comparison of accumulation soil moisture from different treatments for cropping season 2002-2003.

### Cabbage Yield

Cabbage was planted as the indicator crop during 2002-2004. An average yield indicated that, soil and water conservation measures in each treatment obtained more cabbage yield than that farmers practice treatments (Figure 3). The soil and water conservation measures especially vetiver grass hedges gave higher yield than farmers practices treatments, due to obtained more, soil moisture accumulated through deep soil profile and also reduce large amount of soil erosion.



**Figure 3:** An average cabbage yield for 2002-2004.

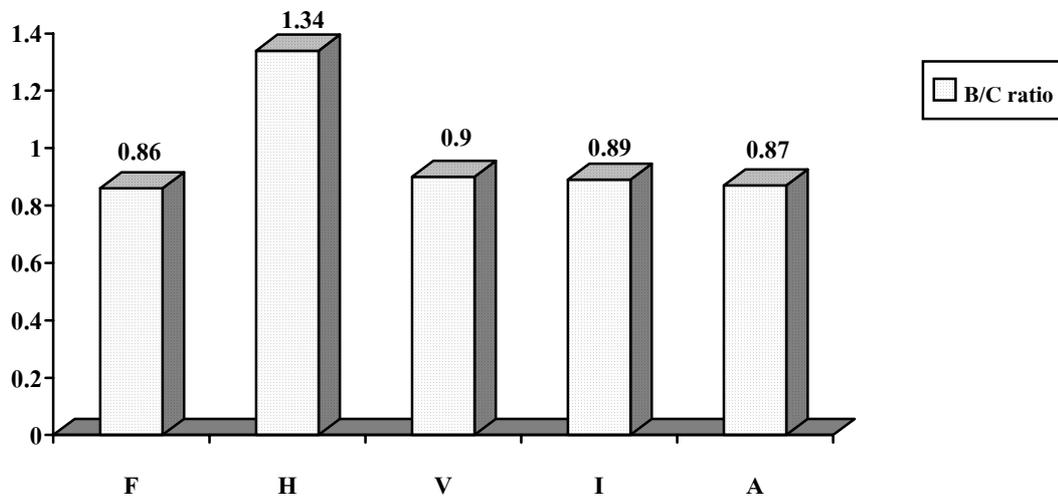
F = Farmerspractice, H = Hill side-ditch, V = Vetiver grass hedgerows

I = Integrated vetiver grass hedgerows/hill-side-ditch

A = Alley cropping

### Economic Return

An average three year economic return is showed that, soil conservation treatments provide more economic return  $3,442 \text{ US}\$.ha^{-1}$ , while farmer practice treatments obtain economic return only 60 percent of those conservation treatments. Benefit cost ratio showed the similar results of economic return (Figure 4)



**Figure 4:** An average benefit cost ration from different treatments for 2000 - 2004  
 F = Farmerspractice, H = Hill side-ditch, V = Vetiver grass hedgerows  
 I = Integrated vetiver grass hedgerows/hill-side-ditch  
 A = Alley cropping

### Conclusion

The results showed that vetiver hedgerows for soil and water conservation provide effective erosion control. Soil erosion from vetiver grass treatment was reduced by 54% compared to farmers' practice treatment. Vetiver hedgerows treatments not only provide more cabbage yield, and benefit cost ratio than farmer plot, but also obtained accumulation of soil moisture down through the roots profile more than no soil conservation treatment.

To convince sloping lands farmer adopted vetiver grass technologies required an intensive training course, and farmer participation in the program. From the case study, we have learned that a participatory approach in transferring vetiver grass technologies to target farmers in remote areas is productive and efficient. Regular meetings, cross-site visits, and the training of lead farmers are effective for empowering farmers. Research and extension linkages are essential for development and have to be improved, especially at the national level where partner agencies have different mandates. The extension program should be integrated among agencies at the grass roots level. Activities for the research and extension linkage program should be conducted in a participatory manner, involving regular meetings for decision making, and a monitoring program should be implemented. Collaboration between and among diversified groups of stakeholders needs to be strengthened to ensure that the project suits the real circumstances and meets farmers' needs, interests, values, and preferences.

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