BoA

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INTEGRATED FOOD SECURITY PROGRAMME

SOUTH GONDER - REGION 3

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Status report on the use of Vetiver Grass for soil and water conservation by GTZ IFSP South Gonder, Ethiopia

Introduction

GTZ IFSP is a project working on food security in six Woredas (local districts) of the South Gonder zone, Amhara region, Ethiopia. The project is situated 660 km north east of Addis Ababa, the capital of Ethiopia. The project area has an altitude range of 1500 - 3,600 m.a.s.l. The average yearly rainfall ranges from 700-mm -1300 mm. Cambisols, regosols, lithosols, and andosols are the predominant soil types, and the average daily temperature is 17^{o}c. South Gondar Zone with its 10 Woredas covers a total area of 14 320 square km of which the 6 GTZ IFSP intervention Woredas comprise about 9 150 square km.

It is estimated that the annual rate of soil loss in the region due to water erosion is about 119 million tons, which amounts to 70 % of the total soil loss in the country as a whole. This has already resulted in a reduction in agricultural productivity of 2-3 % p.a., taken a considerable area of arable land out of production, and increased pressure on the remaining land. The situation is exacerbated because more and more marginal land is being cultivated, more often than not on very steep slopes. Consequently grazing land is becoming scarce, and what remains is thereby exposed to extreme grazing pressure. Water bodies are prone to rapid sedimentation, thus reducing the storage capacity of irrigation and drinking water, and hindering the generation of hydroelectric power.

The Ethiopian government and NGOs have for the past thirty years made great efforts in tackling the problem of soil loss with the use of physical structures. Structures such as stone bunds, soil bunds, and fanya juu have been employed in an effort to conserve soil and water on farmland, and hillside terraces constructed on degraded land.

Despite the fact that this form of soil conservation has not proved popular with farmers due to the fact that it offers no immediate benefits, experts have persisted in the deployment of physical structures. Farmers often assist in the building of these structures so as to get the benefit of FfW (Food for Work) or CfW (Cash for Work), only to neglect or even to destroy them afterwards. A structure erected more than five years ago is difficult to find anywhere in the region. The erection and subsequent destruction of physical soil conservation structures, however, continues unabated. There is abundant evidence that farmers participate in the erection of physical soil conservation structures on their land merely to gain short-term benefits in the form of FfW or CfW, and not because they expect to gain any long-term benefit from these activities.

Reasons for the resistance by farmers to the erection of physical soil conservation structures include the following:

- A considerable amount of arable land is “consumed” by these structures (between 10 and 20% depending on slope) and no corresponding yield increment is attained. Instead, farmers estimate a corresponding 10 - 20% yield reduction as a direct effect of the decrease in arable farmland.
- Physical structures harbor rodents that result in yield losses estimated to be up to 25% of the standing crop.
- Labor and maintenance requirements are high, often beyond the capabilities of farmers without great sacrifice in terms of their normal agricultural activities.
- Physical structures do not augment or regulate the natural drainage system. It therefore requires the willingness of all farmers that cultivate within a micro watershed area to direct surplus water into pre-constructed waterways. This cooperation is seldom attained. Watershed stabilization campaigns that do not consider the human element and the cooperation of farmers who cultivate the land in question have very little chance of long-term success. In many cases farmers from outside the micro-watershed area in question are employed in the construction of the structures in exchange for FfW or CfW, in which case lack of cooperation is a foregone conclusion.
- Physical structures hinder ploughing operations.

After taking all of the above into consideration, and some project staff having had positive exposure and experience with Vetiver , GTZ IFSP decided at its inception in 1996 to test the vetiver hedge technology as an alternative to physical structures on farmland for the purpose of soil and water conservation.

The introduction of Vetiver grass

Vetiver grass was found growing in most forestry nurseries in the region. Excepting for a few attempts to utilize it in farmland however, it was left neglected in Office of Agriculture nurseries.

It was ascertained that vetiver planting-material was brought to the region from the Menschen fuer Menschen project in Ilubabor by the Amhara Development Association (ADA), and distributed to Office of Agriculture (OoA) nurseries. The planting material was planted in the nurseries and left to grow without irrigation in the dry season, where it remained for the following five years. The vetiver nevertheless grew vigorously, with an excellent tillering rate. There was, therefore, every reason to believe that vetiver would perform well in the region.

Disappointing results had, however, been attained in two field trials, one in a high- rainfall area of the region, and another in a low-rainfall area. It was reported that in the high-rainfall area vetiver failed to conserve soil. The survival rate in the low-rainfall area was reported to be discouraging.

Upon further investigation made by project experts, it was discovered that the problems were of a technical nature. Incorrect timing and spacing of plants was found to be wanting, and propagation techniques left a lot to be desired.

It thereby became apparent to the project that it was necessary to determine the range of adaptability, to test different propagation and hedge establishment techniques, and to develop guidelines for these activities.

Vetiver hedges for soil and water conservation

The first attempts by the project to introduce vetiver hedgerows on arable land in four woredas in the region were made by using bare-rooted plant material.

The survival rate in these initial trials were also not very encouraging. Between-plant spacing was too wide, and there were dry spells of more than three days directly after planting. It was concluded that the utilization of bare-rooted plant material was at least partly to blame for the poor performance. There were similar results in each of the trials.

In later trials, using tillers that had been grown in 12cm leaf-lay transparent polythene tubes, a 90% survival rate was attained in the field. However, the production cost per tiller was high due to the low tillering rate achieved in polythene tubes with the above dimensions.

The methods of plant multiplication described in the paragraphs under the heading "Propagation Techniques" was finally settled on, and this resulted in a considerable cost reduction, as well as an excellent eventual survival rate.

Furthermore, farmers are continually trained in methods that allow for the further multiplication of vetiver by utilizing the plant material that is established in their fields. This ensures continuity and the long-term sustainability of the intervention after the phasing out of the project. It is pleasing to note that this strategy has already begun to pay dividends.

Vetiver adaptability

The project has tested vetiver grass in all project sites, which are characterized by a wide range of environmental conditions. Regardless of differences in rainfall, altitude, soil type, and other microclimatic conditions, vetiver has in all cases performed well. The only proviso was found to be that the correct propagation techniques must be followed, that planting out should be carried out at the very beginning of the rainy season, that the correct spacing should be adhered to, and that the actual planting of the tillers should be undertaken with proper attention.

Consideration should also be given to the fact that growth and tillering rates are lower at high altitude ranges, and that establishment in termite-infested areas may prove to be problematic.

Propagation techniques

The project experimented with propagation techniques such as bare-root splits, raised-bed methods, propagation in various sized polythene tubes, and the so-called Thailand method. Root treatments, including the soaking or dipping of roots in manure, were also tested.

Efficient and cost effective methods were developed for a two-stage production process - multiplication within nurseries, and multiplication for final planting out in the field.

Production within nurseries

Black, open ended polythene tubes with a leaf-lay size of 16cm and 22cm in length are filled with a mix of soil, sand and compost at the ratio of 3:2:1. Two vetiver tillers are then planted in each tube. Plants are irrigated twice daily for the first two weeks, and thereafter once daily. Fertilizer is applied at the rate of 10 grams of DAP in the first week and 10 grams of urea once a month thereafter. Trimming of leaves occurs once a month. This strategy results in the development of eight or more tillers per polytube within three months. At this stage the whole process is repeated so as attain the maximum possible tillering rate. The tillering rate declines rapidly if replanting is not undertaken. With care, the polytubes can be re-used three times over.

This system allows for the production of at least 64 tillers from each original tiller, which is far higher than the rate of production from any other method that was tested.

Production for field planting

Planting out in the field occurs at the beginning of the rainy season. Production for field planting occurs two months before this time.

Two tillers from the black polytubes are transplanted into transparent polytubes of 10 cm leaf-lay size, and 16 cm in length, after having being filled with the same potting mixture as above. In this instance DAP and urea fertilizer are applied after a week and at the end of the month respectively. No trimming is required. After one and half month the tillers develop a good root system, new shoots, and a third tiller, all of which enable them to withstand harsh field conditions.
The smaller transparent polytubes are utilized for field planting in order to reduce the costs of production, and to minimize the soil mass that has to be transported to the field. The cost of production (three tillers) using this system is seven Ethiopian cents (less than one cent US) each.

Acceptance by farmers

Vetiver has been planted alongside previously existing physical structures such as stone bunds, and also on untreated farmland, along the contour. In both instances, farmers were pleased with the performance of the vetiver, reasoning that it conserves soil and water, and provides practically immediate benefit by way of forage, thatching and mattress-stuffing material, green leaves for use in traditional coffee ceremonies, and as a potential source of further income. Farmers also appreciate the low labor requirements for hedge establishment, as well as the minimal maintenance needed in comparison to physical structures.

Farmers remove physical structures on their land after the vetiver hedges are sufficiently established, stating that these structures are obsolete due to the fact that the vetiver hedges efficiently trap soil and conserve moisture without occupying more land than is necessary, and that rodents thereby have no tendency to multiply after their breeding places (stone bunds) have been removed.

To enlarge on this last point, farmers insist that vetiver has a dramatic effect in reducing rodent numbers. This effect has been reported and observed in both the Ganwuha and Tach Gayint watersheds.

Agricultural experts have confirmed that farmers are placing a high priority on vetiver in the field of soil and water conservation. Many farmers from outside project intervention areas have also proceeded to treat their own farmland with vetiver obtained from intervention areas.

According to project estimates, about 2,500 hectares have already been treated via vetiver hedge establishment with project assistance. This figure rises to more than 3,000ha when farmers introducing their own interventions without project assistance are taken into consideration.

Cooperation with other organizations

Some eighteen international and local NGO's, as well as bilateral and multilateral organizations have visited and observed project activities in the region, and all have indicated a strong interest to include vetiver hedge technology in their programs.
The majority of them have been supplied with planting material and appropriate information, although we have yet to receive information on their relative success rates.

EU assisted projects have concluded agreements with the project to assist them in the dissemination of vetiver technology and other relevant project activities within their respective intervention areas.

On the basis of these agreements, interventions and innovations developed by GTZ/IFSP South Gonder have been extended to the Tigray region, and to other areas in the Amhara region. USAID has recently initiated a similar program in Sekota woreda.

In relation to the Ethiopian Government, a visit was paid to the project by the Deputy Prime Minister, the Information Minister, and the President and Vice President of the Amhara region, after which a delegation was sent to evaluate the program's activities in relation to vetiver and other innovations. This visit resulted in the inclusion of vetiver hedge technology into the national agricultural extension package.

Plan for the year 2004

During the year 2003, 14 watersheds each with a size of 200-300 ha have been treated with vetiver in the project woredas. Because of the increased demand for vetiver planting material by farmers from outside project watersheds, there will be a 20% increase of production within project nurseries to meet the demand.

As a result of the extension of the project into Tigray and the cooperation agreement with the EU, vetiver will also be introduced to another 16 watersheds, in 16 different woredas, in theTigray region. A further 18 woredas of the Amhara region will introduce vetiver in over 25 watersheds, also as a result of co-operation with the EU. They will produce the planting material in their own nurseries, with training and technical assistance provided by GTZ IFSP.

USAID has begun multiplying vetiver in two nurseries in the Sekota area. USAID staff and farmers from Sekota will be also be trained by the project, after which vetiver will be introduced to at least three watershed areas in their area.

The project has no information as to what extent the government will introduce vetiver to the country in general, other than the information that it has been included in their extension package for implementation in the year 2003.

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