PROBLEMS AND PROSPECTS IN IMPLEMENTING VETIVER GRASS TECHNOLOGY IN ZIMBABWE

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Abstract

Despite the tremendous effort and resources committed to soil erosion control in Zimbabwe during the past 65 years, soil loss tolerance rates continue to be exceeded in cropped areas under smallholder production. The continuously weakening of the local currency, high input costs and draught power shortages have affected the adoption of mechanical conservation measures by farmers. In this light, the Department of Agricultural, Technical and Extension Services (AGRITEX) was mandated to spearhead the dissemination of vetiver grass technology (VGT), which was developed in smallholdings in developing countries to combat soil erosion. However, NGOs, governmental institutions, as well as one of the farmers' representative groups are running uncoordinated parallel programs. Vetiver propagation material shortages, mistrust by some farmers after poor performance of other grasses, and criticism by some local researchers on the merits of the grass for erosion control are challenges faced in implementing the program. This paper reviews the constraints faced by smallholder farmers in implementing mechanical soil conservation measures, the problems faced by AGRITEX in implementing VGT and the strategies that have been put in place to improve dissemination.

Introduction and Background

Despite all the efforts and resources that have been committed to soil erosion control in the past 500 years, soil loss tolerance rates are continuously exceeded in 50 % of the land under crop production, worldwide (Moldenhauer 1978). The soil loss tolerance is the maximum rate of soil erosion that will permit sustained crop productivity, economically and indefinitely (USDA 1971).

Much work has been carried out in Zimbabwe in conventional soil conservation systems in the past 65 years. The country has been an acknowledged leader in Africa in this field, but the rate of adoption has been low, especially by smallholders.

The low rate of adoption of mechanical conservation works that reduce rill and gully erosion has been mainly attributed to high input costs to implement the system. This has led some developing countries, notably India, to develop low input technologies such as VGT which can be afforded by low-income, low-technology farmers.

Constraints that have been identified as affecting the adoption rate in implementing conventional conservation systems are draught power shortages for land preparation and construction of conservation structures, the prohibitive cost of hiring suitable equipment for construction purposes and also land preparation, limited access to cheap credit facilities for lack of collateral and manual labour for digging out the structures and planting operation. High-quality extension has tended to favour large-scale commercial farmers who are also actively supported by commodity groups like fertilizer and seed companies.

Research into low-input soil conservation technologies has centred mainly on conservation tillage. Some studies have been carried out with vegetative hedges such as *banna* grass and aloes. Lately some work has started on VGT.

Vetiver belongs to the grass family Poaceae. Its botanical name is *vetiveria zizanioides* (Linn) Nash (National Research Council 1993). It grows mainly in low, damp sites such as swamps and bogs. It also thrives on hillsides. Two types exist, viz. a wild type from North India which flowers regularly

and sets seeds, and a domesticated type from South India (National Research Council 1993). This type is widely distributed throughout the tropics under cultivation. It is non-flowering, non-seeding (non-spreading) and is replicated through vegetative means. The domesticated type is the type used in Zimbabwe.

Vetiver Grass Technology Extension

VGT was developed for smallholders in developing countries to combat soil erosion. This technology is found in 70 countries (National Research Council 1993), including Zimbabwe. The use of the grass as a soil and moisture conservation technique is virtually unknown in most of these countries. Mauritian settlers in the Chiredzi district of Zimbabwe have used the grass to stabilize irrigation canals (National Research Council 1993). It has also been confirmed by our local extension personnel in Chipinge district that the grass is prevalent in the area, where it is used mainly to protect terraces and for gully reclamation in the surrounding communal hilly areas, which are characterized by steep slopes (Moyo 1997).

Vetiver Grass Programs in Zimbabwe

The vetiver program was officially initiated in 1997 after a visit to Zimbabwe by World Bank experts in that year. The Minister of Agriculture was impressed by the merits of this grass in soil and water conservation as portrayed by the experts and instructed the Department of Agricultural Technical and Extension Services (AGRITEX) to implement the technology.

The then deputy director of AGRITEX in his policy statement stated that "each of the fifty-three districts in the eight provinces of the country should have at least a one-hectare nursery under vetiver grass by the end of the 1997 rainy season". He also directed that pilot projects be set up in the Save river sub-catchments to help contain the high sediment loads that has threatened to silt up one of the biggest rivers in the country.

The Soil and Water Conservation branch of AGRITEX was instructed to coordinate this exercise. The branch carried out an inventory of vetiver planting material in the country through its provincial and district officers. It was established that the planting materials had to be multiplied and bulked for distribution to the districts. Two small nurseries were established at the Institute of Agricultural Engineering and at the Domboshawa Training Centre, each measuring 350 m^2. Propagation material was obtained from the Department of Research and Specialist Services' Henderson research station. These nurseries later provided vetiver planting tillers for four provinces, namely Midlands, Mashonaland Central, Mashonaland West and Masvingo. Five tons of vetiver tillers were bought from a commercial farmer for distribution to the other four provinces.

To date there are forty well-managed vetiver nurseries in some 32 districts of the country. Running concurrently with the multiplication and bulking program of vetiver planting material, demonstration plots were established at the IAE and Domboshawa training centres. The objective was to establish how fast the grass would spread in hedgerows. Three types of in-row spacing were tried: 10, 15 and 20 cm. It was found that the grass needed more than one season to spread and cover the gap effectively (Soil & Water Branch 1998). Based on this, a research proposal to establish the appropriate in-row and between-row spacing was prepared in 1998 and submitted to the Ministry of Agriculture for funding under the Public Sector Investment Program. The in-row spacing to be tried were proposed to be 5, 7.5 and 10 cm, the lower limit being adopted due to concerns that the grass hedge should spread and establish fast as it would operate as a hydraulic structure (Chipanera 1998).

Save Catchment Pilot Projects

The Save catchment is about 4.2 million ha in extent. There are 20 rural district councils in this vast catchment.

A vetiver steering committee was formed in 1998 to spearhead the vetiver technology in pilot areas in the Save catchment at the initiative of two local individuals who I think should be addressed by their

names. Mr. Keith Harvey is a prominent commercial farmer and conservationist, who was then chairing the Natural Resources Board; he has won a couple of conservation awards. Mrs. Khetiwe Mhlanga is the national coordinator of Africa 2000, a UNDP NGO dealing with environmental issues; she has implemented a lot of environmental projects with AGRITEX and has also helped to foster linkages between AGRITEX and other institutions.

The committee is made up of personnel from AGRITEX, the Department of Natural Resources, the Commercial Farmers Union, the District Development Fund (a government parastatal body dealing with rural development), the Forestry Commission and the local authority, the Rural District Council.

Twenty pilot micro-catchments were identified for various vetiver projects during the 1997/98 rainy season in four district councils, Gutu, Bikita, Chipinge and Buhera.

The activities for Save micro-catchment pilot projects included the identification and training of animators from the local communities, establishment of nurseries and hedgerows in arable land, gully reclamation, setting up of silt traps around water bodies, and slope and embankment stabilization.

Planting material was supplied by the Middle Save irrigation complex which had then an estimated 13-ha nursery under vetiver grass and Hippo Valley Sugar Estates. Both are close to the pilot project areas.

Transport for ferrying the planting materials was provided by the army, at the request of the steering committee, and by the rural district councils.

Remarkable progress has been observed in Chipinge and Gutu districts, where a total of 12 nurseries with a combined area of 3.45 ha have been established by the communities. Two gullies have been reportedly reclaimed in Chipinge district (AGRITEX 1998). In Buhera and Bikita, there has not been much progress in terms of implementation on the ground. The problem has been attributed to shortage of transport to get planting tillers from Chiredzi. However, all the selected animators chosen by the local community from their society have received training.

Slope Stabilization

During a look-and-learn tour by officials from the Soil and Water Conservation Branch to Manicaland province, a local commercial farmer showed the group vetiver growing on roadside and hillside slopes. It could not be ascertained whether the grass was growing in these areas naturally or whether it had been planted by someone.

Vetiver grass was tried by the Ministry of Energy and Transport for embankment stabilization on the Harare-Bindura highway flyover near Glendale town. The grass had some difficulty in establishing on this surface, most probably due to the nature of the planting medium, an unproductive subsoil material, and to the timing of planting.

The Soil and Water Conservation branch has designed and supervised the construction of 10 medium-sized dams sponsored by the European Union Micro-Project Organization countrywide. An attempt was made to stabilize some of the eroding side slopes with vetiver grass, especially on the Chesa Mutondwe and Mazivandagara dams in Mashonaland Central province, and a commercial farmer's dam in Mashonaland East. The results were not very encouraging as the grass could not produce effective barriers because of the plant spacing of 15 cm. The grass, when grown on embankments, forms localized clumps in localized stations.

Gully Reclamation

VGT has a success story in gully reclamation. A gully threatening the main pump house of the 80-ha Chilonga irrigation scheme in Chiredzi district was successfully rehabilitated using fencing and vetiver grasses. Civil engineering structures had failed due to the lack of competent foundations. Two gullies have also been stabilized using the grass hedges in Nyanga district and five apiece in Chipinge and Buhera districts.

Problems Encountered in the Vetiver Grass Programs

When the vetiver project was initiated, AGRITEX had no immediate source of planting material. The grass was expensive to acquire. Some commercial farmers who attended a workshop organized by DNR helped finance the project. They quickly established the grass under irrigation and sold it for US$2 000/t, which is expensive by local standards.

We later learned that our Chipinge and Chiredzi district offices had made some advances in collaboration with local farmers in their area. They had already established two nurseries over 500 m^2 after obtaining free vetiver strips from the local commercial farmers.

The nursery established at IAE was completely grazed by cattle just after five weeks of establishment. Three months later the grass was also grazed to the ground by donkeys. The grass, however, did shoot later to a very good stand.

When the nurseries were started, we generally believed that the grass was unpalatable to livestock. Yes, it is true when the plant is at an advanced stage of growth, but not so true during the early stage of growth or when you have hungry donkeys marauding around.

When the multiplication and bulking exercise of vetiver grass was initiated, a lot of planting material distributed to the districts died because some areas did not have water to establish the grass.

Whilst the department is mandated to carry out extension work, it welcomes other institutions that have started to carry out extension programs with vetiver grass. This is beneficial in terms of sharing resources, reaching a large group of farmers as well as sharing knowledge, but it could be harmful if not properly coordinated.

Before the initiation of the vetiver steering committee, various organizations were duplicating efforts in implementing the vetiver hedge technology.

One of our leading scientists at IAE was critical about the introduction of vetiver grass as a measure to reduce soil loss and conserving moisture (Elwell 1987). He was of the opinion that the World Bank was trying to push the technology very hard in developing countries to cover up for some of its failed programs there. In the early 1970s, star grass *(Cynodon dactylon)* was introduced as a runner grass in reclamation of gullies and stabilizing waterways. Its impact was remarkable and it was quickly taken up by farmers. Later on it became a problem weed after spreading onto cropped land. *Banna* grass came and was also taken up by farmers, more so with its added advantage of being a fodder crop. Its merit as a soil conservation measure was not realized and it was abandoned.

Now comes the grass of the moment, vetiver. Understandably, the farmers are taking an even more cautious approach to its implementation. The vetiver grass is unpopular with some farmers with small arable land who have already adopted broad-based contours and are growing a crop in the channel as well as on the bank. They believe the grass will take up some of their limited land.

Termite activity was observed by AGRITEX on some earth dams which had developed high leaf volumes of vetiver when it had overgrown the embankment.

As is always the case with extension agencies in developing countries, mobility is a problem. Lack of transport for extension staff and delivering of planting material has frustrated a lot of programs. Vetiver planting material is needed in large volumes to grass an average embankment.

The Way Forward and Recommendation

Vetiver nurseries at most centres have been fenced. In some communities, the cost of the fence is prohibitive. Live fences are being used to protect the vetiver plant, and in the early stages, the nursery is protected by thorny shrubs to keep livestock out.

Planting material is being propagated at dam sites and at the many irrigation schemes in the country at community level to ensure that the plant survives. The commercial farmers' union has pledged to produce vetiver grass en masse for free distribution to the farmers in communal areas. The natural

resource board and the environmental wing of the commercial farmers' union have played a pivotal role in coordinating the activities of vetiver dissemination.

The functions of the various organizations have been identified as follows:

- DNR is to carry out erosion monitoring.
- AGRITEX carries out extension work collaborating with NGOs and other institutions.
- DDF will develop vetiver nurseries at their base stations throughout the country and provide transport.
- NGOs will facilitate workshops and the funding of projects.
- RDC will coordinate all the players in the vetiver steering committee.
- Farmers' organizations will motivate farmers.

The Soil and Water Conservation branch observed that a large nursery is needed to put up an effective erosion protection system on arable lands and the embankments. Closer in-row spacing is needed to enable the hedge to establish fast. A branch engineer has been instructed to look into this aspect.

It has been strongly recommended that vetiver projects be carried out on catchment bases in villages planned by AGRITEX in their communal area reorganization program. This program seeks to address the haphazard and random settlements in the communal areas that are widely believed to contribute to environmental degradation.

In conclusion, the stance taken by the commercial farmers' union to provide free planting material to farmers will certainly go a long way in the dissemination of VGT in Zimbabwe.

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