

# THE USE OF VETIVER FOR SOIL AND WATER CONSERVATION BY SMALL-SCALE FARMERS IN MALAWI

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## **Abstract**

Malawi is one of the most densely populated countries in Sub-Saharan Africa and as a result there is intense pressure on land resources. Soil degradation is widely accepted as one of the most serious problems facing the agricultural sector. The country has a single rainy season lasting about four months and the conservation of moisture in the early stages of the season can make a significant impact on the final yield.

Traditionally soil and water conservation has been achieved through the construction of contour ridges. These are used by over 90% of farmers. Population pressure has now driven families to cultivate steep slopes and highly erodible soils that used to be left under natural vegetation. Under these circumstances, simple contour ridges are often inadequate to resist the impact of heavy storms. Vetiver has been introduced to provide additional support to the existing system in those areas that are particularly prone to storm damage and water loss.

The initial introduction of vetiver grass technology (VGT) was done by a small local NGO. It is now being promoted by a range of official bodies and NGOs. Several problems have been encountered and progress has not been as fast as was initially hoped, but there are already thousands of farmers who are using VGT.

## **Background**

Malawi is a small landlocked country in central Africa. A rapid rise in population in recent decades has led to densities of up to 450 persons per km<sup>2</sup> on agricultural land. This is the highest density in Africa for countries which have only a single short rainy season. As a result of this growing pressure on land, small-scale farmers have been driven to cultivate steep slopes and highly erodible soils which a few years ago were covered with natural vegetation.

## **Soil and Water Loss**

Although Malawi has a comparatively short wet season of about four months, the actual rainfall is over 1000 mm per year in many areas. Consequently, there are periods of intense heavy rainfall which can result in considerable sheet erosion, some gullyng and widespread runoff, leading to siltation of streams and rivers and the loss of moisture for farmland. Legislation exists to prevent people from farming such vulnerable areas but population pressure has made it impossible for government to enforce them in the absence of alternative suitable sites for displaced families.

## **Traditional Conservation Measures**

Over the past fifty years the overwhelming majority of farmers have adopted contour ridging as the dominant method of soil and water conservation. Ridges are made about one m apart and crops are planted on the top of these. On the gentle slopes on which people have traditionally farmed, this strategy is effective in limiting sheet erosion and keeping moisture in the field. On the steep slopes on to which many people have been driven, such ridges cannot always contain the water deposited during

a heavy storm. The result is broken ridges and large losses of soil. In addition, the loss of water can at times be serious when a couple of weeks of dry weather follow a heavy downpour.

### **The Role of Vetiver**

Vetiver was recognized as a possible tool to strengthen the traditional system in vulnerable areas. The strategy used was to encourage farmers on steeply sloping land to mark out a ridge on the contour with an A frame or line level every vertical m of slope. This was then planted with vetiver so as to provide a buffer in the case of a break in the ridges above this line. Once established, this prevents any break from developing into a torrent which could tear through farms right down the slope. Many of these soils are shallow, so vetiver has been planted well up the ridge to provide it with a modest amount of soil in which it can establish. Within a season the furrow behind the vetiver ridge has been filled with soil carried down by storms. In between the lines of vetiver the land continues to be ridged. This not only helps to limit soil and water movement but provides the maize with greater soil depth and better aerated growing environment.

### **The Spread of Technology**

There has been limited use of vetiver on estates in the 1950s but the technology has not spread outside these private farms. The first program to popularize vetiver with small-scale farmers was started by a non-governmental organization in 1990.

Ten extension agents were employed and each of these established a nursery of *vetiveria nigrinata* collected from its natural habitat in a swampy area in the hot valley in the south of the country. Material from these nurseries was distributed to local farmers free of charge and planted on the marker ridges which had been aligned with an A frame. This was a modest program involving a few hundred farmers but it provided evidence to others that this was appropriate technology for the evolving agricultural situation in Malawi.

In 1992 an agricultural program funded by USAID under the umbrella of the Ministry of Agriculture started to extend vetiver technology to small-scale farmers in five major catchment areas. This was joined in 1995 by a much larger program funded by the European Union working at 290 catchments across the country. A total of 2 038 village nurseries covering 270 ha were established in every district in the country. A source of *vetiver zizanioides* was identified in the north of the country and this is now slowly replacing *nigrinata* in the village nurseries. From these nurseries about 20 000 farmers have planted vetiver on their farms and the target for the coming season is to double that number. At the same time, a range of different NGOs have made soil and water conservation with vetiver an integral part of their local programs and have established nurseries and employed extension staff to promote the technology.

### **Problems and Challenges**

There have been two sets of problems associated with these programs to date. One lot is technical and the other human. The technical problems have in part derived from the climate. With an eight-month dry season and no irrigation in any nursery, the rate of multiplication in the nurseries has been low and the growth of slips on farmers' fields in the first year after planting has also tended to be low. Really dependable rains come in January and finish in March, so that bare slips have only a couple of months of good rainfall before they face eight months of dry weather. They mostly survive but it means that it is a couple of seasons before a farmer can see the vetiver as a worthwhile weapon in the fight to limit soil loss.

It has proved difficult in most areas to coax farmers into trimming their vetiver hedges. In consequence, *nigrinata* lines can turn into tall wide bands in the garden, which compete with the

maize on either side of the barrier. No detailed research has been done on this but it appears to be a combination of shading, by a hedge almost 2 m tall, and competition for water. In some areas farmers use the vetiver for thatching and thus at least ensure that it is cut right back every year. Others burn it off when they are clearing their gardens, which again reduces competition early in the season and stimulates a dense new growth of vetiver shoots.

The technical problems are in fact much less important than the difficulties raised by inappropriate extension strategies. Field staff and their managers have been faced with the challenge of promoting a technology which is not only new but also quite strange to farmers. The original work was done through church women's groups by personnel that were well known and trusted by the local community. Working with small numbers, they were able to convince people of the worth of the technology and achieve entirely voluntary adoption with a consequent sense of ownership of the technology by the farmers.

The entry of larger organizations with targets, deadlines and pressure to rapidly expand the use of vetiver brought complications. Local people were paid to raise nurseries, for which they had little sense of personal ownership. The vetiver they said belonged to the ministry (or to the European Union) and not to them. The lack of a sense of ownership, combined with village jealousy with regard to the payments to individuals, inhibited the subsequent use of the material that had been raised. At the same time, different NGOs were adopting conflicting approaches to payment for vetiver planting, which further confused the situation. Despite this, many thousands of farmers have planted vetiver but those concerned with the program do face challenges for its future development.

The first, and easier challenge, is to switch the whole program over to *zizanioides*, which is less competitive than *nigratana*. The second challenge is to encourage the trimming of the hedges to provide mulch for the adjacent rows of maize and stimulate a better quality of barrier. The third and most serious challenge is for all the different agencies involved to come together and adopt a unified strategy for village nursery development which ensures that the participants develop a genuine sense of ownership both of the plants and of the technology. Some of the difficult experiences of the recent "Crash" programs have convinced the main actors involved of the need for this. Plans are now in hand for a more sensitive approach to the farmers and it is for this reason that there is real hope of doubling the number of participating families in the next season.

## Conclusion

Vetiver is proving to be a really useful tool to help farmers who have been forced into precarious hill areas to control soil and water loss. The technical problems are being identified and overcome. Significant numbers of farmers are now either using or familiar with vetiver. The main challenge facing those who are promoting vetiver use is to develop an extension approach which ensures greater farmer ownership of the nurseries, the planting materials and the technology.