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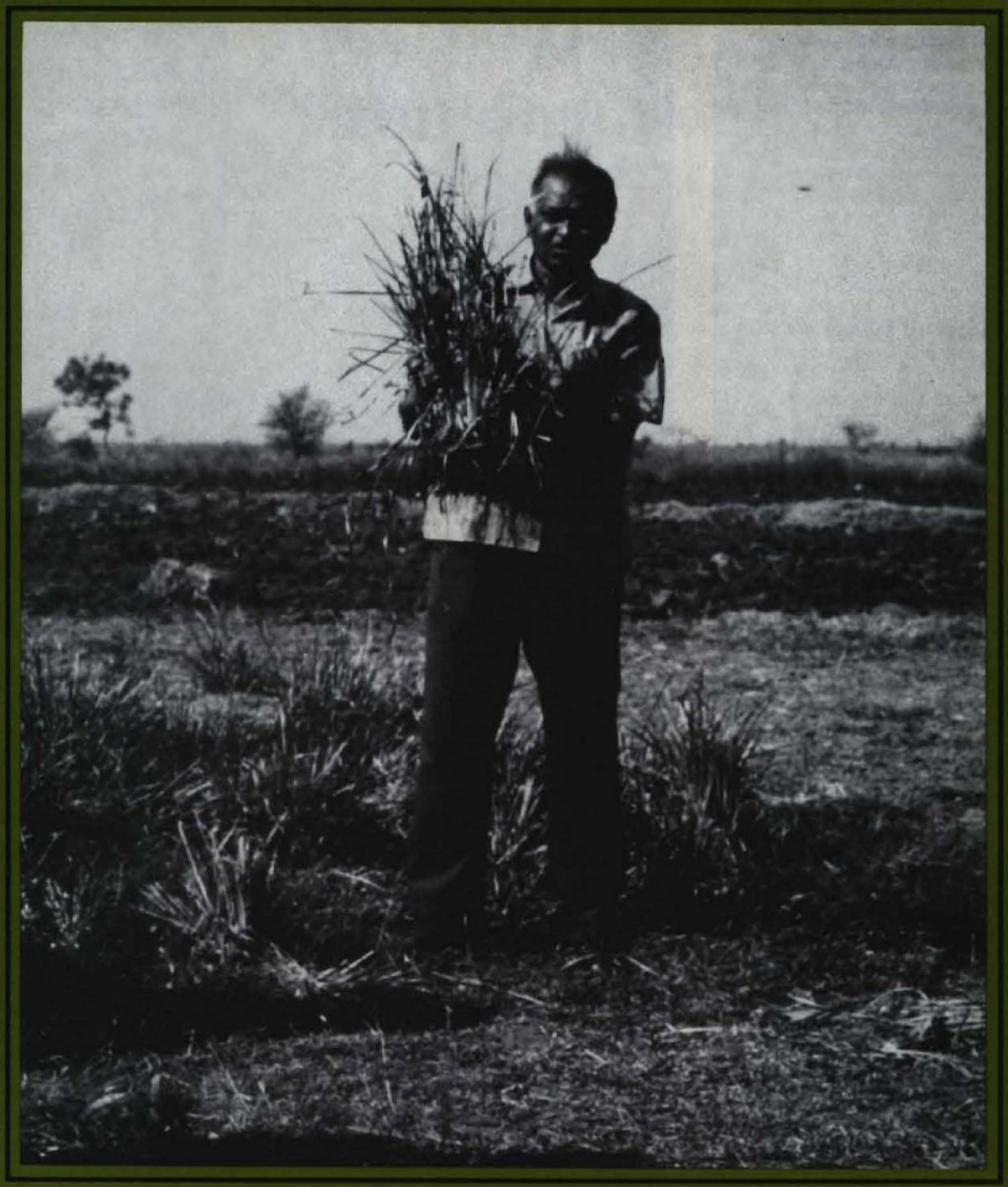

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COVER: A forest researcher holds up a handful of Khus.

Photo by Prabhakar Tamboli

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Khus May Be the Answer

Another "Green Revolution?"

by John Greenfield
New Delhi Office

For more than a quarter of a century, billions of dollars and millions of words have been spent and written in an effort to alleviate famine. Unfortunately, millions of people have died while waiting for a solution to what seems an impossible situation. Land is being degraded, crops are failing with increasing regularity. This need not happen. There is an answer. Its name is *Vetiveria Zizanioides*, better known as "Khus."

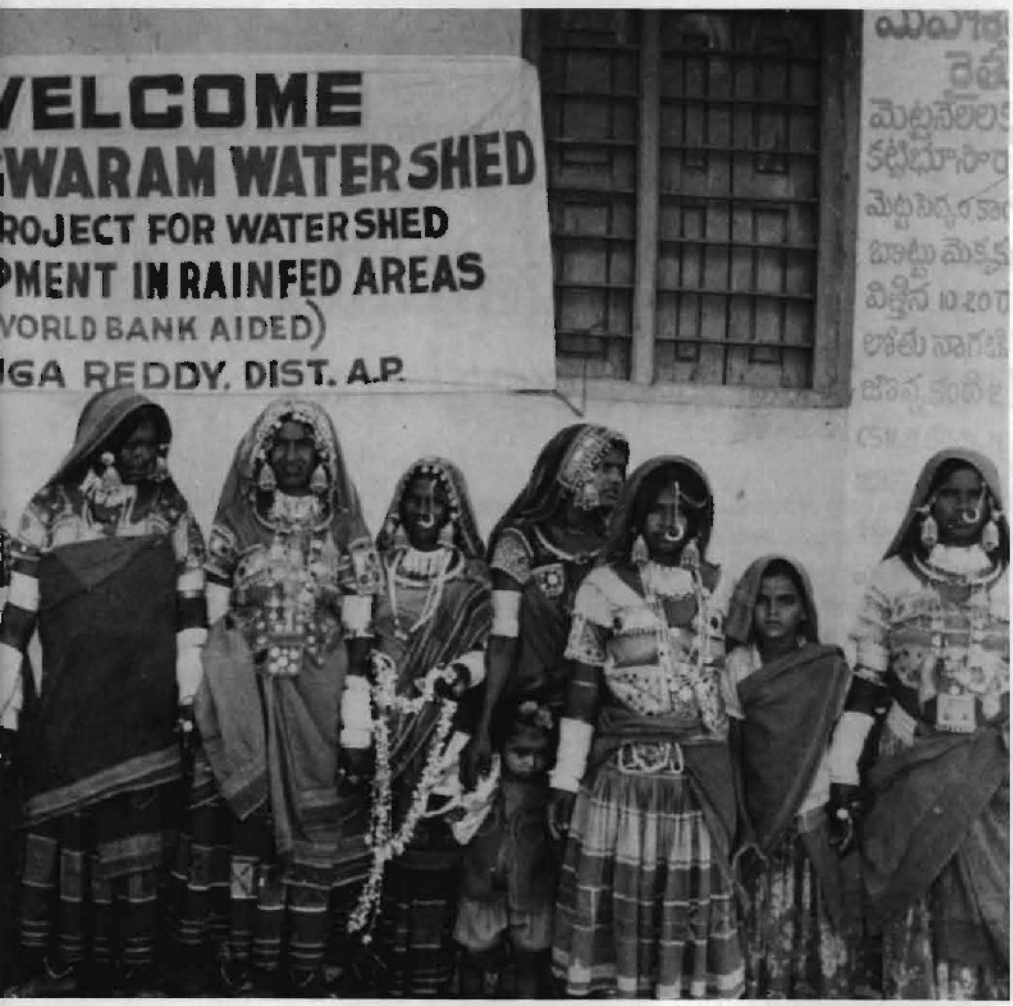
First, some background. There are two predominant types of agriculture: irrigated and rainfed. Irrigated agriculture depends on engineering structures and engineered field layouts to make the best possible economic use of expensive pumped or stored water. Rainfed agriculture depends on and is slave to the whims of the weather. It is to rainfed farming that most of the world's poor are committed, and, in the past few years, their crops have failed continually, due largely to a lack of moisture conservation in situ (MCIs).

In the low rainfall areas of the world, 200 to 300 millimeters is the annual average rainfall farmers can expect, and sometimes more than 60 percent of this essential water may be lost in runoff, leaving insufficient moisture to support a crop. The result: a drought.

Another serious problem that has a major impact on the world is soil erosion, the destruction of the productive soil and its transport out of the area into the seas, reservoirs, or dams.

Concept was correct

Erosion has long been considered an engineering problem. Ergo, we were presented with engineering solutions: contour banks, diversion banks, absorption banks, waterways. The contour concept was correct, but the other measures were unnatural, static, designed and constructed to hold or convey the runoff water sideways and concentrate it in one area, thus increasing its volume and erosive capacity.



Villagers in the Pilot Project greet a visiting Bank mission.

It was calculated that, at the speed of implementation of engineered soil conservation works in India, it would take more than 200 years to cover the eroded and eroding areas completely, at a cost of over $40 billion.

The engineered system has been accepted, it is taught and has never been questioned. It is man's method of soil conservation, but, unfortunately, it does not work in developing countries. There seemed to be no solution until the New Delhi office was able to get Indian state government support to start a massive program of MCIs, stabilized by a vegetative contour barrier of Khus.

I first worked with this plant in the Fiji Islands more than 30 years ago and have followed its progress ever since.

West Indies

The idea of using the grass as a vegetative means of soil conservation originally came from the West Indies, where the British tried it out 50 or more years ago. It proved extremely successful but remained unrecognized, perhaps because it was thought that the islands were too small, the soils too specific and the climate too special for its use to be replicated anywhere else.

In over 30 years of working in developing countries, I've seen expensive soil conservation works fail repeatedly, and, in the process, cause more damage than would have been the case had the scheme not been constructed. I searched for Vetiver grass in Africa, Southeast Asia and South America, and found it growing at some research stations as an essential oil plant (its roots produce oil of vetiver, a perfume base), but never in sufficient quantity or adaptable enough to make it worth promoting.

Yet, the erosion problems were getting worse and the engineered system was definitely not the answer—it was too costly, inappropriate, temporary, and the small farmers did not like it, since it involved too much labor and meant removing a 5-meter-wide strip of land from production in order to construct earth banks.

It was calculated that, at the speed of implementation of engineered soil conservation works in India, it would take more than 200 years to cover the eroded and eroding areas completely, at a cost of over $40 billion.

The only answer was to go to India, where Vetiver grass is a native plant, and study it in the Indian context. If it could be grown successfully there, it could be grown anywhere.

Pilot Project

In 1985, I was transferred to the Resident Mission in New Delhi and put in charge of the Bank's Pilot Project for Watershed Development in Rainfed Areas.

I immediately started looking for Vetiver grass. It wasn't difficult to find, and to my amazement exhibited an enormously wide range of adaptability, from 2,000 meters in the Himalayas, where it is covered with snow during the winter, to the blistering deserts of Rajasthan, the swamps outside Delhi, the wastelands of Andhra Pradesh, and the wet tropical areas of Kerala.

The work done in India will create a major breakthrough in food production for small farmers worldwide, giving them a better chance for survival in the 21st century.

Fully convinced that this was the grass with the greatest potential for soil conservation, I returned to Fiji to examine its performance and discuss its use with farmers who, for more than 30 years, had worked with it. Before recommending Khus for trial in India, I had to be sure that it did not become a weed that could infest fields, that it lasted as a hedge filtering soil and surface water runoff, that it did not compete with the farmers' food crops, that it was not an intermediate host for any pests or crop diseases.

Film had desired effect

The results of the Fiji trip were so positive that I made a documentary film there. I asked Indian extension workers in Fiji to interview sugarcane farmers in Hindi, so that the farmers in India might be tempted to try the system out. Subsequently, 500 copies of the video film were distributed throughout the world. Shown to farmers and government officials in India, the film had the desired effect. The farmers were prepared to give the system a trial in the project areas at the project's expense. The system consists of MCIs, stabilized with a contour hedge of Khus.

The farmers had had bad experiences with the engineered soil conservation methods and did not like the words "soil conservation," so my team only discussed "moisture conservation" and the fact that at no extra costs farmers could increase their yields by 50 percent if they plowed and planted on the contour.

They did, and in the first year the results were excellent.

In the second year, the farmers in Karnataka who practiced MCIs produced excellent crops of groundnuts and pigeon peas while neighbors who had stuck to the traditional system produced nothing at all. Even a crop of late-planted chickpea failed. The area, classified as a severe drought zone, was in reality a man-made problem due to lack of understanding of moisture conservation.

Moisture conservation, on its own, is not enough. The fields must be stabilized with the vegetative barriers of Khus which may, in arid areas, take three seasons to establish. But once established, the hedges are permanent.

The vegetative system, at the very most, costs a tenth as much as the engineered system, and is free if the farmer already has a supply of the Vetiver planting material. The system has proved to be so effective that it has already wiped out erosion in some areas.

Farmers stealing the grass

MCIs has now fired the imagination of Indian farmers, state and central government officials, and, for the first time, a project's technology has spread while the project itself is still in the pilot stage. On the red, sandy soils of Karnataka and Andhra Pradesh, on the black cotton soils of Maharashtra and Madhya Pradesh, the technology is spreading as fast as the planting material is produced, already covering thousands of hectares. Other states that are not part of the program, such as Orissa and Rajasthan, have started programs of their own. Vetiver grass nurseries are being established everywhere. In some states, farmers are stealing the grass from government demonstration sites and from each other, a sure sign that the technology is catching on.

The system can be used worldwide and is ideal for Africa, where moisture conservation is essential. As a result of the work in India, MCIs has been introduced in Nigeria, Somalia, Sri Lanka, and Indonesia. The U.S. Department of Agriculture has sent a representative to New Delhi to collect cultivars of the plant for introduction and trial in the United States.

Major breakthrough

The work done in India will create a major breakthrough in food production for small farmers worldwide, giving them a better chance for survival in the 21st century. Vast areas of land once deemed unstable can be safely used for production of crops. And small island nations can expand their cropping areas.

We are now taking MCIs into the Himalayas, but there we are using indigenous shrubs that have their crowns beneath the surface (so they cannot be killed by browsing animals) and transplanting them as hedges throughout the watershed areas. These shrubs act as Vetiver grass does, and supply essential fuelwood in a three-year cycle. We have so far identified more than 100 different indigenous plants for this purpose.

Even though the system is still in its infancy in India, the future looks promising. We've developed a permanent system of moisture conservation which is reducing farming risks and has given rainfed farmers the confidence to purchase fertilizer. As one of them aptly said to R.G. Grimshaw of the Asia Technical Department's Agricultural Division, "It's like having an electric light in your house instead of a candle." ■

Editor's note: The second edition of a field handbook on Khus usage will be available later this month. Contact Ext. 76227.