



Animals represent 20-30% of farm capital in South-East Asian smallhold systems. They provide draught power, animal products, increased protein in the diet, and a direct cash income. Developing methods of feeding livestock so they do not hinder farm productivity is one of the aims of the forage project.

A 'grassroots' project takes forage to the hills

In May/June this year (1995), CSIRO journalist Nick Goldie toured South-East Asia to report on aid projects sponsored by Centro Internacional de Agricultura Tropical (CIAT). In just under three weeks, he visited remote rural areas in north and south Vietnam, Hainan (in China), and The Philippines.

Goldie was pressed into service as a replacement for Thomas Hargrove, a journalist working for CIAT, who in 1994 was kidnapped and held to ransom, somewhere in Colombia. Hargrove has since been released by his captors. CIAT is a non-profit organisation devoted to the agricultural and economic development of the lowland tropics. Its head office is in Cali, Colombia. The centre is financed by a number of donors, most of which are members of the Consultative Group on International Agricultural Research. They include the governments of Colombia, Japan, the United States and Australia. Organisations such as the Ford Foundation, the Sasakawa Foundation of Japan, and the International Fund for Agricultural Development also support CIAT.

At first sight the hills inland from Matalom, a township on the Philippine island of Leyte, seem verdant. Then one realises that every inch of ground is in intense use, and the twin problems of declining fertility and increasing population are looming.

Like many rural smallholdings in South-East Asia, the hill farms of Matalom have limited resources with which to counter productivity problems resulting from overcropping and the free-grazing of livestock.

Crop-fallow rotation systems have been tried, but with the increase in population density and demand for food, farmers have been compelled to shorten the fallow period. The result is further decline in yield and soil fertility.

In 1989 – at a meeting of government officials sponsored by Centro Internacional de Agricultura Tropical (CIAT) – the need for expert help to select species and develop systems for improved forage and pasture production was recognised. This led to a joint CIAT/CSIRO project which identified six grasses and legumes, mostly from Africa and tropical America, suitable for growing on hill farms in Indonesia, Malaysia, Thailand and the Philippines, particularly on acid soils. Germplasm of the species has been supplied to researchers in the regions by CIAT and CSIRO genetic resource centres.



Nick Goldie

A number of tree species are being tested at Matalom in the search for a 'multipurpose tree'. Acacias and leucaenas are possible candidates, and eucalypts are becoming widely distributed.

The ideal tree will probably be a legume, for its nitrogen fixing properties. It will also provide palatable and protein-rich foliage; useable timber for building and as fuel; and will be hardy when used as a hedge or 'living fence'.

Several criteria were applied when selecting the potential forage species. Ideally, an introduced crop will be useful for three reasons: as a contour hedgerow, for feed and erosion control; for use in fallow improvement, for feed and for soil enrichment; and for use in 'feed gardens', with a high yield of nutritious foliage. (Feed gardens offer an alternative food source for ruminant livestock which graze areas set



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An erosion-control experiment on a cassava plantation in north Vietnam. Cassava (*Manihot esculenta*) resembles a sweet-potato, and its product is almost pure starch. It's a staple human food in Africa and is mostly used as an animal feed in Asia.

In tropical parts, cassava is the third most important crop after rice and maize.

It is processed by hand on the farm, or in small village starch factories with little mechanisation. It is possible that cassava is on the verge of moving from a subsistence crop to becoming a raw material for sophisticated bio-technology in the production of flavourings and sweeteners.

CIAT's Cassava Project aims to lift cassava from its status as a 'security crop', and give it the attention recently given to other Green Revolution crops such as rice and maize.

aside for fallow, delaying the soil regeneration process.)

The next step in this aid program is to increase the availability of the selected forage species, and to integrate their use into smallholder farming systems, especially upland farms. This is the aim of a five-year project funded by the Australian Agency for International Development, and managed by CIAT and CSIRO. Partner countries in the Forages for Smallholders Project are Lao PDR, Indonesia, Malaysia, the Philippines, southern China, Thailand and Vietnam.

The forages project began in January 1995. It has its base in the Philippines, at the headquarters of the International Rice Research Institute in Los Baños, a small town on the slopes of Mt Makiling south of Manila. Crop research is carried out at Los Baños, and farms taking part in the trials are on the islands of Mindanao and Leyte.

On Leyte, the trial farms are situated mainly in the hills above the township of Matalom. This is an hour's drive south of the Visayas State College of Agriculture, whose Farm and Resource Management Institute coordinates the trials.

Matalom was chosen as a trial area because it is in reach of an academic institution. It has upland rice based

agriculture on acid soils, and maize-based systems on calcareous soils. Both are managed by smallholders with limited resources.

Stylo (*Stylosanthes guianenses* CIAT 184) and *Desmodium rensonii* are among five promising legume species being tested. These species are used for both fallow improvement and hedgerows. Fallow improvement is becoming increasingly necessary as the demand for food rises, and farmers are forced to use fallow land for grazing. Legumes, which fix nitrogen, are especially important.

The forages project is taking a 'grassroots' approach to solving farm productivity problems in South-East Asia. While expertise and the original germplasm may come from Africa or South America by way of CSIRO or CIAT, farmers are encouraged to do their own multiplication of seeds, canes and roots. Aid workers and outside researchers regard themselves as a resource bank rather than as a controlling agent, and the farmers thus have 'ownership' of the experiments and pride in their results.



Nick Goldie

Near Basuo in the west of Hainan, China, is the Dong Fang cattle farm, which at first sight to an Australian seems somewhat familiar. Barbed wire fences and gum trees, a row of farm buildings which might be in Queensland. Curiously, the fence posts supporting the barbed wire were made of stone, cut by hand. This is a legacy of a 1980s aid project set up by the New South Wales Department of Agriculture.

The 2000-hectare farm runs 1000 beef cattle, and in a new venture produces stylo meal for Haikou feed factories. Stylo is the primary exotic forage crop in this region and is cultivated in much larger acreages than the tiny hill farms of the Philippines. Local farmers use stylo as animal fodder, as an intercrop in orchards and as erosion control measure with young trees. It also sustains thriving flocks of geese.