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Boosting yields and improving livelihoods on terrace farms

An international team of researchers is developing sustainable agriculture kits to enhance crop yields, nutrition and incomes for hillside farmers in Nepal.

Nepal's mountainous topography makes for some of the world's most challenging farming. More than 70% of arable land is on hillsides, where soil fertility is low and rains are variable. Malnutrition is widespread: nearly half of children under the age of five show signs of stunting. As many Nepalese men migrate to seek higher incomes, the burden of farming in these rugged conditions increasingly falls on women.

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An innovative research collaboration aims to sustainably boost yields and improve livelihoods through intensified terrace agriculture, while easing the drudgery for thousands of women farmers. Canada's University of Guelph, the Nepal-based NGO Local Initiatives for Biodiversity, Research and Development, and its grassroots spin-off company Anamolbiu are working to scale up the use of sustainable agriculture kits.

These low cost, locally tested kits combine a tailored seed mix with simple tools and instructions. Kits can contain varieties of drought-resistant and soil-nourishing legumes chosen to enhance yields and nutrition. The focus is on crops suitable for planting on terrace edges and along terrace walls. Tools might include simple seed planters, as well as reusable storage bags that protect harvested grain from fungus and insects. Instructional picture books teach farmers how to best use the seeds and tools, including how to breed their own hybrid seeds, conserve water and improve animal feed.

Earlier research focused on reviving small millet cropping in rain-fed areas of South Asia. Trials in Nepal identified seed varieties, tools, and planting and growing techniques that are well suited to terrace farming in difficult hillside terrain. These include transplanting finger millet seedlings in rows rather than broadcasting seeds, and intercropping with nitrogen-fixing legumes.

One of the world's oldest known food crops, small millets are highly nutritious, hardy and well adapted to dry

zones with poor soils. Sustainable agriculture kits give farmers – many of whom are illiterate women – the right tools and information on how to maximise yields so they can take advantage of this valuable food source.

In the newest phase of research, the project is expanding to include additional highland crops and will be testing a novel public-private partnership model to target 25,000 households with easy access to the kits. Priced at \$10 or less, the kits will be sold through existing networks of market-stall vendors. This is a low-cost investment, given that farmers can earn many times that amount from improved crop production.

Meanwhile, further innovations are being tested, including GlnLux, a Canadian-engineered microbial biosensor that helps farmers maximise organic nitrogen production from interplanted legume crops. This may help terrace farmers improve soil nutrient management, leading to healthier soils and profits.

By working with Nepal's hillside farmers to intensify agriculture and by tapping into existing networks of small entrepreneurs to reach them, the project aims to produce lessons that could serve other countries where terrace farming is widespread.

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