



Productive and resilient farms, forests and landscapes

A Bioversity International Initiative

The challenge

In order to feed the projected population of 9 billion people by 2050, food production needs to expand by 60% globally and up to 100% in developing countries.

Productive, profitable farms and associated ecosystems rely on a few key factors to address the challenges of rural poverty, natural resource degradation and global food security: environmental factors – light, water, soil and a vast array of biodiversity; genetic factors – seeds and planting materials suited to farmer conditions; and management – the choices farmers make about how they manage their fields and farms.

Rural communities are further challenged, as their farms are burdened by biodiversity loss, salinity and degraded soils, weather variability and continuous pressure from pests and diseases.

Our research solutions

Agricultural and tree biodiversity is essential for resilient farms and landscapes. Diversity provides ecosystem services that are vital for restoring and increasing the productivity, adaptive potential and resilience of agricultural and forest ecosystems on which people depend.

In order to address the need for better ecosystem management and food security in rural communities, this Bioversity International Initiative studies how both agricultural and wild biodiversity can improve soil characteristics, increase water quantity and quality, regulate pests and diseases, and enhance pollination to increase productivity and livelihood benefits, now and into the future.

Ecosystem services are the benefits that human beings get from nature

The initiative works through two approaches:

Ecological intensification and diversification: which focuses on how agricultural and tree biodiversity improves resilience at the field and landscape level. Our research produces biodiversity-based technologies and decision-support tools that will be used to address farmers' needs. How? Through appropriate seeds, planting materials and management approaches that boost farm productivity, reduce pests and diseases and improve livelihoods.

Landscape restoration and management: working with communities, this research focuses on biophysical, social and institutional mechanisms that influence the flow and delivery of ecosystem services. We investigate how practices, behaviour, institutions and different incentives can be used or improved to increase ecosystem services and better distribute their benefits to people, with an emphasis on promoting gender and social equity.

Mix it up! Biodiversity bugs pests

Pests and diseases are a natural part of any ecosystem. What farmers fear are the outbreaks that can cause high yield losses. Pesticides and physical barriers are some of the most common ways to manage pests and diseases, however, less is understood about the role that crop biodiversity could play, particularly intraspecific diversity (the diversity within a species).

Since 2006, Bioversity International has been working with national partners in China, Ecuador, Morocco and Uganda to see how planting different varieties of the same crop in mixtures, can reduce pest and disease damage.

Results

Recent findings from our trials with the National Agricultural Research Organization in Uganda show that mixing varieties resistant to certain pests and diseases, with those that are more susceptible, greatly reduces the incidence of that pest or disease. With common bean, we found this to be most effective when at least 50% of a resistant variety is mixed into a plot. For bananas, farmers have reported a 75% reduction in the presence of weevils in their mixtures. It is important to note that many of the resistant varieties we are finding are actually local crop varieties.



Banana disease management

Banana is one of the most important staple food crops in the tropics and subtropics, providing a source of income, food and nutrition for more than 400 million people.

For seven years, Bioversity International has been part of CIALCA – a global partnership to improve the productivity of legume- and banana-based agricultural systems in Central Africa. We contributed cutting-edge research on banana diseases and their management (banana Xanthomonas wilt, banana bunchy top disease and fusarium wilt), as well as banana agronomy, nutrition and Musa germplasm characterization.

Results

Research investments by Bioversity International and partners in agricultural system productivity and resilience have paid off: impact assessments from 2010 and 2011 found that household incomes had risen by 20%, and farm productivity increased by an average of 30%. Almost all farmers (93%) who worked with us perceived this tremendous rise in productivity. Exposure to new banana disease management techniques has also increased demand by farmers for innovative agricultural technologies.

No honey no money, no trees no bees

We work with Mozambique's Niassa Reserve managers and other partners to find ways to meet the livelihood needs of local people while supporting tree and ecosystem conservation through improved management and use of natural resources. We discovered that destructive honey collection methods were threatening honey production in the reserve. Income made from selling honey was dwindling as people were cutting down trees that were up to 200 years old in order to collect honey from hives. The setting of fires to calm the bees was also threatening the miombo woodlands, which is home to many endemic tree species.

Results

Combining scientific research with the empowerment of local people can ignite change. Bioversity International worked and empowered a local honey hunter to share his know-how of traditional, nondestructive techniques based on tree climbing and the use of special plants, with other honey hunters in the reserve. The adoption by local honey hunters of these sustainable harvesting techniques is conserving trees, reducing fires, and providing long term options for consumption and the sale of honey.



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