Background

Yunnan, in the south-west of China, is one of the centres of origin of banana. It has a warm and humid environment that produces high-quality bananas, as a result of which banana production has expanded rapidly, exceeding 120,000 ha in 2016. However, banana production in Yunnan faces many challenges. Smallholder farmers lack the expertise to manage the risks of banana pests and diseases. Overapplication of synthetic chemical fertilizers is a common problem, resulting in soil degradation and water pollution. At the same time, livestock production also results in plentiful waste, which pollutes water supplies and the atmosphere. Bioversity International and the Yunnan Academy of Agricultural Sciences have worked with the private sector and local communities to develop integrated banana–livestock systems that minimize waste and promote sustainable agricultural production while reducing harmful effects.

Our approach

Bioversity International and partners are studying an innovative approach to increasing the scale of banana and livestock production by integrating the two systems. Enterprises are bringing smallholder farmers together and investing in larger banana plantations and bigger livestock operations, making use of the smallholders’ land. Livestock wastes are collected and fermented into an organic liquid manure that is applied to the banana plantation through drip irrigation. While, in reverse sequence, banana leaves form part of the livestock feed. The result is two products – bananas and livestock – that markets consider high quality and ‘green’ as a result of reduced use of pesticides and synthetic fertilizer.

The study aims to improve the effectiveness of land use, boost farmers’ incomes and protect agricultural environments. The approach has been tested in the Dapijia community in Yuanyang County (see Factsheet 8) and at another site in Yuanjiang in Yunnan Province.

Effective land use

Over the past few years many young people have left the countryside and moved to cities in search of better jobs. The lack of labour in the countryside makes it more difficult for the remaining farmers to manage their land, and the uncultivated land impinges on food security. Smallholder farmers lack the ability to manage risks such as drought, and also lack capital to invest in their farming operations. Under the new system being studied, most of the smallholders have leased their land to private-sector enterprises. These enterprises can borrow money and use it to invest in irrigation systems and other improvements. They also have a more developed capacity to manage risk. As a result, land is no longer left underused and food production is increased. For example, in Yuanyang County, Yuanjia Agricultural Development Co. Ltd rents land from more than 100 smallholders and runs an
integrated livestock operation of 500 pigs and a banana farm that covers 230 ha.

Social and economic benefits

The enterprise employs smallholder farmers, who have seen their incomes rise dramatically and become more stable. This is due to the rent they receive for their land and to the payment for working for the enterprise. In Dapijia, for example, incomes are about one-third higher than in past years. In addition, the farmers are receiving training in advanced technologies for both banana and livestock production. The enterprise as a whole gains from larger-scale production. It recently produced 7,050 tons of high-quality bananas from the 230 ha. Production is also more resilient and more stable through the year as a result of using three different varieties: Brazilian, Guijiao No 6 and Hongyan No 1. Since the plantation’s altitude varies from 300m to 1,000m above sea level, the different varieties offer better adaption to climatic variation.

Improved soil and nutrient management

Recycling livestock waste has increased the organic matter in the soil and the balance of chemical elements, improving the delivery of ecosystem services. At Dapijia more than 5,000 tons of pig manure were piped to the 40,000 banana plants in the plantation, reducing the need for nitrogen, phosphorus and potassium by 13%, 21% and 20% respectively, compared to conventional banana production. In addition, soil-borne pathogens, such as the TR4 strain of Panama disease, so far, have not been found in the integrated system.

Looking ahead

A key research question is how to optimize the ratio of banana plants to animals to deliver the greatest benefits. The study also plans to refine protocols for pest and disease management in both parts of the enterprise and to understand in greater detail the various ways in which the two sectors interact. It is also important to support the local government to develop favourable policies that will attract private investment and encourage the wider adoption of the system so that within the next five years it covers 1,000 ha, reaches 1,000 smallholder families and increases production by 20%.

Partners

Yunnan Academy of Agricultural Sciences
Yuanjia Agricultural Development Co., Ltd
Yuanjiang Agricultural Development Co., Ltd

Related publications


For more information, see:

Factsheet 8: Site visit – Integrated banana–pig production

After being filtered, pig manure is used in the banana drip irrigation system. Credit: Bioversity International/S.Zheng