

Low Risk, High Returns: Intercropping provides a food bonanza for smallholder farmers in Uganda

Summary and key facts



Due to an unprecedented population increase, around 50% of Ugandan farmers are forced into continuous monocropping, which is exerting pressure on natural resources including land



Continuous monocropping without proper land management, such as intercropping and soil and water conservation, leads to soil degradation, and consequently poor land and crop productivity



To sustainably intensify maize and bean production, the SIMLESA project evaluated and defined optimum maize-bean intercropping patterns



Mixed cropping using optimum maize-bean intercropping patterns, increases labor and land use efficiency and reduces soil degradation due to reduced soil nutrient mining and soil erosion



Research shows maize-bean intercropping systems improve food, nutrition and income security of smallholder farming households

What is the problem?

Excessive monocropping depletes soils and threatens food security

A need to feed a rapidly increasing population has forced around half of all Ugandan smallholder farmers to engage in continuous maize monocropping. They commonly grow maize one season after another on the same piece of land. Continuous monocropping without proper land management, such as judicious crop rotations, soil and water conservation etc, leads to soil degradation and consequently poor soil fertility

and productivity. Soil nutrient loss in Uganda is estimated at 87 kg nutrients per hectare per year. The situation is made worse because extension services are inadequate and even if there were extension messages against continuous monocropping; more than 50% of farmers do not follow the relevant extension advice.

What solutions were identified from research?

Intercropping improves productivity, food security and nutrition

In 2012, the International Maize and Wheat Improvement Center (CIMMYT) introduced the Sustainable Intensification of Maize-Legume Cropping Systems for Food Security in Eastern and Southern Africa (SIMLESA) project in Uganda to increase smallholders' food and nutrition security, and income levels. This was achieved by integrating sustainable intensification practices such as conservation agriculture for increased productivity and protection of the environment. Among the Conservation Agriculture-based Sustainable Intensification (CASI) practices promoted was intercropping. Farmers with technical support from multidisciplinary researchers evaluated different maize-bean intercropping patterns in order to establish the optimum in terms of land and labor use efficiency, grain yield and economic returns.

SIMLESA research in Uganda indicated optimum maize-bean intercropping patterns included:

- Two maize rows with one bean row in between
- One maize row with one bean row within the maize row

In all trials, intercropping did not impact maize yield, that is, there were no significant yield differences between maize planted as a sole crop compared to maize yield in all maize-bean intercropping patterns. Because there was no yield penalty, and given the additional bean harvest and lower labour costs, farmers overwhelmingly confirmed the increased economic returns from intercropping maize and beans as opposed to monocropping.

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Intercropping maize with beans has increased farm outputs as we are able to harvest both crops from one field and in one season, while using the same labor as before”. Daniel Kato, smallholder farmer and chairperson of Wantabya East Farmers' Group, Wabinyonyi sub county, Nakasongola District.

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From the results of the field agronomic trials, optimum intercropping patterns were then promoted, targeting mainly rural smallholders.

Intercropping increased labor and land use efficiency and reduced soil degradation due to reduced soil nutrient mining and soil erosion. Ultimately, the maize-bean intercropping system improved food, nutrition and income security among smallholder farmers.

	2 maize rows: 1 bean row in between	2 maize rows: 2 bean rows(in between)	1 maize row: 1 bean row (within the maize row)	2 maize rows + 1 bean row (within the maize row): 1 bean row (in between)	T5: maize alone
Attributes	Easy to establish	Easy to establish	Easy to establish	Difficult to establish (need more labor)	Easy to establish
Maize yield (kg/ha)	5,942	5,703	5,601	5,486	5,702
Bean yield (kg/ha)	257	151	277	125	
Combined revenue from maize and beans (USD/ha)	1,317	1,189	1,264	1,128b	1,075



Maize-legume inter-cropping improves food, nutrition and income security while regenerating soils



Opportunities for policy action

Mainstream maize-legume intercropping in extension service messaging

Given the benefits of maize-legume intercropping, there is need to produce widely accessible extension modalities. These would include:



Farmer manuals in local languages, including a module on optimal intercropping patterns, that can be disseminated at community meetings.



Use of existing mass media campaigns to pass on the messages on the benefits of intercropping for smallholder farming.



Sponsoring a network of maize-legume intercropping demonstrations in local communities.

The process used by SIMLESA applied adaptive research conducted at experimental stations then replicated in local communities. The deep reach into the participating communities was enabled by the implementation of demonstrations and Agricultural Innovation Platforms. This illustrates the opportunity to integrate similar processes in Uganda's rural community development agenda and organize public and private funds to support large scale and long term demonstrations.

Why act now?

Continuous monocropping is an unsustainable agronomic practice that damages soils and threatens overall food security. Monocropping is not part of a climate-resilient farming system, Ugandan farmers need to produce more food despite increasing erratic rainfall and dry spells.

Crop diversification through maize-legume intercropping and rotations is important to break pest disease cycles and fix atmospheric nitrogen, thus contributing to sustainability. Ensuring Uganda's smallholder farming systems do not practice unsustainable mono-cropping is critical to the environmental and economic health of the entire production system.

References and sources

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