

Practice Note 3: Three Sister System

Research on the three sisters system

The three sisters system, otherwise known as the Milpa system, originating from Central America, is a system combining three different crops in a space saving, multi-story, complementary and highly production intercropping system. The main crops, or three sisters associated with the system as maize (*Zea mays L.*), climbing bean (*Phaseolus spp.*), and pumpkin (*Cucurbita pepo L.*). The three sisters are compatible with each other, in that they each provide a function, sustaining the production of the other two sisters.

In the EaTSANE project, researchers selected the three sisters system as a viable option for both research areas in Kapchorwa, Uganda and Teso South, Kenya as the crops used are actively planted and consumed. The three sisters were integrated in field trials of the Three Food Strata System (TFSS), and were used as demonstration plots for the training initiatives with farmer groups in the project area (see practice note 2). In the TFSS system, the three sisters were planted in the core area crop in the TFSS system.

Description of the three sisters system



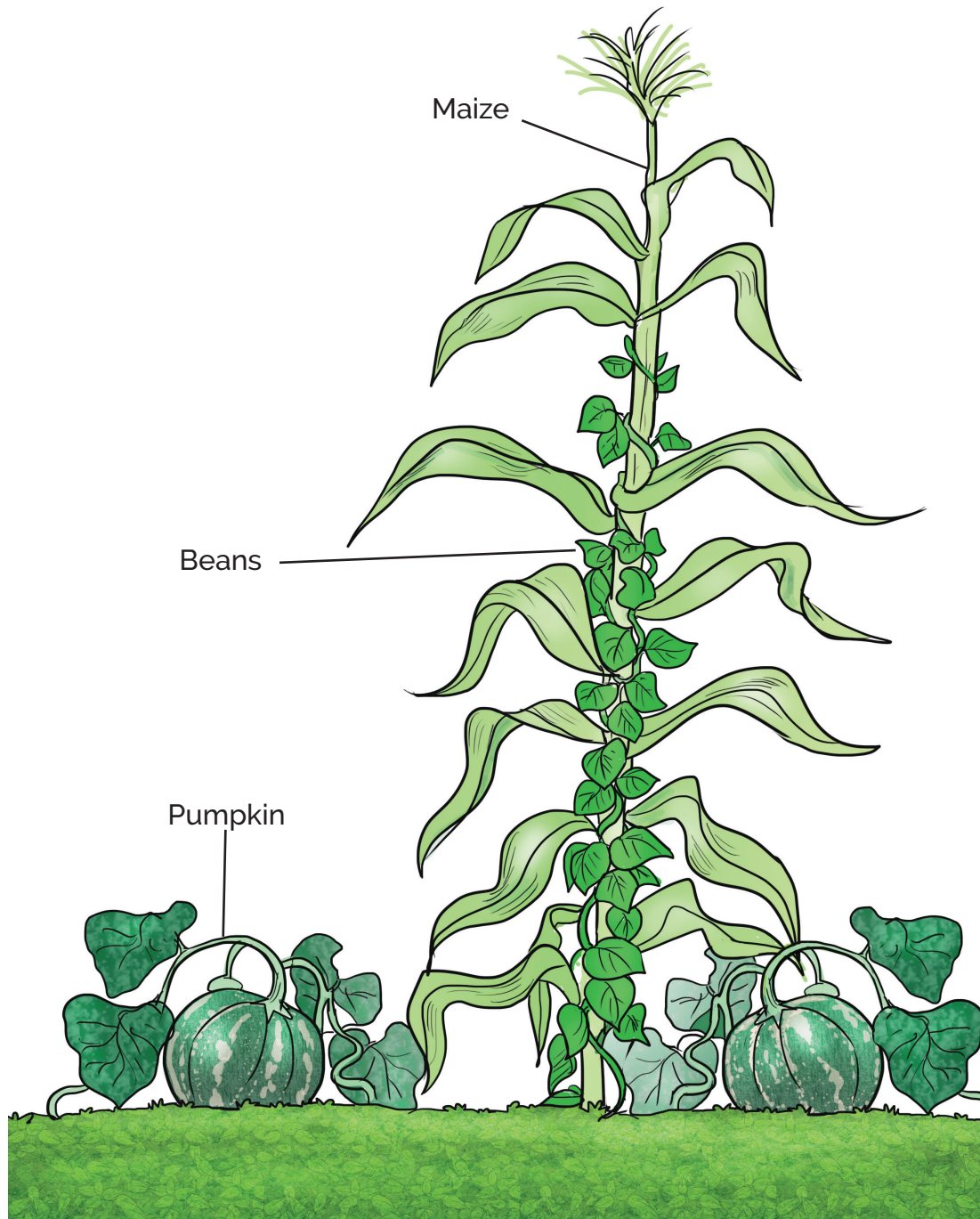
Two examples of the three sisters system as planted in Kapchorwa, Uganda on the demonstration plots of the EaTSANE Project. Photos by Jeninah Karungi Tumutegyeize .





Maize is the base of the system and is planted first in the system. It provides the growth structure for the climbing beans to attach too, therefore eliminating the need for poles. The climbing beans, planted second, being a leguminous species, fix nitrogen in the soil, and therefore provide the other two sisters with nutrients. Pumpkin, planted last, is a creeping plant with large leaves, therefore providing a cooling mechanism and increasing the water retention of the soil.

Benefits of the three sisters system



The three sisters system provides the opportunity to plant three different crop types on one field, thereby maximising land use for production. Agronomically, using the three different crops makes sense, particularly when including climbing beans as a means for fixing nitrogen.





In terms of human nutrition the three sisters system is highly beneficial as it (under the correct management) can cover four different food groups. Maize grain itself is considered a staple crop in both project areas, and provides the consumer with energy. Beans are a legume and provide protein. Pumpkin, can be used in two ways, and can provide consumers with the fruits (rich in vitamin A), as well as with the leaves, which are classified as micronutrient rich green leafy vegetables.

Practical aspects of the three sisters system

The three sister system functions best with time staggered planting, and were implemented in the EaTSANE project by farmer-researcher teams. Maize is planted first, as it functions as the main structural element for the climbing bean. After a time period of 2-3 weeks, or when the maize has reached about knee height, the climbing beans are planted. One and a half weeks after planting the beans, the pumpkin is planted. The pumpkin is last, so that the large leaves do not shade any developing plants.

Material	Planting time	Planting	Spacing in and between rows
Maize	–	Planting depths 5 cm; 2 seeds per whole*	30 cm in the row, 75 cm between rows
Climbing Beans	2-3 weeks after maize	Planting depth 3 cm; 2 seeds per whole*	7-10 cm from maize, 30 cm between bean
Pumpkin	3.5 – 4.5 weeks after maize	Planting depths 3 cm; 2 seeds per whole*	100 cm between plants; 20 cm from maize

* thinning required

To maintain a constant yield, the crop residues of all crops, and particularly the climbing bean should be composted or mulched, and re-integrated into the field. Fertilisers should be added as required by the cultivars used.

The implementation of the three sisters system supplied a new method for farmers in the region as it is currently not a common practice in either research area.



About the EaTSANE project

The EaTSANE project is an interdisciplinary research project on diversified agriculture, nutrition, and value chains, implemented by research and development institutions from Kenya, Uganda, Germany and the Netherlands in the period from 2018 until 2021. The main objectives are to develop more sustainable farming practices and improve diets of households in Teso South, Kenya and Kapchorwa, Uganda by diversifying the food system with a participatory action research approach. The research teams identified practical implications across the project activities, which led to a set of practice notes.

Further Reading and Training Material

On the EaTSANE website, further presentations and research results on the TFSS in Kenya and Uganda can be found: <https://www.eatsane.info/publications>



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