How a mix of old and new techniques produced a superior maize harvest in a dry part of South Africa

August 19 2024, by Abeeb Babatunde Omotoso and Abiodun Olusola Omotayo

Credit: Pixabay/CC0 Public Domain

New research into rural small-scale farms in South Africa's North West

province has found that climate-smart farming techniques lead to a better maize yield, a more regular supply of food for the farmers, and a wider variety of crops.

Small-scale farmers often produce primarily for their own consumption, but many also sell produce in local markets. Because small-scale farmers rely on their crops both to survive and as their only form of income, they are particularly vulnerable to the impacts of climate change.

Some of the climate-smart techniques being successfully used are:

- planting drought-tolerant maize seeds (a new variety of maize that grows well even when there is a drought)
- mulching (covering the soil with a layer of leaves or bark to keep the moisture in)
- cover cropping (planting grasses or legumes between the main crop to nourish and protect the soil)
- mixed cropping (growing two or more crops together to repel pests)
- zero tillage (placing mulch over the soil and planting seeds in that layer instead of digging beds).

The North West province of South Africa has a semi-arid climate with hot summers and mild winters. More frequent and intense droughts and unpredictable rain have created an unstable environment. Traditional farming practices have become less reliable, underscoring the urgent need for adopting climate-smart agriculture.

Across South Africa, rural small-scale farming families are very vulnerable to climate change. They do not own expensive irrigation systems. These days, rains are often delayed. This means the small-scale farmers can no longer plant as early as they used to. This affects growing seasons and reduces their crop output, creating food insecurity in their households.

We are agricultural economists who research how climate-smart agricultural practices can make small-scale farmers more productive and resilient.

As our findings show, adopting certain agriculture practices helps mitigate climate impacts. It also leads to increased food availability and a more diverse range of foods, enhancing overall food security for rural farmers.

Maize is an important crop in South Africa. Tens of millions of people eat 5.2 million tons a year of this staple food, which provides essential nutrients and forms a significant part of their diet.

The study

We interviewed more than 300 small-scale maize farmers from 30 rural communities across the North West province, which borders Botswana. We asked them what farming practices they had used during the 2022 and 2023 agricultural seasons.

Our research found that they'd started adapting their farming to climate change since 2010, based on their Indigenous knowledge of how to cope with droughts, storms and changes in the climate, how to conserve water, protect the soil, and how to introduce new crops.

In 2011, South Africa released the National Climate Change Response

White Paper. As part of this, climate smart agriculture was integrated into agricultural policies and programs run by agricultural scientists, non-governmental organizations, and government agriculture extension services in the study area. This specialist advice plus the farmers' grassroots solutions evolved into the climate-smart agriculture they practice today.

This synergy is an important part of helping small-scale farmers adapt to climate change because, ultimately, the individual farmer's unique perception of climate change determines what farming practices they choose to implement.

What we found

We found that 86% of the farmers interviewed (or 272 farmers) had adopted climate-smart agriculture. As one farmer said,

"The weather used to be more predictable, and we knew when to plant and harvest. However, the rain comes late or not at all. I've had to change how I farm through trying new seeds and planting techniques… It's not just about growing food; it's about adapting to the new reality we face."

That the majority of farmers began adapting to climate change on their own highlights their ingenuity and resilience and shows that small-scale maize farmers can farm while the climate changes.

The farmers who adopted climate-smart agriculture had more maize to consume than farmers who had stuck to ordinary farming methods. They harvested around 6.2 tons of maize per hectare per year, earned about R15,000 (US$824) per hectare from selling their maize, and sold 4.1 tons of maize per year.

The farmers who stuck to ordinary farming methods harvested 3.9 tons

per hectare, sold 2.7 tons of maize, and earned about R11,500 (US$632) per year. The 30% improvement in earnings for farmers who use climate-smart agriculture is meaningful and transformative. Small-scale farmers often operate on thin profit margins. A 30% improvement in earnings provided these farmers with economic stability, the chance to re-invest the money in their farms, and improved livelihoods.

The benefits of climate-smart agriculture

Enhanced soil health: Practices like cover cropping and using organic fertilizers improve soil structure and fertility. This leads to more crops for harvesting.

Environmental sustainability: Climate smart agriculture includes conservation agriculture (combining intercropping, mulching and zero tillage) and agroforestry (planting trees and bushes with crops). These store carbon and reduce greenhouse gas emissions from farming activities, contributing to environmental sustainability.

Improved food security: With more diverse farms came additional food and income sources. This reduced the farmers' dependence on a single crop. It improved their resilience to climate shocks. This diversification can also buffer farmers against the risks of crop failure.

Increased productivity: We found that climate-smart agriculture in the North West province improved soil health (helping the soil retain water), water management and pest control. This meant that farmers could continually rely on their crops doing well.

Economic benefits: Switching to climate-smart agriculture, which is nature based, meant the farmers reduced chemical inputs such as pesticides. This saved them money. Climate-smart agriculture practices can open up opportunities and new markets for eco-friendly products,

providing additional income for farmers.

Why government and stakeholders should make changes

The government must provide support through extension services (agricultural specialists who visit farmers with advice and training, such as on the use of climate forecast services).

The government should also provide small-scale farmers with financial incentives to switch to climate-smart agriculture now. Agricultural co-operative societies must become stronger so that all small-scale farmers have access to climate-smart agricultural equipment.

Government policies should be geared towards climate-smart agriculture and include community engagement. Academics and government departments can also work with small-scale farmers on researching new ways for these farms to produce more crops.

Through this, South Africa can build more resilient and sustainable agricultural systems. These will secure the livelihoods of maize farmers in the face of climate change.

Provided by The Conversation

Citation: How a mix of old and new techniques produced a superior maize harvest in a dry part of South Africa (2024, August 19) retrieved 19 August 2024 from https://phys.org/news/2024-08-techniques-superior-maize-harvest-dry.html