

CLIMATE-SMART AGRICULTURE

Using seasonal forecasts to support farmer adaptation to climate risks

Over the last two decades, seasonal weather forecasts have become more accurate and timely in sub-Saharan Africa. This creates new opportunities to support smallholder adaptive responses to average and extreme climate events, such as the ones induced by El Niño–Southern Oscillation (ENSO). Seasonal weather forecast information reduces uncertainty and can help farmers make better decisions on production strategies that are most suitable for the prevailing weather conditions.

This brief explores two interrelated questions:

1. Do farmers change their production strategies in response to receiving seasonal weather forecasts?
2. What additional factors can improve smallholder responses to forecast information?

The brief uses a unique set of data from Zambia collected from smallholders before and after the 2015/2016 ENSO event, which was widely anticipated by regional and global forecast services to contribute to dry conditions in southern Zambia and an overall shorter growing season.

Information on upcoming weather conditions can induce adoption of related technologies

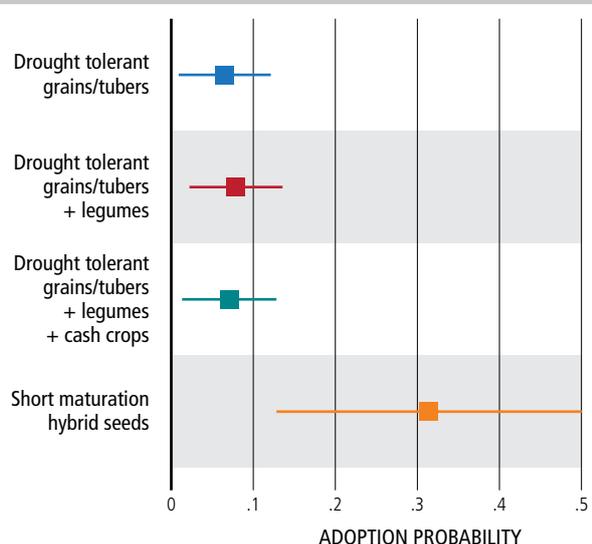
Access to weather information remains limited among farmers in Zambia; only 21 percent of farm households received seasonal weather forecasts before 2015/16 agricultural season. Farmers that received seasonal weather forecasts are more likely to change their farming practices, and shifted toward cropping systems and seeds best suited to the seasonal forecast information received (see Figure 1).

In Zambia, farmers receiving seasonal weather information in areas projected to experience low rainfall and a shorter growing season integrated drought tolerant crops into their cropping systems, such as small grains (millet and sorghum), tubers (e.g. cassava and sweet potato), hearty legumes

KEY MESSAGES

- ▶ Farmers receiving seasonal weather forecasts are more likely to adopt cropping systems and seed varieties that are adapted to the expected weather conditions, yet access to weather information remains limited.
- ▶ Access to competitive private markets increases the probability that a farmer will adopt drought tolerant cropping systems and improved seeds in response to an adverse seasonal forecast.
- ▶ Policies that attract private investment in smallholder markets can improve farmers' adaptive response to anticipated weather events.

FIGURE 1. Farmers receiving drought-related forecasts act upon the information received, Zambia



Source: FAO, Economic and Policy Analysis of Climate Change (EPIC) team.

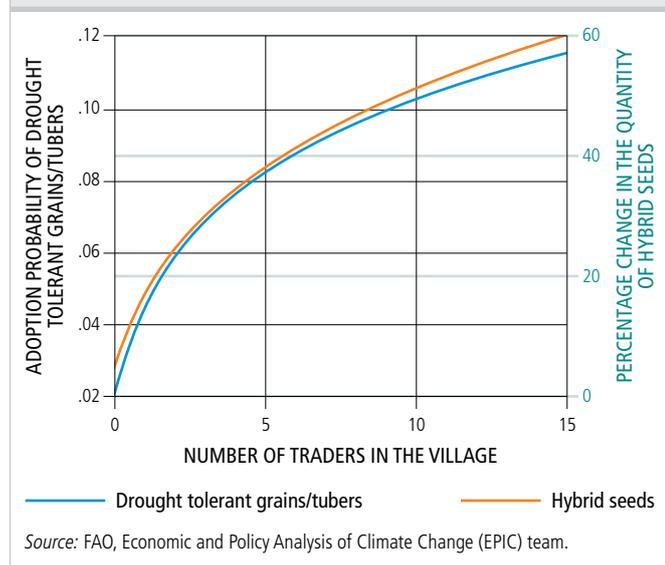
(e.g. pigeon pea and cow pea) and drought resistant cash crops (e.g. cotton). For households receiving seasonal forecast information on the ENSO-induced drought, the probability of adopting a drought tolerant cropping system increased by about 7 percent for every 10 days of forecasted low rainfall in the area where the farmer resides. Furthermore, these farmers were also more likely to adopt hybrid seeds, which have shorter maturation lengths than most traditional maize seeds.

Private market institutions complement weather information and support farmers adaptation

Even though seasonal forecasts do induce a change in farmers' cropping systems and seed choices, the effect of forecast information is enhanced by the existence of competitive private markets. In Zambia, households receiving drought-related seasonal weather forecasts and residing in villages with many private traders have statistically higher probability of adopting drought resilient cropping systems and improved seeds than households receiving the same information but residing in area with few traders (see Figure 2). Farmers with access to private markets are also likely to purchase significantly more hybrid seeds.

However, there are diminishing returns to market competition. Once the number of private traders in a village exceeds five, the marginal effect on farmers' adaptation behavior reduces.

FIGURE 2. Private markets enable farmers to adapt strategies to seasonal weather forecasts, Zambia



Policy options to promote seasonal forecasts adaptation

To improve farmers' adaptive capacity to adverse weather conditions, the following policy recommendations can be considered:

- ▲ **Improve access to seasonal forecast information.** Receiving seasonal forecast information does lead to an adaptive response by farmers. Therefore, increasing the share of farmers that receive this information is an important first step in supporting farmers to adapt to climate change. Extension services have a decisive role to play in channeling regional and downscaled climate projections into information that is accessible and comprehensible to farmers. The communication of seasonal weather forecasts should be accompanied by complementary agricultural support, including information on cropping systems and technologies more suitable for the expected weather conditions.
- ▲ **Increase private investment in agricultural output markets.** Policy predictability, including predictability related to agricultural trade, input subsidies, and food price stabilization instruments, is critical for stimulating private investments in input and output markets. Enhancing the predictability of government actions and policies is therefore critical for fostering private investment in agricultural markets. In addition, increased public investment in road infrastructure, and soft and hard market infrastructure, including storage and market information systems, can help facilitate market participation by farmers.
- ▲ **Reforming subsidy programs to enhance farmers' adaptation.** Advancements in mobile payment technologies and increased mobile data coverage create new opportunities to link input subsidies with seasonal forecast information and to stimulate greater private investments in rural areas. The use of conditional and/or unconditional electronic input vouchers, which are redeemable from private input suppliers, is an example of potential reforms to consider. Distributing vouchers along with seasonal forecast information and crop recommendations may enhance the effectiveness of both the vouchers and the seasonal forecast information.