## GROWING SEASON

### This lasts 180 to 270 days during the rainy season, which is the end of April through July

- A shorter rainy season takes place in September and October, while the dry season takes place from the end of October to March.
- Average temperatures range from 68 to 77 degrees Fahrenheit on the cooler side, to 86 to 94 degrees Fahrenheit on the warmer side.
- Rainfall averages between four and eight inches per month.
- Frost is not relevant to farmers in West Africa.

## RECENT HISTORY

### West Africa has encountered several regional agricultural challenges in recent years:

- In September 2012, a monsoon triggered heavy rainfall and flash floods, devastating farms – more than 7,000 farms were flooded.
- In 2012, swarms of invading desert locusts threatened agriculture in parts of West Africa.
- Various species of stem borers are the most devastating pests affecting corn in West Africa. They can cause 20 to 40 percent losses during cultivation and 30 to 90 percent losses postharvest and during storage. Other pests in West Africa include ear borers, armyworms, cutworms, grain moths, beetles, weevils, grain borers, rootworms and white grubs.
- Corn diseases in West Africa include downy mildew, rust, leaf blight, stalk and ear rots, leaf spot and maize streak virus (MSV).

## CLIMATE CHANGES

Floods, drought and rising sea levels are some of the environmental impacts of climate change in West Africa. In fact, Africa is becoming the most exposed region in the world to the impacts of climate change – dry areas will become drier and wet areas will become wetter. Crop failures are possible and will affect agriculture harvests. Because agriculture contributes to 30 percent of Africa's Gross Domestic Product ( GDP), and agriculture is mostly rainfed and highly susceptible to climate variability, the continent often sees swings in annual GDP that exceed 30 percent.

## ECONOMICS

While corn commodity prices in West Africa (Nigeria) in 2013-2014 were $23.28 USD per bushel, you grow corn to feed your family and likely cannot afford to sell any bushels. Additional challenges may include: limited technology and dependency on family help only (if family members should fall ill or need to attend school, you will have a difficult time keeping up with your farm).

SCENARIO INFORMATION

# *West African*
# FARMER

You are a West African farmer who is likely to encounter severe drought, have limited access to advanced farming technologies, and must support your family on three acres of land. The bushels of corn you yield goes towards your family's food supply.

| REGION | ACREAGE | TARGET AVERAGE YIELD | BUDGET |
|---|---|---|---|
| *West Africa* | *3 Acres* | *76.5 Bushels/Acre* | *$150* |

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# TECHNOLOGY MARKETPLACE

| | OPTIONS | TECHNOLOGY AVAILABLE |
|---|---|---|
| PLANTING | SEED CHOICES (One seed option required) | Open-Pollinated |
| | | Hybrid |
| | PRECISION AGRICULTURE | None Available |
| | NEW PLANTING EQUIPMENT | Rent A Small Planter/Tractor |
| | | Extra Manual Labor |
| CROP MANAGEMENT | COVER CROPS | Not Available |
| | IRRIGATION SOLUTION | Rent A Jet Pump |
| | SOIL MANAGEMENT | Synthetic Fertilizer |
| | CROP PROTECTION | Manual Labor (Option to purchase multiple days) |
| | | Insecticide (Comes with three applications) |
| | | Herbicide (Comes with three applications) |
| HARVEST | NEW PLANTING EQUIPMENT | Manual Labor |
| | | Storage: Not Available |

| | COSTS | EFFECT ON YIELD % |
|---|---|---|
| The open-pollinated seeds are untreated and unselected, meaning there are no built-in protections or benefits to the seed variety. Because open-pollinated seeds can be saved from growing season to growing season, there is no cost associated with using these. | FREE | |
| This hybrid variety can help preserve yield potential in limited water conditions. This will increase your yield significantly compared to using open-pollinated seeds. | 50% | 50% yield increase if purchased |
| West Africa does not currently have precision agriculture options available, like data science equipment, software, precise planting equipment, etc. | | |
| By renting planting equipment, you'll be able to plant faster and work more efficiently. It takes about two hours to plant three acres. | 17% | 10% yield increase if purchased |
| Extra manual labor enables you to plant at a faster rate which will help you beat any weather delays resulting in a late planting. The result of better timing is an increase in the estimated average yield of your crops. | 30% | 5% yield increase if purchased |
| Because of the low acreage of farms, cover crops are not often used in West Africa. | | |
| Irrigation is a means of bringing in more water to your crops in the event of drought. The cost listed includes buying the irrigation system. | 17% | |
| Synthetic fertilizers are applied to soils or to plant tissues (usually leaves) and supply one or more plant nutrients essential to their growth. Most fertilizers increase nitrogen, and can help boost your overall yield. *Manure is a free, commonly used fertilizer in West Africa that may be available to you over the course of the growing season. | 60% | 25% yield increase if purchased |
| Manual labor can physically remove weeds in your fields, preventing your crops from competing with weeds for nutrients. You will need to hire labor each time you need weeds eliminated. | 10% | |
| Insecticide can help prevent insect infestation, as well as manage current infestations. One application can help manage one infestation. West African farmers typically spray three times. | 40% | |
| Herbicides can help prevent weed infestation, as well as manage current infestations. Weeds can compete with your crops for nutrients, resulting in a lower yield. One application will help manage one infestation. West African farmers typically spray three times. | 40% | |
| Extra manual labor will enable you to harvest at a faster rate — limiting risk of losing crops to elements and other benefits. | 30% | 5% yield increase if purchased |
| Unfortunately, you don't have an option to store your crops in protective infrastructure in West Africa, meaning your crops are susceptible to damage from insects. | | |