

# Farming for the future

How many people farm in the world?

What are the practices that the majority of global farmers use?

Nearly three fourths of all farms worldwide are less than one hectare (about 2.5 acres). Just over ten percent of all farms are between 2.5-5 acres. Only one percent of farms are over 125 acres. (<http://www.globalagriculture.org/report-topics/industrial-agriculture-and-small-scale-farming.html>)

In Ohio, the average farm size is 188 acres while the United States has an overall average farm size of 441 acres (USDA, 2015). Different methods of farming are used on the farms in Ohio and in the U.S., than are used in other countries of the world, particularly developing ones.

In this simulation students within a “village” make decisions about farming as it exists in some of those developing countries. Their production will be affected by events that are out of their control (i.e. government stability, weather events, education).

## Directions

1. Your village has 10 small fields to plant.
2. You must plant at least three different crops to ensure a variety of food types and at least two fields must be protein crops. Label the fields where you plant each crop on the *year 1 plot*.
3. Determine your yields based on the weather dice roll:  
1, 2, 3, 4 = dry year; 5, 6 = wet year
4. Use a pencil to fill out the worksheet.
5. Choose an *impact card*, read it aloud, and calculate impact losses. (Some impacts will affect all villages and some will affect only your village.)
6. Determine the effect of malnutrition based on your final total yield and the *Effects of malnutrition* chart.
7. Repeat activity for year 2 and year 3.

# Year 1

## Plot diagram

Label the plot diagram to show which fields are planted with which crops.


## Worksheet

Type/crops		Number of fields	Wet yield units	Dry yield units	Total
<i>Roots</i>	Yams		70	20	
	Cassava		40	60	
<i>Cereal</i>	Maize		60	30	
	Millet		30	60	
<i>Protein</i>	Groundnuts		50	30	
	Peas		50	30	
<b>Total yield</b>					
Impact loss (from card)					
Total yield after impact					
<b>Next year's loss from malnutrition</b>					

## Year 2

### Plot diagram

Label the plot diagram to show which fields are planted with which crops.


### Worksheet

Type/crops		Number of fields	Wet yield units	Dry yield units	Total
<i>Roots</i>	Yams		70	20	
	Cassava		40	60	
<i>Cereal</i>	Maize		60	30	
	Millet		30	60	
<i>Protein</i>	Groundnuts		50	30	
	Peas		50	30	
<b>Total yield</b>					
Impact loss (from card)					
Loss from last year's malnutrition					
<b>Total yield after impact</b>					
Next year's loss from malnutrition					

## Year 3

### Plot diagram

Label the plot diagram to show which fields are planted with which crops.


### Worksheet

Type/crops		Number of fields	Wet yield units	Dry yield units	Total
<i>Roots</i>	Yams		70	20	
	Cassava		40	60	
<i>Cereal</i>	Maize		60	30	
	Millet		30	60	
<i>Protein</i>	Groundnuts		50	30	
	Peas		50	30	
<b>Total yield</b>					
Impact loss (from card)					
Loss from last year's malnutrition					
<b>Total yield after impact and malnutrition loss</b>					

## Impact cards: years 1 and 2

<p><b>Normal harvest</b></p> <p>However, failure to rotate crops has lowered your yield. Cassava is very filling, easy to grow and does not require much water, but it depletes soil.</p> <p>Your village reduces units by 60 if you grew 2 or more fields of cassava.</p>	<p><b>Normal harvest</b></p> <p>However, “rust,” a plant disease, affects your village, reducing maize yields to 50 units for a wet year and 30 units for a dry year.</p> <p>Your village calculates the loss of maize yield.</p>
<p><b>Normal harvest</b></p> <p>However, your village’s food storage has become damp, causing rot in 25% of your yams.</p> <p>Your village calculates the loss in yam yield.</p>	<p><b>Flood</b></p> <p>River bursts its banks and since your village is located close to the river, your fields are flooded.</p> <p>Your village loses 50 units.</p>
<p><b>Normal harvest</b></p> <p>However, there has been political corruption in your village and a local government official has demanded you pay him with food units.</p> <p>Your village loses 40 units.</p>	<p><b>Global warming</b></p> <p>Temperatures have been rising steadily. Many seeds are temperature sensitive and will not germinate at higher temperatures.</p> <p>Each village loses 50 units.</p>
<p><b>AIDS</b></p> <p>Several working-age villagers have contracted HIV/AIDS, reducing the number of villagers available to grow crops.</p> <p>Your village loses 70 units.</p>	<p><b>Population growth</b></p> <p>More children were born in your village this year, requiring extra food to survive.</p> <p>Your village increases the “next year’s loss from malnutrition” line by 40 units.</p>
<p><b>Normal harvest</b></p> <p>However, the amount of food you have been producing allows you to sell some to other villages. However, there is not a road to take you to the nearest village.</p> <p>Your village loses 50 units that it could not sell.</p>	<p><b>Normal harvest</b></p> <p>However, the amount of food you have been producing allows you to sell some to other villages. You take your extra food to the market shared by your neighboring villages, but no one likes the flavor of the maize you grew. They prefer the flavor of an imported variety.</p> <p>Your village loses 30 units if you grew maize.</p>

## Impact cards: year 3

<p><b>Community well</b></p> <p>After several years of drought, a non-governmental organization (NGO) offers to work with your village to construct a well.</p> <p>Your village's yield increases by 60 units.</p>	<p><b>Biofortification</b></p> <p>Your village gets new seed that when grown provides more vitamins and minerals than what your current seed provides.</p> <p>Only 400 food units are now needed to prevent malnutrition.</p>
<p><b>Experimental field</b></p> <p>You plant a field of maize using compost and drip irrigation. The irrigation water is from a rooftop catchment system, since rain is your only water source.</p> <p>Your village gains 20 units for each maize field planted.</p>	<p><b>Digging ditches</b></p> <p>You spend several weeks digging contour ditches, which help conserve water and prevent soil erosion.</p> <p>Your village's yield increases by 30 units.</p>
<p><b>Rotate crops</b></p> <p>Your village decides to rotate maize and groundnut crops. Groundnuts enrich the soil with nitrogen, doubling the yield of your maize crops.</p> <p>Your village doubles its maize crop units.</p>	<p><b>Composting</b></p> <p>Your village decides to start using compost and can thus reduce the buying of expensive fertilizers.</p> <p>Your village saves money and is able to increase crop yield by 20 units</p>
<p><b>Literacy class</b></p> <p>Several people in your village join a literacy class and, now able to read the directions on a natural pesticide sack, they find you need less than you have been using.</p> <p>Your village gains 10 units because of the money saved on pesticides.</p>	<p><b>Health center</b></p> <p>A regional health center opens, providing primary and reproductive healthcare to all villages. The health center teaches reproductive health classes. After time, birth rates begin to stabilize and all villages require less food to survive.</p> <p>All villages revise the malnutrition chart so only 400 food units are needed to prevent malnutrition.</p>
<p><b>Farming collective</b></p> <p>All the villages form a collective to learn and share sustainable farming practices.</p> <p>Each village's yield increases by 50 units.</p>	<p><b>Agroforestry</b></p> <p>Your village has begun to plant trees to help provide fertilizer, fodder, firewood and fruit.</p> <p>Your village's yield increases by 40 units.</p>

## Effects of malnutrition

If food production falls below 450 units, your village will suffer from malnutrition and illness, affecting the residents' ability to work in the fields the following year. Use this chart to calculate malnutrition in your village based on the total food unit yield for each year.

Food units	Loss from malnutrition next year
450 and above	Lose 0 units
400–449	Lose 25 units
350–399	Lose 40 units
300–349	Lose 55 units
250–299	Lose 65 units
0–249	Lose 70 units

## Reflection

1. How successful were you at growing enough food for your village?
2. How is this simulation realistic? Not realistic?
3. What suggestions would you recommend to an NGO to provide for your village?
4. Describe 3 specific differences between this farming simulation and commodity farming as it is practiced in the United States.
5. What can the village learn from the United States?
6. What can the United States learn from your village?