1.0 Loading Screen

Presented By...



Notes:

- Other required logos or logo screens (e.g. for Unity) are acceptable

2.0 Welcome Screen



Welcome to the Green Revolution

This app supports the aim of <u>Engineers Without Borders Canada</u> to advocate for change and address the root causes of poverty by exploring the role of technology in global food security.

Please choose one of the following options:

BEGIN

LEARN MORE

SKIP TO ACTIVITY

(picture of wheat field)

- Other required logos (e.g. for Unity) are acceptable
- What is shown here and on all subsequent pages are for visualization purposes only and don't fully represent how the screen should look only what they should present
- The team may customize this and all screens as they see fit (e.g. font, style, colours, etc.)
- If possible, the **SKIP TO ACTIVITY** option should not be there until the user has completed the game at least once

2.1 Learn More Screen



The Green Revolution

Engineers Without Borders (EWB) volunteers deliver workshops like this one to elementary, high school, and university students across Canada. To explore workshop opportunities within the Greater Toronto Area (GTA), you can contact the Toronto Professional Chapter of EWB Canada.

Email

topro@chapter.ewb.ca

Website

https://www.torontopro.ewb.ca/

Facebook

https://www.facebook.com/EWBToronto/

LinkedIn

https://www.linkedin.com/company/ewb-toronto-professional-chapter

Facebook

https://www.facebook.com/EWBToronto/

Instagram

https://www.instagram.com/ewb.to/

Private Policy (will provide link at later date)

Notes:

- If possible or easy to do, you could use the images for the above sites with the links embedded

3.0 Introduction to the Green Revolution App Screen



Introduction

The Green Revolution Workshop introduces participants to the issues of agriculture & global food security, and the role new technologies can play in helping – or hurting – local farmers. By using this app you will simulate the life of a rural family, exploring new options to raise more crops and earn a better living. But beware! Not every new option is the best, and you will have to make good decisions to survive and earn the most money!

BACK

NEXT

Notes:

- Picture of farm or crops if there is room, but focus on legibility of words on the phone screen

4.0 What is the Green Revolution? Screen



What is the Green Revolution

The Green Revolution is a wave of mostly technological developments that spread to developing countries like Mexico, Brazil, China, and India starting in the 1940s which vastly increased crop productivity.

Click on the pictures to learn more about the technologies of the Green Revolution:

PICTURE OF SEEDS

PICTURE OF PESTIDCIDES

PICTURE OF FERTILIZER/SOIL

PICTURE OF TRACTOR

BACK

NEXT

Notes:

- Clicking on a picture should bring up a pop up screen OR lead to another page with the information and picture

4.1 High-Yield Crop Varieties Screen



High-Yield Crop Varieties

New versions of important crops such as wheat, rice, and potatoes were developed to provide more food and grow quicker than traditional varieties, but they require more water and fertilizers to achieve their full potential and are not as tough as their natural cousins.

(can have pictures of seeds, rice, potatoes, etc. depending on space)

BACK

- BACK button should go to 4.0 What is the Green Revolution? Screen
- No BACK button if this is a popup

4.2 Synthetic Pesticides Screen



Synthetic Pesticides

While natural substances like salts and plant compounds were used in the past to control or kill pests, man-made chemicals produced in large quantities since the 1940s were used and are very effective at eliminating insects. However, some pesticides were found to have negative effects on the environment, killing helpful insects like bees or even larger animals.

(can have pictures of crops being sprayed, crop dusters, locusts or other pests eating crops, etc. depending on space)

BACK

- BACK button should go to 4.0 What is the Green Revolution? Screen
- No BACK button if this is a popup

4.3 Synthetic Fertilizers Screen



Synthetic Fertilizers

Natural products like manure and compost can be used to make soil more fertile. Man-made fertilizers, on the other hand, provide nitrogen and other plant nutrients that plants can absorb directly. While synthetic fertilizers have been around since the 1800s, their use really took off after the 1940s. Ammonia from natural gas is used to produce fertilizers, and the process also creates carbon dioxide gas emissions.

(can have pictures of plant food, manure, soil etc. depending on space)

BACK

- BACK button should go to 4.0 What is the Green Revolution? Screen
- No BACK button if this is a popup

4.4 Mechanization Screen



Mechanization

While tools like ploughs and sickles have been used by farmers for hundreds of years, use of gasoline-powered tractors and other machines took off in the 1940s in North America and Europe and later in Asia and South America, completely replacing beasts of burden. While these machines are much faster than people or animals, they are more expensive and use lots of fuel.

(can have pictures of tractors, harvesters, and other farming machines, depending on space)

BACK

- BACK button should go to 4.0 What is the Green Revolution? Screen
- No BACK button if this is a popup

5.0 Positive Effects of the Green Revolution Screen



Positive Effects of the Green Revolution

The Green Revolution increased yields for crops such as wheat and rice, helping many people avoid famine. It also helped many farmers sell more crops which lifted them out of poverty.

Click on the portrait below to see a quote from Norman Borlaug, the "father of the Green Revolution" and 1970 Nobel Peace Prize winner.



BACK NEXT

Notes:

- Clicking on the portrait should bring up a pop up screen OR lead to another page with the information and picture

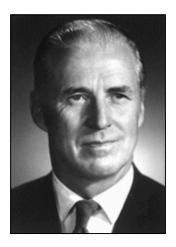
5.1 Positive Effects Quote Screen



"The Green Revolution is all about alleviating world hunger. The world's grain output in 1950 was 692 million tons. Forty years or so later, the world's farmers used about the same amount of acreage but they harvested 1.9 billion tons — a 170% increase!

We would have needed an additional 1.8 billion hectares of land, instead of the 600 million used, had the global cereal harvest of 1950 prevailed in 1999 using the same conventional farming methods."

Norman Borlaug



BACK

- BACK button should go to 5.0 Positive Effects Screen
- No BACK button if this is a popup



Negative Effects of the Green Revolution

Synthetic pesticides and fertilizers harm the natural environment and create greenhouse gases because they are made from natural gas and oil. Growing the same few crops reduces biodiversity and increases risks to disease and pests. Also, many poor farmers cannot afford these new technologies.

Click on the portrait below to see a quote from Vandana Shiva, physicist, feminist, writer, and 1993 "Alternative Nobel Prize" winner.



BACK NEXT

Notes:

- Clicking on the portrait should bring up a pop up screen OR lead to another page with the information and picture

6.1 Negative Effects Quote Screen



"The Green Revolution was supposed to bring Western technology to the aid of Third World Farmers. But instead of wealth, the new high yielding seeds brought poverty and environmental destruction.

The beneficiaries have been the agrochemical industry, large petrochemical companies, manufacturers of agricultural machinery, dam builders, and large landowners."

Vandana Shiva



BACK

- BACK button should go to 6.0 Negative Effects Screen
- No BACK button if this is a popup

7.0 Introduction to the Farming Simulation Screen



The Green Revolution Farming Simulation

Now that you have learned a little about the Green Revolution, it is time for you to see how these new technologies would have affected poor small-scale farmers. You will take on the role of a rural family in 1960s Punjab, India where new farming innovations have just been introduced. Your goal is to earn as much money as you can with whatever you start with!

BACK NEXT

Notes:

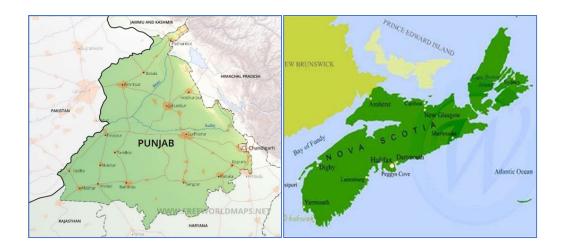
- A picture of farming can be placed here if there is room



Setting

Punjab is an northwestern state in India, about the same size as the Canadian province of Nova Scotia though 27 million people live in Punjab compared to the 1 million people that live in Nova Scotia!

Thanks to advancements from the Green Revolution in the 1960s, Punjab is known as the "Breadbasket of India".



BACK

NEXT

Notes:

- You can organize the page however you like as long as you can compare the map of Punjab and Nova Scotia



Starting the Simulation

To begin the simulation, you will need to select a family from the options below. Each family begins with a different number of adults (people over 12 years old), children (people age 0-11), and acres of land. However, all families start with the same amount of money (\$500).

Choose one of the families or click the RANDOM button below to begin the simulation:

Rama family - 3 adults, 4 children, 4 acres of land

Madhar family - 2 adults, 3 children, 3 acres of land

Gupta family – 5 adults, 3 children, 7 acres of land

Dhillon family – 2 adults, 1 child, 2 acres of land

Dulai family - 5 adults, 4 children, 2 acres of land

Grewal family – 6 adults, 4 children, 5 acres of land

Kohli family - 2 adults, 0 children, 1 acre of land

Aujla family - 2 adults, 4 children, 2 acres of land

Sandha family - 3 adults, 4 children, 6 acres of land

BACK

RANDOM

Notes:

- You can organize the families/buttons/information however you like to fit everything on screen

10.0 Year 1 (Tutorial) - Introduction Screen



Year 1 (Tutorial)

Welcome to the Green Revolution, (insert family name here) family! Here is your property in the Farm Screen, where your House, fields, and the path to the Market can be seen. Let's take a tour and learn how to be a farmer! If you have played before you can click Skip Tutorial to start the first year without any guidance.

Click on the HOME to learn more about your inventory:



BACK

SKIP TUTORIAL

NEXT

- Pictures used as reference only; feel free to use any valid art/artstyles, pictures, etc.
- You can run the tutorial in a different way if you feel that would be better; what is described here is for example purposes only



Year 1 (Tutorial) – Home Screen

The Home Screen is where you can find detailed lists of your family's assets. On the top left you can see the amount of savings your family has, the number of adults and children in the family, and how much wheat your family needs to survive for the year. The bottom left shows statistics for the year, including the weather quality (1/5 the worst and 5/5 the best) and the price of wheat. The right side shows your farming inventory, as well as if there are any discounts in the market for any of the tools.

Click on the FARM button to go back outside.



BACK

SKIP TUTORIAL

NEXT

- Pictures used as reference only; feel free to use any valid art/artstyles, pictures, etc.
- You can run the tutorial in a different way if you feel that would be better; what is described here is for example purposes

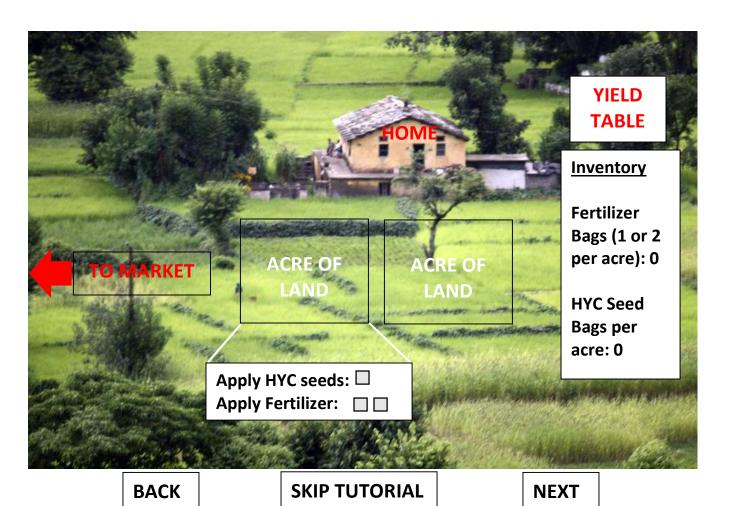
10.2 Year 1 - (Tutorial) - Farm Screen



Year 1 (Tutorial) – Farm Screen

The Farm Screen is where you will manage your fields and tend to your crops. If you click on an Acre of Land, a menu, a button and an inventory will pop up. If you have the needed supplies, you can customize that plot of land. High Yield Cultivars (HYC) are the new types of wheat seeds that can produce more bushels of wheat. You have to buy these seeds from the Market. If you don't have HYC seeds you will use native wheat seeds that you automatically save and are free to use. You can apply fertilizer to any seeds, and can apply one layer or two layers. Each Acre of Land has a separate menu, so you can customize each plot of land depending on your resources. If you buy more land, they will be shown in this screen.

Click on the YIELD TABLE button to continue.



Notes:

- If there is too much text, you can make it go sentence by sentence and click each time to advance the text, or scroll up and down for all the text

10.3 Year 1 - (Tutorial) - Yield Table Screen



Year 1 (Tutorial) - Yield Table

The Yield Performance Table will show you how many bushels of wheat you will grow based on the weather during the growing season, the amount of fertilizer you add, and the type of seeds used. Study this table well, because it represents your knowledge and intuition as a farmer.

Click anywhere outside of the table to close it, then click on MARKET to go to the market.

ġ.	Yield	Perf	ormance Ta	ble		na A		ta .	
		Yield [Bushels per Acre]							
dl (1) 50 25 50 4			No Fertilizer		Low Fertilizer		High Fertilizer		
			LR	HYC	LR	HYC	LR	HYC	
-	_	5	17	5	18	9	21	15	<u>rentory</u>
	Index	4	18	7	19	10	24	20	bewells: 0 bour: 4.0
101	Weather I	3	19	9	20	13	27	28	its rtilizer
		2	20	12	22	20	30	40	gs (1 or 2 r acre): 0
gen de		1	25	27		40	45	80	'C Seed
		4	Apply	rertilize				C 800000000000	gs per re: 0
The state of the s	BAC	K	ACTIVITY OF MAN	SKIF	P TUTOF	RIAL		NEXT	

Notes:

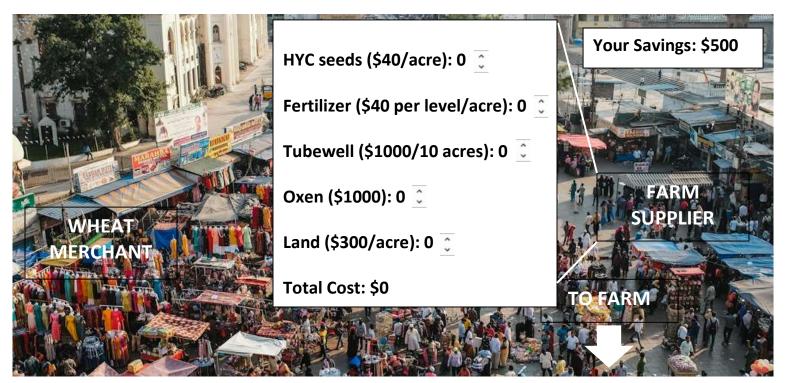
- This screen and button not needed if there is another way to show how much each acre of land will yield in a different way



Year 1 (Tutorial) – The Market

Welcome to the Market! You can sell (or buy) wheat from the Wheat Merchant and tools, seeds & fertilizer from the Farm Supplier. If you click on the Wheat Merchant, you can sell the wheat you've grown at the market price, or buy some wheat if you did not grow enough to feed your family. The Farm Supplier will sell you all the farm supplies you need, and you can see the prices as well as your savings. If there is a special event you may see different prices from the Farm Supplier.

Click anywhere outside of the menu to close it, then click on Farm to go back to the Farm.



BACK

SKIP TUTORIAL

NEXT

Notes:

- You are welcome to change this screen however you want to make it work better

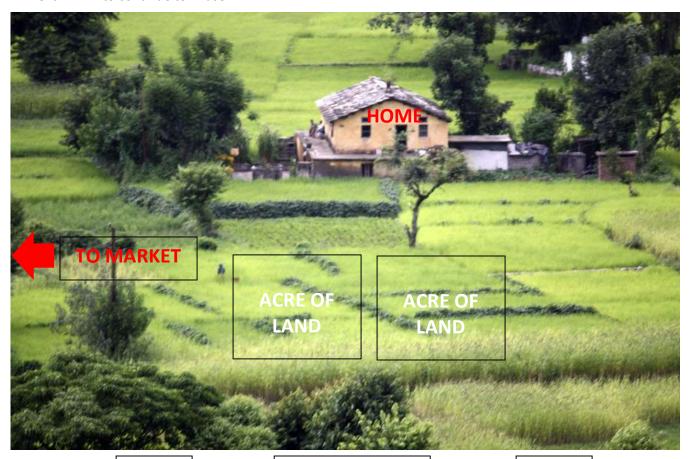
11.0 Year 1 (Tutorial) - The First Turn Screen



Year 1 (Tutorial) - The First Turn

Now that we have looked at all the menus and options, we can finally start the simulation! There are three phases to each year: Phase 1 – the beginning of the year (also called the growing season), Phase 2 – Harvest Season, and Phase 3 – Planting Season. In Phase 1 you will receive information about the new year and your crops will grow according to the weather. In Phase 2 you harvest and eat your crops, and in Phase 3 you can sell your extra wheat and buy supplies for your fields to grow more wheat.

Click NEXT to continue to Phase 1.



BACK

SKIP TUTORIAL

NEXT

Notes:

- Adjust text, pictures, buttons, etc. as needed

11.1 Year 1 (Tutorial) - Phase 1 Screen

Year 1 (Tutorial) – Phase 1



NEXT

Phase 1 is the Growing Season, when the seeds planted in the land grows. If any fertilizer, HYC seeds or irrigation was applied to the land in the previous year's planting season, they will take effect. Of course, none of these apply in the first year. Special Events will also be announced, though they will not happen in the first year.

In Phase 1, a pop up will appear telling you the Weather Index, Wheat Price, and Special Events for the year. The Weather Index is the quality of the weather for growing wheat, which is graded from 1 to 5 with 1 as the worst weather and 5 as the best weather. The Weather Index is decided at random. The Price of Wheat is how much you can sell or buy wheat for per bushel at the Market. There are a variety of special events which will happen at random (except for the first year of the simulation). If you have a tubewell and enough labour, you will be asked if you wish to irrigate each of your plots of land. Doing so will make it as if the weather for that plot a 5/5, or perfect weather, for each plot of land you decide to irrigate.

It is Year 1!

The Weather Index for the Growing Season is 4/5, great weather for growing wheat!

The Price of Wheat is \$3 per bushel.

No Special Events will happen this year.

LAND

LAND

Irrigate (0.5 units):

SKIP TUTORIAL

Notes:

BACK

- Adjust text, pictures, buttons, etc. as needed

11.2 Year 1 (Tutorial) – Phase 2 Screen

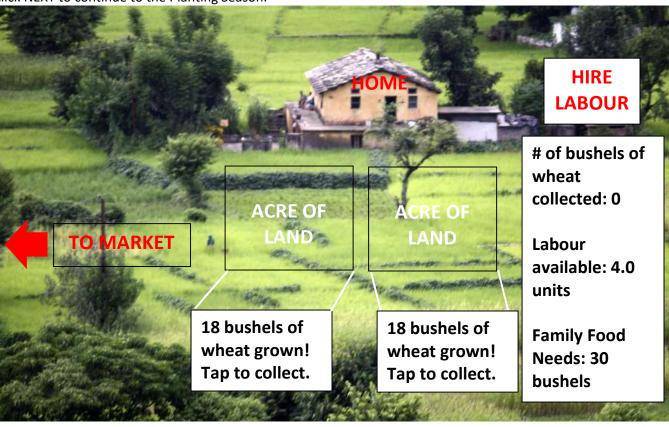


Year 1 (Tutorial) - Phase 2

Phase 2 is the Harvest Season, when the fully grown wheat is collected. You need enough labour to harvest the wheat. Each adult is worth 2 Labour Units, and it costs 1 Labour Unit to harvest land. If you need more labour you can hire more labour at a cost. Each ox you own will double the number of one adult's Labour Units, from 2 to 4. After you collect all the wheat some of it will be used to feed your family. If you harvest less wheat than your family needs to eat, there will be a deficit. You must buy wheat in Phase 3 or else one of your family members will die at the end of the year!

Once you collect all the wheat and your family has been fed, you can move onto Phase 3 where all the buying and selling will happen.

Click NEXT to continue to the Planting Season.



BACK

SKIP TUTORIAL

NEXT

- If there is more land than labour, should be popup or other method of warning player (e.g. red text, etc)
- Wheat will be sold in Phase 3

11.3 Year 1 (Tutorial) - Phase 3 Screen

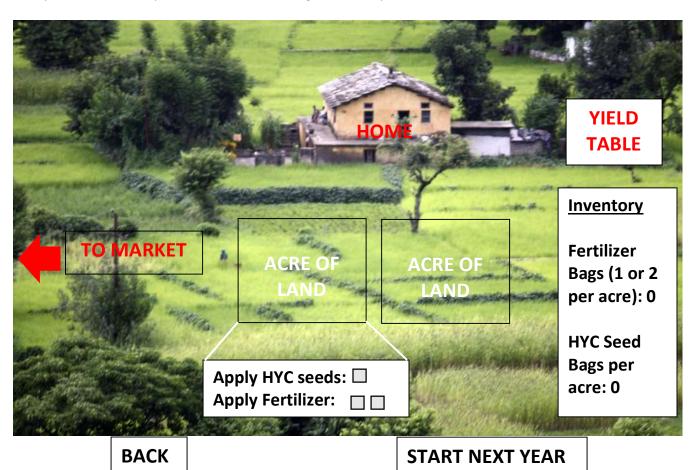


Year 1 (Tutorial) - Phase 3

Phase 3 is the Planting Season, when the harvested wheat can be sold (or bought) at the Market. You can also buy different products you might want to improve your crop yield. In this Phase you can freely switch between the Farm Screen, Home Screen, and Market Screen. Anything you buy in the Market will be stored in your inventory, which can be checked in the Home Screen. Click on each individual Acre of Land to decide what types of seeds (native or HYC) to plant and how much fertilizer to use (none, low level, or high level). You do not need to buy native seeds.

Don't forget, if you wish to buy or sell land this is the season to do it! And buy food if you don't have enough!

When you are finished tap START NEXT YEAR to begin the next year!



- User is free to explore, buy and sell, and use products. If you feel more guidance is needed here, when switching between screens pop ups from previous screens can be used.
- Add warning that there is unsold wheat and it must be sold before moving on

11.4 End of Tutorial Screen

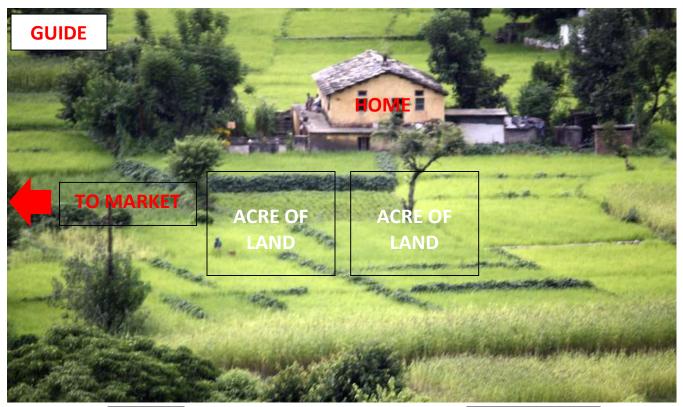


End of Tutorial

Congratulations, you have finished the tutorial and completed your first year as a Punjabi wheat farmer! You have another six years to earn as much money as you can by growing wheat. Remember that starting in the second year, special events can occur randomly. You could lose half of your harvest, have another child, or some tools might be sold at half price! Also, children will grow up depending on their age. An adult in this simulation is someone old enough to take care of the farm, which is 12 years old.

If you need more information you can tap on the GUIDE button to get help at anytime.

If you are ready to do more farming click NEXT PHASE to being the Growing Season of Phase 2!



BACK NEXT PHASE

Notes:

- Adjust text, pictures, buttons, etc. as needed



Gameplay Guide

The goal is to earn as much money as possible in 7 years of gameplay. You can customize each plot or acre of land by planting native or High-Yield Cultivar (HYC) seeds, and choosing to use no fertilizer, a little bit (low level) or a lot (high level) fertilizer).

A year goes by in the following way:

Phase 1 (Growing Season):

- The Weather Index and the Wheat Price will be announced at the start of the year.
- Crops grow according to the weather, seeds, and fertilizer for each plot of land. If you own a tubewell you can water crops so they will grow as if it were the best weather (5/5). You need 0.5 Labour Units to irrigate a plot of land. Also, see your Yield Table to learn more about how each type of seed performs.
- Special events may happen randomly in this phase and will last until the end of the year:
 - New Baby!: You get a new child, 0 years old.
 - o Pest Attack!: In this year's Phase 2 you will lose half of your crops.
 - HYC Seeds/Fertilizer Sold Out!: You cannot buy any HYC seeds/fertilizer during Phase 3.
 - o Relief Organization Visits!: Oxen at half price during Phase 3.
 - o Charity Organization Visits!: Tubewells at half price during Phase 3.
 - Robbed!: Lose \$50 from your Savings.
 - o Flooded Land!: Lose all crops from a random plot of land.

BACK

EXIT GUIDE

NEXT

BACK

NEXT PHASE

- Make the guide as long as you need, with multiple pages/screens
- You can add more events if they make sense and are not too confusing



Gameplay Guide

Phase 2 (Harvest Season):

- Wheat is ready to harvest from all plots of land. You require 1 Labour Unit to harvest a plot of land. Each adult is worth 2 Labour Units. If your family does not have enough labour to harvest all of your acres of land, you must hire more labour (\$100 per Labour Unit) or else you must leave your crops in the field to rot.

Phase 3 (Planting Season):

- You can sell (or buy wheat if your family could not feed itself from the harvest) wheat to the market at the Market Price announced in Phase 1.
- Products and tools are available for purchase from the Market. Tools can be sold to the Market at half price.
- You can also buy or sell land at the Market for \$300 per acre.
- Seeds and fertilizer can be applied to each plot of land separately. You can customize each plot of land to experiment with seed yields, or prepare each plot the same way.
- When you are finished preparing your land, you can advance to the next year which will begin at Phase 1 again.

The simulation will finish after 7 years, when the harvest is collected and sold. Your money, land, and all of your equipment (oxen and tubewells, but not seeds or fertilizer) will be combined and the total \$ value determined. That is your score. Try the simulation multiple times to get the best score!

BACK NEXT

BACK

NEXT PHASE

Notes:

- Make the guide as long as you need, with multiple pages/screens





Gameplay Guide

Family and Labour

- Your family consists of adults (who need 10 bushels of wheat/year and provides 2 Labour Units) and children (who need 5 bushels of wheat/year, but cannot work). Each person has a name and each child has an age. If the child reaches 12 years of age, he/she will become an adult and can work, but will also need more food.
- If the family grows less bushels than their yearly food requirements (see your Home Screen for details), wheat must be bought from the Market or your family members will starve.
- Labour is used for irrigation (0.5 Labour Units per plot of land irrigated) and for harvesting (1 Labour Unit per plot of land). An ox doubles the amount of labour from an adult, but each adult can only have one ox and an ox cannot be shared.

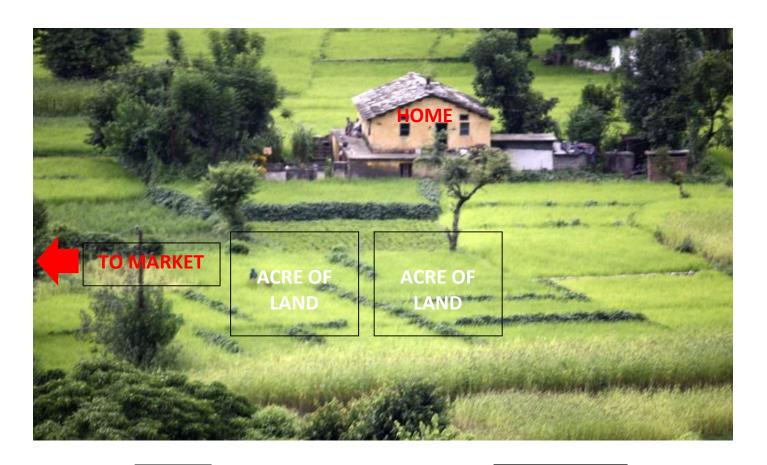
Seeds and Fertilizer

- There are two types of seeds: Native and High-Yield Cultivar (HYC). Native wheat has consistent and stable yields, while HYC wheat can produce large yields if taken care of properly. Native seeds are always available and do not need to be purchased. HYC seeds can only be used for one year, but can be stored if not used.
- Fertilizers can help crops grow and increase yields. They are applied at low and high levels, meaning you apply them to a plot of land once or twice. Fertilizers are sold by one application per acre. Like HYC seeds they are used for one year, but can be stored for later.
- Check your Yield Table to figure out the best combination of seeds and fertilizer.

BACK

NEXT





BACK

NEXT PHASE

- This page is not an actual screen, just a placeholder that represents the game being played
- The phases described in the tutorial will go in order from 1 to 3, for Years 2-6.
 - o If possible, after the first time the game is played, the SKIP TUTORIAL button will start the game in Phase 1 of Year 1 with no tutorial.
- For Year 7, Phase 1 and 2 will go on as normal.
- For Year 2, Phase 3 add a popup warning the player that Year 7 is the last year.

14.0 Year 7, End of Game Screen



End of Game

Congratulations, you have spent 7 years as a wheat farmer in rural Punjab, India! Let's see how well you did!



End of Year 7

Starting savings: \$500

Starting acres of land: 3 x \$300

Inventory

Tubewell: 0 x \$1000

Ox: 1 x \$1000

Acres of Land: 6 x \$300 Total savings: \$600

Total Assets: \$3,400 Starting Assets: \$1,400 Total Earnings: \$2,000

Congratulations, your family of (insert # of adults and # of children) earned \$2,000!



BACK

KEEP PLAYING?

NEXT

Notes:

- If saving scores is feasible, add SAVE SCORE button or just save automatically
 - o Add button to Welcome Screen to see past scores
- Hide KEEP PLAYING button (if infinite play is feasible) until after first time playing the game; want the player to answer questions to reinforce learning principles

_

15.0 Assessment Screen



Effects of the Green Revolution

Now that you have seen the effects of new technologies on rural farmers, please answer these questions to find out what you have learned about the Green Revolution. Tap NEXT to begin.

BACK NEXT

Notes:

- Add pictures of crops, farming, etc. if there is room

15.1 Assessment Question #1 Screen



Question #1

Which option best describes the Green Revolution?
☐ A) A war that was caused by people who hate vegetables
■ B) A period in the 20 th Century when food production dramatically increased due to the introduction of new technologies
C) An unexpected attack from Martians, also called "Little Green Men"
D) The rise in advertising concerning leafy foods and how they are healthy for you
BACK
Notes:
- Hide/gray out the NEXT button until an answer is chosen

- Answer is B)
- Popup when correct answer is tapped: Yes, that is correct!
- Popup when wrong answer is tapped: No, that is incorrect! Try again.

15.2 Assessment Question #2 Screen



Question #2

which of these helped crops produce much more food during the Green Rev	olution?
☐ A) New types of high-yield crops	
\square B) Chemical fertilizers and pesticides	
☐ C) Farming machinery such as tractors and harve	sters
☐ D) Smartphones and tablets	
□ E) A, B & C	
☐ F) All of the above	
ВАСК	NEXT

- Hide/gray out the NEXT button until an answer is chosen
- Answer is E)
- Popup when correct answer is tapped: Yes, that is correct!
- Popup when wrong answer is tapped: No, that is incorrect! Try again.

15.3 Assessment Question #3 Screen



Question #3

What were the negative effects of the Green Revolution?
☐ A) All vegetables lost their flavour
\square B) Pesticides and fertilizers harmed the natural environment
□ C) Some poor farmers became poorer when using technologies they did not fully understand
\square D) Too much food was produced
☐ E) None of the above

BACK

NEXT

Notes:

- Hide/gray out the NEXT button until an answer is chosen
- Answer is F)

□ F) B & C

- Popup when correct answer is tapped: Yes, that is correct!
- Popup when wrong answer is tapped: No, that is incorrect! Try again.

16.0 Thank You Screen



Great Job!

Thank you for using our app! We hope that you learned a lot from the simulation. Feel free to share this app with your family and friends to raise awareness about global food and hunger issues.

You can find this app on Google Play and the App Store for iPhone.

If you wish to run the simulation again, tap HOME to begin again.





BACK

HOME

- HOME button goes to Welcome Screen
- After this screen is reached, should be counted as having gone through the app at least once, and all buttons (e.g. SKIP TUTORIAL) are enabled