RED HOT CHILI PEPPERS

New Mexico
Supercomputing Challenge
Final Report
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Team 39
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Executive Summary

Our project is predicting if next year will be a good year to grow a chili crop. We will be looking at various different variables to determine if we will have a good crop. We wanted to find out how long it takes to grow chili and what is the right soil so it can grow. We are doing this project because chili is a source of income for people in New Mexico and we want to grow our own garden. Some of things we are researching are moisture levels, soil type, and weather patterns. All of these will determine if our chili crop will grow and produce an abundant amount. The program we used to simulate our project is Star Logo. In Star Logo we used bears and flowers program to start. We changed variables to simulate chili growth. By completing this project we hope to learn when and where to plant a successful chili crop.

Introduction

We chose this project because we wanted to grow chili in our town. We want to find out how chili grows. We also need to find out what soil is good for chili. We were not sure of the growing conditions so we wanted to research the topic and learn how to do it. All of our team members have had a garden in the past. Some of them were successful and others were not. We wanted to make sure that our gardens were successful. This is also a glimpse of what we can do in the future and study when we go to college.

This project is important because chili is a major source of income in New Mexico and we want to learn more about it. People depend on chili crops to support their families. It is necessary for farmers to predict the growing season. Things that farmers need to know are weather patterns, moisture, soil type, and temperature. The soil needs to be medium textured sandy loam. The temperature needs to be 75 degrees or higher. Chili needs 4 inches of water a week. However, if the water sits on the ground for 12 hours or more it will make the chili roots rot. If the roots rot the chili will not be good or it will die. Chili needs to be planted between March first and April first. The chili is harvested 120 days after planting. This relationship is illustrated in illustration 1.1.

Description

We began our project by researching the weather patterns, moisture and temperature in particular, for our state for the past 5 years. We also researched chili. We found that there are lots of different kinds of chili grown in New Mexico. The major chili region in New Mexico is the Hatch Valley. The kind of chili we are interested in is green chili. After we got all our data we looked at it and made our hypothesis. We hypothesized that next year would be a good year to grow chili. There has been a good amount of moisture in the off season, which prepares the land for planting. Also the temperatures for the growing season are predicted to be right on target for chili crops to thrive.

We are using Star logo for our simulation. We are using the program bears and flowers from Star Logo to start our simulations. When the bears, which we changed to rain drops, hit the flowers, which we changed to chili, they multiply. This simulates the chili plant receiving water and chili growing. Another factor of chili growth is the soil. The type of soil you are using for your crop determines how well it will grow, so we divided the land in half, where there is one half that is optimal soil and lets the chili grow. The other half is not as good and lets the chili grow, but not as fast. That simulates that you need the right kind of soil for chili to grow. As we ran the simulation the chili on the brown half grew quickly as it interacted with the water. The chili on the red side grew very slowly. You need several factors to be right in order for the chili to grow. We are just learning Star Logo so we weren't able to incorporate the temperature into the simulation. We know that you need a certain temperature as well for the chili to grow.

In star logo we did a test on the good soil (brown) and the bad soil (red) (graph 1.3), the way we did in star logo there are many things you can tell the chili to do, so we said in the brown soil you will grow more than if you are in the red patch. To make this equally matched we put half of space land red and the other half brown, still the brown soil (good soil) grew more chili. Also we had rain drops that were controlled by a monitor, so when it was all the way down to 0.0 there would be no rain drops and the chili would not grow. Then you know when we put the monitor on 20.0 there would be more rain drops so the chili would grow.

Conclusion

Our hypothesis was correct because the planting period was between March first and April first. During that time period we got a lot of moisture for the chili to sprout faster and become better. Now that the chili has had some moisture they will soon be able to be eaten. Our hypothesis was that it would be good year for chili to grow because of all the moisture we have had. We learned some new things like Chili needs to be planted between March first and April first. If the water sits on the ground for 12 hours it will make the chili roots rot. If the roots rot the chili will not be good or it will die. This will most likely happen when farmers are irrigating. So when they irrigate their crops they have to be careful not to put too much water and they have to make sure the soil absorbs the water in less than 12 hours or they will have to remove the excess water from their field themselves in order to avoid root rot. The chili is ready to be harvested 120 days after planting.

Results

The results of our project are we found out that it will be a good year to grow chili. The best conditions for chili to grow are in effect they are as follows: lots of moisture in the off season (winter, fall) and it should be warm during the growing season (spring, summer). We also found out that the right soil is a soil that is wet and has lots of good fertilization; bad soil is soil that is dry and is mainly just dirt. So we can by lots of chili and they won't die off.

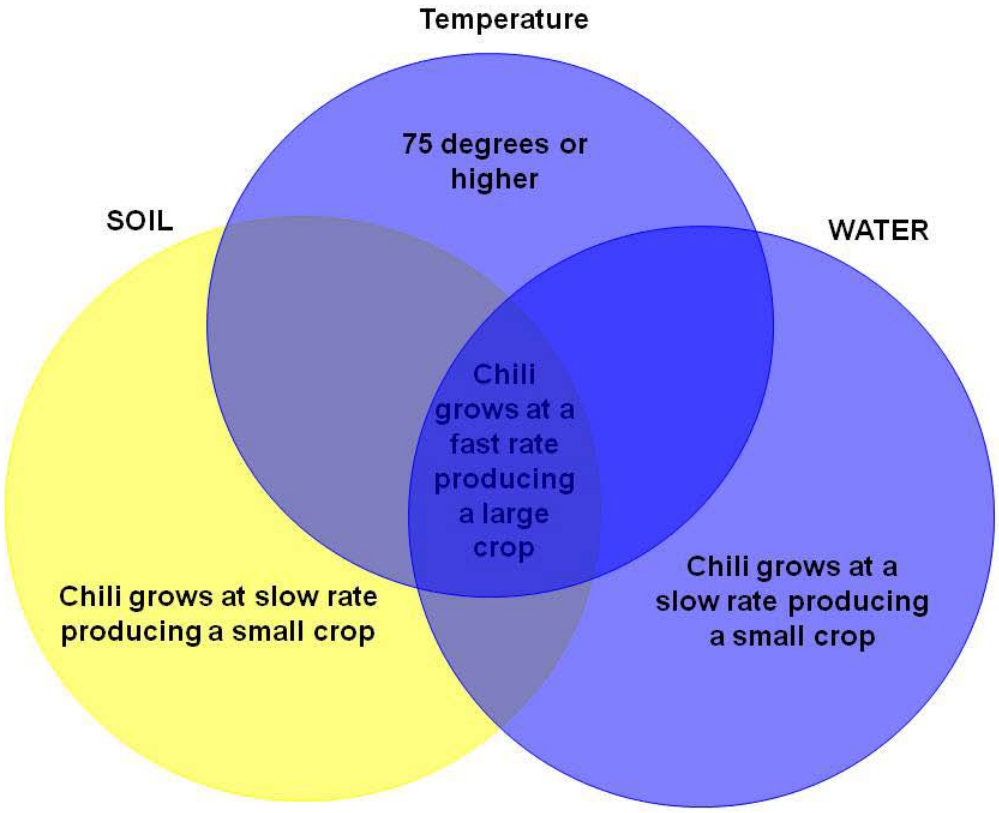
In our simulation Star Logo, we made a graph (1.2) which tells whether the brown soil is better than the red soil. The results came out to be that the brown soil grows more chili than the red that is because the brown soil has more precipitation and moisture. The brown soil meant it was good for chili to grow in and the red soil meant that it's fair soil. Every time the water would bump into the chili it would sprout and make more in the brown soil. In the red soil it would bump into the chili and it wouldn't sprout as much as in the brown soil. What we found out by using Star Logo is that if the chili has more precipitation, moisture, and soil with vitamins it grows better. What you need to grow a garden of your own is moist soil, warm weather and plenty of water.

Recommendations

If we were to do this project again we would add different simulations to Star Logo. One might be add the seasons and see how the chili is affected by the season change. You could do this by researching what season the chili grows best in. With this information you could have 4 seasons in the space land that has its own square and each one would be a different color (such as brown for fall, blue for winter, green for spring, and yellow for summer). When you do this you want to program the chili to grow more or less in a color depending on which season it grows best in, which you got from your research.

Graphs and Illustrations

Illustration 1.1 The relationship of all variables needed to grow chili



Graph 1.2 Data from Star Logo illustrated the growth of chili on good soil with sufficient water.

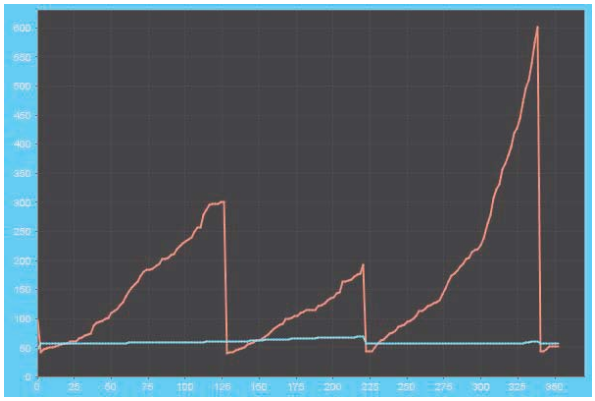


Illustration 1.3 Spaceland Star Logo simulation

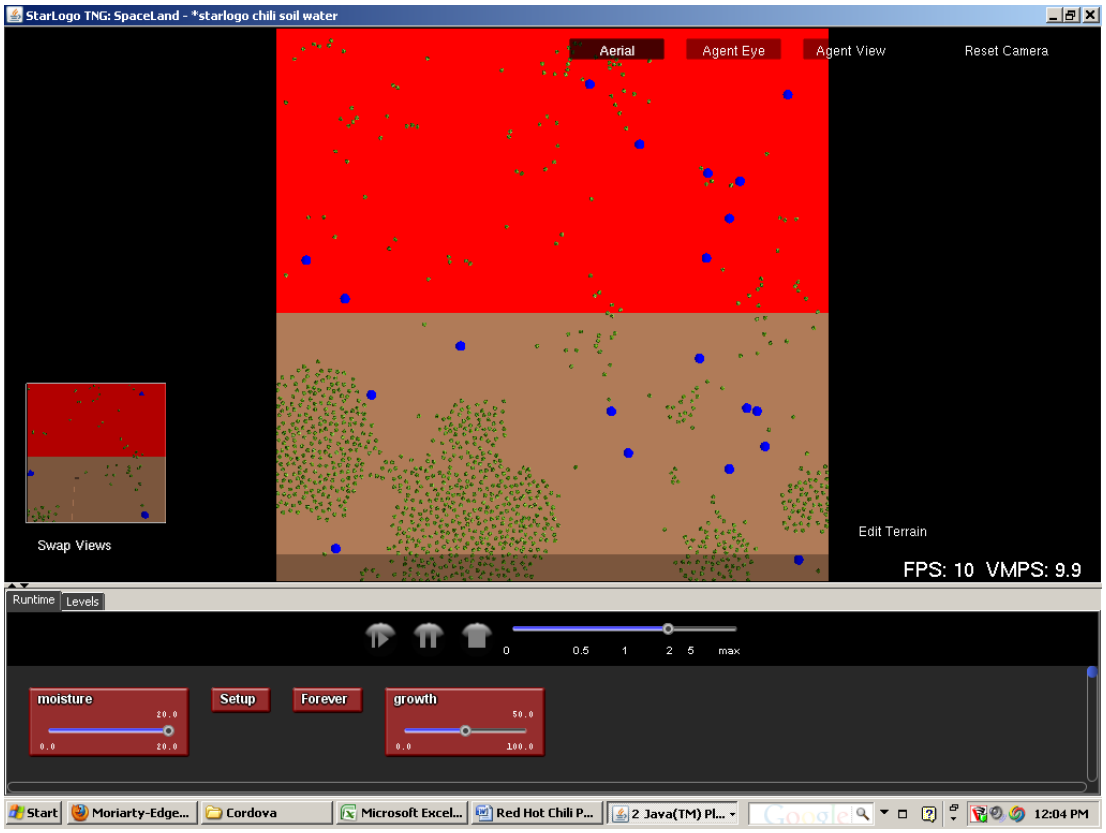
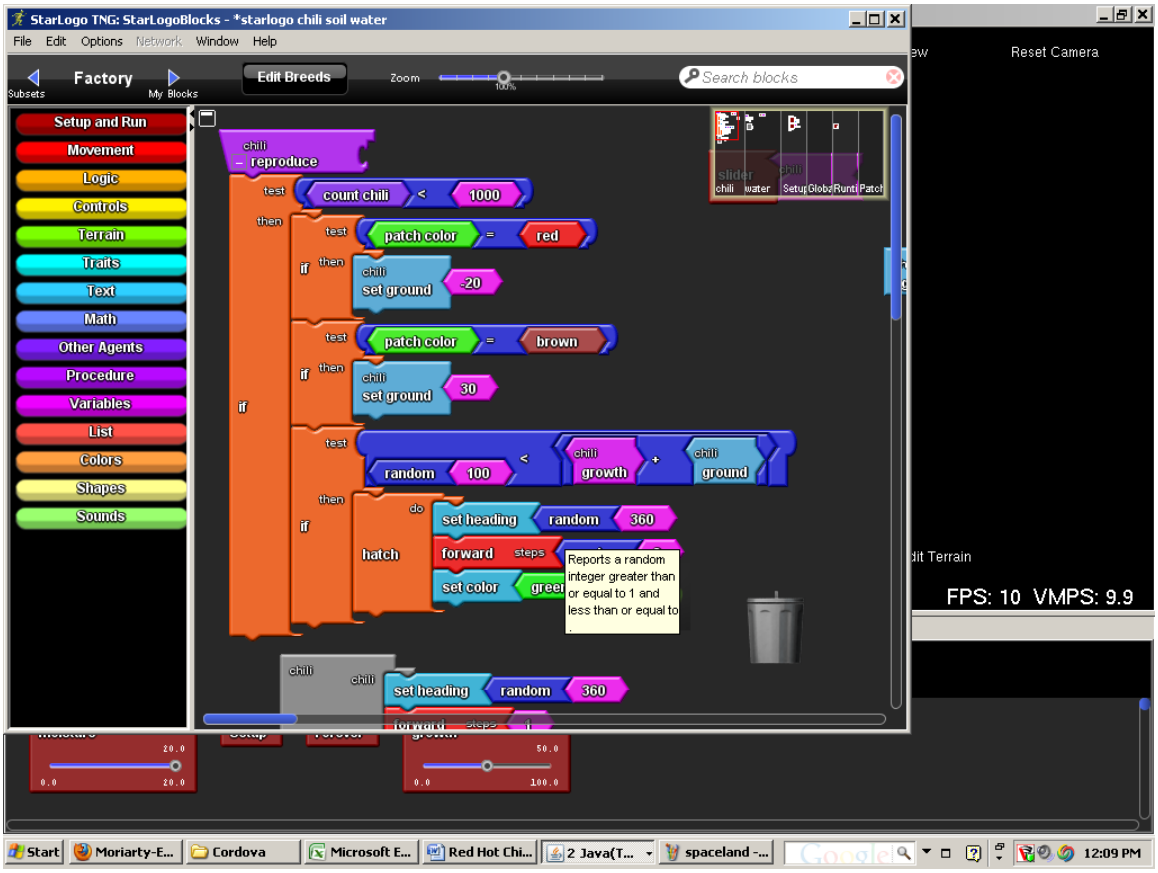


Illustration 1.4 Star Logo Programming



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