The Spread of Red Imported Fire Ants

New Mexico

Supercomputing Challenge

Final Report

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Executive Summary

This project has looked at how fast a Red Imported Fire Ant (RIFA) population will spread in a controlled environment and what precautions can taken in order to prevent the issue of their spreading. RIFA, (Solenopsis invicta) are a very invasive and destructive species of ants that dominate the areas they inhabit due to the overwhelming population and aggressiveness. The purpose of this project is to look into how an invasive species can spread and grow. This project can give us insight on how to contain or control other invasive animals; furthermore, this project will show how an invasive species can cause damage to people, farmlands, and other local animals. Red Imported Fire Ants are becoming an increasingly large problem in the United States because of the devastating Hurricane Harvey. Hurricane Harvey is what sparked this increase of RIFA population in the U.S. because they were swept from their native land of South America and were carried along with the hurricane itself.

The program used to model the life cycle of the rifa was Netlogo. We used three different simulations in netlogo to represent growth, destruction, and pathing of the ants. We also created graphs that represent the cost of containing or killing these ants as they spread.

Problem Statement

The reproduction and life cycle of these ants is being investigated in order to gain more knowledge on this particular species. By gaining more knowledge on this species and how they spread and reproduce we would possibly be able to prevent them from spreading any further. These ants have virtually no competition, the sheer amount of aggression these ants hold has displayed that. Not only is it the bite of these insects that can cause immense amounts of pain but also the overwhelming number of ants that come and attack when necessary. Cases of Red Imported Fire Ants have been reported in Texas, North Carolina, and many other Southern states. These ants stay in these states because of the temperatures. These ants are fond of hot humid areas which is why they haven't migrated even further North. With the climate change occurring in the U.S. it is important to try and find a way to prevent them from spreading, this is important because they have been known to destroy anything in its path and attack anything in its way. These fire ants build mounds in almost any type of soil, but prefer open, sunny areas such as meadows, pastures, parks, playgrounds, lawns, and golf courses, as well as agricultural land and wilderness areas. Fire ants will not create mounds when the weather is extremely hot (above 36∘C or 96∘F) or dry. Fire ants forage when temperatures range from 22∘C (72∘F) to 36∘C (96∘F).

Methods

In order to model the growth and reproduction cycle of the ants we used the program Netlogo. This program allowed us to write code for everything; the ants, the food source, and other variables. Once having completed the observation of the ants life cycle and reproduction for three different ecosystems graphs were made in order to visualize our results.

How Our Problem was Verified

In order to verify our experiment we introduced many variables. The variables we included were: the ants themselves, a food source, temperature, humidity, a queen, hay, and most importantly death. It is thought that death is the most important variable included because without it the ants would've lived forever and keep repopulating and that is what would make our experiment invalid.

Results

We found that given enough food fire ants will spread very fast. These ants are very aggressive and will take over other ant hills.
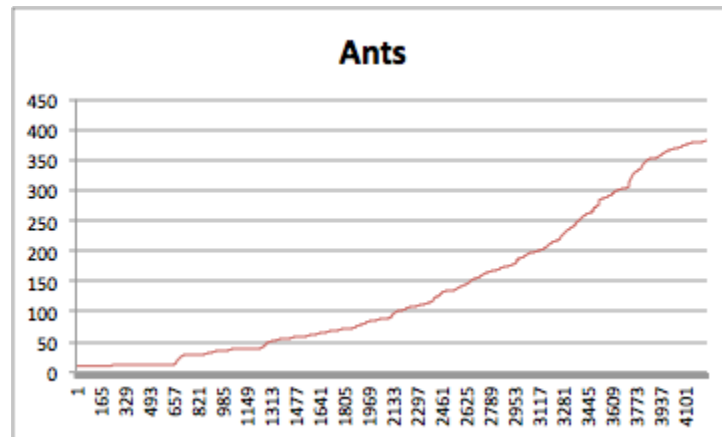
Conclusion

Overall we found that these invasive ants can and will spread very quickly. If we do not control the spread of red imported fire ants we could be struggling with them in our backyards, parks etc. every day.

Significant achievements

First place in school science fair
Second place in regional science fair

People and Organizations who Helped

We would like to thank not only our teachers who were a great help but also Tatiana Paz. Tatiana is a professor at UNM who is currently studying the Argentine Ants. Despite her studying a different species of ants she still relayed onto us what she knew about the species were are studying and gave an insight on how RIFA compares to Argentine Ants. :
UNM Professor Tatiana Paz

References

(n.d.). Retrieved from http://entnemdept.ufl.edu/creatures/urban/ants/red_imported_fire_ant.htm

(n.d.). Retrieved from http://entoweb.okstate.edu/ddd/insects/rifa.htm

Allen, C. R., Demarais, S., & Lutz, R. S. (n.d.). RED IMPORTED FIRE ANT IMPACT ON
WILDLIFE: AN OVERVIEW. Retrieved from
http://digitalcommons.unl.edu/ncfwrustaff/51/

Fire Ant Life Cycle: Lifespan & Reproduction of Red Fire Ant. (n.d.). Retrieved from
https://www.orkin.com/ants/fire-ant/life-cycle/

Synthesis of both the enantiomers of dihydroactinidiolide. a pheromone component of the red
imported fire ant. (2001, June 27). Retrieved from
http://www.sciencedirect.com/science/article/pii/S0040402001874299