

A whimsical illustration of a forest floor. At the top, two large trees with thick brown trunks and dense green foliage frame the scene. The ground is a mix of brown soil and green grass. In the center, there are several strawberry plants with red berries and small white flowers. At the bottom center, a yellow mole character with large eyes and a small smile is peeking out from a hole in the ground. The overall style is soft and painterly.

WHAT IS THAT  
LITTLE **YELLOW**  
DOT UNDER  
YOUR FEET?



# INTRODUCTION

The main character of this book is Gigi, a species of arbuscular mycorrhizal fungus (AMF), a group of fungi of extreme importance to soil because they are associated with most of plants on Earth, including those that produce food, and provide several environmental services. However, they are still largely neglected in soil education. Thus, in order to promote and popularize the knowledge and importance of soil biodiversity, this book was idealized, which narrates the life of an AMF, its importance in soil biodiversity and how much they have been affected by human activities, like fires that we have observed recently around the world.

Enjoy the reading!





Hey, you! Can you see me?  
I am not the plant! I am here  
inside the plant roots!



Are you seeing me now?

If you look really  
close maybe you will  
see me.

Come closer... because I am going to tell  
you who I am, and why I need you so much...



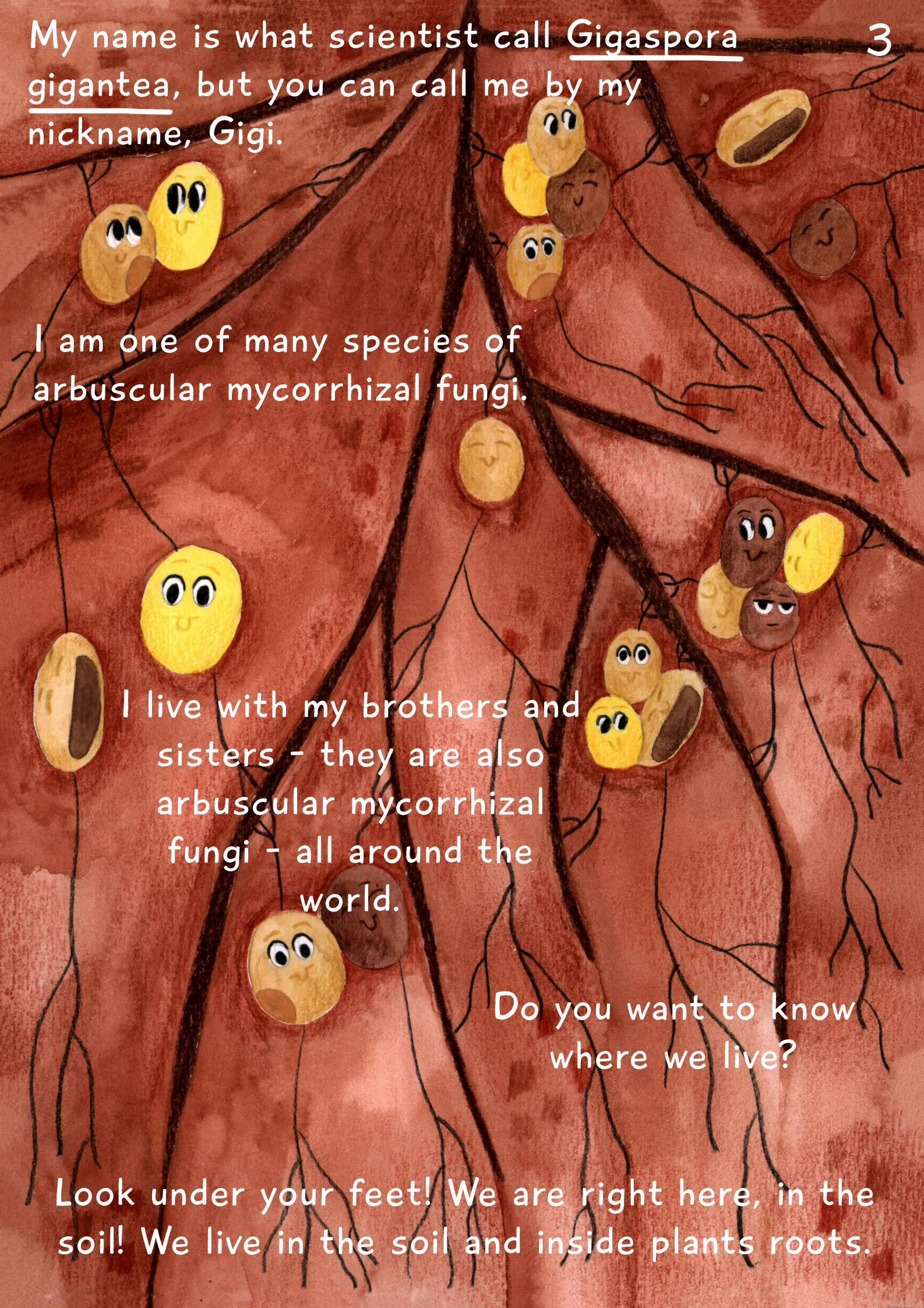
My name is what scientist call Gigaspora 3  
gigantea, but you can call me by my  
nickname, Gigi.

I am one of many species of  
arbuscular mycorrhizal fungi.

I live with my brothers and  
sisters - they are also  
arbuscular mycorrhizal  
fungi - all around the  
world.

Do you want to know  
where we live?

Look under your feet! We are right here, in the  
soil! We live in the soil and inside plants roots.

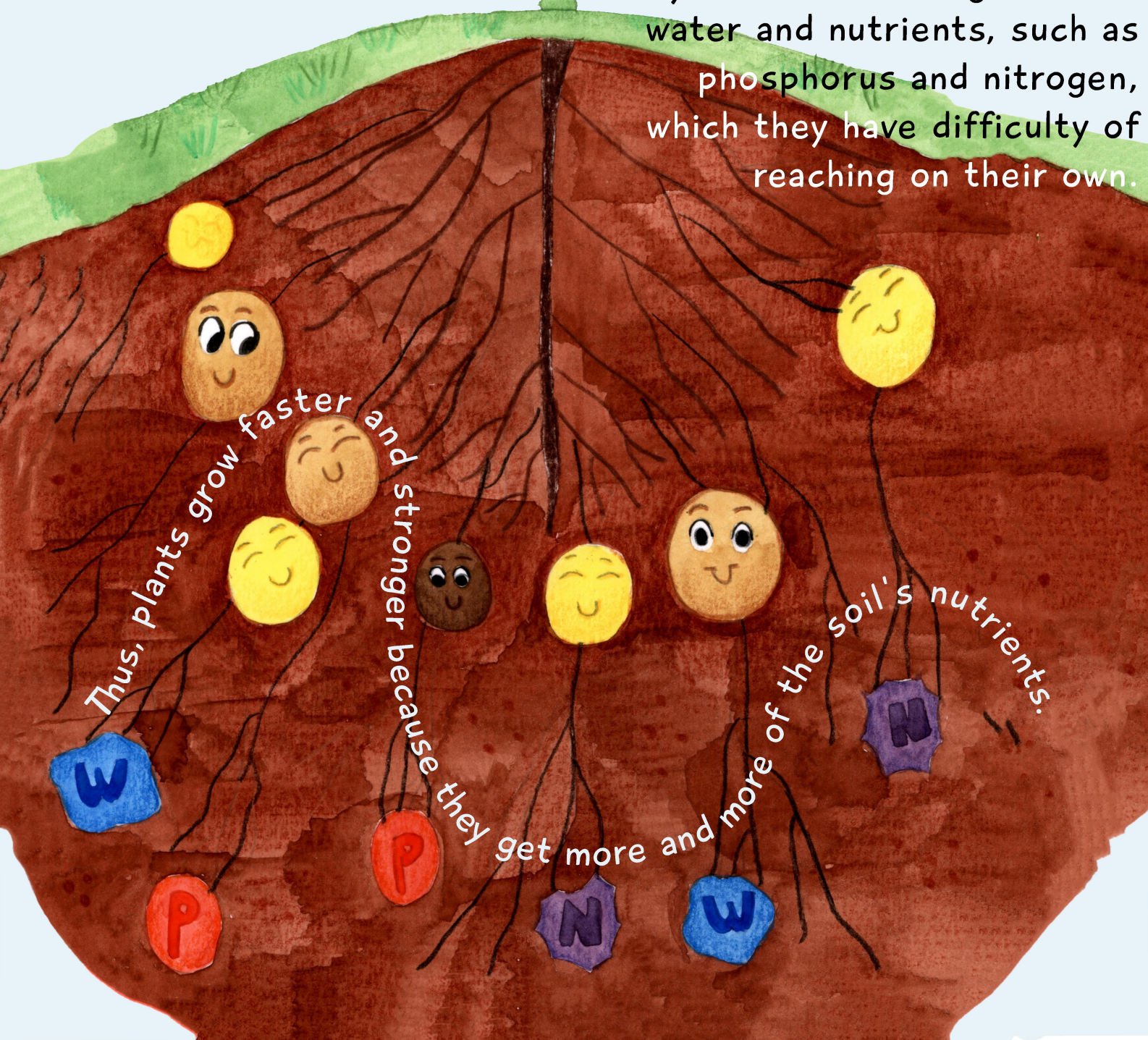




We live in a **symbiosis** with plants that is called "**mycorrhiza**".

It is a great **FRIENDSHIP** where we help the plants and the plants help us to get food.

It works like this: plants give us food (sugars) that they produce on the leaves during the photosynthesis, and we give them water and nutrients, such as phosphorus and nitrogen, which they have difficulty of reaching on their own.



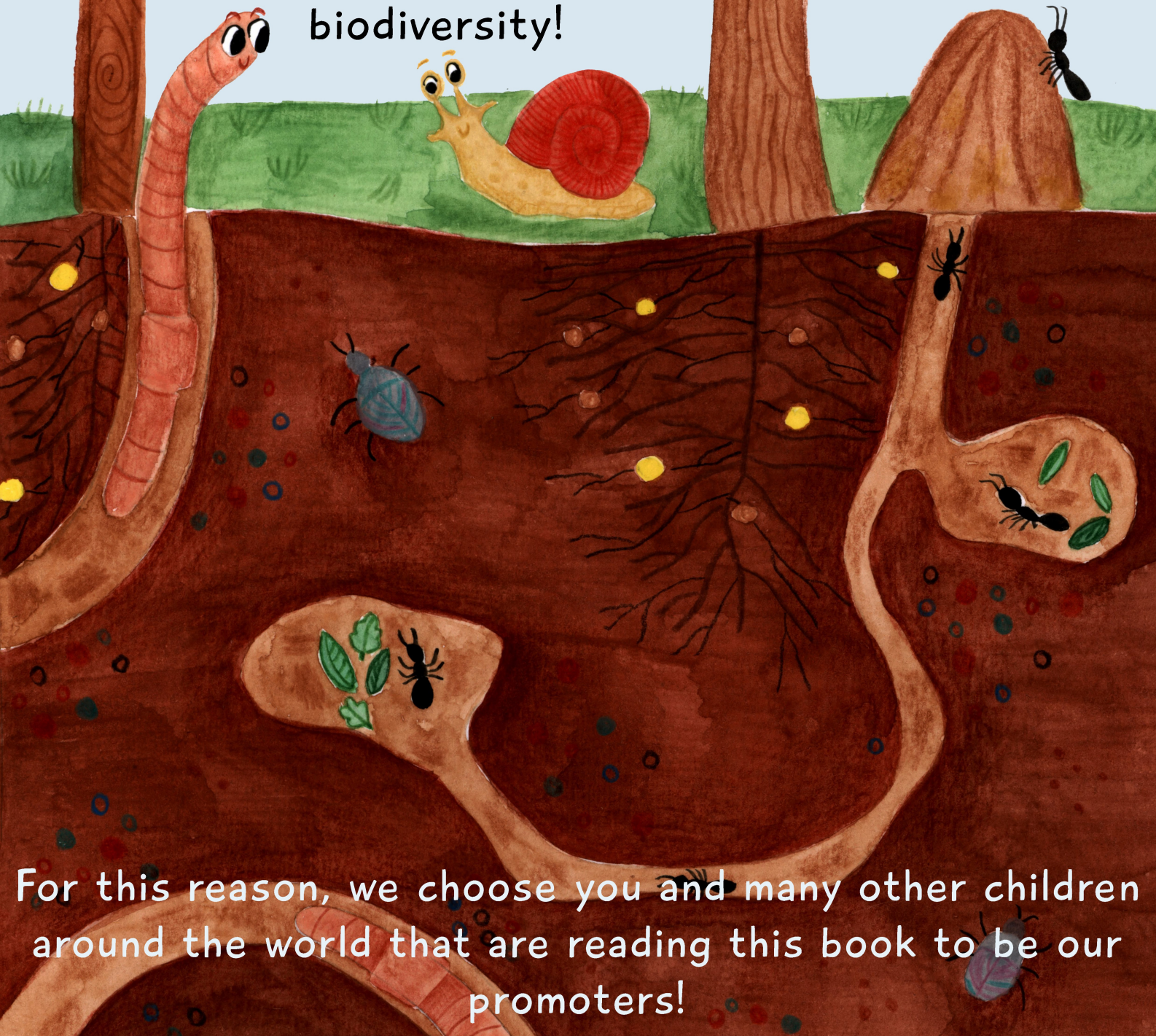
Thus, plants grow faster and stronger because they get more and more of the soil's nutrients.



We live in soils with other living beings that you must have already know, like bacterias, earthworms, insects, snails, and many other organisms.

Together, we are part of a group called soil biodiversity!

Although we are essential to keep soil healthy, many people do not know us and neither understand our importance in their lives.



For this reason, we choose you and many other children around the world that are reading this book to be our promoters!

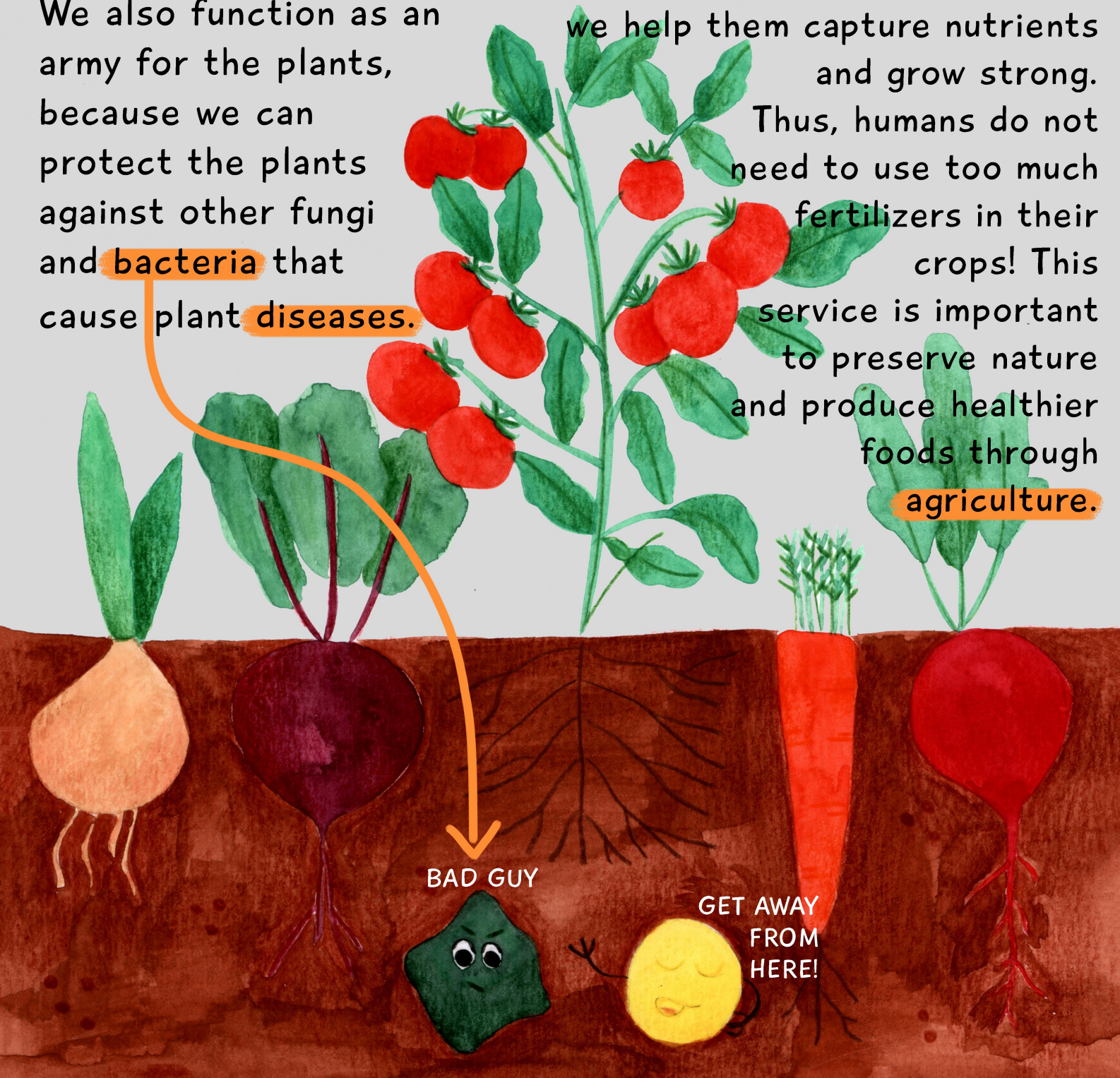


We can improve the quality of the plant for human health because there are more nutrients, and the fruits are more

**DELICIOUS!**

So far, with the few things I have told you, you already know that arbuscular mycorrhizal fungi are very important for plants because we help them capture nutrients and grow strong. Thus, humans do not need to use too much fertilizers in their crops! This service is important to preserve nature and produce healthier foods through agriculture.

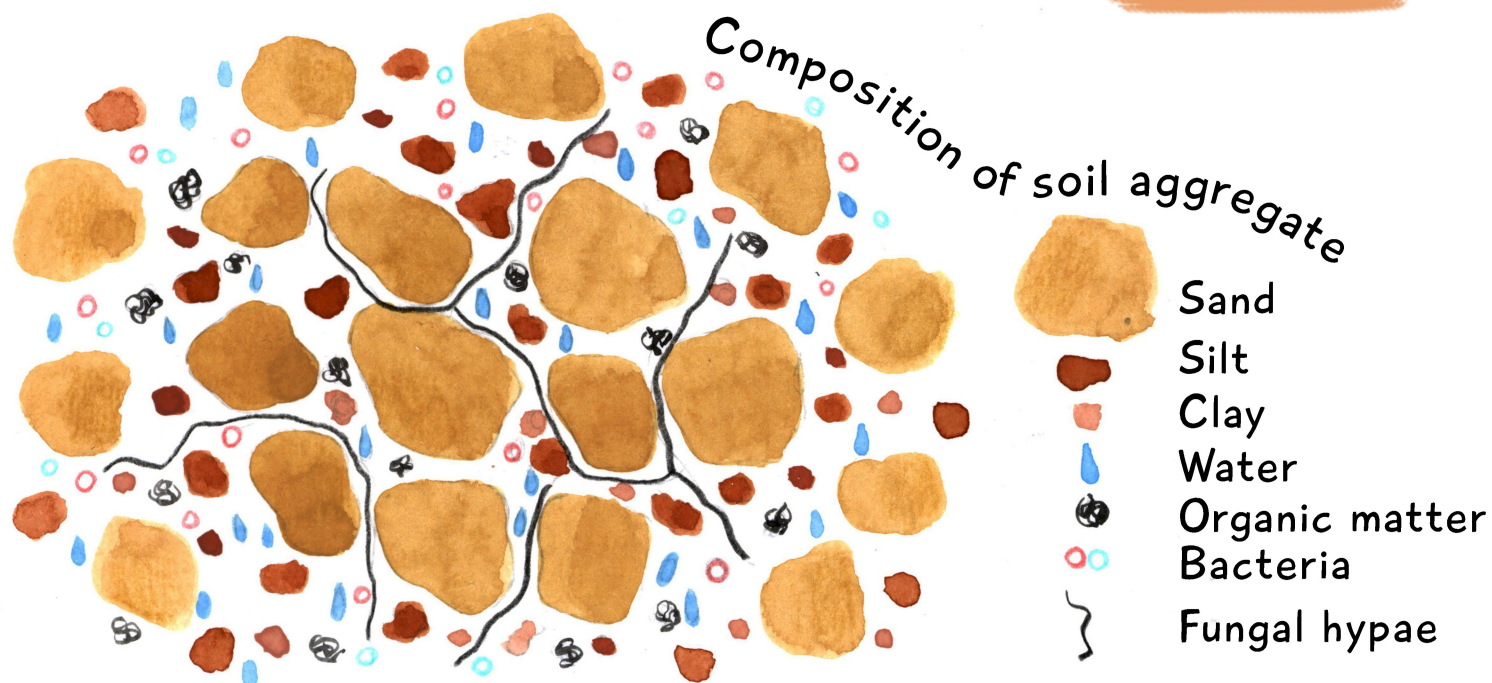
We also function as an army for the plants, because we can protect the plants against other fungi and bacteria that cause plant diseases.



But wait! Our work does not end here, we have so many more things to do on the soil.

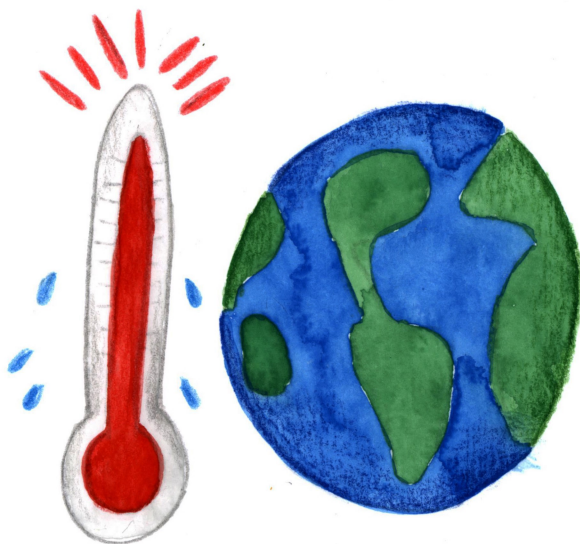


When we grow in the soil, we produce a kind of glue, known as glomalin. Together with other microorganisms, such as bacteria and amoebas, this glue helps to keep small parts of the soil together and to form aggregates.



Soil aggregates can be home to a lot of microorganisms. It can also provide better plant growth and a more stable soil for you, humans!

Oh, I almost forgot to mention that we, arbuscular mycorrhizal fungi...



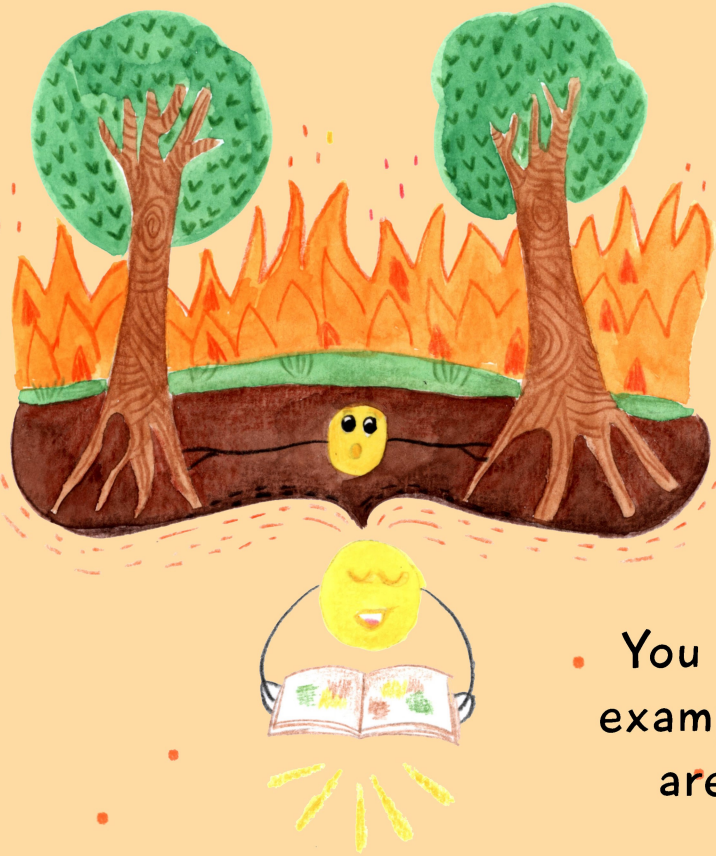
...can help to reduce greenhouse gas emissions, the main cause of the climate change advance.



Did you see how many things we can do?



However, the actions of humans are affecting the soil and us as well. All soil organisms have lived hard times lately, and I would like to share this story with you. I am sure you will understand us.



This story begins on a sunny and very hot day, in a place where everything seemed perfect. But suddenly, the trees warned us that they were burning. We have already seen this before, but nowadays wildfires are happening more and more frequently in several parts of the world.

You can see this situation in Brazil, for example. In this country, there is a huge area like a wetland with an impressive biodiversity, called Pantanal.

Close to Pantanal, there are large farming areas that produce food for animals and humans. In these areas, it is very common to intentionally cause fires to prepare the soil for future plantations. However, if dry and hot weather persists, the wildfire spreads in the forest, harming animals, plants, and us, soil organisms.





One of the problems is that wildfires causes global warming, that increase temperature in our atmosphere and melts ice in the south and north Pole. Other countries also suffer with wildfires like Australia and Russia.



- Although we live in the soil, the wildfires also affect us, and do not let us to do our work to keep soil health and help plants.



Russia



Australia

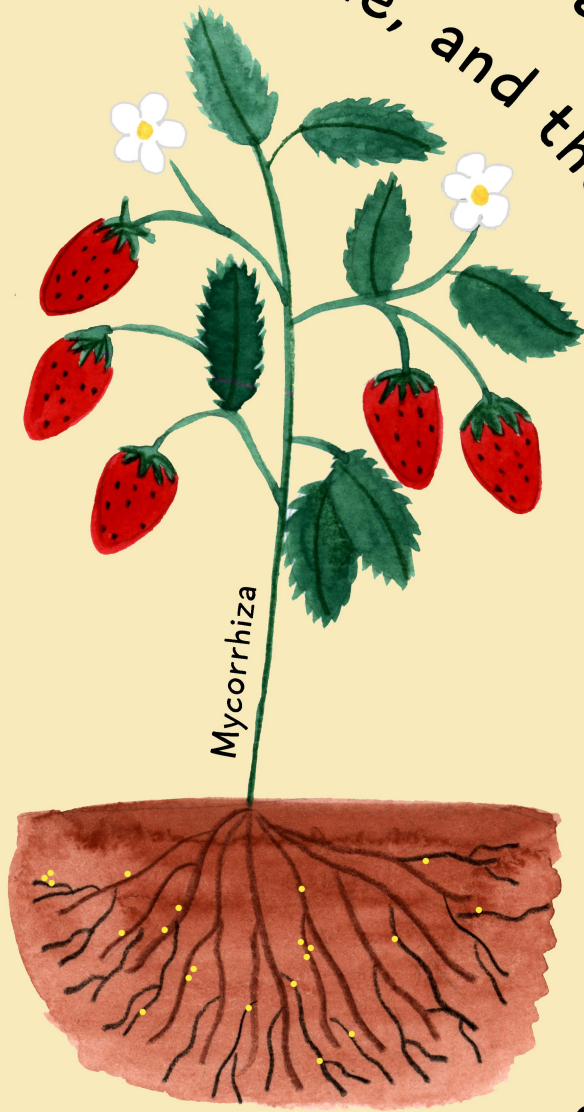
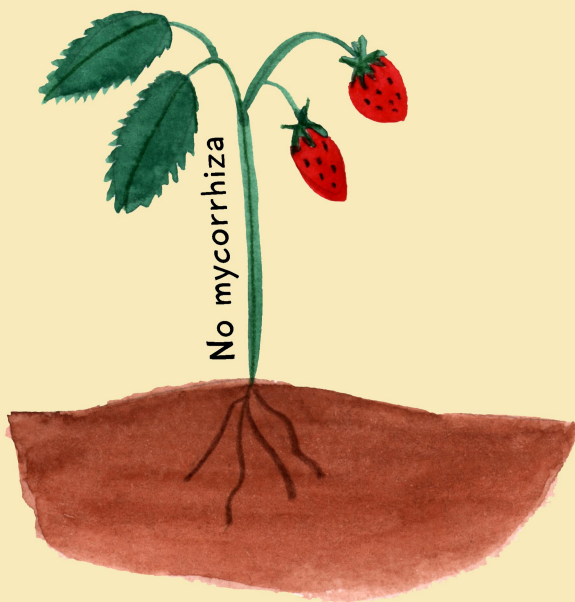
Did you understand why burns are harmful to the biodiversity that inhabits the soil?



Have you ever thought about how this is related to your life?



Soil without its organisms becomes unhealthy.  
Without us, plants grow up more fragile, and they could be easily harmed by diseases.



Also, the soil is home to a lot of organisms of the planet, including you, remember?





That is why scientists around the world research about us - arbuscular mycorrhizal fungi -, collect us and take care of us, so we will not disappear from the planet.



It would be a great adventure to participate in research about soil biodiversity, don't you think? So, join soil scientists and many other children, who just like you, are curious and know the importance of soil life.





We need **brave young people** who are ready to help to save the soil and our planet.



Starting to take care of the soil is not difficult and we can do that with **small actions.**



You can adopt sustainable habits as **recycling materials, conserving water, stopping to waste food, learning more about the biodiversity of the soil ecosystem, and supporting soil preservation actions!**





Finally, we have an invitation! We need you to contribute to our cause "Keep soil alive, protect soil biodiversity"!

Can you imagine yourself as a soil scientist?

- 1 Choose your scientist's clothes. It can be a coat or a field vest.  
Choose your materials (pencil, notebook, magnifying glasses, camera, etc.), and take your sign (Keep soil alive, protect soil biodiversity).
- 2
- 3 Draw your face and hair, color it, and cut out all the parts with scissors. After, glue the parts together, forming your scientist! Then, fix a stick behind the scientist.
- 4 Choose a place to anchor your scientist. It can be your house, a frame, your school, your vegetable garden, or a flower vase.
- 5 Now, share your scientist on Instagram. Do not forget to use the hashtag #soilover. Thus, more children can join you, and start to observe the soil and its biodiversity with more attention!

It was nice talking with you. Thank you for your attention.  
Good-bye, Gigi.



If you want to know more about all the things we discussed here

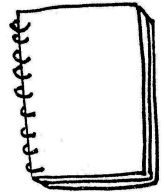
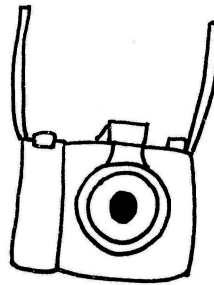
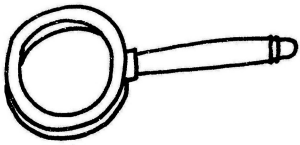
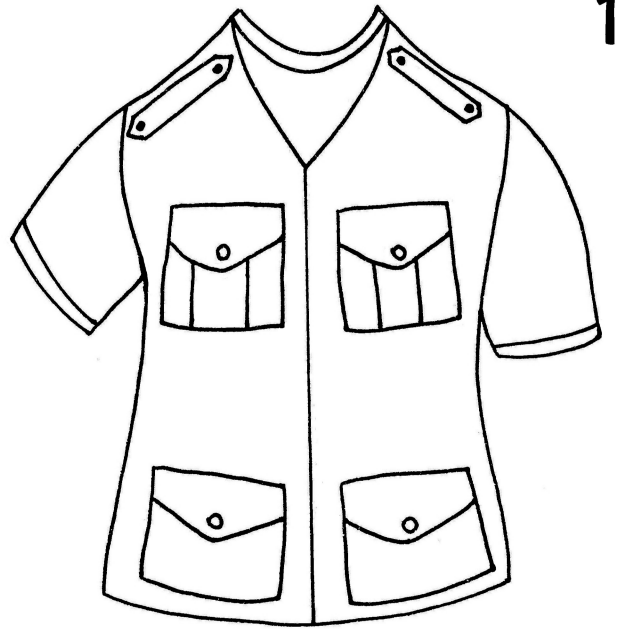
Gianinazzi, S., Gollotte, A., Binet, M. N., van Tuinen, D., Redecker, D., & Wipf, D. (2010). Agroecology: the key role of arbuscular mycorrhizas in ecosystem services. *Mycorrhiza*, 20(8), 519-530.

Lombao, A., Barreiro, A., Fontúrbel, M. T., Martín, A., Carballas, T., & Díaz-Raviña, M. (2020). Key factors controlling microbial community responses after a fire: Importance of severity and recurrence. *Science of The Total Environment*, 741, 140363.

Rillig, M. C., & Mummey, D. L. (2006). Mycorrhizas and soil structure. *New Phytologist*, 171(1), 41-53.

Smith, S. E., & Read, D. J. (2010). *Mycorrhizal symbiosis*. Academic press.





KEEP SOIL ALIVE,  
PROTECT SOIL  
BIODIVERSITY!

