



Food and Agriculture
Organization of the
United Nations



International
Plant Protection
Convention

ACTIVITY BOOK

Healthy Plants Healthy Planet



INTERNATIONAL YEAR OF
PLANT HEALTH
2020



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Note for the educators:

This book has been designed, written and illustrated to help educators and guardians bring children and young people closer to the world of plant protection; the science that deals with plant health. Although addressed to an age group between 8 and 12 years, this book can also be useful for older kids. It can be considered as a first, simple plant protection manual, designed on the occasion of the International Year of Plant Health.

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her contribution to this publication.

It all starts with a seed...

Among all life forms on Earth, there is one that is different, since all other living beings on the planet, including humans, depend on it. Without it there would be no life on Earth.

Plants.

There are many types of plants. Counting them all would be impossible. Just think that forests alone cover more than 30 percent of the Earth's land surface, and that doesn't even include grasslands, gardens, jungles, savannahs and other terrestrial habitats. Just look at the surface of the Earth as seen from space, and you will notice that green is one of the three main colours as well as brown and blue. There are even plants living beneath the blue surfaces!



Plants are life

There are things in our daily lives that we do regularly and often take for granted. Breathing, eating, playing, studying and running are all activities that we normally do, without asking ourselves why. Well, this will surely surprise you, but many of these actions would not be possible without the help of our green, silent allies – plants. Why? Because plants provide us with oxygen to breathe, food to eat, and green areas to run and play!

Over 98 percent of the oxygen we breathe is produced by plants. They also offer shelter, like dens and beds for animals, and act as our main source of food. Did you know that 80 percent of the food in our diet is composed of plants and products of the earth? To date, over 250 thousand plant species have been identified, of which as many as 30 thousand are edible for humans. The nourishment and oxygen plants provide give us the energy we need to grow and jump. Plants also provide us with medicines when we are sick.

With their roots, they keep soil from moving and help prevent soil erosion. They keep soils healthy too, meaning more carbon can be stored in the ground, which is important in the fight against climate change. Good, solid soil and healthy plants go hand-in-hand. Taking care of plants and keeping them healthy is therefore very important for human survival and for other life forms on Earth.

Over 98% of the oxygen
we breathe is produced
by plants.



Plants and the Sustainable Development Goals (SDGs)

The 17 SDGs are what the world needs to become a peaceful, safe and healthy place for everyone. Member States of the United Nations have committed to do everything they can to ensure that all 17 goals are reached by 2030. An impossible challenge? Not at all, but it depends on each of us. We can all play a part.

Plant health contributes to “Zero Hunger” (SDG2) by making sure that food is provided for the world’s population. Healthy plants even protect “Life on Land” (SDG 15). “Climate Action” (SDG13) starts with healthy plants that help soils to store carbon. At the same time, climate change is a threat to plant health because the increase in temperature causes plant pests and diseases to move to new countries (see page 16).

Healthy plants also contribute to global economic development (SDG 8) through increased **international trade** (the sale of goods between two or more partners from different countries). However, international trade can affect plant health because plants and plant products (seeds, cut flowers and fruits) are often contaminated by pests and diseases, meaning that they move from one continent to another.



Activity

Can you suggest other SDGs to which plant health can contribute? Find out more about the SDGs and how you can play a part in achieving them here:

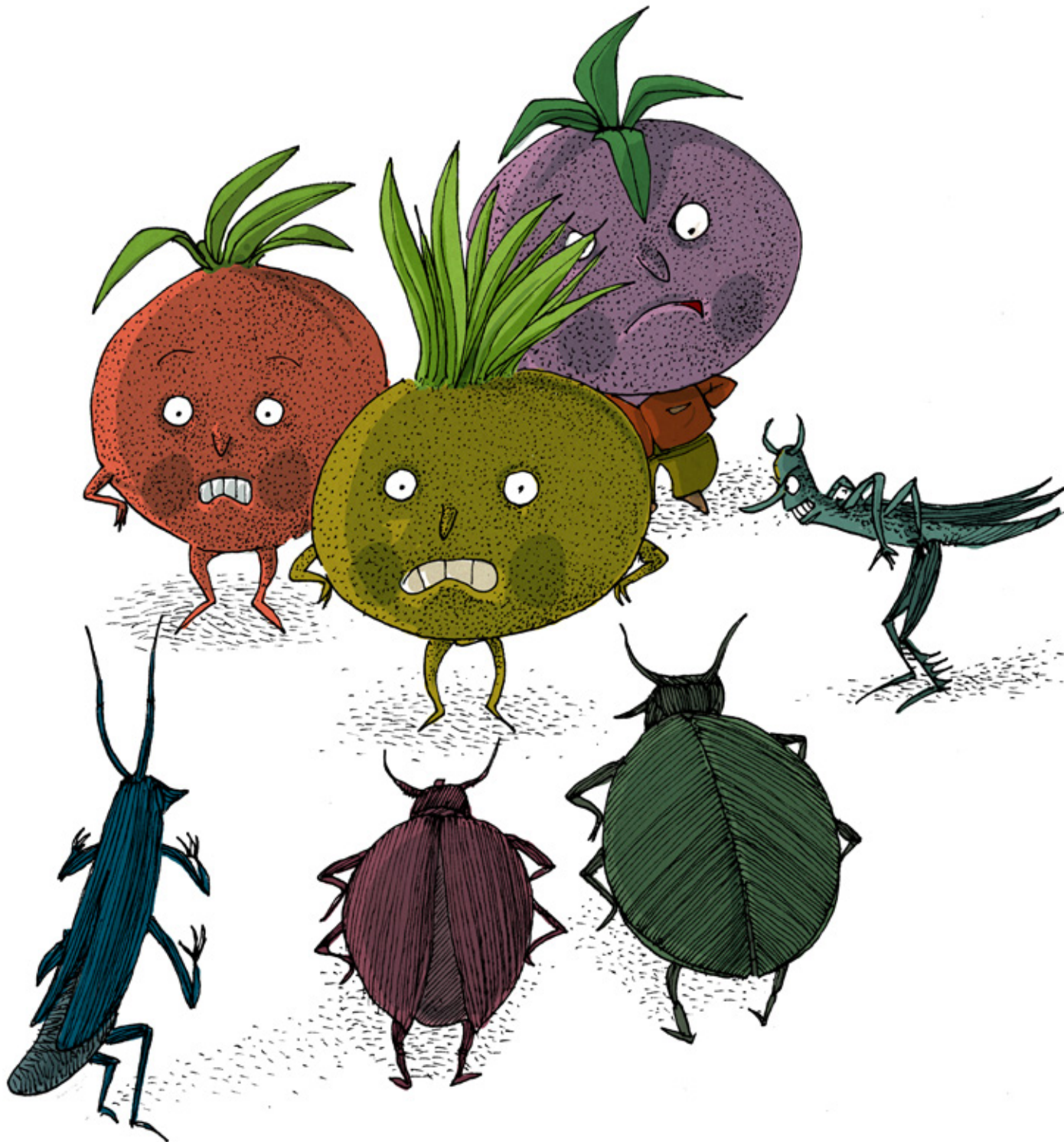
worldslargestlesson.globalgoals.org



Plants get sick and hurt, too

Just like us humans and all other living beings on Earth, plants get sick or hurt. However, when this happens the whole planet can be affected. Plant pests and diseases can cause wheat and tomatoes to stop growing in our fields, trees to no longer produce fruits, and other products of the earth to rot. Even worse, people who depend mostly on agricultural products for their daily meals can start to suffer hunger.

How does a plant get sick or hurt? Seeds, bulbs, leaves and other plant parts can become the vehicle – if not the permanent home – of entire colonies of pathogens, armies of pests, and other plant enemies. Just like the measles or the flu, these diseases can be contagious and spread from one plant to another, causing serious damage to the environment. Just think how only one contaminated seed in every ten thousand is enough to destroy entire fields of plants, depriving whole populations of food.



Plants get
sick or hurt

Plant enemies

As small as they are lethal, plant enemies have different shapes and colours. Some insects, fungi, viruses, bacteria and worms can destroy entire forests, gardens and cultivated fields, beautiful flowers and ornamental plants. Finding these pests is often very difficult, because they hide where no one would ever think of finding them. They slip into suitcases or find shelter under the soles of our shoes. They travel by cargo ships or intercontinental flights. Their favourite hobby is to travel the world in search of new crops and healthy plants they can attack. Many of these dangerous creatures remain quiet for long periods, in a sort of lethargy called "dormancy". However, they wake up refreshed from this sleep, stronger than ever.



When plants get sick or hurt, they need real medicines, used to prevent and treat infections. In addition to synthetic chemicals called "agrochemicals", for several years researchers have actively studied and developed more natural or biological means of control: beneficial bacteria, fungi, viruses and useful insects capable of counteracting the development of plant pests. In other words, friendly microorganisms and insects are fighting the bad creatures that make plants sick or damage them.





Plants are life

Plants produce almost all of the oxygen we breathe and make up 80 percent of the food we eat. Even the meat, fish or dairy products we eat come from animals that depend on plants to grow.



Economic advantages

All countries sell plants and plant products to other countries through an activity called international trade. Over the past decade, this activity has helped plant pests and diseases to enter new countries as they hide within the products that arrive.

SOME NUMBERS



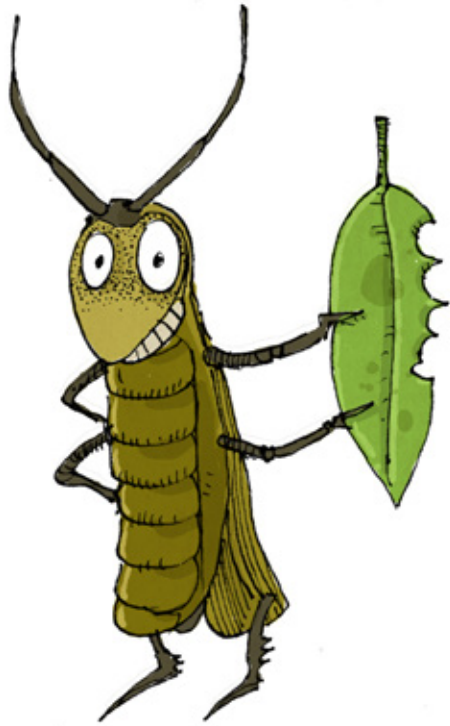
A growing demand for food

Farmers will have to produce more than double what they do today by 2050 to satisfy a fast-growing and richer population that increasingly lives in towns and cities.



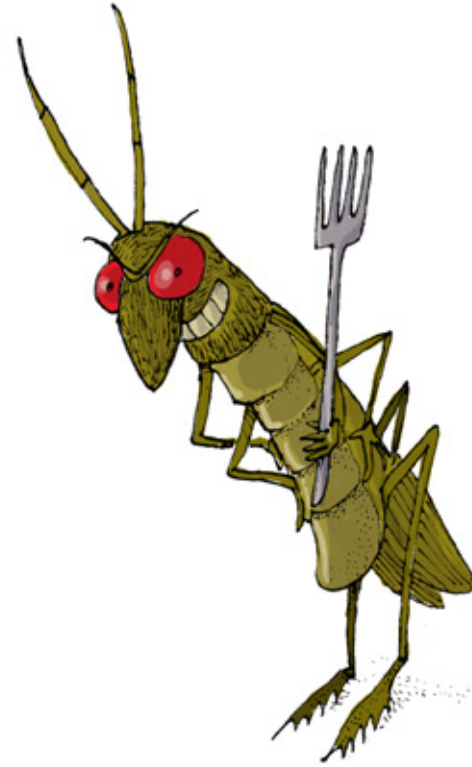
Activity

Choose your favourite food and think about the ingredients used to make it. Draw it and show any links with plants, even if it didn't originally come from plants!



Damage caused by pests

Plant pests can destroy a large amount of plants and cause a country to lose a lot of money, because they are not able to trade these plants or plant products. In the most difficult conditions, which often occur in developing countries, more than a third of crop production is lost.



Hungry pests

The largest swarms of locusts consume more than 100 thousand tonnes of food per day. This could feed tens of thousands of people for a whole year!

Climate change

Climate change and resulting higher temperatures can stop a plant from growing properly or make it less nutritious. It can also encourage pests to move to new countries or continents.



Useful insects

Some insects are important for plant health. They promote pollination, which is vital for the reproduction of plants; they stop pests from causing destruction; and they promote soil health. Unfortunately, the amount of useful insects has decreased by 80 percent in the past 25 to 30 years.

Historical enemies: wandering pests and foreign diseases

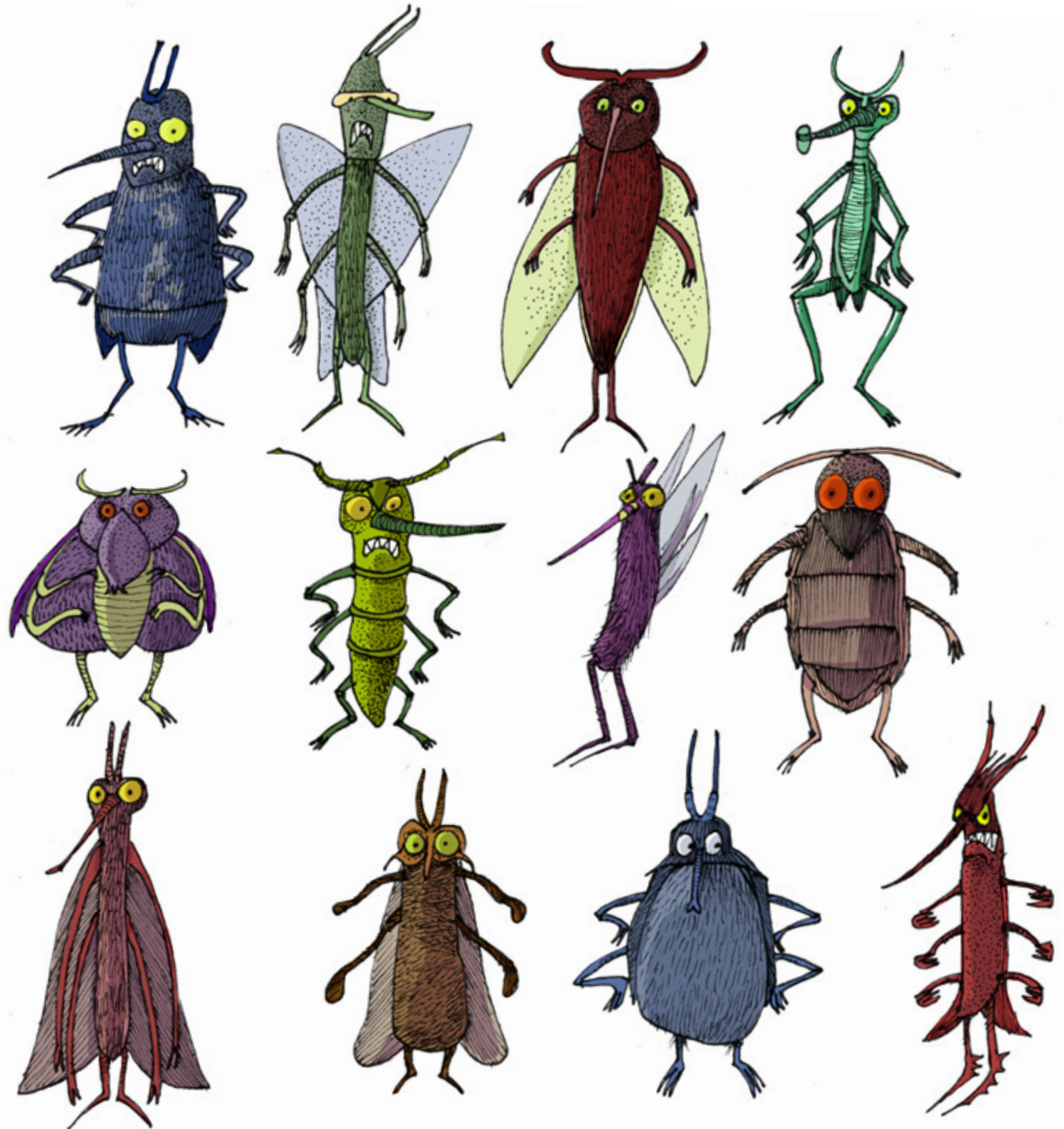
Plant enemies have existed since the dawn of time. However, in the past, when science and technology were not as advanced, identifying and defeating a plant pest was a very difficult undertaking.

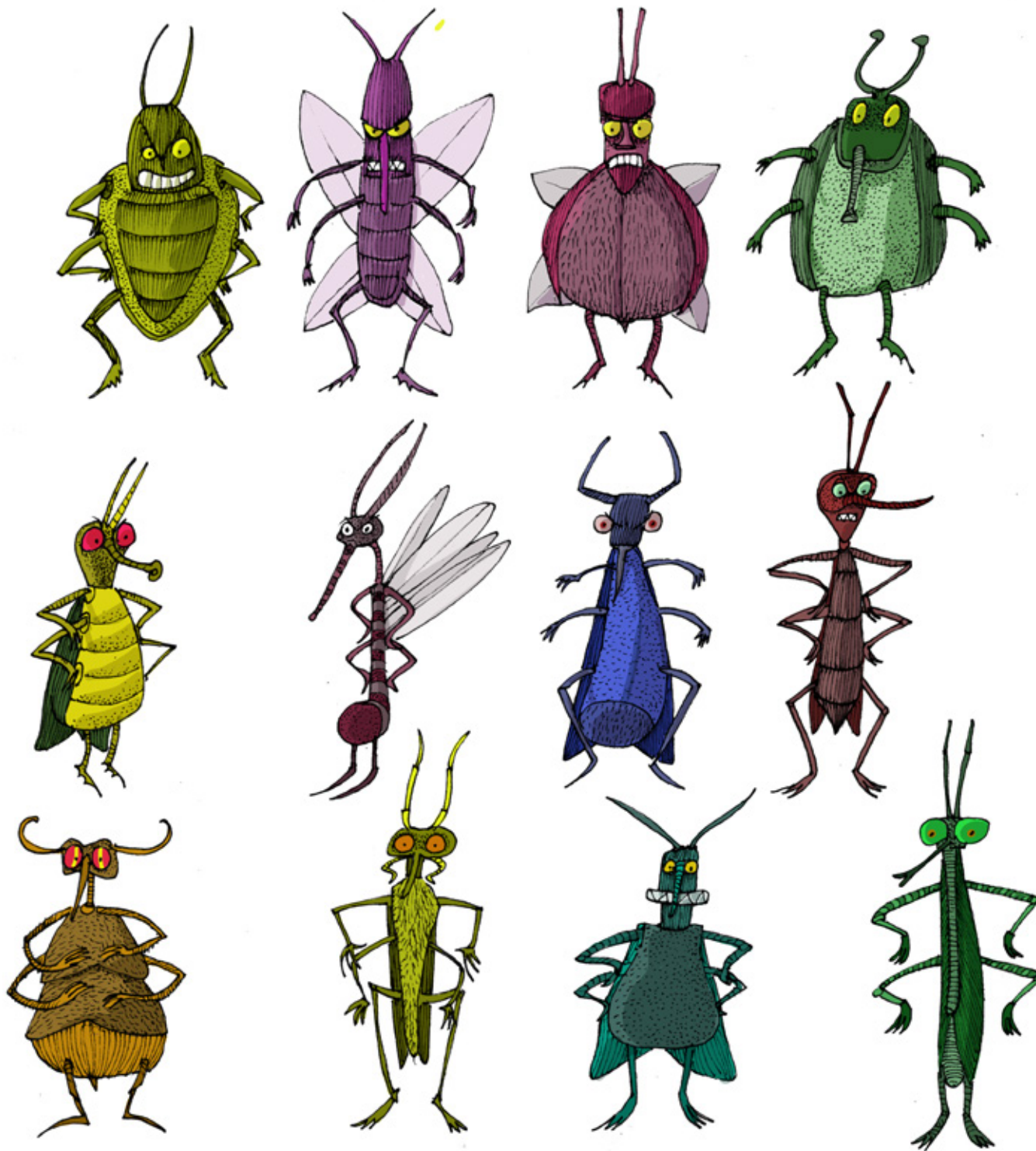
In the mid-nineteenth century, a wandering microorganism called potato blight arrived in Europe from an unknown land. Nobody was prepared to welcome this unexpected little guest. In Ireland, the pest destroyed entire potato crops, the main meal for the Irish at the time, and caused a famine that led to more than one million people dying.

In 1943, a fungal disease called brown spot destroyed almost the entire rice crop in Bengal, India. More than two million people died of hunger, while the rest were forced to emigrate elsewhere in search of food.

Often the origin of these diseases remains unknown. Majestic trees like elms and cypresses that covered large areas of Mediterranean countries, such as Spain and Italy, about a hundred years ago have been struck by catastrophic diseases. These diseases also made their way across the ocean to America.

Plant enemies have existed
since the dawn of time





Today's enemies: pests with a suitcase

Over the years, pest invasions have become even more frequent and devastating. Opportunities for movement have increased. In fact, with globalization, the number of intercontinental flights has skyrocketed, and commercial traffic from one end of the world to the other is normal. Long ago, these dangerous pests had to make long and exhausting trips from one country to another, with their own means (wings, legs, antennae, teeth), or be transported by the wind. Today, however, they just have to board an international plane or a cargo ship to arrive at their destination in record time.

A disease called wheat rust Ug99 appeared in Uganda in 1999, and attacked the most used varieties of wheat, spreading rapidly to all wheat growing areas of the world.

A bacterium called *Xylella fastidiosa* is destroying olive trees in Salento, a fertile land in southern Italy. This is ruining the livelihoods of entire families of farmers who depend on olives for their income, threatening tradition and destroying the landscape and tourism.



Spot these pests and diseases!





Traveling pests: aliens

My name is José Carlos and I come from Mexico. There's a pest called fall armyworm that's driving all the maize farmers in the world crazy. It's a worm that eventually turns into a moth through a process called metamorphosis and it appeared first on my continent - the tropical Americas. Unfortunately, it didn't stay put. It started to travel far and wide across the planet, destroying entire crops of maize. This is one hungry worm. It prefers maize, but can feed on more than 80 different crops, including rice, millet, sugarcane, vegetables and cotton.

It can travel huge distances – up to 100 km per day – and has even made its way to Africa, India, Yemen, China, Korea, Japan and Australia! It's really difficult to stop this parasite because it flies so far and reproduces so fast. A female fall armyworm can lay up to a thousand eggs!





We are very worried about locusts where I come from. They're like grasshoppers. I'm Zala from Ethiopia, where tens of millions of hungry locusts that fly in huge swarms are eating all our crops. A lot of people in my region are already poor or hungry so this is a big problem. Locusts are also very fast. They travel 150 km and can eat an amount of food equal to their body weight in a day. Well, you might think that's not a lot because they're so small but multiply this weight by millions (one swarm), and you'll understand the damage they can cause. We are terrified!



Activity

With the permission of your parents, take a photo of any insect you find. Discover what it is and if it has a purpose. Is it a pest or a useful insect?



Plant pests and climate change

You must have heard about climate change. Many young people and children of your age are already fighting all over the world to save the planet from the effects it is having on the environment. But what you may not yet know is that climate change is an ally of plant pests.

In fact, most pests can't survive cold or frost. The higher temperatures caused by global warming provide armies of pests with the ideal conditions to trace new paths, reproduce and hire new recruits.

The effects are especially visible on those pests that we find during the summer, such as fruit flies. These insects need humid and warm environments to survive and reproduce. But that's not all! The damage caused by climate change to the environment weakens the resistance of plants and their ability to recover, meaning that they're weaker in the event of an attack.

But what you may not yet know is that climate change is an ally of plant pests

Who will save the planet from plant enemies?

Plant doctors

Step forward plant and flower doctors! These experts love life and spring, and green is obviously their favourite colour. Just like our doctors, and veterinarians who treat our four-legged friends, plant doctors intervene when a plant, flower or tree gets sick or hurt. They work hard to identify what is the best response for each disease and how to save a plant. These doctors never get discouraged. On the contrary, the discovery of new diseases and pests helps them to make progress with their research and to experiment with more effective treatments. Plant doctors never give up, because they know that protecting a plant means protecting life.

On the next pages you can read how the Food and Agriculture Organization of the United Nations (FAO) and the International Plant Protection Convention (IPPC) also work hard to protect plants.





The international community

Protecting plants from pest and disease invasions is a global mission. All continents, countries and people of the world are fighting together to protect plant health. Every year in Rome, a group of representatives and experts on plant pests and diseases gathers from all over the globe. Their task is to define guidelines, universal instructions, which all countries in the world can follow to prevent pests and other plant diseases from spreading from one end of the world to the other. These international measures (or "standards") not only help to prevent situations, such as the ones Zala and José Carlos spoke about, but also to fight hunger in the world.

All continents,
countries and
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plant health



PLANT GUARDIANS 1

Food and Agriculture Organization of the United Nations

FAO works with more than 190 Member States to fight hunger and poverty and to ensure access to safe and nutritious food for all. FAO helps farmers around the world, especially those in developing countries, to use sustainable agricultural practices. This means producing enough food both to eat and make an income, while protecting the world's natural resources and the environment. FAO plays an important role in spreading the use of new effective technologies to produce food and protect plants in an environmentally friendly way. FAO also protects forests all over the globe from pest attacks to maintain biodiversity and protect the main source of oxygen for humans. Protecting plants is not only about fighting pests. It also means keeping soil and seeds healthy, managing the use of water, ensuring proper nutrition for plants and using sustainable agricultural practices. Plants are exactly like us: the healthier they are, the less they get sick.



PLANT GUARDIANS 2

International Plant Protection Convention

They say that prevention is better than cure. Preventing harmful pests from arriving suddenly in new places is surely simpler than trying to repair all the damage they cause. As we have read so far, plant pests are not only making plants sick, they also have disastrous effects on food security, world hunger and trade.

The Secretariat of the **International Plant Protection Convention (IPPC)** knows this well and has been working for years to protect plants from the invasion of harmful plant pests. More than 180 countries around the world are a part of this Convention and they have a common mission to safeguard the world's plants. However, minimizing the effects of these plant pests on a global level would not be possible without help from the regions and countries. For this reason, **national and regional plant protection organizations** come into action: they collect and share information and deal with plant pests and diseases locally.

So what can we do?

To take care of plants you don't necessarily have to be a plant doctor or a government representative. Everyone can do something to protect them!

1 **Become a plant guardian**

Observing roots, leaves and stems more closely is the first step in learning to love these precious living beings who keep the planet in balance. Take walks in nature to a botanical garden, or to the park nearest your home. If you notice something strange, take note of it and inform an adult. An expert, a teacher or a parent will know whom to contact.

2 **Be careful when you travel**

If you travel, remember not to bring seeds, flowers, fruits or vegetables with you unless you have permission. Some pests could be hiding inside!



3 Check the origin of online products

Tell your parents to be careful when ordering plants or plant products online. Small parcels are often not checked by the authorities, which means that you could help pests get into your country from abroad.



5 Be kind to the environment

Try to be kind to the environment and protect the Earth's precious resources. For example, avoid wasting water and make sure you properly dispose of household products that contain chemicals, paints or batteries, so as not to pollute our soils or water.



4 Make cities greener

Add some green to the scene by creating and caring for school gardens, community gardens, or potted plants on roofs or balconies. Ask your parents to help encourage local authorities to plant roof gardens to cover tar that absorbs heat. All this plant material creates shade, cleans the air, cools the city landscape, and reduces water pollution.



6 Become a #PlantHealth supporter

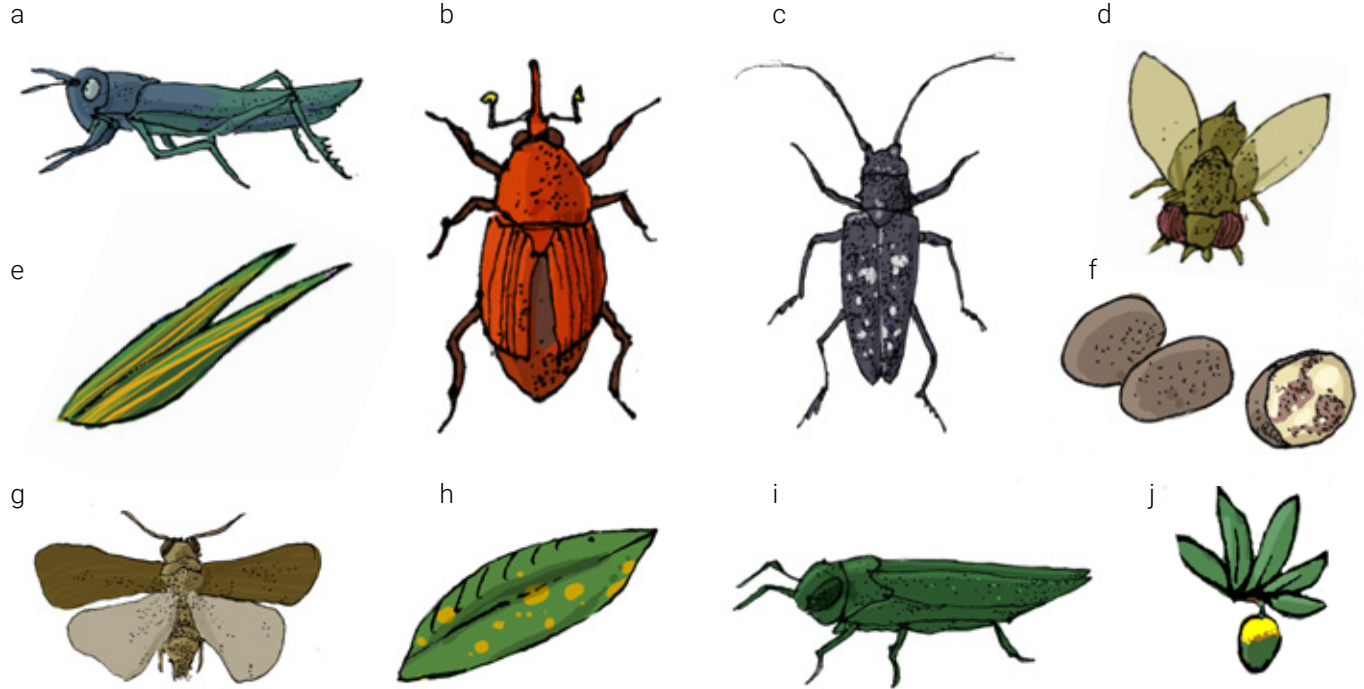
Spreading the word is very important, so inform your family, class and neighbours. Everyone must know that protecting plants is essential for life and a better future.



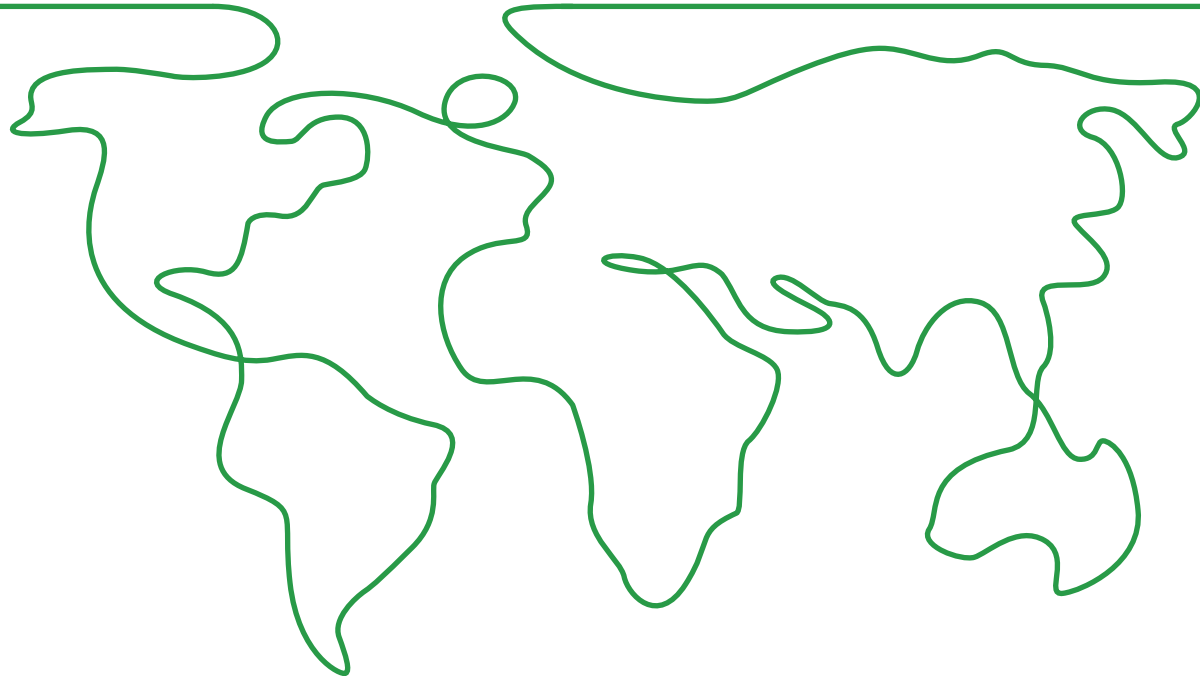
Activities

Look up images of plant pests and diseases online and use this information to help match the pictures here (you also saw these on pages 12-13) with the correct name:

- | | |
|--|--|
| 1. <i>Spodoptera frugiperda</i>
(fall armyworm) | 6. <i>Schistocerca gregaria</i>
(desert locust) |
| 2. <i>Rhynchophorus ferrugineus</i>
(red palm weevil) | 7. <i>Phytophthora infestans</i>
(potato late blight) |
| 3. <i>Anoplophora glabripennis</i>
(Asian long-horned beetle) | 8. <i>Hemileia vastatrix</i>
(coffee leaf rust) |
| 4. <i>Agilus planipennis</i>
(emerald ash borer) | 9. <i>Candidatus Liberibacter asiaticus</i>
(citrus greening bacterium) |
| 5. <i>Ceratitis capitata</i>
(Mediterranean fruit fly) | 10. <i>Puccinia striiformis</i>
(wheat yellow rust). |



- Do some research on the internet with a guardian and discover where you can find the six pests. Draw a simple map and mark the movements of these pests across the world. Use your imagination to show how they may have travelled there.
- Search the internet to learn about the history of one of the four plant diseases above. Write a case study with text and photos and present it to the class.





INTERNATIONAL YEAR OF
PLANT HEALTH

2020

2020: the International Year of Plant Health

The United Nations General Assembly proclaimed 2020 as the International Year of Plant Health. The objective of this international year is to spread and increase awareness of the importance of plant health among the public, and especially the younger generations. FAO and the IPPC Secretariat are working to raise awareness of this issue among the adults of today and tomorrow, and to understand how protecting plants is essential to defeat world hunger.

Activity Book Series

You can download the FAO Activity Book Series on our “Building the #ZeroHunger Generation” portal together with a range of material to support educators and parents in the preparation of activities or classes on important global issues at the core of FAO’s work: www.fao.org/building-the-zerohunger-generation



▶ Eating Healthy Matters



▶ Your Guide to FAO



▶ Working for Zero Hunger



▶ Change the future of Migration



▶ Climate is Changing



INTERNATIONAL YEAR OF
PLANT HEALTH
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