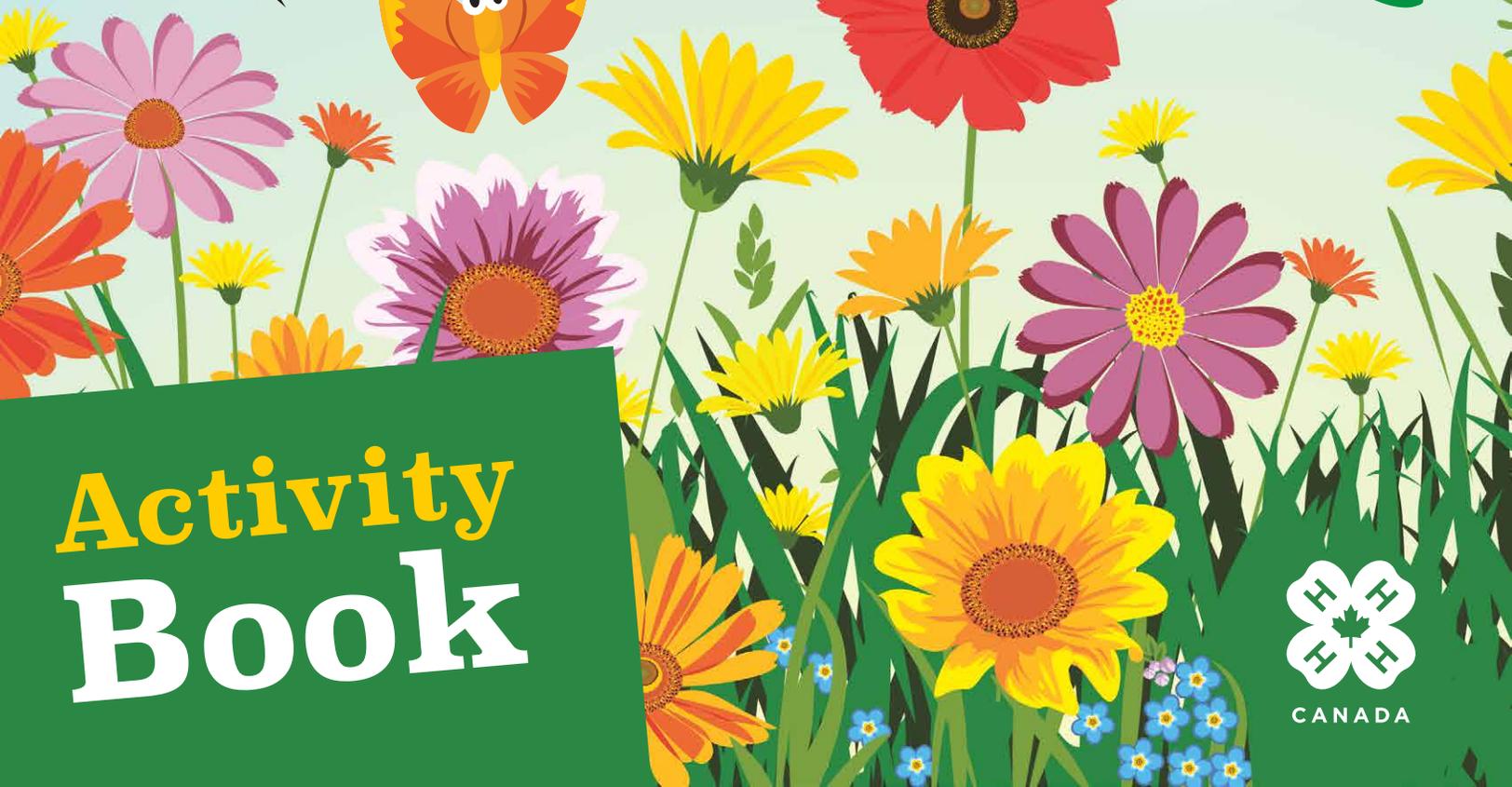


PROUD

to

Bee

a 4-H'er



**Activity
Book**



CANADA

Acknowledgements



Proud to Bee a 4-H'er gives youth across Canada the opportunity to learn about the "Life on Land" United Nations Sustainable Development Goal, get to know pollinators, and explore their role in creating a healthy ecosystem and a sustainable food supply.

FOUNDING PARTNER



This unique program is part of 4-H Canada and its partner Syngenta Canada's commitment to teaching our youth about the importance of building a sustainable future for all. Syngenta Canada and 4-H Canada have a long history of working together to advance shared interests in positive youth development, leadership, communities, sustainable agriculture, and food security. For more information about Syngenta Canada, please visit syngenta.ca.

SUPPORTED BY



Operation Pollinator is a Syngenta program focused on research and partnerships to promote the health and well-being of bees and other pollinators, given their essential role in agriculture and nature. It supports activities that enhance biodiversity, habitat, and other practical initiatives that contribute to healthy pollinator populations. Originating in the United Kingdom, Operation Pollinator has since been expanded to several countries around the world and includes both on-farm and off-farm components.

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You'll notice there are links to videos and other information throughout this activity guide. Please download the digital version of Proud to Bee a 4-H'er for easy access to these links!

Download and learn more at 4-h-canada.ca/proudtobee

Introduction



Hello!

We're so excited you are joining us for Proud to Bee a 4-H'er! This is an opportunity for you to learn about pollinators and have some 4-H fun with your club or at home.

Since the launch of Proud to Bee a 4-H'er in 2014, over 150,000 pollinator seed packets have been planted across the country by youth just like you!

Throughout this activity book, you will find everything you need to know about the vital role pollinators play in creating a healthy ecosystem and a sustainable food supply, along with the hands-on activity where you can plant your own "bee-autiful" garden to create a healthy ecosystem for pollinators in your backyard. We hope that you achieve these learning goals:

- Understand the importance of pollinators and their role in creating a healthy ecosystem
- Learn about the United Nations Sustainable Development Goals, and their impact on the world
- Develop skills that help the environment and aid in the production of a sustainable food supply
- Identify actions you can take to support the building of pollinator-friendly habitats
- Bee-come a pollinator champion by creating awareness about the importance of pollinators

Your activity kit contains:

- Proud to Bee a 4-H'er Activity Book
- Packs of the Proud to Bee a 4-H'er pollinator seed mix
- Info cards about pollinators you can share with others

We wanted to grow the opportunity for youth to get involved in 4-H programming by making this kit available across Canada to 4-H members, families, and even youth who aren't yet members! For those of you who may not be familiar, at 4-H we believe in nurturing responsible, caring and contributing leaders who are committed to positively impacting their communities. We provide hands-on learning for youth across the country thanks to the support of volunteer leaders. To learn more about us, check out our programs at 4-h-canada.ca!

We hope you enjoy this opportunity to understand the importance of pollinators and a healthy ecosystem, educate your friends, family, or community and plant gardens to help pollinators! Take a minute to share your experience with us by tagging [@4hcanada](https://www.instagram.com/4hcanada) or using [#ProudToBeeA4Her](https://www.instagram.com/#ProudToBeeA4Her) on Instagram, Facebook, or Twitter.

Happy 'Learn To Do By Doing'!

The 4-H Canada Team

How does Proud to Bee a 4-H'er work?

Get to Know Pollinators!

Explore this activity book to learn about the amazing and fascinating work of Canada's pollinators while getting to know some of the SDGs!



Use your Pollinator Activity Kit

Now that you have your pollinator activity kit, you are free to use your seeds however you like! Here are some ideas for what you can do:

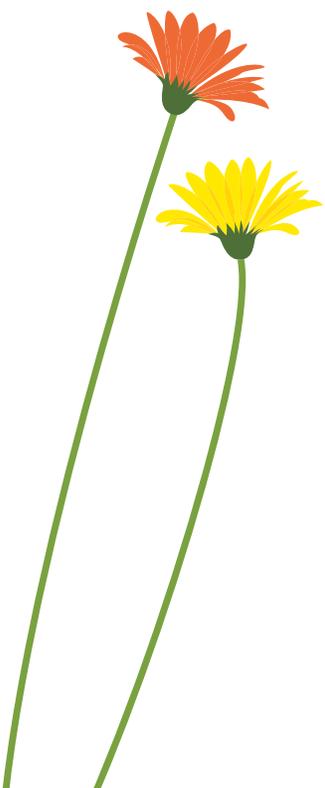
- Plant at home! Sow the seeds in your backyard to create your own pollinator haven at home. Window boxes and planters are also a great option where you don't have a lot of space to plant.
- Invite members of your community to be a part of your Proud to Bee a 4-H'er planting activity. You can see if there are places in your community where you can plant larger gardens to help create bee-friendly habitats.
- You can give seed packets as gifts to those who support your efforts as a 4-H club, or as gifts to prospective club members, encouraging them to come and join you in helping to support this initiative.
- You can sell seed packets to fundraise for your 4-H club. You can use the sales tracking sheet included in your activity kit to track any sales (for 4-H clubs only). 100% of any revenue from seed sales will stay with your club.

Plant a "Bee-autiful" Garden

Use the seed packets to grow a beautiful garden to create a pollinator-friendly habitat that will bloom throughout the year!

Share the Buzz

Spread the word like pollinators spread pollen! Let others in your community know about the awesome work you are doing to create pollinator-friendly habitats. You can share the pollinator info cards from your activity kit with others so they can also learn about pollinators!



What are the Sustainable Development Goals?

The Sustainable Development Goals (SDGs) are global goals developed by the United Nations. The United Nations is an international organization that encourages nations to protect peace, security, and work well together. The SDGs were agreed to by all 193 member nations, including Canada. Each nation is working to achieve these 17 goals, which deal with poverty, health, education, and the environment.



When setting a goal, it is always valuable to look to the future - what will it look like when the goal is achieved? How long will that take? Is it realistic? In 2015, the United Nations developed these goals and laid out what they wanted the world to look like in 2030.

Explore The 17 SDGs
You can learn more about what the 17 goals are at sdgs.un.org

Buzzworthy

What is a long-term goal you've set for yourself? Maybe it was to develop a new habit or achieve something important to you. How did you work toward that goal? Were there little steps, or a big effort all at once? How did you know when you achieved it?

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Consider the SMART template for setting your own goals!

Specific S G	Measurable M O	Achievable A A	Realistic R L	Timely T S
What do you want to do?	How will you know when you've reached it?	Is it in your power to accomplish it?	Can you realistically achieve it?	When exactly do you want to accomplish it?

These are the goals the United Nations set:

SUSTAINABLE DEVELOPMENT GOALS



For Proud to Bee a 4-H'er we are focusing on SDG 15: Life on Land, which promotes conservation, as well as biodiversity sustainably and has the following goal:

	<p>15 LIFE ON LAND</p> <p>PROTECT, RESTORE AND PROMOTE SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS, SUSTAINABLY MANAGE FORESTS, COMBAT DESERTIFICATION, AND HALT AND REVERSE LAND DEGRADATION AND HALT BIODIVERSITY LOSS</p>
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In 2010, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) declared the **bumblebee an endangered species** and it is estimated that nearly 25,000 different species across the globe are now endangered with extinction. In Canada alone, species that are considered at risk have seen their populations fall over 40% in the last 50 years. While there have been many steps forward to protect and restore ecosystems and biodiversity, the changes to our climate and the impact of human activity have put stress on the environment and made it harder for these ecosystems – including plants and animals – to remain healthy. It is important that we continue to combat the loss of our ecosystems and habitats as they directly mitigate the effects of climate change.

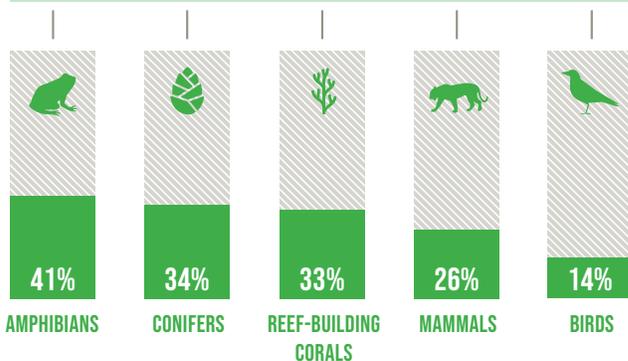
15 LIFE ON LAND



PROTECT, RESTORE AND PROMOTE SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS, SUSTAINABLY MANAGE FORESTS, COMBAT DESERTIFICATION, AND HALT AND REVERSE LAND DEGRADATION AND HALT BIODIVERSITY LOSS

MORE THAN A QUARTER OF SPECIES ASSESSED BY THE IUCN RED LIST ARE THREATENED WITH EXTINCTION

PROPORTION OF SPECIES THREATENED WITH EXTINCTION

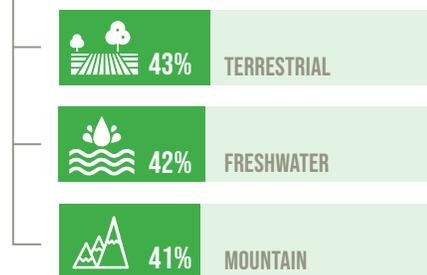


IUCN RED LIST

TRACKS DATA ON MORE THAN 134,400 SPECIES OF MAMMALS, BIRDS, AMPHIBIANS, REEF-BUILDING CORALS AND CONIFERS. MORE THAN 37,400 SPECIES ARE THREATENED WITH EXTINCTION.

PROGRESS TO SAFEGUARD KEY BIODIVERSITY AREAS HAS STALLED OVER THE LAST 5 YEARS

GLOBAL MEAN PERCENTAGE OF EACH KEY BIODIVERSITY AREA COVERED BY PROTECTED AREAS (2021)



ALMOST ALL COUNTRIES HAVE ADOPTED LEGISLATION FOR PREVENTING OR CONTROLLING INVASIVE ALIEN SPECIES



INVASIVE ALIEN SPECIES NEGATIVELY AFFECT NATIVE BIODIVERSITY AND COST THE GLOBAL ECONOMY BILLIONS OF DOLLARS ANNUALLY.

PROGRESS HAS BEEN MADE TOWARDS SUSTAINABLE FOREST MANAGEMENT

BUT THE WORLD HAS LOST 100 MILLION HECTARES OF FOREST

IN TWO DECADES (2000-2020)



Get to Know Pollinators

Pollination Power

Birds, butterflies, bees, and other insects provide a very important service to the world as pollinators. For example, when a bee lands on a flower, pollen ends up sticking to the bee's hair (that's why pollinator bees are fuzzy!). As they zoom from flower to flower to gather food (pollen and nectar), bees are also delivering the pollen that allows flowers and many crops to become fertilized and reproduce.

Some flowers need their pollen to be "buzzed" out by bees that can vibrate at high frequencies. Bumblebees are great "buzz pollinators" and that is why they are often used as managed pollinators of plants that require buzz pollination (such as tomatoes).

To reproduce, plants rely on insects and other pollinators. Over time, plants have adapted to become more attractive to pollinators.

We have pollinators to thank for many of the foods we eat. Pollination is important to the production of one-third of today's food crops. From apples to zucchini, many fruits, nuts and vegetables rely on pollination by bees and other insects.

Pollinators also affect our food in other ways. For example, since they pollinate many crops (such as alfalfa), they help to feed animals in the dairy and meat industries.

There are many factors affecting the health of bee populations that must be managed to minimize risk to these beneficial insects. Risk factors include pests and diseases, poor nutrition, stress, weather, loss of habitat, and pesticides.



The Buzz about Bees

To date, about 800 species of bees have been discovered in Canada.

There are over 20,000 different bee species worldwide. Honey bees are social bees that live together in colonies. There can be 50,000 or more all living in one colony. They are the bees who make and store the honey we know and love. Bumblebees also live in colonies and do make a form of honey, but it isn't a type we typically eat. Mason bees are non-social bees and prefer to do their own thing and live alone - usually in places like abandoned bee nests, beetle tunnels, or crevices in buildings. They were given the name "Mason" because they use mud to split their nests into compartments.

Bumblebees and mason bees are native to Canada, but honey bees (*Apis mellifera*) were originally brought to Canada from Europe.

Canada has both wild bees and "managed" bees. Managed bees are raised by people and have their habitat built for them.



Proud to *Bee* a 4-H'er

Wild bees need to find their own habitat. The queen bee chooses the location for social bumblebees. She looks for a safe home that is close to food and water sources but is unlikely to flood. She also considers nest size. She needs enough room for the colony to grow, but can't have too much extra space, because that makes it hard for bees to survive the cold in winter.

Managed bees are often studied or given jobs in agriculture. For example, since bumblebees are such great pollinators, tomato growers use them in greenhouses to help pollinate plants.

Fun Facts

The earliest known interaction of humans and bees is estimated to be between 6,000 and 8,000 years ago. Evidence was found in cave paintings in Spain. There is also evidence of honey being harvested as far back as 2450 BC.

Scientists have only identified about 10 percent of the world's insect population. There could be additional bee species buzzing around out there waiting to be discovered!

Sweat bees get their name from the fact that they like to lick the sweat off people and animals in order to get some of their salt intake.

Honey bees are deaf, which makes them unable to communicate through sounds. Therefore, they communicate by doing a "waggle dance." When a bee returns from gathering food, they will perform a dance to show the other bees where to find flowers. Watch [this video](#) to see them dance.

Bees are the only insects that produce food commonly eaten by humans (honey).

Cuckoo bees do not build their own nests. Instead, they sneak into the nests of other bees to lay their eggs. Some even have special "armour" to help protect against stings from other bees if they get caught sneaking around.

Honey bees divvy up tasks according to age. The oldest bees are the ones who go out foraging. Scientists think this is likely because the oldest bees are closest to the end of their lifespan, so it's less of a risk to the overall hive if they are unable to return.

On average, to make one pound of honey, 556 honey bees must visit two million flowers.

What's In The Seed Mix?

Each packet of the Proud to Bee a 4-H'er pollinator seed mix contains several species of wildflowers that have been specifically chosen for providing nectar and pollen to a variety of pollinators, including bees and butterflies.



Black-Eyed Susan

Black Eyed Susan has been a staple in many gardens for generations. This bright flower ranges in colours from yellow and orange to red or purple with dark centers. It's considered beneficial to many pollinators as a source of nectar and pollen, including bees, butterflies, and birds.



Lance Leaf Coreopsis

Coreopsis can be grown as an annual or as a perennial and is particularly attractive to native bees. It also attracts adult butterflies and honey bees. It provides both nectar and pollen for foragers during a long flowering period.



Blanket Flower

This vibrant plant attracts a variety of pollinators with its orange, red and yellow blooms. Blanket flower flowers for a lengthy period, from early summer into the fall. This plant is relatively easy to grow and manage and is especially noted for its ability to attract butterflies.



Lemon Mint

Lemon mint is an annual plant that flowers in the spring and summer. Lemon mint attracts bees and butterflies and offers nectar rewards. Its blooms are varying shades of white, pink and purple and flowering occurs from May until July.



Borage

The blue flowers of borage are known to attract pollinators such as bees and butterflies. It is also known to attract beneficial insects like the green lacewing. Borage is an annual plant but will re-seed itself in following years. Its lengthy blooming period during June and July makes borage an ideal flower for pollinator gardens.



New England Aster

New England aster is a popular perennial addition to gardens, especially for pollinators. Its late-season blooms provide a food source to bees and butterflies at a critical time in the season. New England aster attracts bumblebees and honey bees.



Butterfly Weed

True to its name, this orange-blossomed flower is known to attract butterflies, as well as hummingbirds and native bees. This perennial flower provides a lengthy blooming period that extends into the fall. Butterfly weed is a rich source of nectar, providing a valuable food source to pollinators.



Partridge Pea

Partridge pea is an important annual, providing nectar to bees and seeds to birds. Nectar is not produced within the flowers but is instead found in glands at the base of each leaf. Ants and butterflies are also known to visit partridge pea, and butterflies will even lay larvae on this plant.



White Clover

White clover is especially desirable for pollinators as the pollen and nectar are easily accessible. Due to white clover's short florets, long tongues on insects are not required to access the nectar and pollen. Bees are particularly attracted to white clover and utilize both the pollen and nectar.



Purple Coneflower

Purple coneflower is a perennial which can grow in full sun but can also tolerate partly shaded conditions. Nectar found within the flowers appeals to birds, butterflies, native bees, and wasps. Native bees known to visit purple coneflower include bumblebees and leaf-cutting bees.



Corn Poppy

The corn poppy, also called the wild field poppy and Flanders poppy, blooms from June to August. It was termed the 'corn' poppy as it often grows in corn fields because it prefers disturbed soils. Interestingly, corn poppy does not produce nectar but is an abundant source of pollen.



Sweet Mignonette

Sweet mignonette is considered a biennial plant, taking two years to complete its life cycle. Small yellow blooms are present from late spring until early summer. Pollen and nectar are readily produced by sweet mignonette, making it an attractive flower to visit by bees and other pollinators.



Forget-Me-Not

Forget-Me-Not flowers are ideal for pollinator gardens as their early blooms provide nectar to bees and butterflies at a critical time in the season. Forget-me-nots are available in annual and perennial form. They typically bloom in April and May and feature small blue flowers.



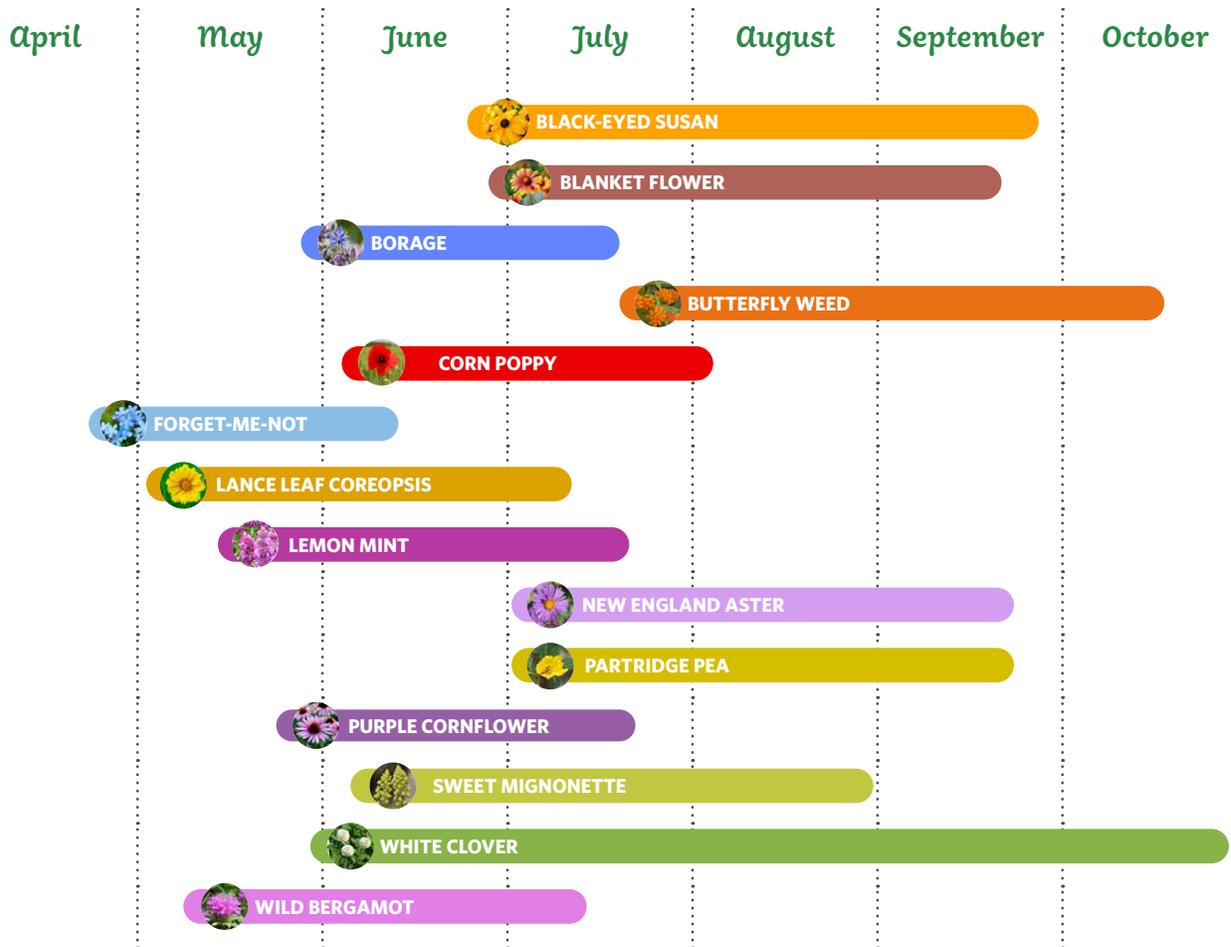
Wild Bergamot

Wild bergamot is a showy perennial that blooms in June and July (and sometimes even later) and is attractive to many types of pollinators. Bees, butterflies, bee flies, hummingbirds and moths are all known to visit wild bergamot's white, pink, and purple flowers for nectar.

Proud to *Bee* a 4-H'er

When does the pollinator seed mix bloom?

Since there is a mix of seeds in the packet, the plants can be expected to bloom at different times throughout the growing season. This ensures that pollinators have a variety of plants at their disposal. Have fun tracking the growth times of your plants and enjoy your ever-changing garden!



Are there any plants in the seed packets that are considered toxic to humans or animals?

The Proud to Bee a 4-H'er pollinator seed mix does not contain any plants considered to be toxic to humans or animals. Older versions of our pollinator seed mix had wild lupine, which has a small natural toxicity. While the new mix no longer has wild lupine, it is recognized as being of value to bees, including native bees such as bumblebees. Wild lupine is also common in wild and open spaces in many parts of Canada, North America, and elsewhere in the world.

What does it mean for a plant to have a small natural toxicity, you might ask? Some plants produce a toxin to deter herbivores (like animals or humans) from consuming them. Over time, some plants have evolved

to develop a vast array of toxins to protect themselves and even began developing physical defences such as thorns, spines, and prickles.

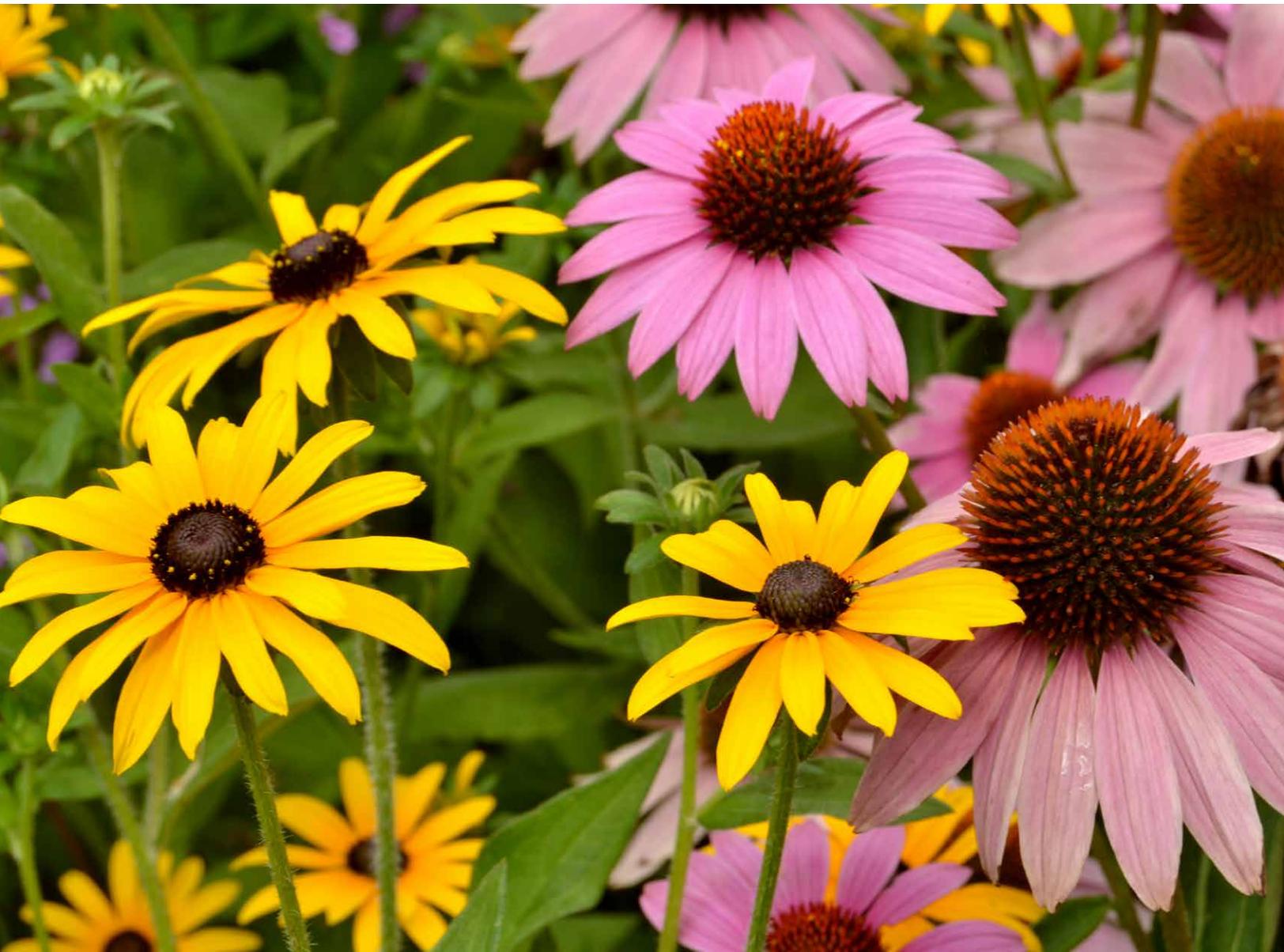
It is important to remember that many common plants contain a small natural toxicity such as bracken, daffodils, goldenrod, hyacinth, iris, lily of the valley, morning glory and sweet pea, to name a few.



While there are no plants considered toxic in the seed mix, we still recommend that your seeds are planted away from grazing livestock. Any plant known to be toxic to humans or animals should not be ingested.

Are the pollinator seeds perennials or annuals?

There are both perennial and annual plant seeds in the pollinator seed packets. Annuals complete their life cycle in one year, perennials will keep growing, year after year. Some varieties can take a year or two to fully develop.



Activity: Planting Your Pollinator Garden



Why Are Pollinator-Friendly Gardens Important?

By using your pollinator seed mix, not only are you growing a beautiful garden, but you are also helping to create pollinator-friendly habitats. Healthy pollinators are an important part of a healthy ecosystem and a sustainable food supply.

When pollinators land on a flower or a plant to gather food for themselves, they are also helping to feed us. That's because, during their daily flower-hopping trips, pollinators end up transferring pollen from plant to plant – helping plants become fertilized and reproduce.

Let's Get Started!

Seeds need tender loving care if they are going to grow into beautiful plants. Here are some instructions to help you grow a “bee-autiful,” pollinator-friendly garden.

Materials You'll Need

- Seed packets
- Gardening tools, such as a hand spade and hand rake/claw
- Potting soil and mulch
- Small garden plot
- Water
- Sunny location
- Optional window box or planter

Things to remember

Your seed packets contain a variety of great plants that will make up a tasty buffet for bees and other pollinators – here are a few things to remember!

- Germinate your seeds in containers indoors for transplant outside **or** plant them directly outdoors into well-drained loose soil once there is no longer a risk of frost in the spring.
- For a fall planting, sow seeds outdoors after the first frost, with the goal that they will germinate the following spring. A late fall sowing allows any dormant seed to be naturally stratified over the winter. Plant your seeds in a sunny location, according to seed packet instructions.



- Water regularly to keep the soil moist.
- Don't pick the flowers because that's where the all-important pollen is.
- Keep plants in a sheltered spot, away from wind and heavy rain.
- Let your garden grow wild and natural. Once your garden is planted and blooming, try not to disturb it because bees and other beneficial insects are busy in there!
- Since there is a mix of seeds in your packet, plants will bloom at different times. Plus, some are perennials, meaning they will bloom year after year. Have fun tracking the different growth rates of your plants and enjoy your ever-changing garden!

If you don't have space to plant in your garden or an open area, you can also plant in a window box or planter. Once you have selected the right container to plant in, be sure to:



- Plant directly in the container.
- Put plants in a plastic or metal liner that fits inside the box. With this method, you can rotate liners and add fresh plants when plantings pass their prime.
- Cover the drain holes.
- Fill with soil mixture and firm soil around plants, leaving at least one inch at the top for watering.
- Use routine good care on the window box, starting with regular watering.
- Place your planter or window box in a sunny location, according to seed packet instructions.

Reflection

You have just completed activities about pollinators, and we hope you feel like you've achieved the goals we mentioned in the beginning! When we learn and do something new, one of the key steps is to reflect at the end of it all...how did it go? What did you achieve? What would you do differently next time?

Consider the following questions and see how they link up to the skills you've developed in Proud to Bee a 4-H'er:

REFLECTION QUESTIONS	OUTCOMES
How have you advocated for pollinators and a healthy ecosystem, or supported others in their learning? 	<i>Leadership development</i>
What skills have you learned by going through these activities? 	<i>Skill mastery</i>
What positive change can you make by supporting the Life on Land SDG? 	<i>Positive values</i>
What responsibility do you feel you have in supporting healthy pollinator population efforts? 	<i>Responsibility</i>

What goals have you set for yourself to continue to learn about and support healthy pollinator population efforts?

Planning and decision making

.....

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.....

How will you make your mark as a member of your community, and as a global citizen?

Sense of purpose

.....

.....

.....

What was the most fun part of this kit? What was something you learned in a hands-on way? Did anyone help you with your learning - acknowledge them here.

Learn To Do By Doing

Fun

Supportive adults

.....

.....

.....



Thank you for joining 4-H Canada, and youth across the country in learning more about pollinators and a healthy ecosystem, gaining skills, and having fun with planting as you explored Proud to Bee a 4-H'er. We look forward to seeing what you've accomplished (remember to share it with us on social media by tagging @4hcanada) and hope you'll take part in other 4-H Canada opportunities!

References

Canadian Honey Council: [👉 https://honeycouncil.ca/](https://honeycouncil.ca/)

Canada Agriculture and Food Museum [👉 https://bees.techno-science.ca/english/bees/default.php](https://bees.techno-science.ca/english/bees/default.php)

Xerces Society [👉 http://www.xerces.org/](http://www.xerces.org/)

Agriculture and Agri-Food Canada [👉 https://agriculture.canada.ca/](https://agriculture.canada.ca/)

Photos

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NOTES

A series of 20 horizontal dotted lines for writing notes.



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