

# Pollinator Awareness Class

Darwin Initiative Project 2022-2024

Funders:



**BELMONT**  
FORUM

Partners:



University of  
**BRISTOL**



Tribhuvan University  
Institute of Science and Technology  
Central Department of Zoology

# Session overview

Welcome & introduction



Pollinator declines



What is pollination?



How can I manage pollinators?



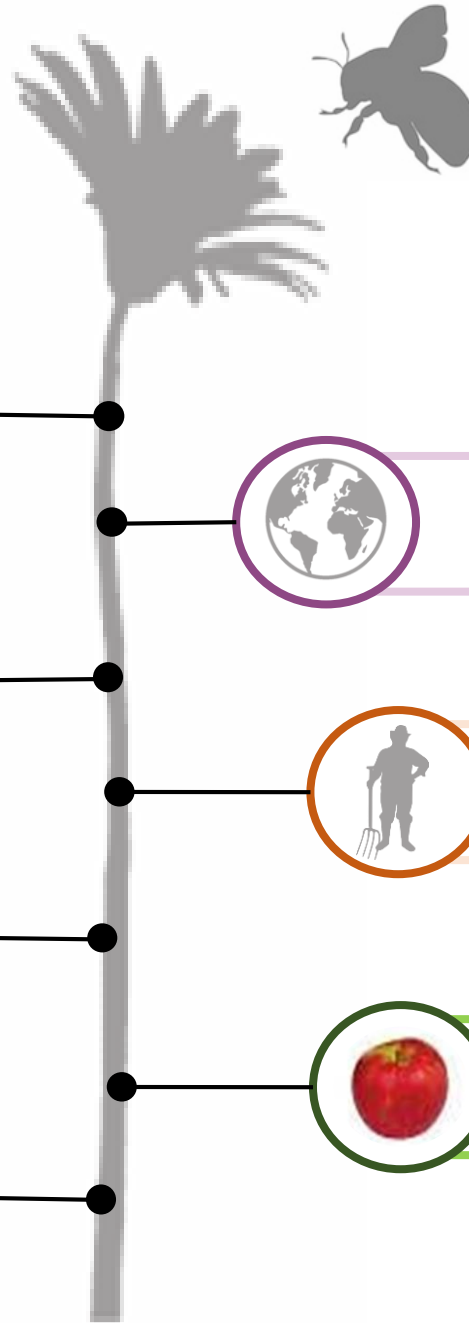
Why do you need pollinators?



Apple pollination management



Which insects are pollinators?



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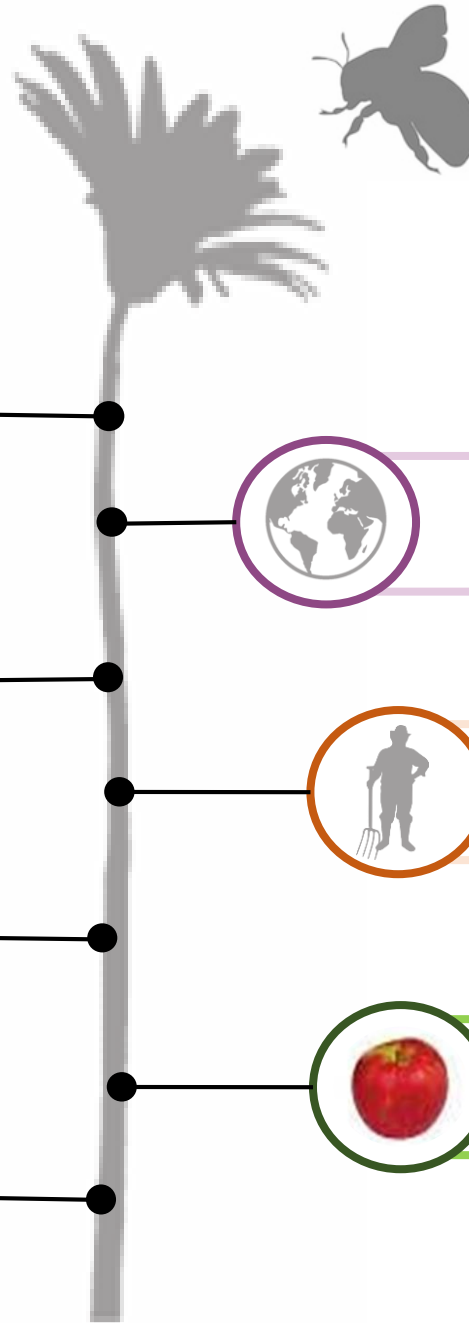
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# The problem of plants

To make seeds and fruit, plants need to move pollen from one flower to another.

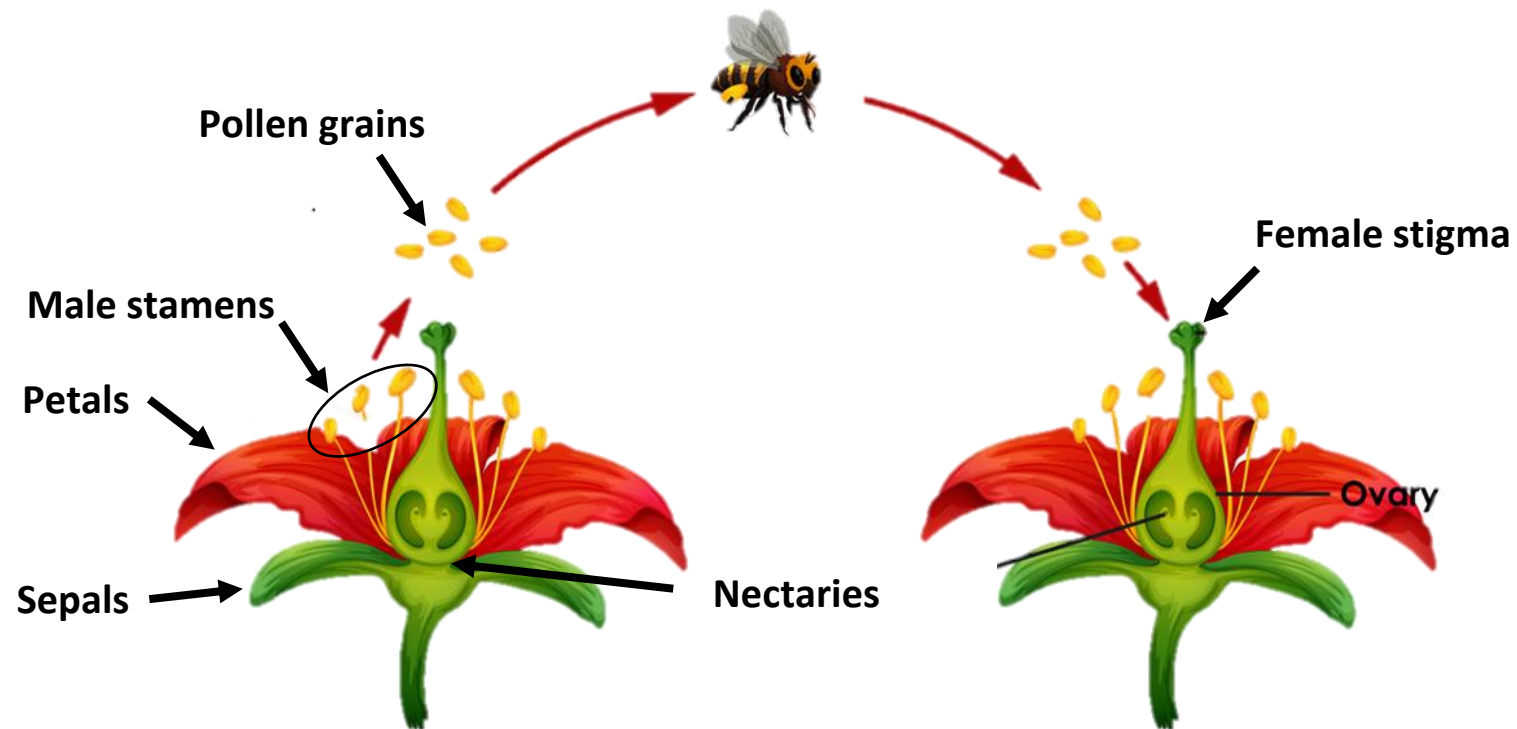
This is difficult because plants cannot move...



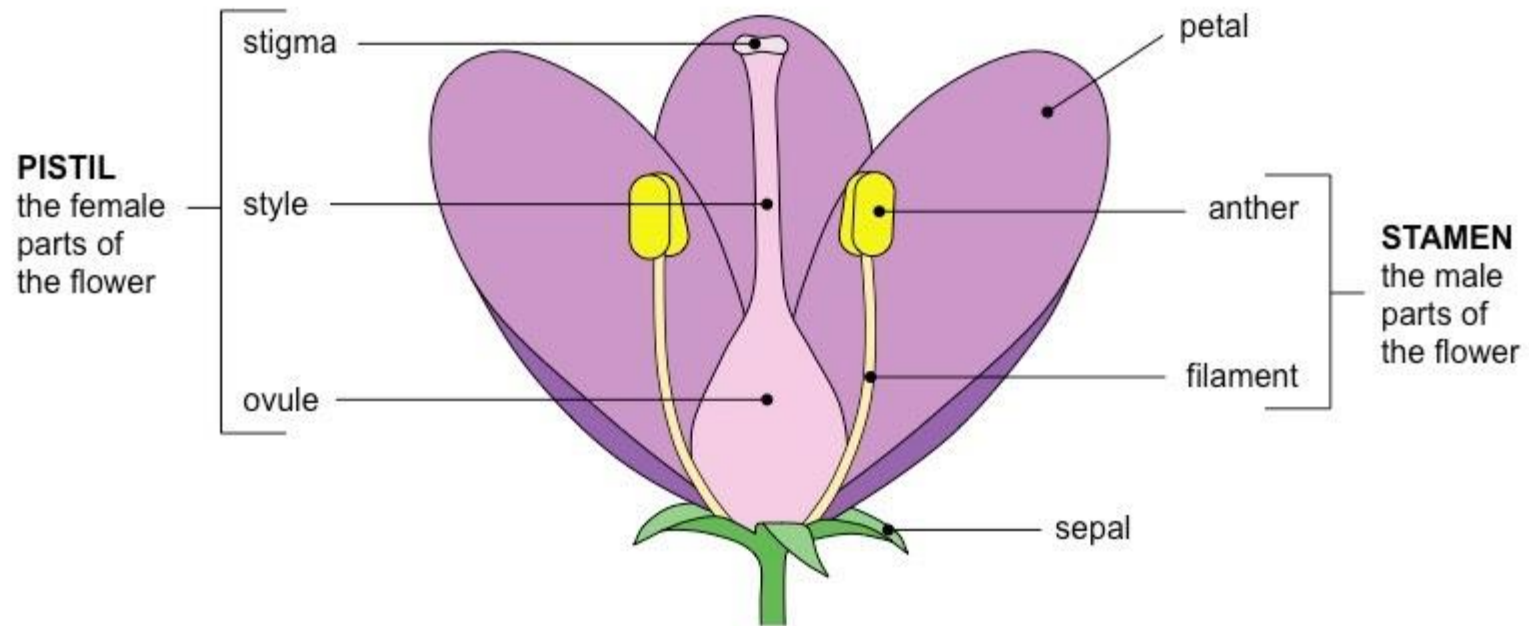


# The solution

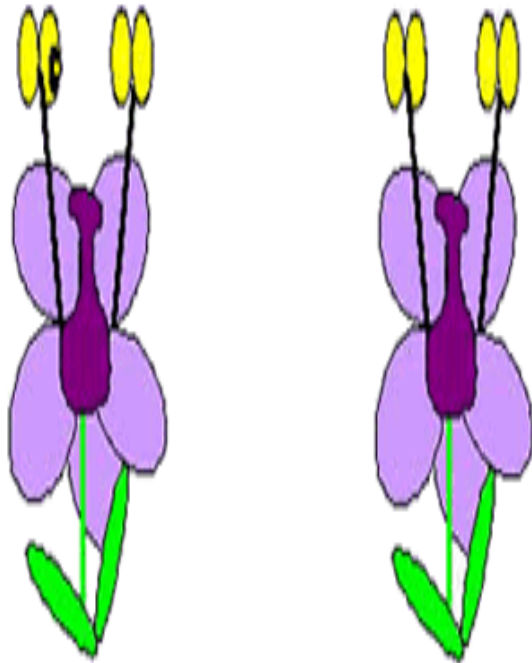
Instead of moving themselves, plants get insects to carry pollen between flowers for them...



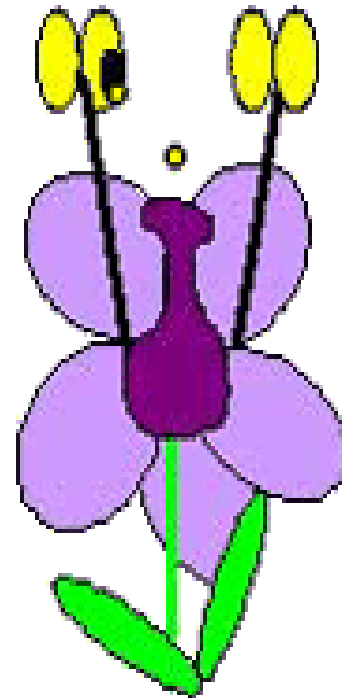
# Floral structure



# Types of Pollination



**Cross pollination**



**Self pollination**



**Stigma**

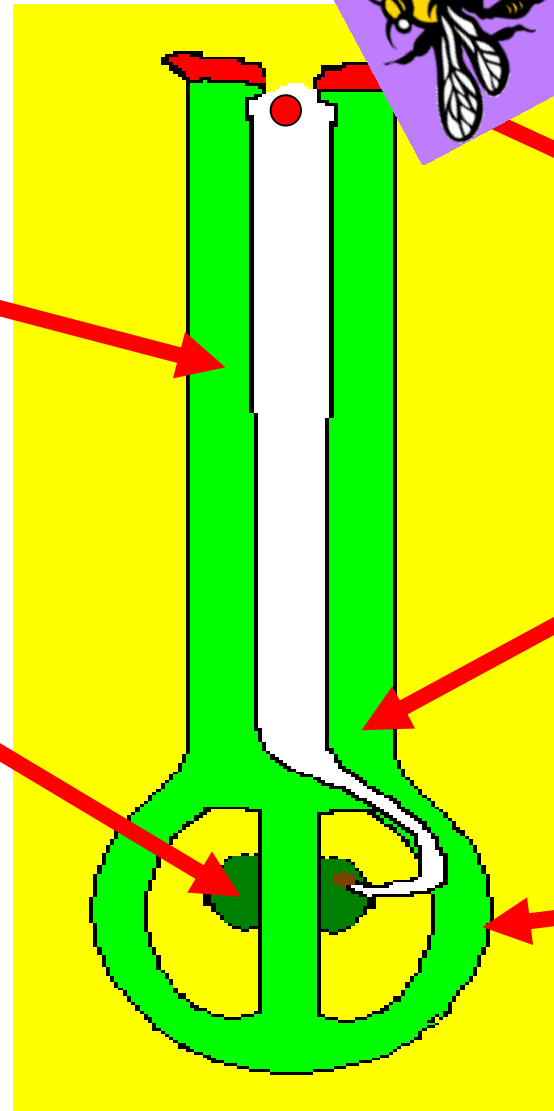
Pollen grains land here

The **Male Cell** travels down the tube

The **Male Cell** fertilises the ovule

**Style**

**Ovary**





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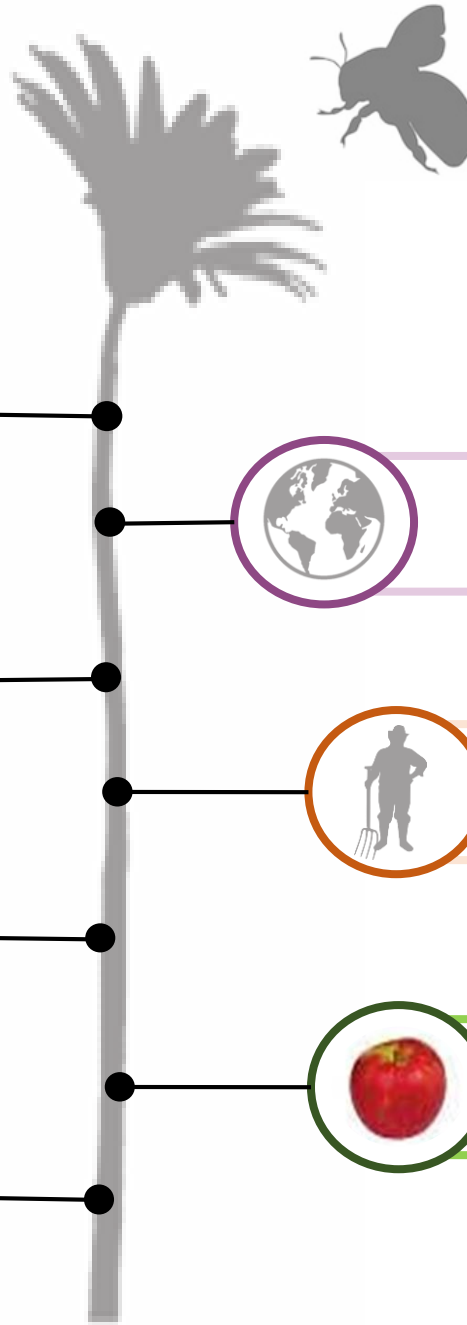
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# BEE POLLINATION

## Bees

No Bees



BEEES  
&  
AGRICULTURE  
=>  
YIELD  
&  
QUALITY



N. Morison, INRA

*Four widely used bees in commercial pollination*



Bumble Bee



Honey Bee



Alkali Bee

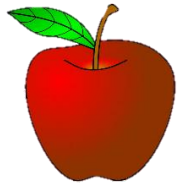


Leafcutting Bee

# What do pollinators do for us?



1 in every 3 **bites** of food is thanks to pollinators



3 out of every 4 crop plants rely on pollinators



Many essential **vitamins & minerals** come from pollinator dependent crops



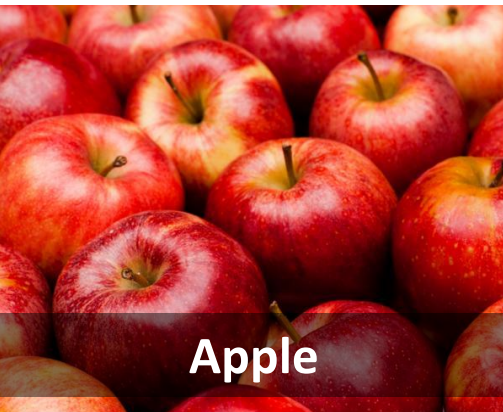
The value of pollination in Nepal is **\$477 million (US) each year**



*Without pollinators **crop yields** would **decline**, leading to food insecurity and nutrition deficiency*



More than **50 crops** in Nepal are **pollinator-dependent**, for example:



**Apple**



**Mango**



**Mustard**



**Watermelon**



**Buckwheat**



**Pumpkin**



**Citrus**



**Soybean**



**Chili**



**Eggplant**



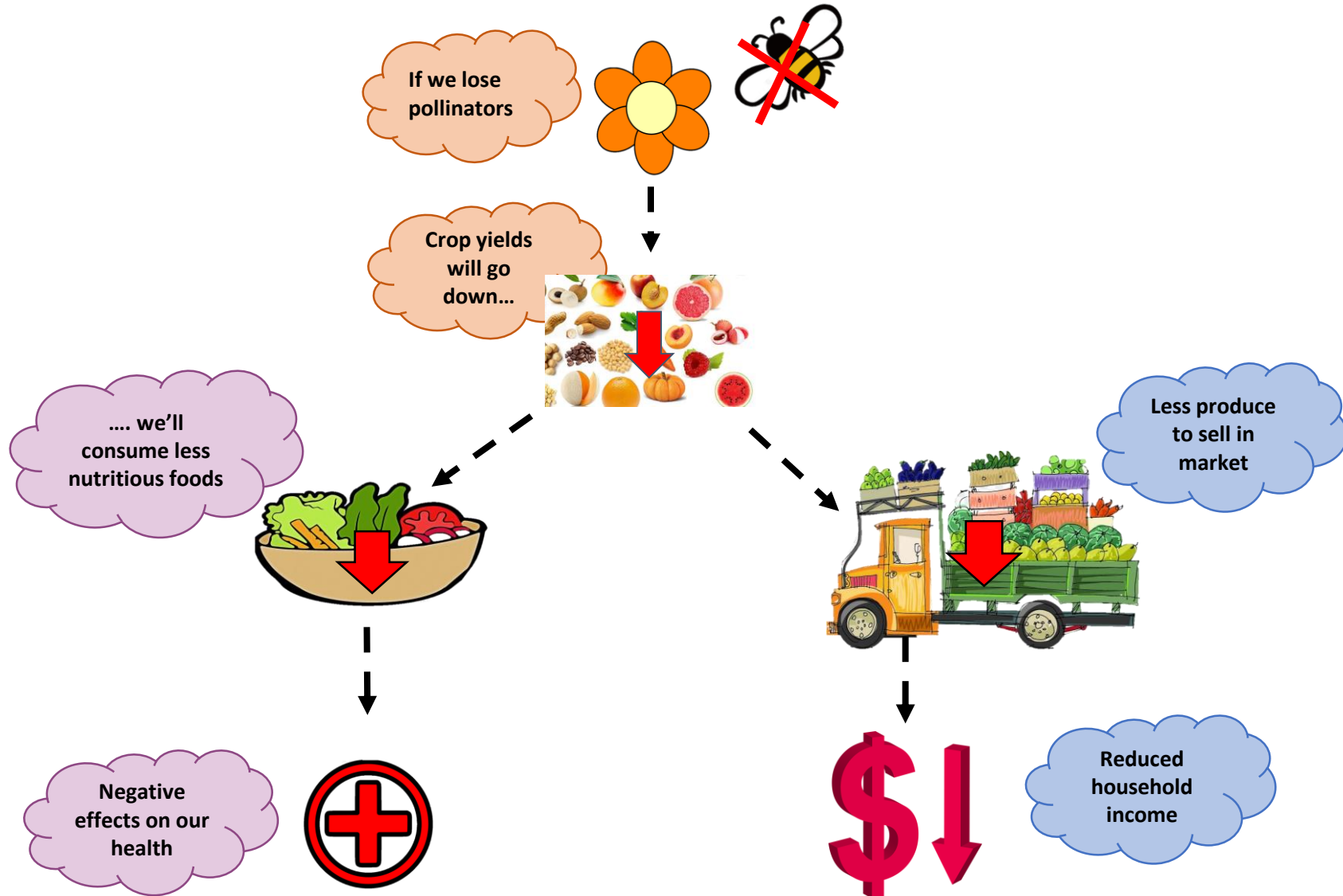
**Cucumber**



**Cardamom**



# Pollinator dependent crops are highly nutritious and have a high economic value



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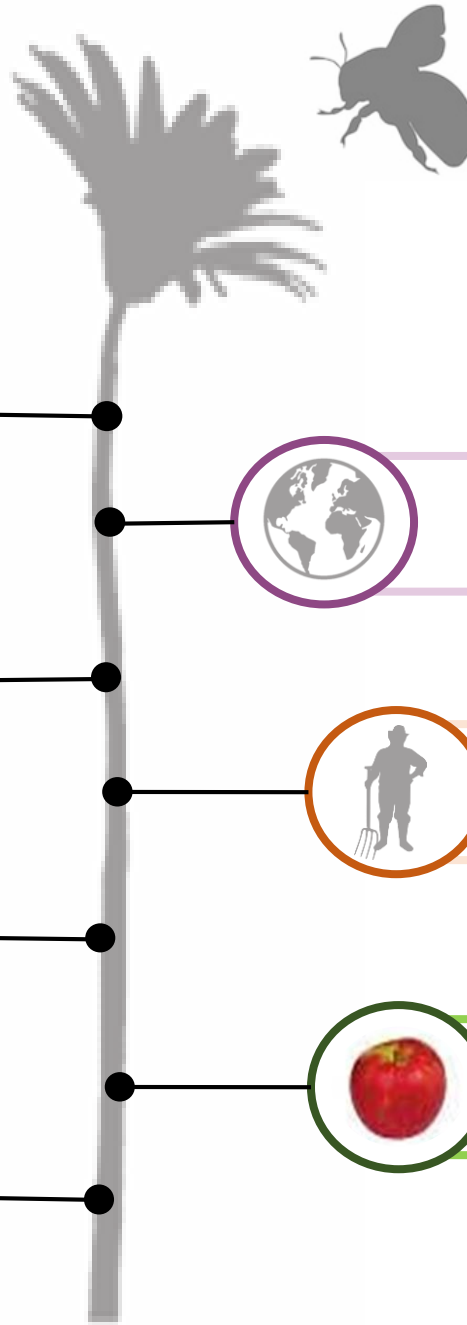
Why do you need pollinators?



Apple pollination management



Which insects are pollinators?





# Who are the pollinators?



Honeybees are used by farmers for pollination...

But many wild insects are even better...

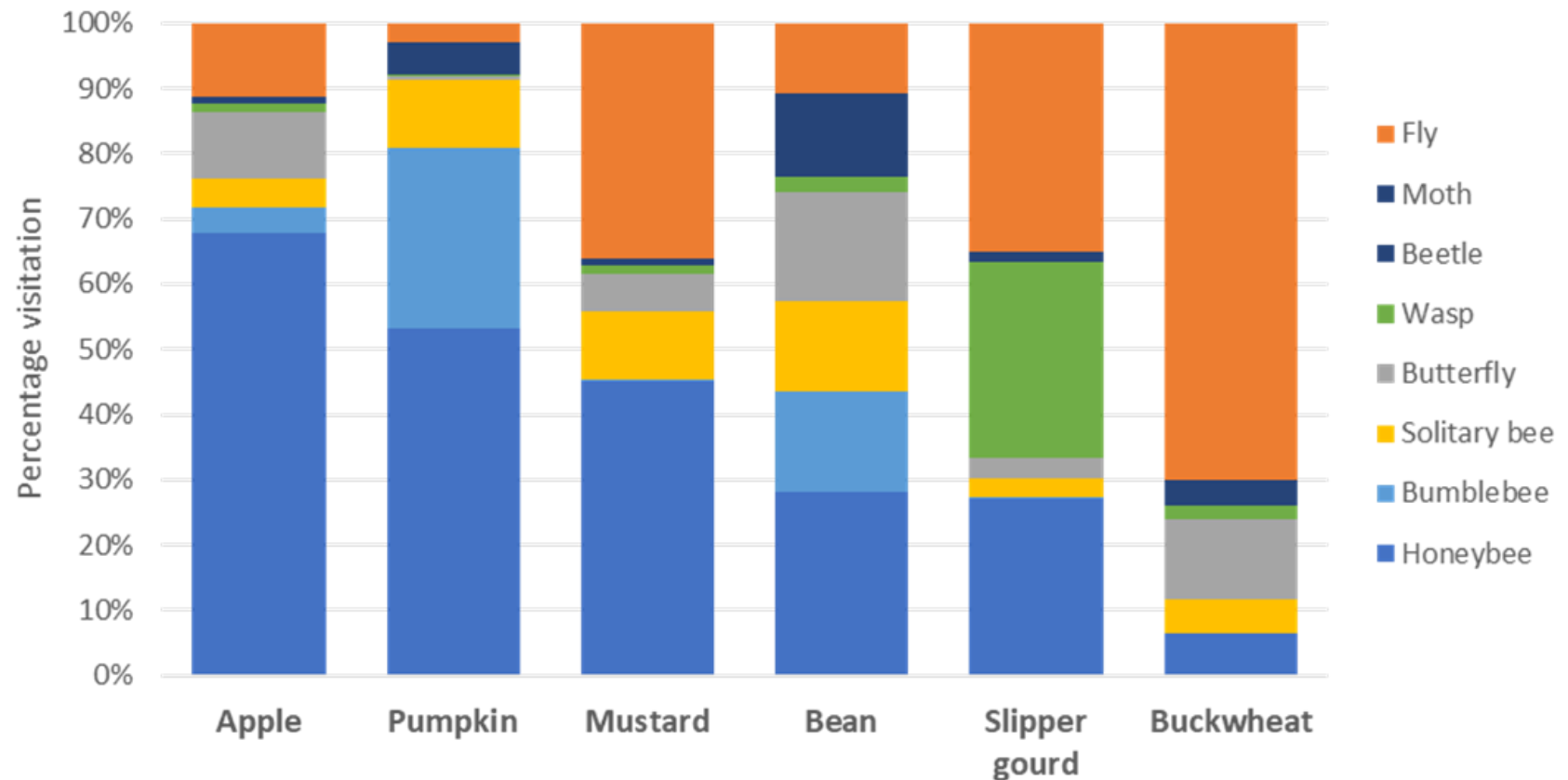


More types of pollinator =  
**better crop production**

**Some crops rely more on bees (e.g. apple)**

**Some crops rely more on flies and wasps (e.g. buckwheat)**

**We need LOTS of pollinating insects to ensure all crops are successfully pollinated**



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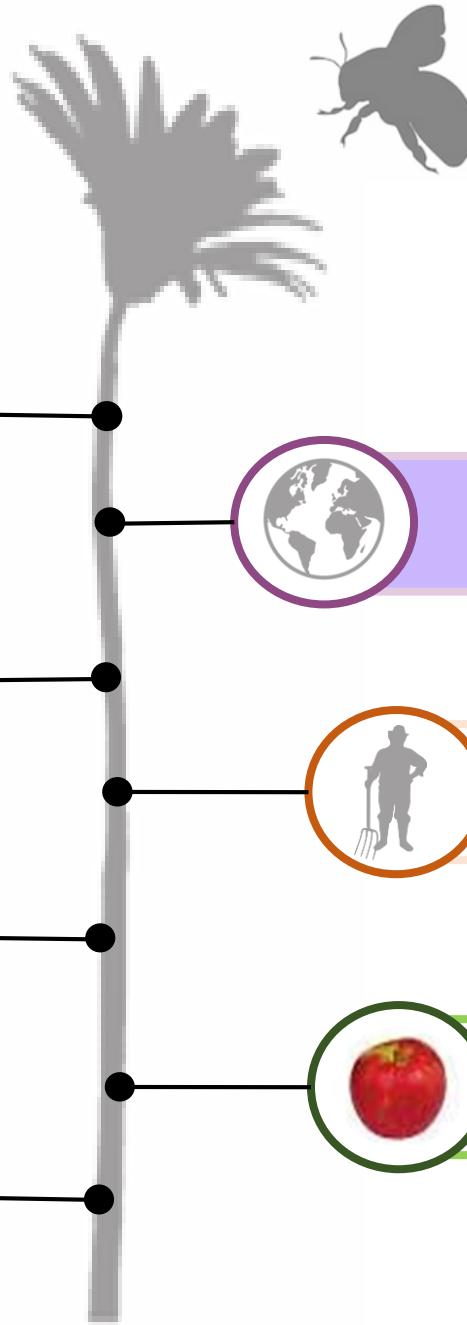
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# Pollinators are declining around the world!



In some parts of China, **pollinators have declined** so much that farmers now need to pollinate **by hand**





# Why are pollinators declining?

- > Clearance of forests & grasslands
- > Intensive farming
- > Pesticide use
- > Climate change



...are killing pollinators in Nepal



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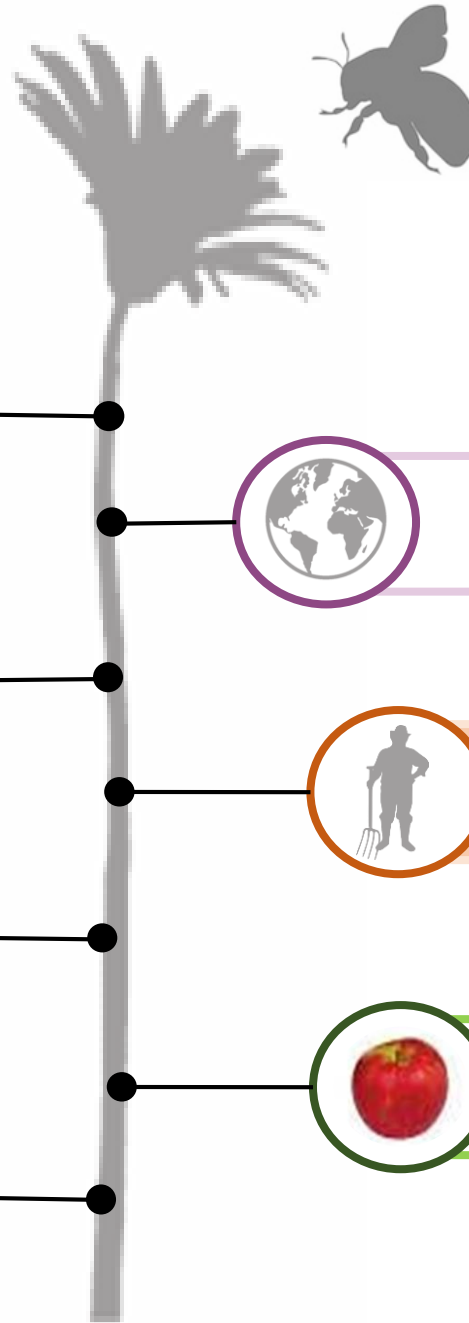
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# 1) Plant more flowers



- Plant lots of different types
- Use flowering hedgerows
- Keep something flowering all year

## Pollinator-friendly plants in Karnali:



Prinsepia  
(ढटेला)



Knotweed  
(सीन्के रत्नौली)



Cosmos  
(झ्याँजी)



Thistle  
(थकल)



Cotoneaster  
(घंगेरू)



Catmint  
(काले भीडों)



Dandelion  
(गोब्या)



Silky rose  
(करौसी)



Marigold  
(हजारी)

## 2) Reduce pesticides



- Never spray during crop flowering
- Use organic / botanical pesticides
- Only use when really needed
- Follow recommended dose





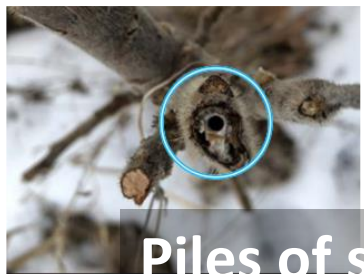
### 3) Leave natural habitat



- Conserve nearby forests & grassland
- Leave patches of weeds
- Leave dead wood & fallen branches



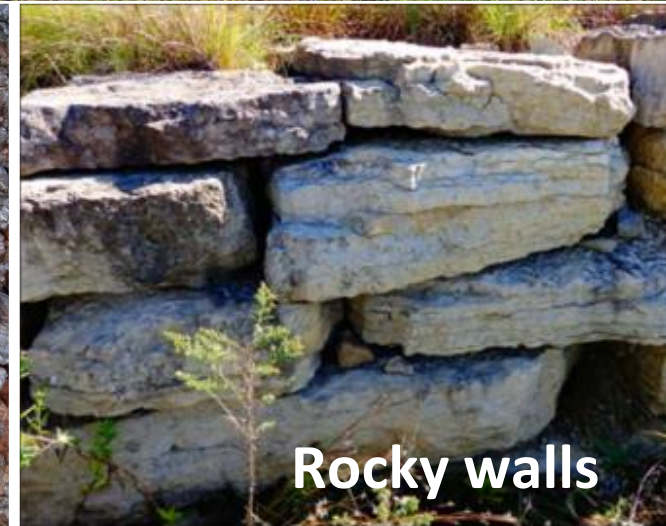
Patches of weeds



Piles of sticks



Holes in trees



Rocky walls

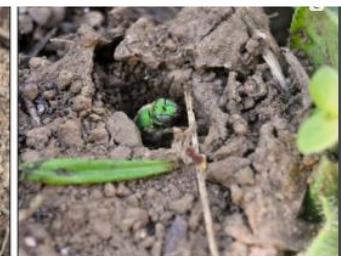


Dead wood



Bare earth banks

Holes in ground





## 4) Use bee hives



- Place hives in crops during flowering
- Only use native bee species
- Manage disease carefully



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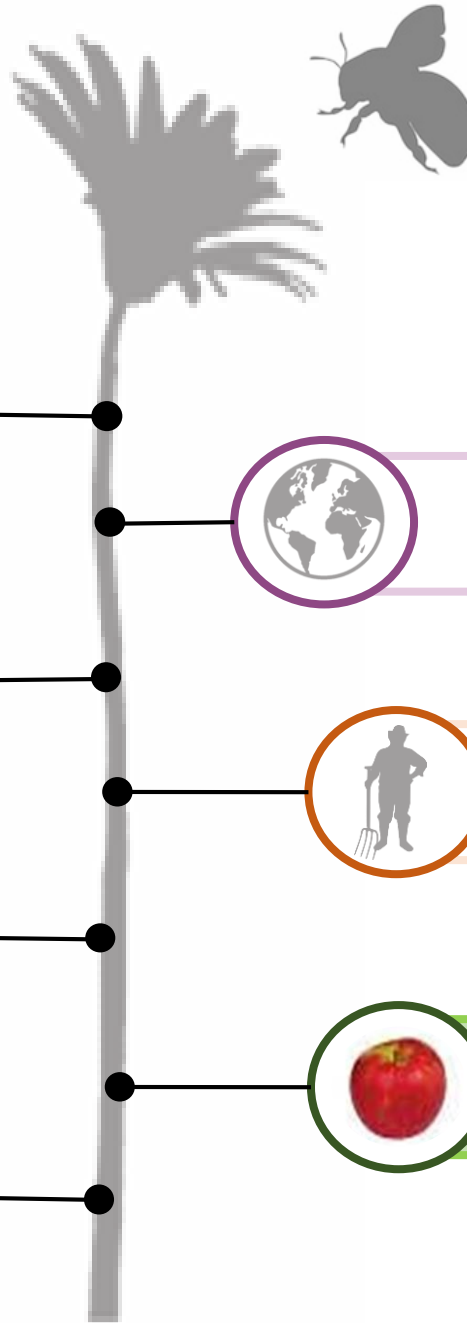
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# Apple pollination & orchard management

## Now we will go into the field and learn:

- How we can improve apple pollination
- How to prune apple trees correctly
- Good orchard management practices

