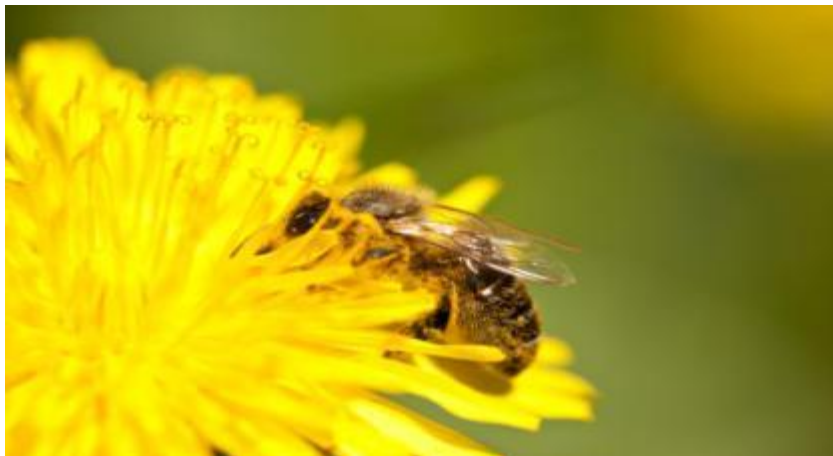


ROLE OF HONEY BEES IN CROP POLLINATION AND SEED PRODUCTION,USES OF BEES IN GREEN HOUSE POLLINATION



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BSA-11-064

Bees as Pollinators!

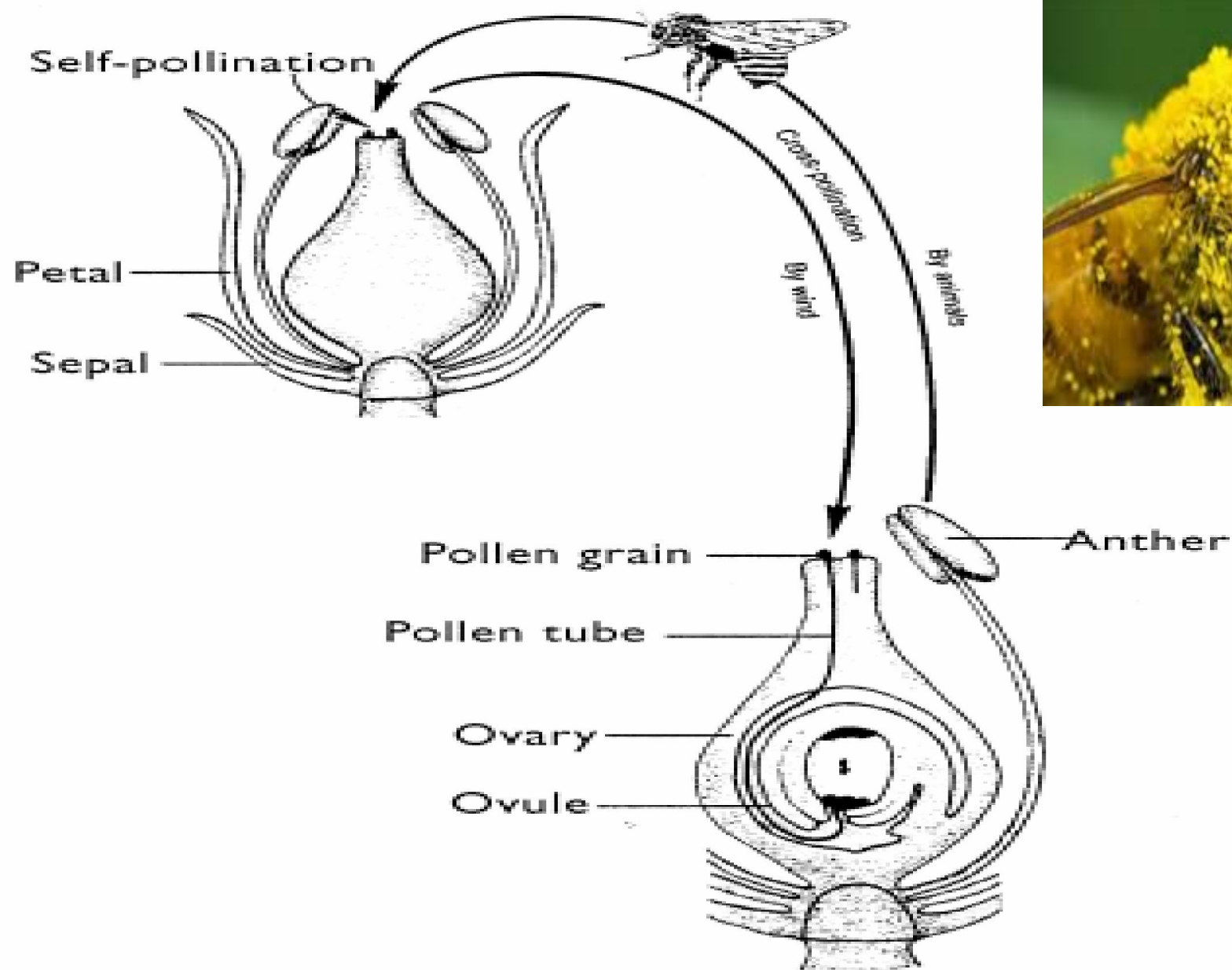
Pollinators provide an ecosystem service that enables plants to produce fruits and seeds.

About 70% of the world's plants require a pollinator

Bees depend on nectar and pollen for food

Bees are attracted to bright color flowers – yellow and blue; red appears dull but can be seen in UV light

Bee pollinated flowers such as the dandelion have UV markings “nectar lines” that help the bees locate the nectar producing glands





Open or field pollination

- Near about 80% of agricultural and horticultural crops depended on honeybee to pollinate.
- The production of some crops increased after honeybees to pollinate of its flowers.
- Pollination importance is back on beekeepers and farmers because after pollination by honeybees the increase in crop production and in reverse it get pollen and nectar from the crops.

Cross-pollination

pollen
grains

1. Pollen from stamens sticks to a bee as it visits a flower to collect food.

3. Pollen on the bee sticks to a pistil of a flower on the other plant.



2. The bee travels to another plant of the same type.



Honeybee have its great economic importance in terms of increased yield and quality of commercially grown insect pollinated crops and also in assisting self pollinated crops in the world.

In Europe, pollination by honeybee is worth approximately U4.25billion, and pollination by other taxa worth approximately 0.75billion

Value of agricultural crops dependent on honeybee pollination was estimated to be \$14.6billion per year in the U.S.





Competition between some plants which have a lot of pollen grains and nectar concentration to the plants of our crop which we want its pollination because honeybees will be attracted to these plants for pollens and nectar.

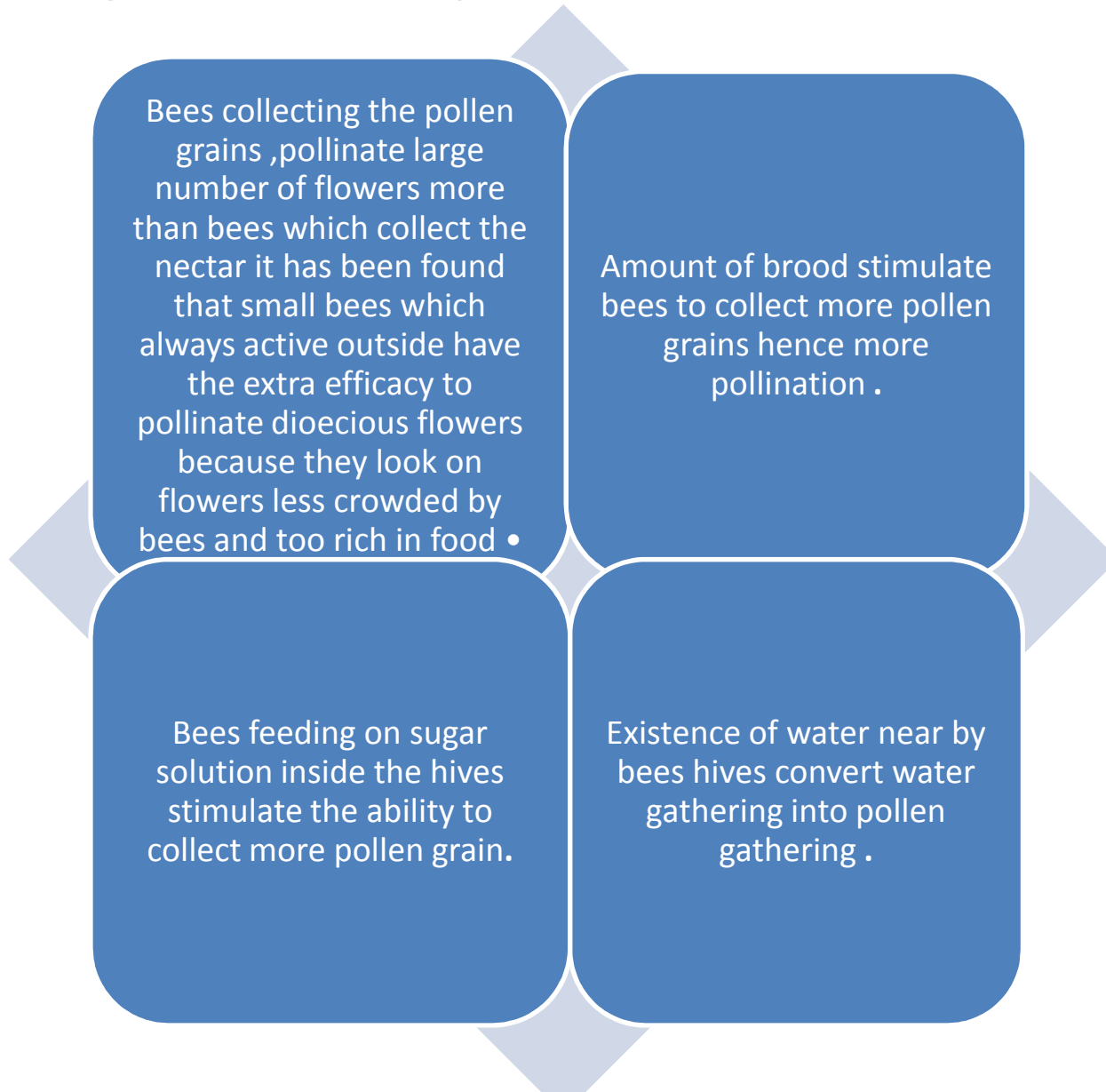
So it is recommended to eradicate these plants from crops or near to crops to enhance our crop pollination

Power and colonies number: It was found that the strong colonies and higher colonies number have the good ability to pollinate the crops after winter season

Beehive placement to pollinate the crops: Colonies distribution is an important factor. Colonies should be placed in all area.

From the Experiment demonstration it has been found that placing of **2-3** colonies to an acre.

Honey bee in pollination behaviour



Not Just Honey

Many valuable agricultural products are dependent on honeybee pollination.

Crop value in billions- 2006		% Pollinated by honeybees
Soybeans	\$19.7	50%
Alfalfa	7.5	60
Cotton	5.2	80
Almonds	2.2	100
Apples	2.1	90
Oranges	1.8	90
Peaches	0.5	80
Cherries, sweet	0.5	90
Grapefruit	0.4	90
Tangerines	0.1	90

SOURCE: U.S. Dept of Agriculture; AP
Roger A. Morse and Nicholas W. Calderone,
Cornell University

Increase in Yield Due to Bee Pollination

HORTICULTURAL CROPS	% INCREASE IN YIELD
Apple- various varieties	180-695
Pear	240-601
Cherries	56-100
Strawberry	17.4-91.9
Litchi	4538-10246
Orange	47-90
Citrus	7-33.3
Guava	70-140
Papaya	5-10
This increase in yield is in addition to the value of honey	

Increase in Yield Due to Bee Pollination

AGRICULTURAL CROPS	% INCR. IN YIELD
Mustard	128.1-157.8
Rapeseed	12.8-139.3
Sunflower	21-3400
Niger	60.7-173
Berseem (Seed)	24.3-331
Buckwheat	62.5
Egyptian cotton	16-24
Coffee Beans	16.7-39.8
Pulses (Arahar, Moong, Urd, Masoor, Peas, Beans, etc.)	10-38.7
This increase in yield is in addition to the value of honey	

Bee Pollinated Crops		
Crop	Value in billions(2006)	% Bee Pollinated
Almonds	2.2	100
Apples	2.1	90
Cotton	5.2	16
Blueberries	0.5	90
Grapes	3.2	1
Oranges	1.8	27
Peanuts	0.6	2
Peaches	0.5	48
Soybeans	19.7	5
Strawberries	1.5	2

Managing Colonies for Pollination

Queenright

Forager bee strong

Expanding brood population

Limited super space

Minimum strength

No swarming

Dry & in sun

Distributed in crop

Moved in & out promptly



SEED PRODUCTION

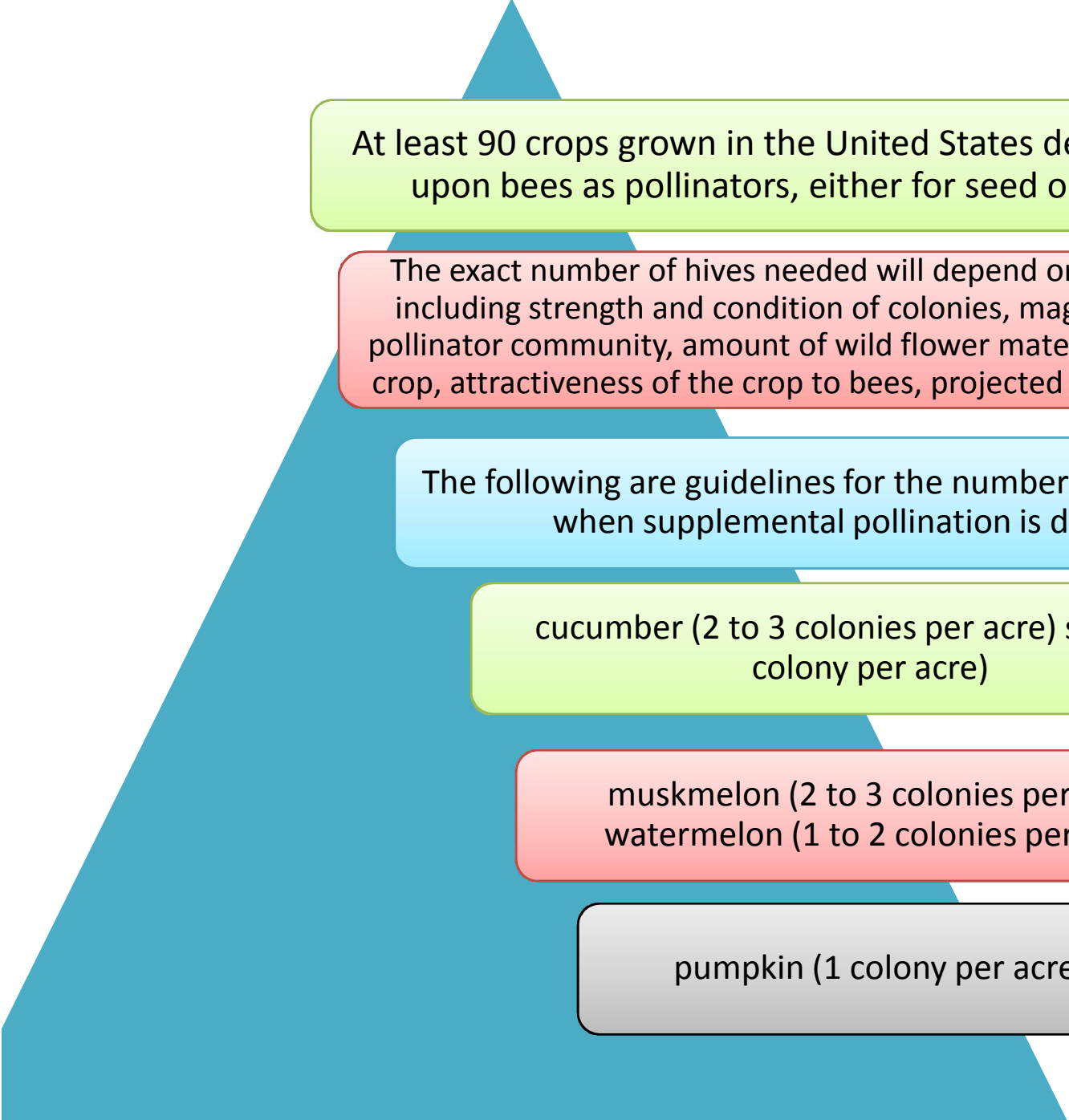
The presence of honeybees and other pollinating insects is needed for a good setting and high seed yielding.

The number and mass of seed obtained from the plants grown in isolator-cages was only a small percent in comparison to the adequate amounts obtained with open pollination.

At the first period of flowering and under bad weather conditions, honeybees work on blooming onion more intensively the closer their hives have been situated to the field.

When the flowering near honeybee colonies is ended, honeybees move their activity to farther and farther parts of the field.

Bee foraging on open pollinated cultivars of onion is satisfied in Poland. Possible need of spraying attractants, like Citral, Geraniol or anise, seems to be necessary only in the case of the presence of some more attractive competitive plants flowering in the neighbourhood of the seed onion field or if there is a low number of bee colonies surrounding it.



At least 90 crops grown in the United States depend to some extent upon bees as pollinators, either for seed or fruit production.

The exact number of hives needed will depend on a number of factors, including strength and condition of colonies, magnitude of the natural pollinator community, amount of wild flower material competing with the crop, attractiveness of the crop to bees, projected yield, and the weather.

The following are guidelines for the number of hives to use when supplemental pollination is desired

cucumber (2 to 3 colonies per acre) squash (1 colony per acre)

muskmelon (2 to 3 colonies per acre)
watermelon (1 to 2 colonies per acre)

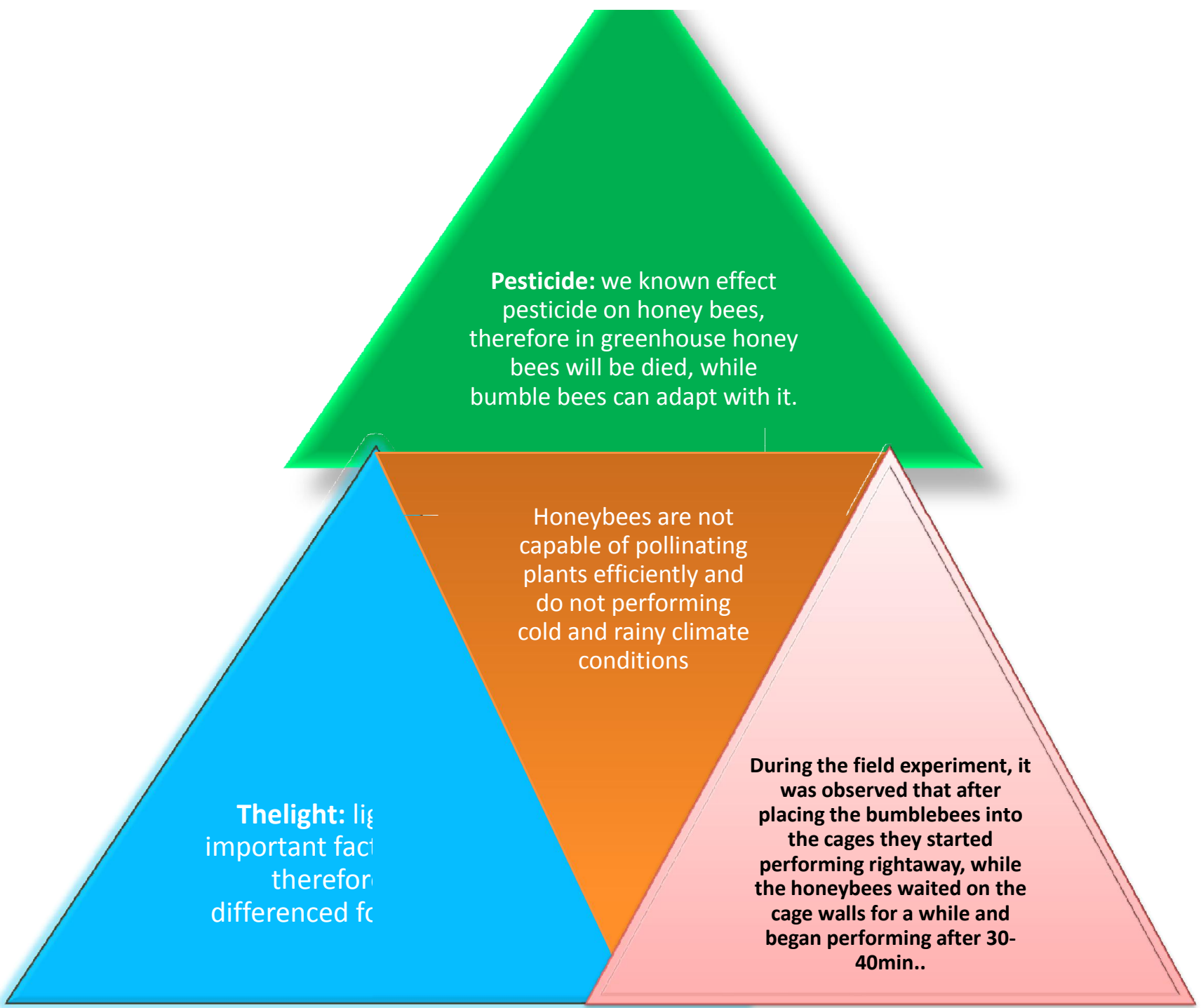
pumpkin (1 colony per acre)

GREENHOUSE POLLINATION

There are many physiological and behavioral factors of honey bee which control of its usage for pollination is limited in greenhouse production areas These factors includes:

Temperature and relative Humidity: usually temperature in greenhouses particularly in midday and early afternoon during sunny conditions when humidity is about 70%, is best especially to Tomato crop.

Greenhouse temperature should be kept above 15 °C at night and below 29 °C during the day



Pesticide: we known effect
pesticide on honey bees,
therefore in greenhouse honey
bees will be died, while
bumble bees can adapt with it.

Honeybees are not
capable of pollinating
plants efficiently and
do not performing
cold and rainy climate
conditions

The light: lig
important fact
therefor
differenced f

During the field experiment, it
was observed that after
placing the bumblebees into
the cages they started
performing rightaway, while
the honeybees waited on the
cage walls for a while and
began performing after 30-
40min..

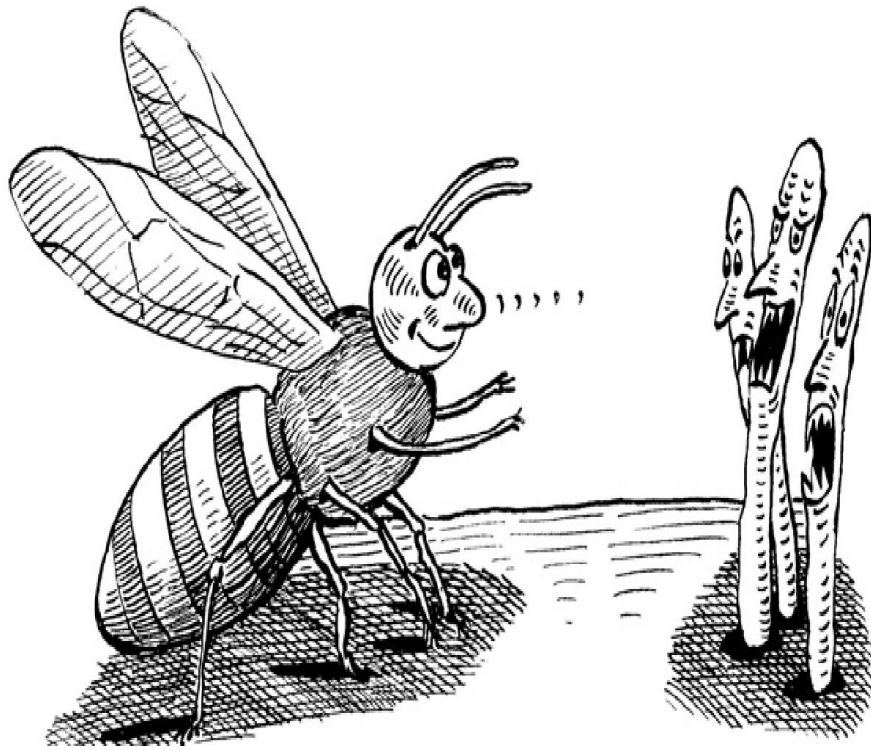
USES



Pollinating bees are not only useful for pollinating crops, but also for other purposes.

Honeybees are also used to spread natural antagonists to benefit biological disease control in agriculture and horticulture.

By collecting pollen from bell peppers in greenhouses, bees can help prevent allergic reactions of greenhouse workers.



**Reducing problems
with pollen allergy in
horticultural crops
using honeybees**

More than one third
of all workers in bell
pepper greenhouses
have demonstrable
allergic reactions from
working with these
plants

**Using
honeybees and
to spread
natural
antagonists**



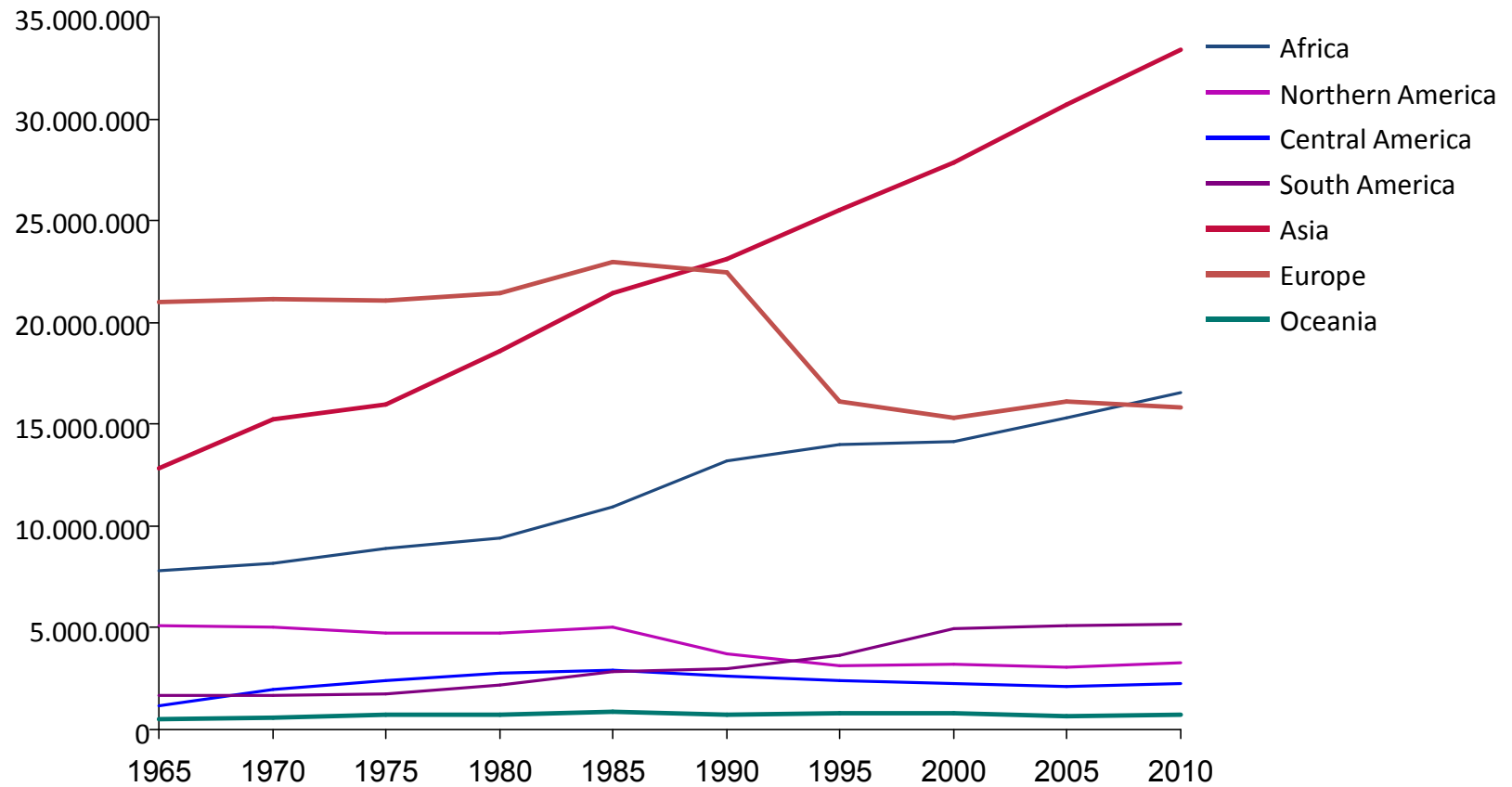
Honeybees can be used to spread natural antagonists in a crop. This is a form of biological control in which antagonists prevent fungal diseases from harming crops. Because the honeybees bring the antagonists to the right location – in the flower itself – only a small quantity of the antagonists is needed to protect the crop, and the use of fungicides can be reduced. There is substantial interest in this method from various countries.



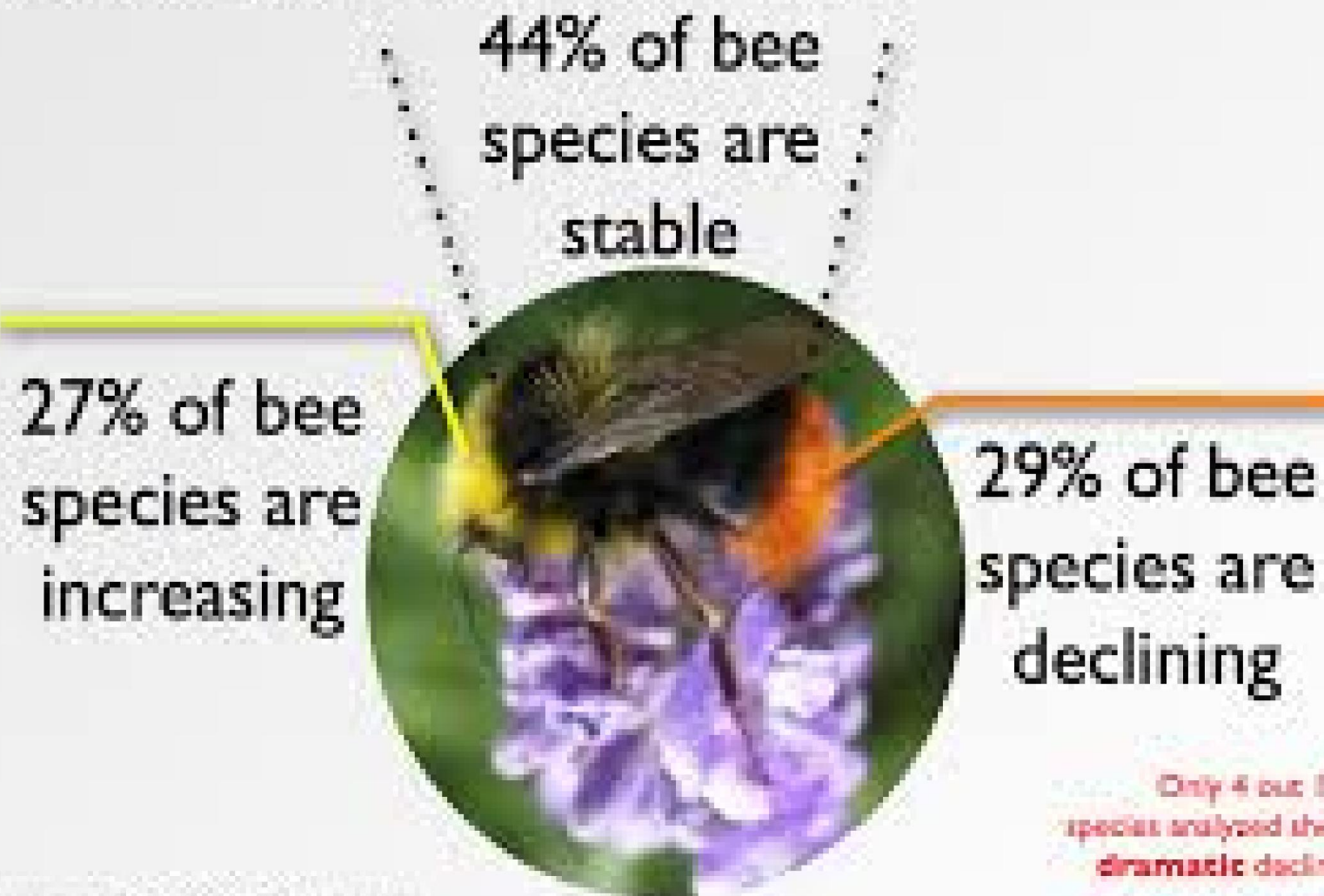
Honeybees can also be used for biomonitoring of environmental quality

Bee Colonies Worldwide

Trend in Beehives Numbers Across Continents



Putting numbers to the pollination crisis



Baronius et al 2013 PNAS, in press

Data reflects relative abundance changes in the northeastern US along the last 100 years







Your produce choices
with bees

© Whole Foods



Your produce choices
without bees





If we die,
we're taking
you with us.



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