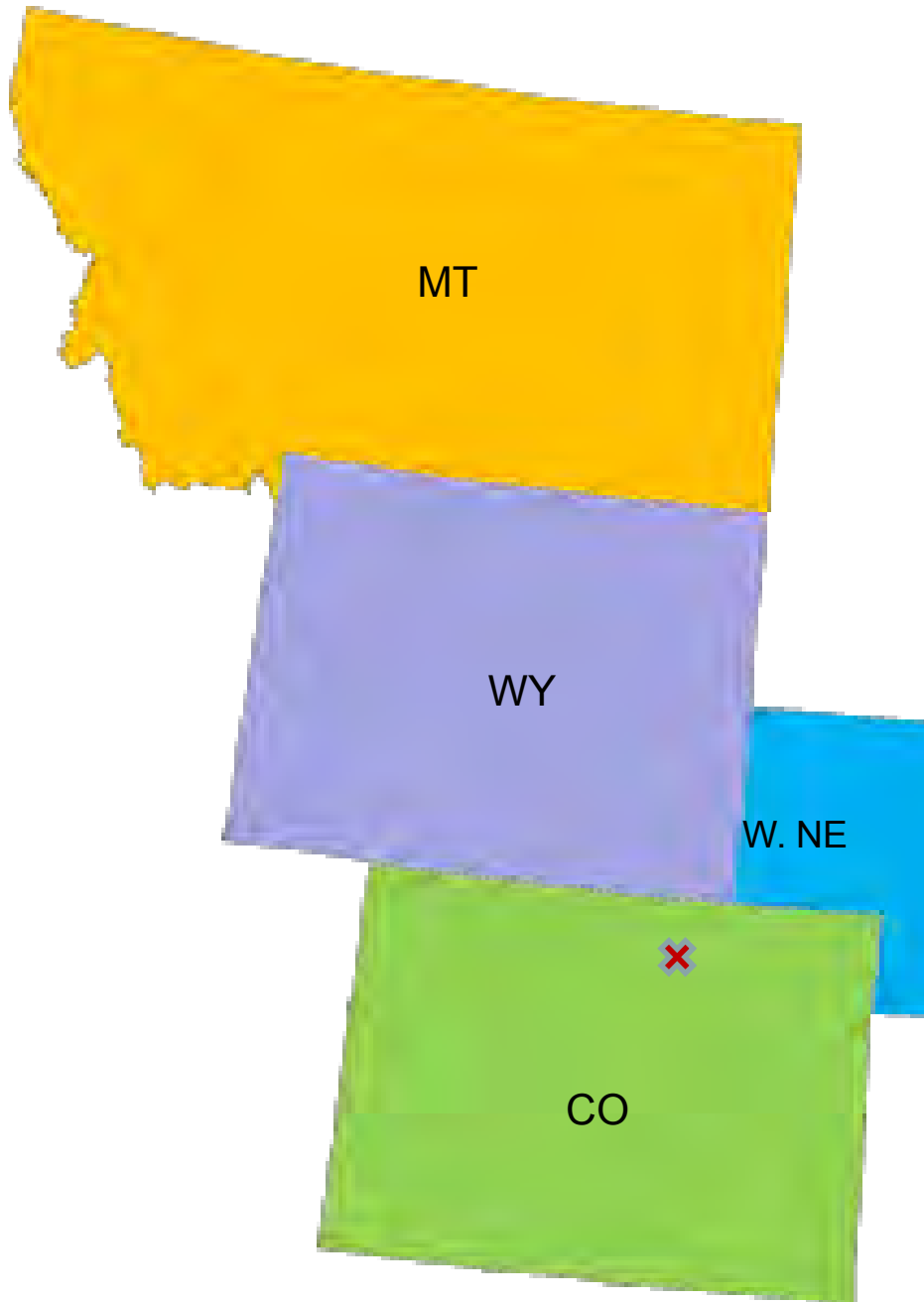




# Factors Affecting Bee Health: Fact, Fiction and the Future

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# Hicks Territory

# Outline

- Bee Basics
- Factors affecting bee health
- Pollinators and Crop Protection
- Neonicotinoids and Bees
- Bee Care Program
- Q & A



# Apiculture - the keeping of bees especially on a large scale



## Description

Is it a BEE or a hornet?

- **Bees** – Vegetarians, forage flowers, generally hairy, usually not aggressive unless provoked
- **Wasp or Yellow Jackets** – large head, distinct yellow markings, smooth, carnivorous (meat, other insects), dart in flight i.e. humming bird, stingers are smooth (repeated stings), can be aggressive



# Definitions continued...

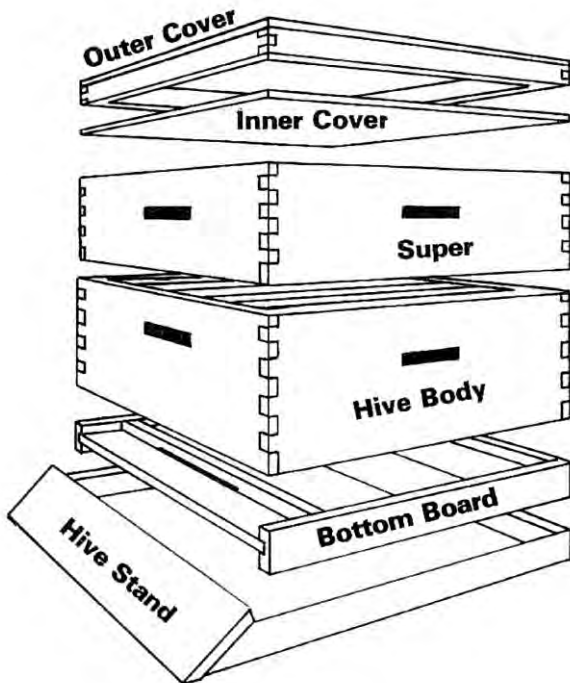


Bees in the hive

honeybee  
(*Apis mellifera*)



- Worker – Female bees in the colony, up to 50,000 in a hive. Live 4-6 weeks, 21 days to develop. Does all the work in the hive!
- Queen – 1 per colony. Lays 1500 – 2000 eggs per day. Lives 1-5 years, 16 days to develop.
- Drone – Male bees in the colony, only job is mating. Lives 2-3 months, 24 days to develop.

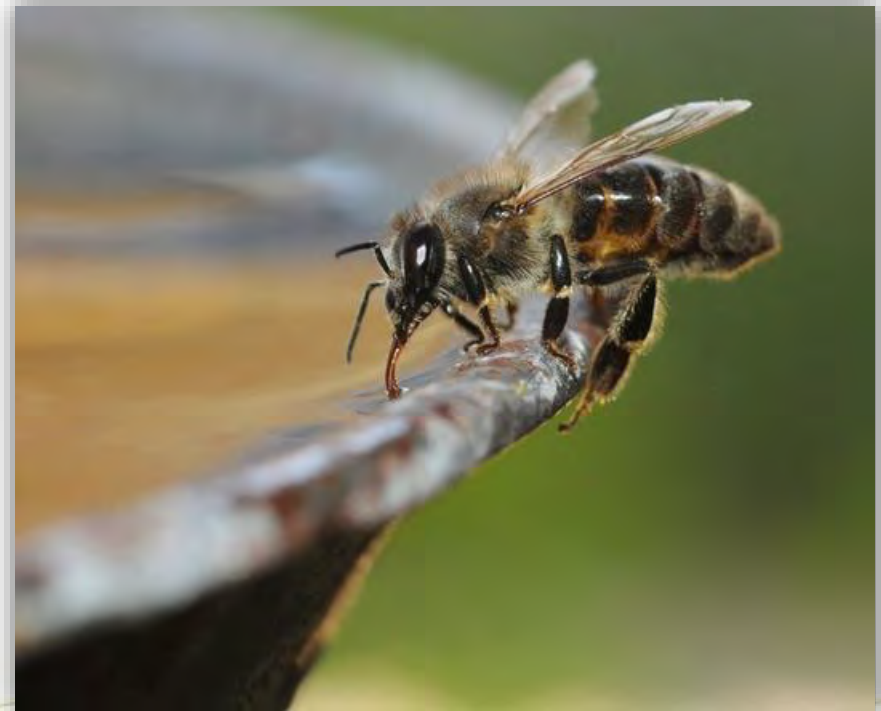


Equipment

# Food



- Carbohydrate
- Protein
- Water



# 1. Carbohydrate



## Nectar

- 50-100 flowers / full load / bee
- 7-13 trips / day / bee
- typical load of nectar = 30 mg

## Fuel consumption (foraging bees)

- 2 km / mg honey = ~7,142,857 mpg

▶ Nectar is converted to honey and honey is the energy supply for bee activity

## 2. Protein



### Nutritional needs

- Pollen quality and quantity needed are inversely proportional
- deficiency results in reduced brood rearing
- high protein pollen increases adult bee longevity
- Honeybees will collect pollen-like substitutes e.g. sawdust, bird seed chaff, corn pollen, if no other pollen available
- Needs about 1500 flowers for full pollen load



Pollen is the protein source required for successful brood development



# 3. Water



## Clean water essential

- Also needed for:
  - To dissolve and utilize crystallized honey
  - Nutrition and body functions
  - Hive temperature regulation (cooling)
  - Hive RH regulation (imp for normal brood development; 90-95%; no egg hatch <50%)
- Water not stored (collected as needed, so must be readily available)

## Sources of water

- Puddles / wheel tracks / ditches / *pools*
- Pails / barrels / feeders / drinkers / *bird bath*
- Moist soil and other material and surfaces



Clean water is essential for colony survival



# Honey Bees: Importance and Challenges



# Role and Value of Pollinators

- 20,000 bee species act as pollinators
- Critical role of pollinators
  - 1 of 3 bites of food we eat
  - 70% of top 100 food and fiber crops
  - 90% of all flowering plants
- Honey bees are most important
  - Can be managed & moved where needed
  - Provide us with honey & hive products
  - Pollination services (almonds/veg/fruit)
- Half of all U.S. bee colonies are used to pollinate almond crop each season



# Components of Sustainable Agriculture

## Crop Protection

10% post-harvest

13% disease

14% weeds

15% insects

Average % losses without crop protection products

## Insect Pollination



10% pollination

Average % yield impact from insect pollinators

\*approx. 50% of crop area worldwide - Source: Oerke et al., 1995 / Yudelman et al., 1998

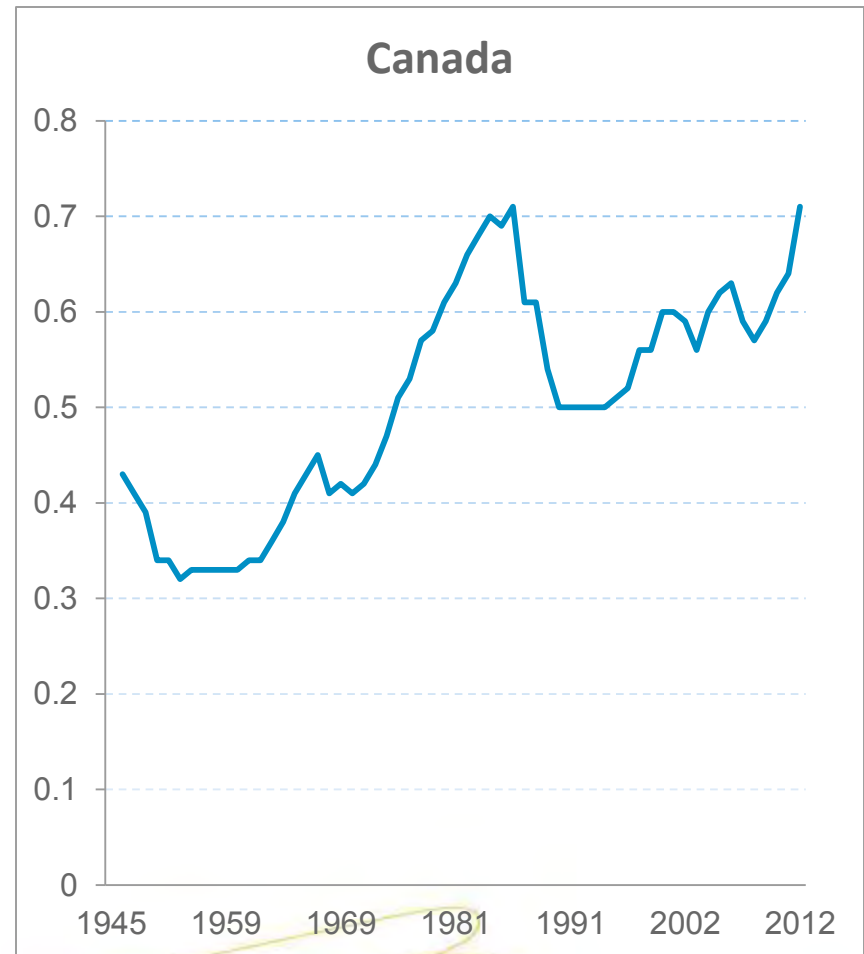
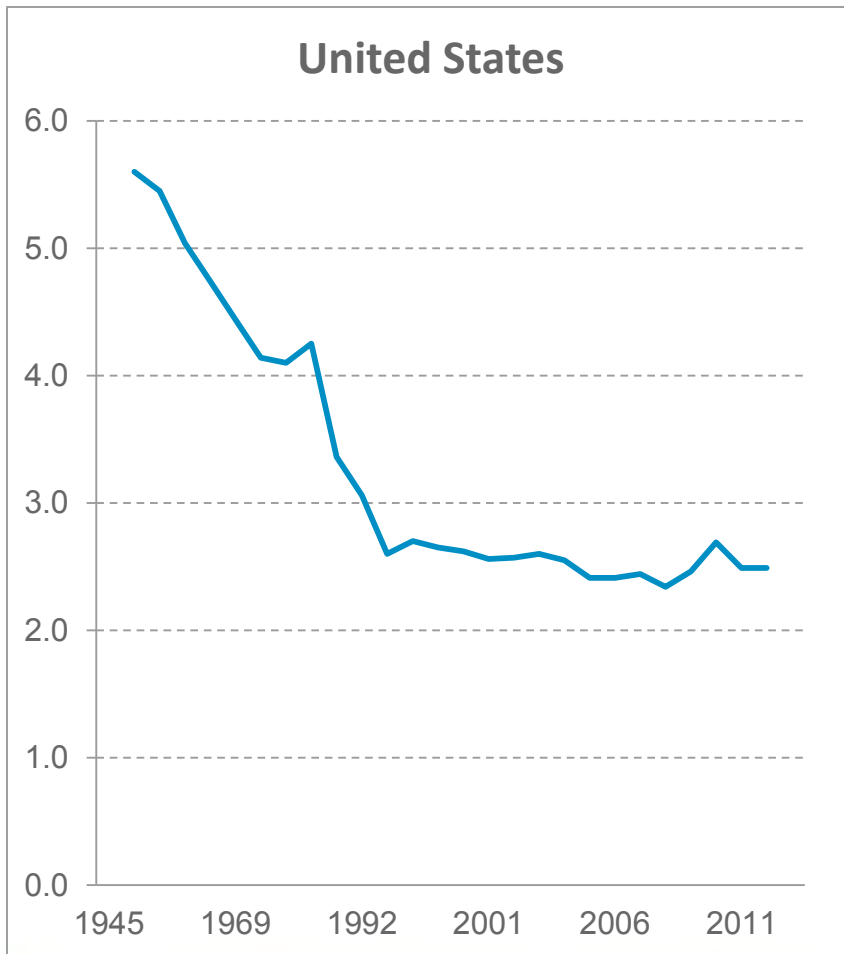


# Recent Concerns about Bee Health

- Bee losses have occurred since 1860s
- Colonies in U.S. declined from 4.5 million (1940s), but have stabilized at ~2.5 million since 1980s (Neonics introduced in 1990s)
- U.S. overwintering losses average ~30% in recent annual USDA surveys
- Globally, colonies have increased by 45% in last 50 years
- Beekeepers routinely replenish their hives after winter to meet crop pollination needs



# Bee Colonies in North America



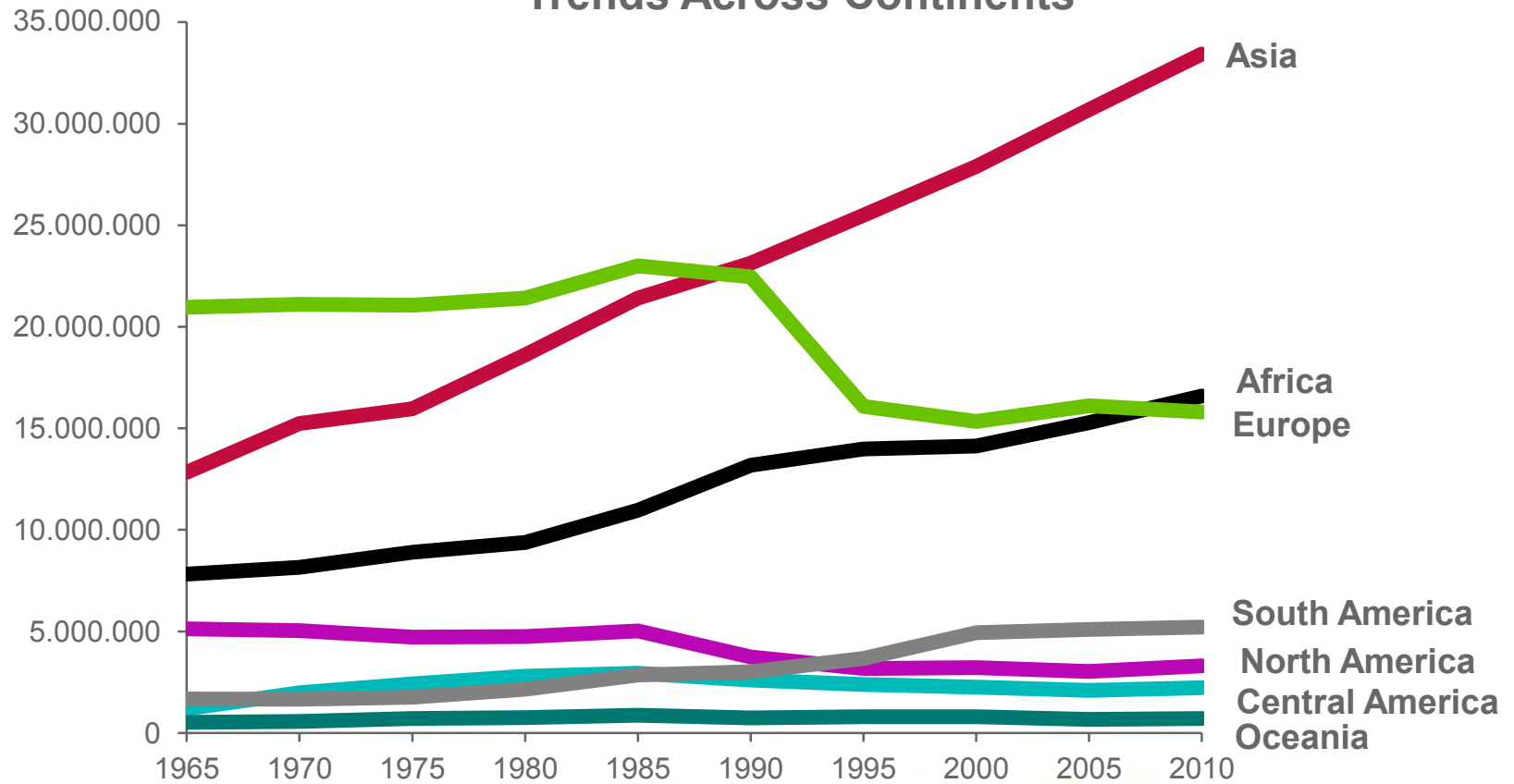
Source: Fairbrother et al. (2014) - Number of managed honey colonies (in millions)



# Managed Honey Bee Colonies Worldwide



## Trends Across Continents



Data source: FAOSTAT (<http://faostat.fao.org/site/573/DesktopDefault.aspx?PageID=573>)