Small Fruit Berry Crops:

Production and marketing overview and Environmental Horticulture Implications

Mark Gaskell, Ph.D.
University of California Cooperative Extension

Small fruit "Berry" crops

- Blueberry

- Blackberry

- Raspberry

Blueberry nutraceutical value

BLUEBERRIES

A Handful of Health

Plump, juicy, and sweet, with vibrant colors ranging from deep purple-blue to blue-black and highlighted by a silvery sheen called a bloom, blueberries are one of nature's great treasures. Though miniature in size, they are also proof that, when it comes to health benefits, good things really do come in small packages.

BLUEBERRIES ARE...

LOW IN FAT.
A one-cup serving contains only **80 calories** and virtually no fat.

FULL OF DIETARY FIBER.
A handful of blueberries helps satisfy recommended daily fiber intake.[2]

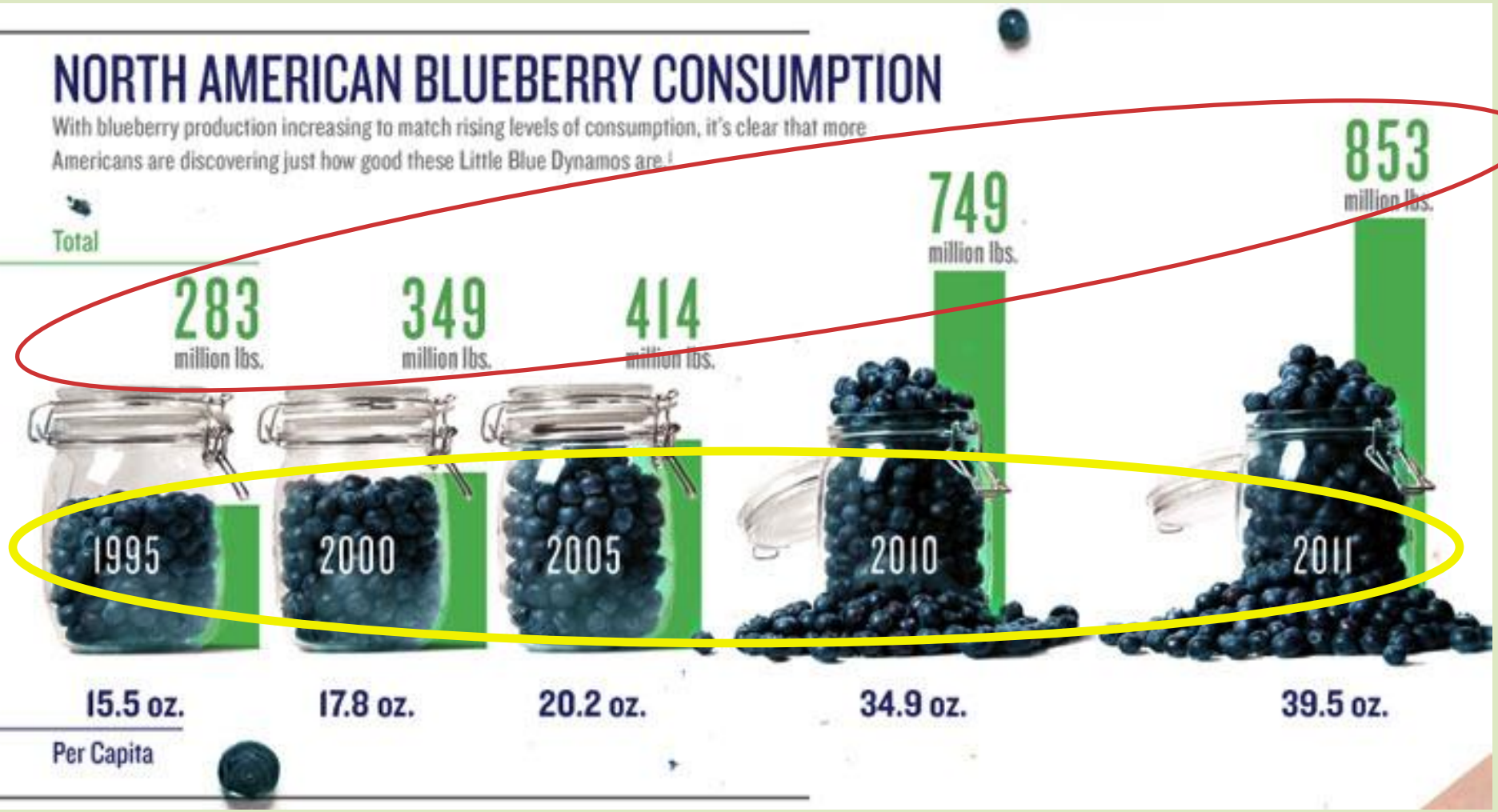
Fiber helps keep the body regular, the heart healthy, and cholesterol in check.[3]

FULL OF PHYTONUTRIENTS.
Research suggests that the phytonutrients in blueberries, called polyphenols, have antioxidant and anti-inflammatory properties that may help lessen the inflammatory process associated with chronic conditions such as cardiovascular disease, cancer, and other age-related diseases.[5,6,7]

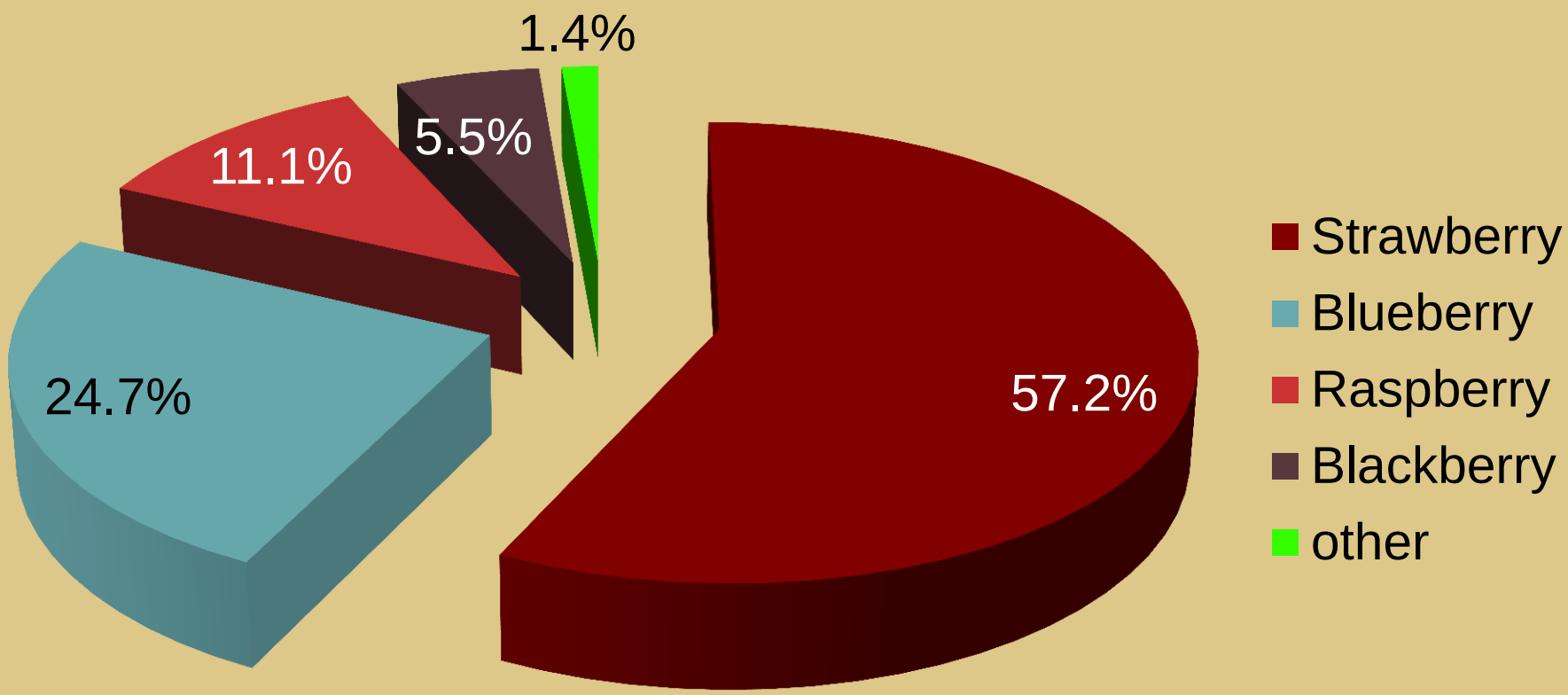
PACKED WITH VITAMIN C.
One serving delivers almost **25%** of one's daily requirement of vitamin C.[2]

Vitamin C aids collagen formation and helps maintain healthy gums and capillaries and a healthy immune system.[3]

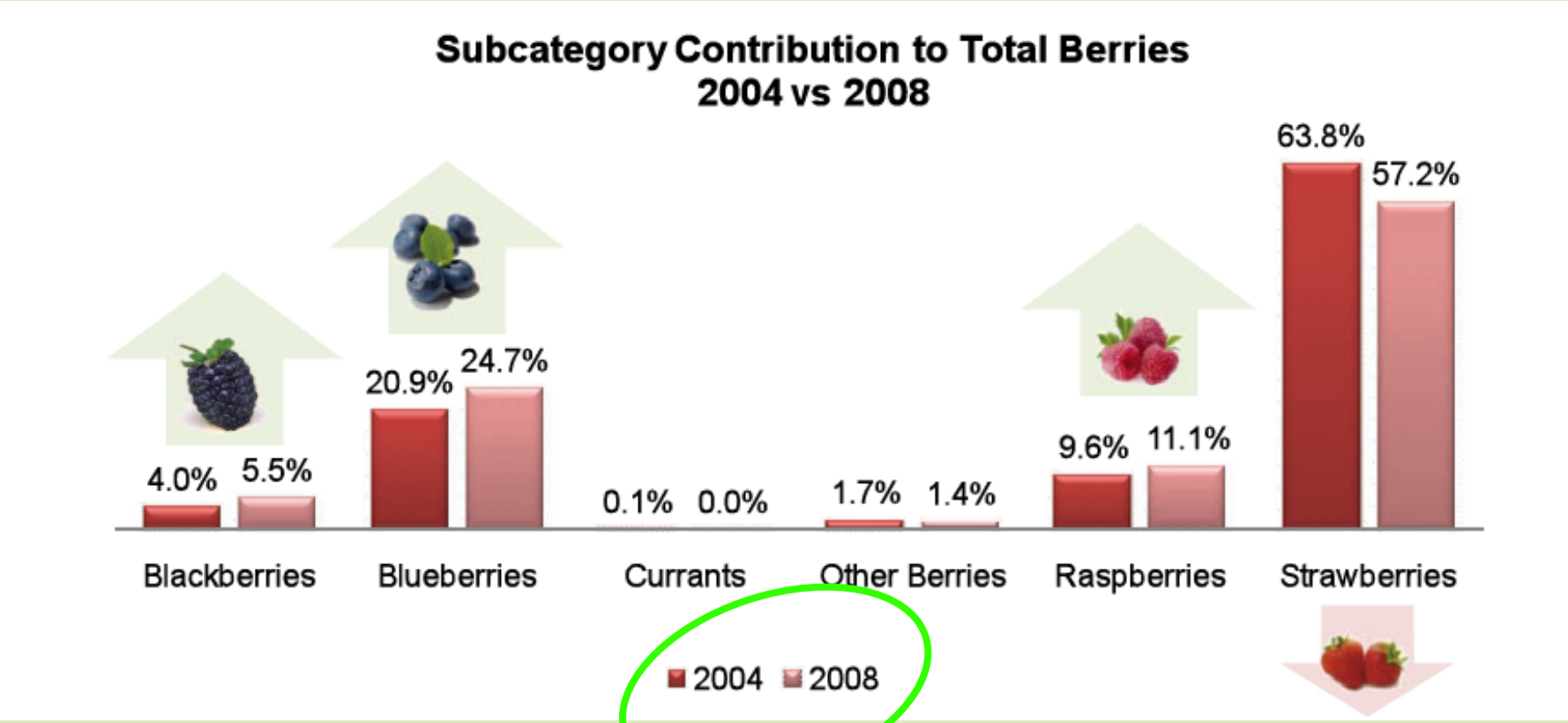
AN EXCELLENT SOURCE OF MANGANESE.
Manganese plays an important role in bone development and in converting proteins, carbohydrates, and fats into energy.[4]


NORTH AMERICAN BLUEBERRY CONSUMPTION
With blueberry production increasing to match rising levels of consumption, it's clear that more Americans are discovering just how good these Little Blue Dynamos are!
Total
283 million lbs.
349 million lbs.
414 million lbs.
749 million lbs.
853 million lbs.
1995
2000
2005
2010
2011
15.5 oz.
17.8 oz.
20.2 oz.
34.9 oz.
39.5 oz.
Per Capita

U.S. Sales of Small Fruits - 2008



Consumer demand for small fruits - US



source: FreshFacts- www.perishablesgroup.com

Environmental factors affecting production

- Temperature
- Moisture vs relative humidity
- Wind
- Soil environment
- Day length
- Frost threat

Environmental factors affecting production

- Temperature
- Moisture VS relative humidity
- Wind
- Soil environment
- Day length
- Frost threat

Environmental factors affecting production

- *Temperature*
- *Moisture VS relative humidity*
- *Wind*
- *Soil environment*
- *Day length*
- *Frost threat*

Environmental factors affecting production

- *Temperature*
- *Moisture vs relative humidity*
- *Wind*
- *Soil environment*
- *Day length*
- *Frost threat*

Environmental factors affecting production

- *Temperature*
- *Moisture vs relative humidity*
- *Wind*
- *Soil environment*
- *Day length*
- *Frost threat*

Environmental factors affecting production

- *Temperature*
- *Moisture vs relative humidity*
- *Wind*
- *Soil environment*
- *Day length*
- *Frost threat*

Environmental factors affecting production

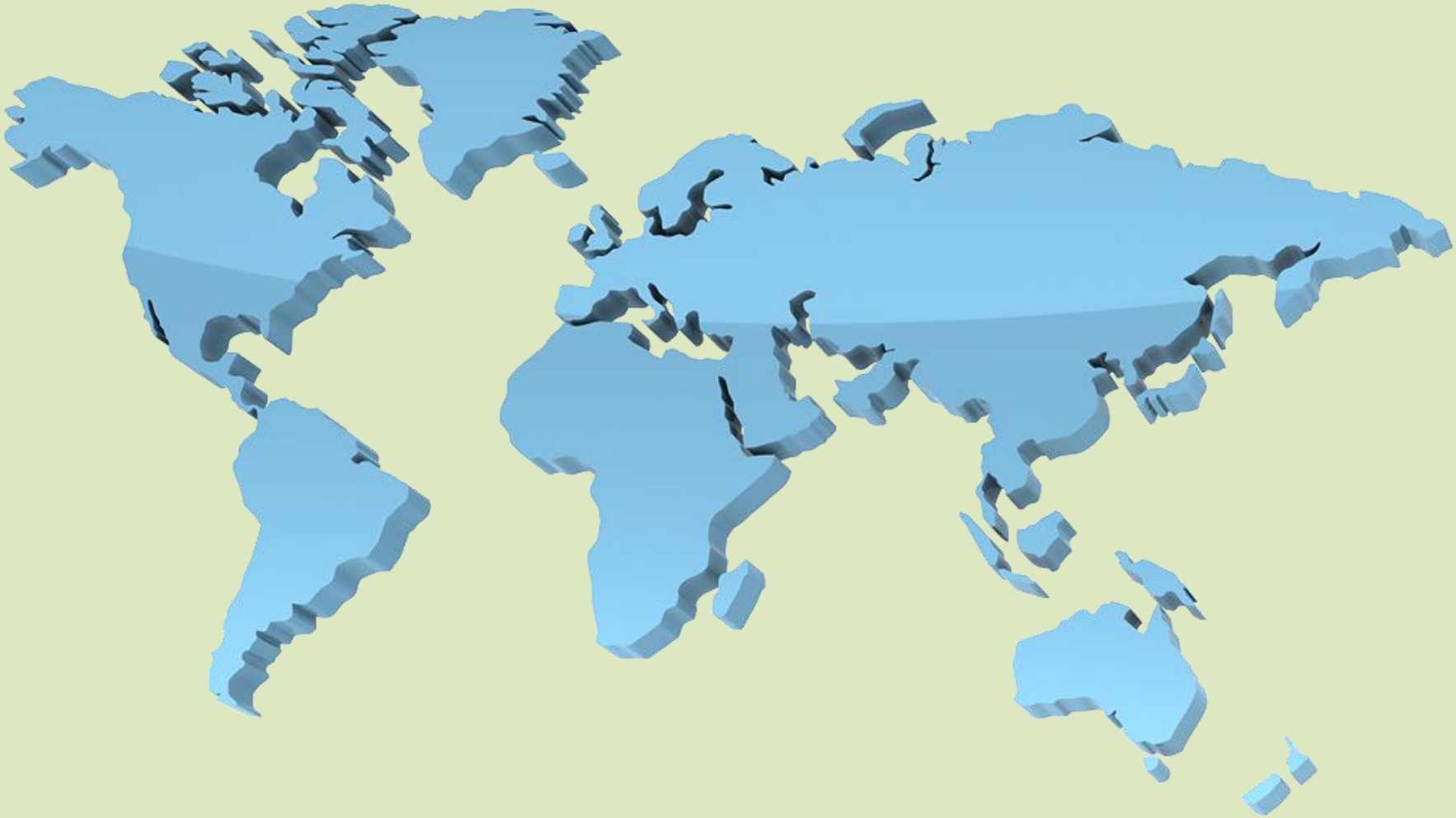
- *Temperature*
- *Moisture vs relative humidity*
- *Wind*
- *Soil environment*
- *Day length*
- *Frost threat*

Climates dictate environmental conditions

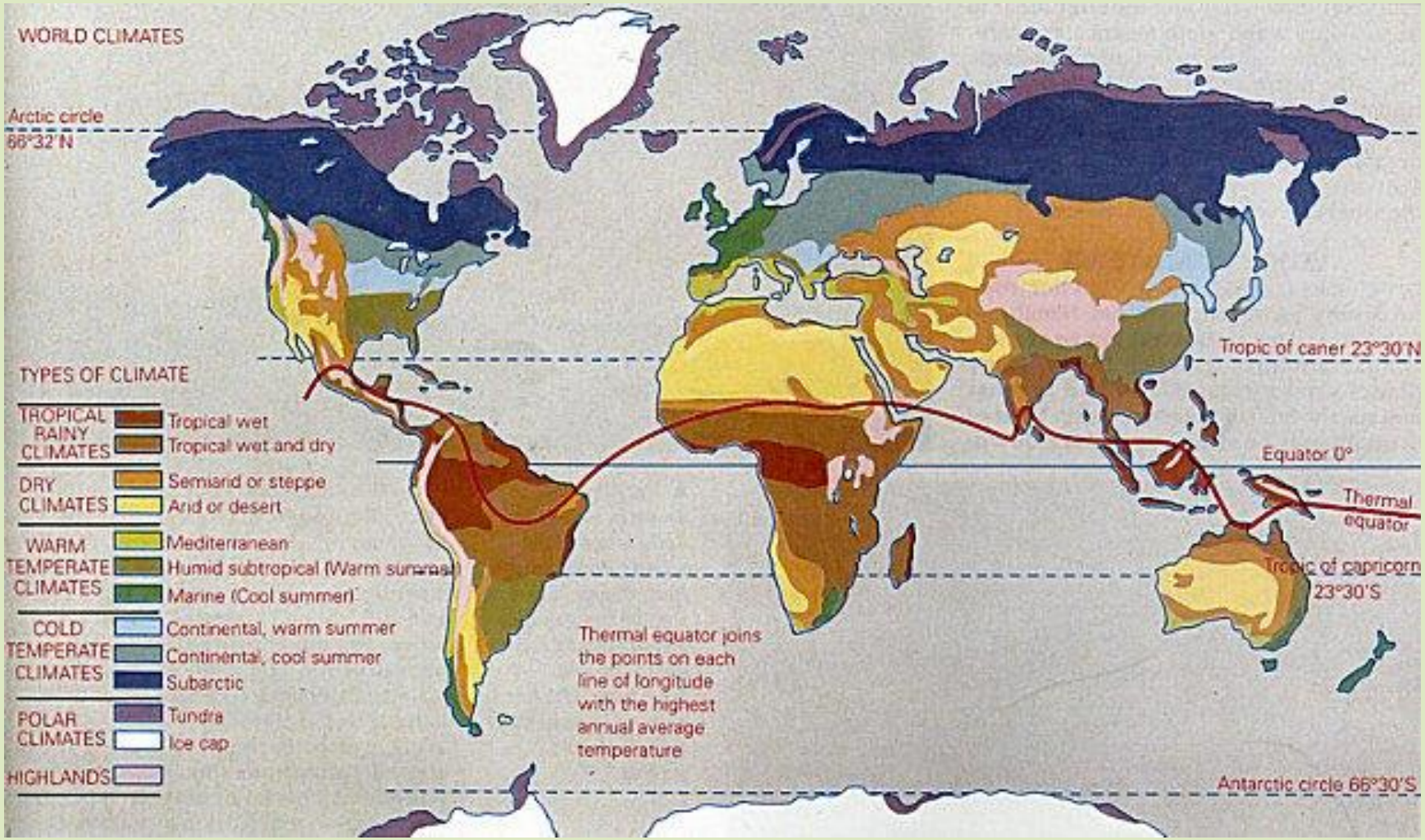
- *Macroclimate*
  - *geographic positions > marine vs continental*
  - *latitude*
  - *altitude*

- *Microclimate*
  - *plant canopy*
  - *soil surface*
  - *soil environment*

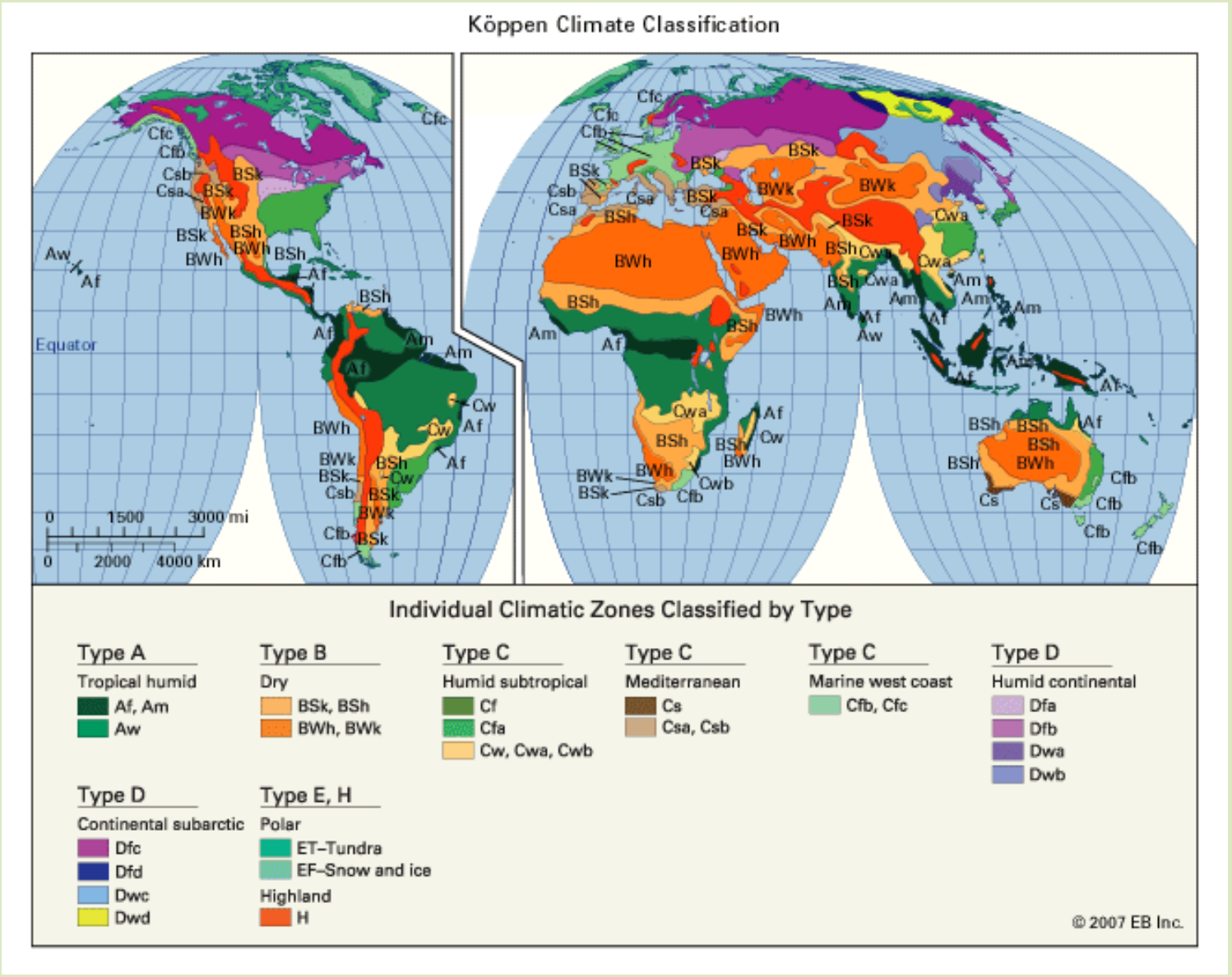
Macroclimates



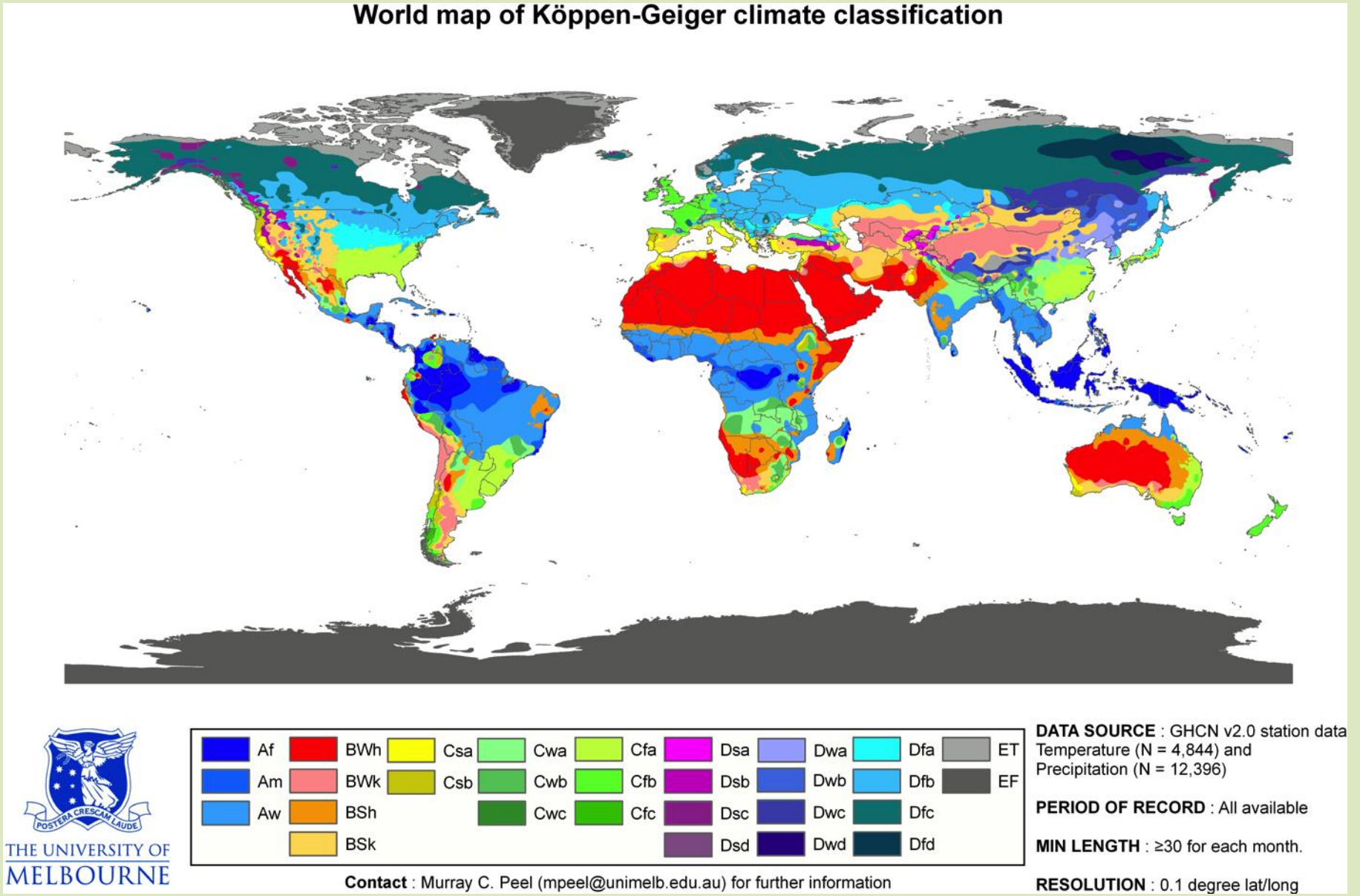
Macroclimates



Macroclimates



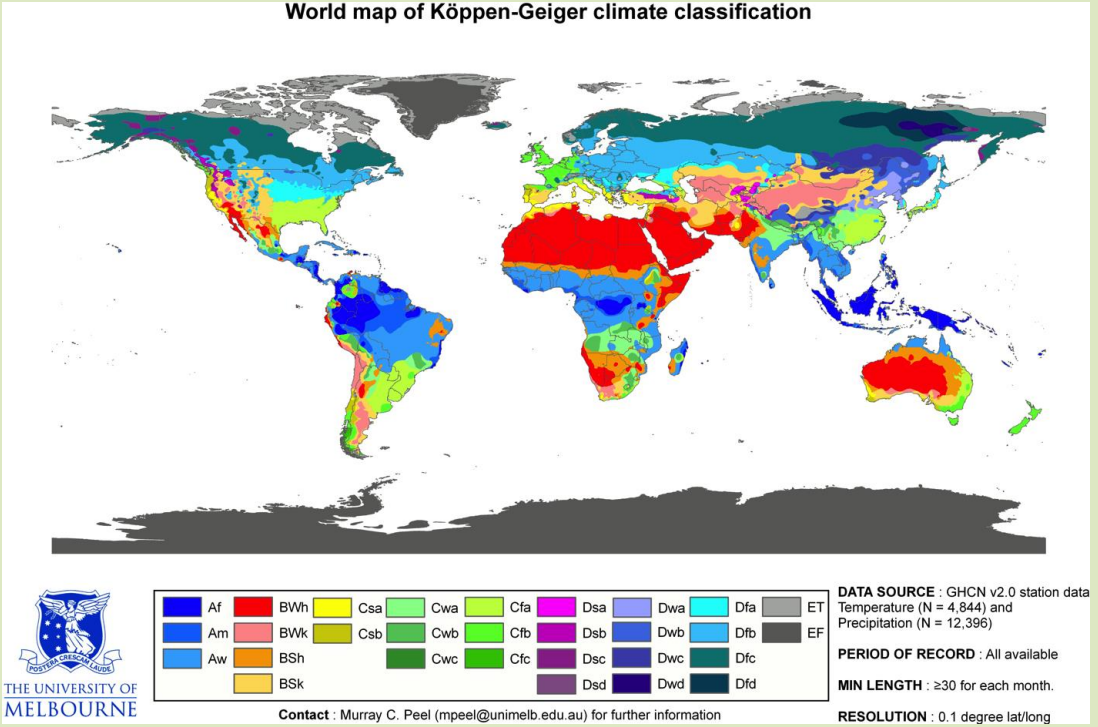
Macroclimates



Macroclimates

Koppen uses:

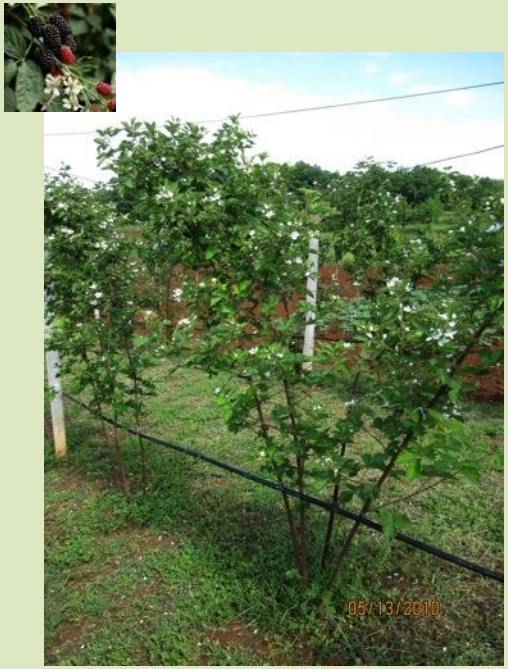
- *Native vegetation*
- *Temperature*
- *Precipitation*
  - seasonality



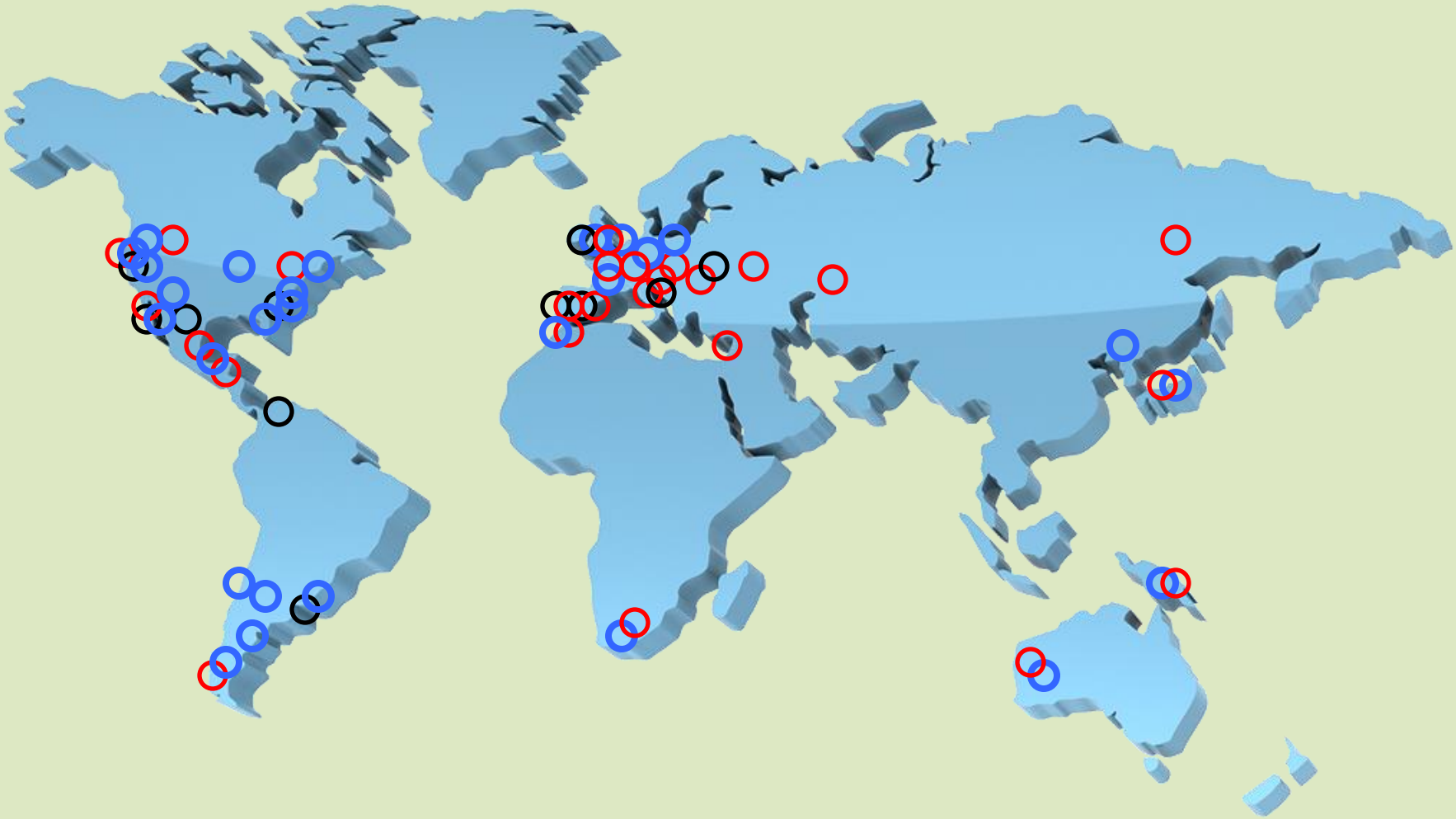
Microclimates – strawberries / vegetables

Small fruit berry crops

- *Small perennial shrubs or vines*



Macroclimates



Berry crop environments

Berry crop environments

- *Temperature*
- *Moisture VS. relative humidity*
- *Wind*
- *Soil environment*
- *Day length*

Berry crop environments

- *Temperature*
- *Moisture VS. relative humidity*
- *Wind*
- *Soil environment*
- *Day length*

+ latitude, proximity to markets, labor, infrastructure?

Temperature

- *Overall adaptation VS problems*
- *Frost, freeze threat*
- *Heat unit accumulation; timing*
- *Night VS day*
- *Soil temperature*
- *Fruit quality VS vegetative growth*

Production AND Fruit Quality

Moisture VS relative humidity

- *Rainfall*
  - *soil moisture*
  - *dust, mites, whitefly*

- *Relative humidity*
  - *disease incidence*
  - *fruit quality*

Wind

- *Moisture loss*
  - *evapotranspiration (ET)*
  - *irrigation management*

- *Physical effects*
  - *cane breakage*
  - *fruit scarring*
  - *sand, soil abrasion*
  - *manage protected structures*

Environmental factors

- *Temperature*
- *Moisture VS relative humidity*
- *Wind*
- *Soil environment*
- *Freeze threat*

Soil environments

- *Physical properties*
- *Chemical properties*
- *Biological properties*

Soil environment

- *Moisture*
  - *soil water and plant availability*
  - *aeration*
  - *electrical conductivity*
- *Nutrient availability*
- *Soil forming factors*

Frost threat

- *Short-term losses*
  - *- flower, fruit abortion*
  - *- fruit damage*
  - *- loss of market, production, price*

- *Plant little effected*

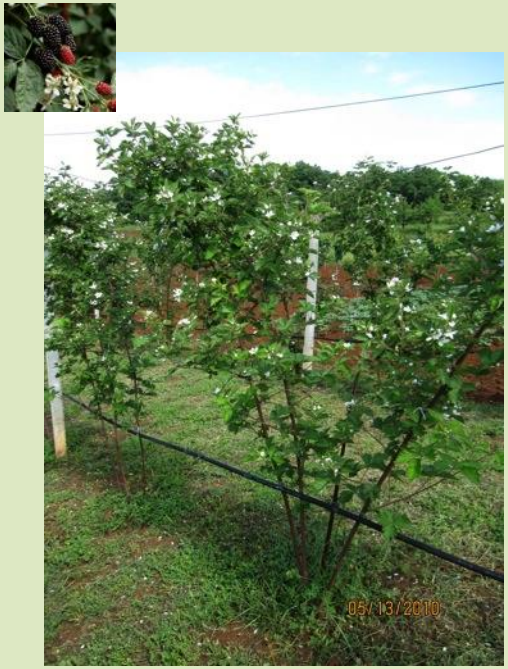
- *Protection*
  - *- irrigation ~ 3-4^{o} F.*
  - *- wind machines > air mixing ~2-3^{o} F.*

Environmental factors affecting production

- *Temperature*
- *Moisture VS relative humidity*
- *Soil environment*
- *Wind*
- *Freeze threat*

Small fruit berry crops

- *Small perennial shrubs or vines*



Small fruit berry crops

- *Small perennial shrubs or vines.*

- *Share many production and marketing characteristics with strawberry.*

- *Historically cultivated in temperate cold areas.*
  > now also into subtropical areas of US,
  - Florida, California

also Spain, Portugal, Morocco and highland tropics in Mexico and Central America

Grown in open fields or "protected"

Small fruit berry crops

- *Small perennial shrubs or vines.*
- *Share many production and marketing characteristics with strawberry.*
- *Historically cultivated in temperate cold areas.*
  > now also into subtropical areas of US, - Florida, California

  also Spain, Portugal, Morocco and highland tropics in Mexico and Central America

Small fruit berry crops

- *Small perennial shrubs or vines*
- *Share many production and marketing characteristics with strawberry*
- *Historically cultivated in temperate cold areas.*
  > now also into subtropical areas of US,
  - Florida, California

also Spain, Portugal, Morocco and highland tropics in Mexico and Central America

Organic Berry Production

- *Growing demand in North American, Europe, Asia*
  > more specialized market with premium prices

- *Higher costs of production and more demanding management*
  > specialized skills and special research needs

- *Very different soil environment – nutrient availability*

- *Very different pest management regimes*
  - managing weeds, insect pests are more challenging

Small Fruit Berry Crops:

Production and marketing overview and Environmental Horticulture Implications

Mark Gaskell, Ph.D.
University of California Cooperative Extension