99% of scientists: Climate change is real and it’s here now

75% of Marylanders accept that climate change is real, but only 57% think that scientists agree

9 of 20 hottest years all since 2000

Global warming, 1884 – 2011

Difference from 1951 – 1980

Average

Source: NASA Goddard Space Flight Center Scientific Visualization Studio

This is EVIDENCE, not opinion

Global warming, 1884 – 2011

Last five years the hottest since 1884

http://data.giss.nasa.gov/gistemp/graph/
How do we know this is not part of a natural cycle?

Scientists: 100% of warming in past 50 years due to human activities

The Greenhouse Effect slows heat loss from Earth, so air warms

Greenhouse gas molecules interfere with heat waves as they move toward space
  *more gas molecules, 
  **slower heat loss 
  ***more warming

Modified from The Climate Reality Project

Warmer ocean = more evaporation 
  more water vapor in air (~7% more)

This is the New Normal

The New Normal in the Garden

1. Rising temperatures
   - warmer winters, earlier springs 
   - more extremely hot days, longer heat waves 
   - fewer cool nights 
   - increased temperature variability

2. Heavier downpours
3. More possibility of drought
- Longer growing season, shorter warmer winters
  - Fewer cold nights for required plant chilling
    - Fruit trees (e.g., apples, peaches)

Warmer winters: New Hardiness Zones

- planting, harvest dates
- length of season
- overwinter survival

Warmer winter, earlier blooming

Yoshino Cherries in Japan from 800 - 2017

Effects of warmer winters: weeds

Weeds benefit more than native plants or crops
- better overwinter survival
- earlier flowering time

Weeds have a competitive edge

Mulch in fall to slow down overwintering weeds

Adapting to increasing weed pressure

- Mulch!
- Stop tilling
- Weed early
- Weed often
- Get them when they’re small!

Efforts of warmer winters: animals

- Deer: more food available during winter
  - healthier populations
  - higher overwinter survival
  - increase in # offspring

- White-footed mouse also benefits, so more Lyme disease
Effects of warmer winters: animals

**Pest insects & disease**
- better overwinter survival
- earlier appearance
- more generations/yr
- range expansion

What to do??

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Pests appear earlier, reproduce more quickly and may differ year to year.

- Be vigilant (learn signs of damage!)

- Consider row covers
- Decide on control strategy before pests arrive

Consult the experts at Home & Garden Info Center
https://extension.umd.edu/hgic

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Call in the cavalry: Natural enemies!

Attract insect predators and parasitoids with flowers & native plants!
- Native flowers provide nectar, pollen, and protection
- Mulch your beds to provide cover & winter protection

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Biocontrol: Encourage parasitoid wasps or flies

What’s a parasitoid?

- Native flowers provide nectar, pollen, and protection
- Mulch your beds to provide cover & winter protection

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Hazard of warmer winters: “False Spring”

Warm February then hard freeze in March or April

- cover up if valuable
- Flowering trees may lose the year’s blooms

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The New Normal: Hotter Summers

Plot the distribution of daily temperatures between 1951-1980 – the baseline

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Evidence: Summer Temperatures Have Shifted
More hot days means longer heat waves

Adapting to increased temperature
- Plant earlier in spring, later in fall
  (last/first frost dates are changing)
- Mulch (plant material, white or reflective)
- Try heat tolerant varieties
- Build shade or use row cover
  for heat sensitive crops

Heat stress reduces pollination, fruit set & quality
Tomato Pollination and Excessive Heat
July 12, 2012, Amy Brust, IPM Vegetable Specialist
University of Maryland, jbrust@umd.edu

Drought is more likely with climate change
Warmer & longer summers but no increase in rain
California:
extreme case with prolonged drought expected.

Maryland will not escape
Flash drought in 2019
Oct 1: “Abnormally Dry” to “Moderate Drought”

Watering wisely is crucial

Use water wisely
- Mulch!!
- Use drip irrigation, soaker hoses
  or water breakers
- No nozzles or sprinklers
- Water deeply every few days
**What's a gardener to do?**

Too much water?
- Improve drainage
- Monitor food safety
  - throw produce that has touched floodwater away
  - many foods can’t be washed
  - fruits off the ground may be OK
- Try raised beds

**Start with climate-friendly transplants**

Garden Center transplants: Usually in disposable plastic pots, may have been sprayed, potted in peat-based mix

Growing your own transplants is easy!
- need a few shop lights (preferably LED)
- 4’ wide shelving unit, timer
- reusable pots or plug flats

**Regenerative Gardening**

Build soil health!
- Don’t till!
- Use organic material for mulch— holds water, yet drains, decomposes to feed soil
- Add compost — food scraps, and compost your leaves this year!
- Plant cover crops
  - add organic material
  - can add nitrogen
  - feed soil microbes
- Control erosion by keeping soil covered

**Climate-Friendly Gardening**

Gardeners are part of the solution!

- Climate Change
  - mitigation
- Gardening

**Start with climate-friendly transplants**

Sustainable potting mix means reduced peat moss

Alternatives:
- coconut coir
- rice hulls
- paper (Pittmoss)
- sand
- compost

Possibilities:
- 50% regular seed starting mix & 50% coir
- 20-25% each: regular mix, coir, sand, compost, paper or rice hulls

Watch out for water retention, & fertility since these will differ from regular mix

**Climate-Friendly (Regenerative) Gardening**

Reduce emissions
- Use hand tools (or electric)
- Reduce lawn, plant low-mow mix
- Weed smart, weed early
- Mulch-- NO bare soil around plants
- Cover crops-- NO bare soil in beds overwinter
- limit synthetic N fertilizer

[Oldworldgardenfarms.com](http://oldworldgardenfarms.com)
Reduce emissions: Stop tilling
- Leaves soil structure intact, improves infiltration
- Keeps decomposable carbon underground
- Keeps weed seed underground
- Bonus: saves fuel and your back

No-Till Gardening!
Make permanent beds & rows
- Don’t walk on beds
- Deep mulch in rows
Set up drip irrigation in rows
No bare soil -- cover crops!
Choose cover crops for your purpose
- Terminate cover crops with mower, string trimmer, tarps...

You may not run the world, but you can control your part of it