Examining the Diversity of Chili Peppers as a Food

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www.Baumlerlab.com

My pepper research (prior to joining UMN)

www.Watchchilepeppers.com
Talk outline
- Origin and spread
- Species
- Nutrient content
- Hot peppers and hotness
- Antimicrobial properties
- Growing peppers

Where do chili peppers come from?

By Birds and then Natives

Bolivia

How did they spread?

Peppers are members of the Family Solanaceae
- Members include: tomatoes, potatoes, tobacco, nightshade, and peppers

A few facts ...
**Genus Capsicum**: Different species of peppers

- **Habanero**
  - *C. chinense* (chi-NEEN-seh)
  - “from China”

- **Aji’s**
  - *C. annuum* (AH-nee-um)
  - “annual”

- **Rocotos**
  - *C. pubescens* (pew-BES-enz)
  - “hairy”

- **tabasco**
  - *C. frutescens* (fru-TES-enz)
  - “shrubby or bushy”

- **C. annuum**

- **C. baccatum**

- **C. pubescens**

- **Spread of different species of peppers**

**Other physical differences of peppers**

- **Fruit Shape**
- **Calyx shape**
- **Fruit outline**
- **Penduncle position**
- **Fruit shape at Penduncle**

**What is with the name…Chili or Pepper?**

- Notice that the name for the plant in the original areas was NOT PEPPER!
  - But … chili …

- So, why did this crop, which had a unique geography (South America) get a name change to pepper?
  - Bell pepper …
  - Jalapeno pepper …
Pepper ... as in peppercorns

- The original pepper
  - Botanically *piper nigrum*
  - Pepper comes from the sanskrit word pippali, which refers to the berry
    - Became péperi in Greek
    - And piper in Latin

So, bell pepper?

- Christopher Columbus set out to India in 1492
  - Ended up in the West Indies, which he thought was India
  - He thought that the chili with the seeds inside was a variation of pepper
    - "plenty of aji, which is their pepper, which is more valuable than [black] pepper, and all the people eat nothing else, it being very wholesome"
  - Took these chilies back to Iberia and told the king he brought pepper with him
  - Europeans liked this new pepper, and everyone could grow it.
- Thanks to Columbus for lots of confusions!

Nutritional Benefits

- Chilies are extremely nutritional to the human body. They are cholesterol free and low in sodium and calories.
- Chilies are rich in Vitamin A, Vitamin C, and folate, but only Bell peppers have been examined
Hotness of Peppers: Capsinoids

- Capsaicin: how to stop the burn
  - Hands with a bleach solution, or rubbing alcohol
  - Rinse eyes with water
  - What should you do to reduce the burning in your mouth?
  - Eat dairy foods the casein molecules bind and release capsinoids from receptors

Some Are Hotter: Scoville Heat Units

- The heat of the chili pepper is measured in Scoville Heat Units (SHUs), developed by pharmacist Wilbur Scoville in 1912.
- Scoville Units are measured in multiples of 100, with the bell pepper at 0 and very hot chili peppers, such as the habanero, at more than 300,000 Scoville Units.
- In this method, pure ground chili pepper is blended with a sugar-water solution. Taste testers then sip the mixture in increasingly diluted concentrations until mouth burning no longer occurs.
- The Scoville Unit number is based on how much dilution of the ground chili is necessary before no heat is detected.
More Accurate Heat Testing

- High Performance Liquid Chromatography (HPLC) has now almost completely replaced Scoville’s dilution taste test, but Scoville Units are still used to report data.
- Because capsaicin has no odor, color, or flavor, HPLC, a specialized, replicable laboratory test, is a more effective and accurate way to measure the heat of capsaicin.

Capsaicin: Hotter Than Hot

- A single drop of capsaicin diluted in 100,000 drops of water will blister the human tongue.
- Capsaicin is:
  * 70 times hotter than piperine, the chief component in black pepper.
  * 1000 times hotter than zingerone, the spicy ingredient in ginger.
- Pure capsaicin, a crystalline alkaloid, registers at over 16 million Scoville Units.
- Capsaicin is barely soluble in water, but extremely soluble in oils and alcohols.

How capsinoids in Chilies Affect Us

- Wrapped around each tastebud of the tongue are a set of neurons that relay information about temperature and pain to the brain.
- Capsaicin feels hot in the mouth because it activates sensory receptors on the tongue otherwise used to detect thermal heat.
- This receptor is called Transient Receptor Potential Vanilloid 1 (TRPV1). TRPV1 receptors are also located in the gut and in other organs.
- Stimulation of TRPV1 receptors is known to bring about activation of the sympathetic nervous system (SNS).
- Capsaicin has been shown to increase fat burning in humans and animals through stimulation of the SNS.
- The same is true for other molecules, such as menthol in peppermint. The brain receives a message of cold or pain.
- The brain is essentially being tricked into thinking that pain is being felt when there is no pain or damage occurring.

Pure Capsaicin = 16,000,000 Scoville Heat Units (SHUs)

- Heat scale 0-12
  >1,000,000 SHUs
  100,000 - 1,000,000 SHUs
  50,000 - 100,000 SHUs
  30,000 - 50,000 SHUs
  15,000 - 30,000 SHUs
  5,000 - 15,000 SHUs
  2,500 - 5,000 SHUs
  1,500 - 2,500 SHUs
  1,000 - 1,500 SHUs
  500 - 1,000 SHUs
  100 - 500 SHUs
  10 - 100 SHUs
  0 SHUs

2013 Chili Pepper Collection
Anadita Tamuly, a housewife from Assam, India set a new Guinness Record eating 51 “ghost” peppers in 2 minutes.

~1,081,000 SHUs

Before Dec 2010, What was the hottest pepper in the world?

How many could a person eat in 2 minutes?

How to grow the world's hottest peppers, and have a curious child...

The Chilly Chili, (April's Pepper)
Butch T Trinidad Scorpion

- Butch T Trinidad Scorpion Facts and Information
  - The record-setting Butch T Trinidad Scorpion tested at 1,463,700 SHU (SHU = scoville heat units). The current official Guinness record holder is the Naga Viper pepper which tested at 1,382,118 scoville heat units.
  - The record-setting Butch T Scorpion was grown in Australia by The Chilli Factory.
  - The Hippy Seed Company supplied the seeds to the Chilli Factory that were used to grow the 1,463,700 SHU Butch T Trinidad Scorpions.
  - The name ButchT or Butch T is after Butch Taylor. Butch is the owner of Zydeco Hot Sauce and a person credited with originally discovering this strain. According to a post in this thread Butch was growing out the Jonah strain, noticed a pod variation and saved the seed. He’s been sharing the seeds for a few years. When sending out seeds Butch would include his first name last initial (common when swapping seeds) on the seed package.

www.Midwestchilipeppers.com

2012: A NEW Hottest Pepper
The Carolina Reaper
What is the hottest Pepper we can grow in the Midwest?

- 7-Pod Congo SR Gigantic
- 7-Pot
- 7-Pot Brown
- 7-Pot Jonah
- Bhut Jolokia Red
- Brainstrain Yellow
- Brown Scotch Bonnet
- Brown Trin Moruga Scorpion
- Brwn Moruga
- Butch T
- Carolina Reaper
- Congo Trin
- Fatali Gourmet Jigsaw
- Hab Mustard
- Hab Orange Blob

The average hottest data:

Antimicrobial properties of chili peppers and chili pepper leaves

- S. typhimurium
- E. coli
- P. aeruginosa
- V. cholerae
- H. pylori
- S. aureus
- L. monocytogenes
- B. cereus

Pathogens most tested against:

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H. pylori
S. aureus
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B. cereus

Growing your own peppers (In the Midwest)

- Start seeds early or purchase seedlings in late May or first week of June
- Put outdoors when daytime temps are > 70 F and nighttime temps are > 50 F
- Partial shade to full sun
- Fertilize every 2 weeks, and water during dry spells

Which Chili Pepper Variety Could Cure Vitamin A Deficiency Worldwide?

I am hoping to launching a crowdfunding campaign to try to raise $25,000 through the platform: Experiement.com Coming very soon: June 1st-June 30th
Cooking with peppers
Can dry pepper and use as a powder, or freeze them and use them like fresh (more flavor)
Making Hot sauces, salsas, and chutneys
Vinegars, butters, cookies, candied, breads, beers, cheeses, meat products, ice cream, and lots more...
www.pepperfool.com

Where can I get these chili pepper plants?
Starting in the end of May, You can purchase over 350+ varieties of chili pepper plants from the Hugo Feed Mill and Hardware Store
Located in Hugo, MN off Highway 61

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Chili Pepper Game and Song
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