# Hybrid Hazel Cultivars

## *Cultivars for Eastern North America*

- Presented by:
- Jeff and Dawn Zarnowski, November 29, 2021

# Hybrid Hazel Cultivars

- Overview:
  - Why now?
  - Cultivars vs seedling.
  - What makes a good cultivar?
  - Pollen compatibility?
  - Sources – Where to get cultivars.
  - Information -37 cultivars here or coming soon!

# Hybrid Hazel Cultivars

- Why now?
  - Initial commercialization efforts hindered by the slow onset of Eastern Filbert Blight often taking 10 years to show[2,8].
  - Commercial production was limited to blight free or limited blight regions of the Northwest. Northwest propagated using mainly non-hardy European genetics.
  - The remainder of the continent limited to native genetics with small nuts & thick shells.
  - Increased hybridization efforts from public and private entities building on efforts of previous breeders[1,8].
  - Also, European genetics found to be blight resistant being added to hybridization efforts[2].

**What is a cultivar?** A cultivar is a superior selection that is asexually propagated (a.k.a. cloned). Usually patented or copyrighted so do not copy them.

# Hybrid Hazel Cultivars

- Cultivars vs. Seedlings?
  - Seedlings have variable:
    - Nuts sizes, shell thicknesses, ripening times, S-alleles, pollination timing, EFB resistance, growth habits, yields, blanching quality and taste.
  - Cultivars have variable:
    - Nothing of the above
  - So why would you use seedlings?
    - We still urge the use of seedlings for pollination insurance whether you plant two or 20,000. If in an orchard they should be placed every fourth or fifth row, genetic diversity and find the next generation improved cultivar.

# Hybrid Hazel Cultivars

- What makes a good cultivar for you?
  - EFB resistance is first!
  - Zone Compatibility is next.
    - If you are in Zone 4b and you buy 5b trees you will not see nuts in some to most years.
  - Nut quality
- It’s never so simple! . . .

Like pollen compatibility?

# Hybrid Hazel Cultivars

## So, what makes a good cultivar?

| **Selecting Cultivars - Grower viewpoint** | | | |
|---|---|---|---|
| | **Sales Channel** | | |
| **Primary concerns** | **Out of hand** | **Confection** | **Comment** |
| EFB Resistance | High | High | Trees need to survive |
| Zone compatibility | High | High | Trees need to produce nuts where you plant them. |
| Quantity per sq. ft. of bush or tree/Year avg. | High | High | Trees need to be financially/society viable |
| Kernel size | Low | High | Consumers unfortunately gravitate towards larger sizes. Confectioners small to medium size. |
| Percent Kernel | High | High | We want grow nut meat not shell weight. We want 45+% |
| Taste | High | High | Nuts need to taste as expected not "earthy" |
| Blanching - amount of pellicle removed after roasting | Low | Medium/High | Pellicles are healthy for us, but not to confectioners' expectations |
| Big Bud Mite resistance | Medium | Medium | Not a major concern for first generation orchards but will become one. |
| Roundness | Low | Medium/High | Out of hand eating not important. Confectioners' using whole nuts it can be very important. |
| S-allele compatibility | Low | High | High for 100% Clonal orchards and need to know pollen release timing. Not so important for orchards with seedling rows for pollenations. |
| Pollen timing | Medium | Medium | Not so important for orchards with seedling rows for pollenations. Flowers stay viable for up to 8 weeks. Need to have as much pollen available over as long a time as possible |
| Genetic diversity | High | High | Need citizen scientists to find the next seedling to become a **cultivar**. |

# Hybrid Hazel Cultivars - Pollen

- Hazelnut trees need compatible pollen to produce nuts.
  - This is important if you have only cultivars (clones)
  - Many clones had their pollen tested by OSU professor Shawn Mehlenbacher[10] to find what their S-alleles are.
  - Each pollen has two alleles and are numbered 1 through 32
  - You do not want the dominate allele to have the same number for two trees you are cross pollinating.
  - So in the cultivar chart listings make sure if you plant only two cultivars make sure the S-alleles are different.
  - If planting more than two seedlings you will almost always have compatible pollen for each other and any clonal tree you plant.

# Hybrid Hazel Cultivars

Wow, how did we go from a few to 37 in a couple years?

Way too many to see. Let's see cultivars by USDA zone!

| Name | Heritage - European, American, Asian | EFB Resistance | Pollen (Early, Mid., Late) | Cold hardiness, USDA Zone | S- alleles, ND=Not Determined | Nut Quality Comments | Buy from |
|---|---|---|---|---|---|---|---|
| Rose9-2 PPAF | A x E | Yes | | 3 | ND | 0.62g. nut, 45.5 % kernel | Check UMHDI |
| PriceW41 PPAF | A x E | Yes | | 3 | ND | 0.58g nut, 39.4 % kernel | Check UMHDI |
| Minar342 PPAF | A x E | Yes | | 3 | ND | 38 % kernel | Check UMHDI |
| Rose18-10 PPAF | A x E | Yes | | 3 | ND | 0.75g. nut, 41.9% kernel | Check UMHDI |
| SpC-2D5 PPAF | A x E | Yes | | 3 | ND | 0.68g. nut, 37.4% kernel | Check UMHDI |
| StapN2-7 PPAF | A x E | Yes | | 3 | ND | 0.66g. nut, 39.4 % kernel | Check UMHDI |
| ShepRosy PPAF | A x E | Yes | | 3 | ND | 0.77g. nut, 42.0 % kernel | Check UMHDI |
| Cuddy2-28 PPAF | A x E | Yes | | 3 | ND | 0.48g. nut, 35.3% kernel | Check UMHDI |
| Arb4-3 PPAF | A x E | Yes | | 3 | ND | 0.50g. nut,38.5% kernel | Check UMHDI |
| Gibs5-15 PPAF | A x E | Yes | | 3 | ND | 0.54g. nut, 29.1% kernel | Check UMHDI |
| Eric4-21 PPAF | A x E | Yes | | 3 | ND | 0.57g. nut, 31.0% kernel | Check UMHDI |
| HandFats PPAF | A x E | Yes | | 3 | ND | 0.85g. nut, 42.7% kernel | Check UMHDI |
| Aldara™ | A x As | Yes | L | 3b | 25, 27 | Medium Nut | Grimo[3] |
| Andrew™ | A x As | Yes | L | 3b | ?, 27 | Medium Nut, | Grimo |
| Dermis™ | A x As | Yes | L | 3b | ND | Medium nut, 40% kernel | Grimo |
| Frank | A | Yes | | 3b | 14, ? | Medium Nut | Grimo |
| Het E | A x As | Yes | | 3b | ND | Medium Nut | Grimo |
| Julia | A | No | | 3b | 11, 14 | Large nut, productive | Grimo |
| Kiara | A | Yes | | 3b | 14, 23 | 0.6g. nut, 37% kernel | Grimo? |
| Marion | A | Yes | | 3b | 14, 25 | Medium Nut | Grimo |
| Joanne | A | Yes | | 4 | 2, 14 | Medium nut | Grimo |
| Northern Blais™ | A | Yes | | 4 | 8, 25 | 1.0g. nut, 35% kernel | Grimo |
| NITKA ™ | A x E | Yes | M | 4a | 5, 17 | 1.1g. nut, 52% kernel | Z's Nutty |
| Photon | A x E | Yes | M | 4a | ND | 1.1g. nut, 44% kernel | Z's Nutty |
| Cheryl(NY 110) | A x E | Yes | | 5a | 10, 12 | 1.5g. nut, 34% kernel | Grimo? |
| The Beast | E x A | Yes | E | 5b | **8**, 23 | grower, Taller European | Great Plains, Arbor Day |
| Grand Traverse | E x A | Yes | M | 5b | **11,25** | 1.3g nut, 40% kernel | Great Plains, Arbor Day, Z's Nutty |
| Truxton | A x E | Yes | M | 5b | ND | 1.3g. nut, 48% kernel | Z's Nutty |
| Gene™ | A x E | Yes | | 5b | 15, 23 | 0.81g. nut, 39% kernel | Grimo |
| Carmela™(208P) | A x E | Yes | | 6a | 23, 25 | Large Nut | Grimo |
| Linda(NY104) | A x E | Yes | | 6a | 14, 23 | 1.0g. nut, 32% kernel | Grimo |
| Slate™(NY616) | A x E | Yes | | 6a | 1, 23 | 0.81g. nut, 39% kernel | Grimo |
| Alex(186M) | A | Yes | | 6b | ND | 1.1g. nut, 44% kernel | Grimo |
| Matt(208D) | A | Yes | | 6b | 11, 13 | 1.5g. nut, 41% kernel | Grimo |
| Raritan PPAF | E | Yes | M | 6b/7a | **3**, 22 | 1.1g. nut,48% kernel | Foggy Bottom |
| Monmouth PPAF | E | Yes | E, M | 6b/7a | **1, 12** | 1.2g. nut, 52% kernel | Foggy Bottom |
| Somerset PPAF | E | Yes | M | 6b/7a | **3**, 10 | 1.1g. nut, 55% kernel | Foggy Bottom |
| Hunterdon PPAF | E | Yes | M | 6b/7a | 1, **3** | 1.2g. nut, 46% kernel | Foggy Bottom |

# Hybrid Hazel Cultivars

## USDA zone 3 cultivars

Plant genetics from UMHDI and Grimo.

Much of UMHDI genetics is from Badgersett.

Much of Grimo is from their own crosses and Morden Experimental Farm in Manitoba.

For availability see Grimo and UMHDI web site.

| | Name | Heritage - European, American, Asian | EFB Resistance | Pollen (Early, Mid., Late) | Cold hardiness, USDA Zone | S- alleles, ND=Not Determined | Nut Quality Comments | Buy from |
|---|---|---|---|---|---|---|---|---|
| 1 | Rose9-2 PPAF | A x E | Yes | | 3 | ND | 0.62g. nut, 45.5 % kernel | Check UMHDI |
| 2 | PriceW41 PPAF | A x E | Yes | | 3 | ND | 0.58g nut, 39.4 % kernel | Check UMHDI |
| 3 | Minar342 PPAF | A x E | Yes | | 3 | ND | 38 % kernel | Check UMHDI |
| 4 | Rose18-10 PPAF | A x E | Yes | | 3 | ND | 0.75g. nut, 41.9% kernel | Check UMHDI |
| 5 | SpC-2D5 PPAF | A x E | Yes | | 3 | ND | 0.68g. nut, 37.4% kernel | Check UMHDI |
| 6 | StapN2-7 PPAF | A x E | Yes | | 3 | ND | 0.66g. nut, 39.4 % kernel | Check UMHDI |
| 7 | ShepRosy PPAF | A x E | Yes | | 3 | ND | 0.77g. nut, 42.0 % kernel | Check UMHDI |
| 8 | Cuddy2-28 PPAF | A x E | Yes | | 3 | ND | 0.48g. nut, 35.3% kernel | Check UMHDI |
| 9 | Arb4-3 PPAF | A x E | Yes | | 3 | ND | 0.50g. nut,38.5% kernel | Check UMHDI |
| 10 | Gibs5-15 PPAF | A x E | Yes | | 3 | ND | 0.54g. nut, 29.1% kernel | Check UMHDI |
| 11 | Eric4-21 PPAF | A x E | Yes | | 3 | ND | 0.57g. nut, 31.0% kernel | Check UMHDI |
| 12 | HandFats PPAF | A x E | Yes | | 3 | ND | 0.85g. nut, 42.7% kernel | Check UMHDI |
| 13 | Aldara™ | A x As | Yes | L | 3b | 25, 27 | Medium Nut | Grimo[3] |
| 14 | Andrew™ | A x As | Yes | L | 3b | ?, 27 | Medium Nut, | Grimo |
| 15 | Dermis™ | A x As | Yes | L | 3b | ND | Medium nut, 40% kernel | Grimo |
| 16 | Frank | A | Yes | | 3b | 14, ? | Medium Nut | Grimo |
| 17 | Het E | A x As | Yes | | 3b | ND | Medium Nut | Grimo |
| 18 | Julia | A | No | | 3b | 11, 14 | Large nut, productive | Grimo |
| 19 | Kiara | A | Yes | | 3b | 14, 23 | 0.6g. nut, 37% kernel | Grimo? |
| 20 | Marion | A | Yes | | 3b | 14, 25 | Medium Nut | Grimo |

# Hybrid Hazel Cultivars

## USDA zone 4 & 5 cultivars

Plant genetics from Hybrid Hazelnut Consortium, Cecil Farris, Grimo, Cornell and Z's Nutty Ridge.

Much of UMHDI genetics is from Badgersett.

Much of Z's Nutty original genetics was from Badgersett as well.

For availability see Growers web site.

| | Name | Heritage - European, American, Asian | EFB Resistance | Pollen (Early, Mid., Late) | Cold hardiness, USDA Zone | S- alleles, ND=Not Determined | Nut Quality Comments | Buy from |
|---|---|---|---|---|---|---|---|---|
| 20 | Joanne | A | Yes? | | 4 | 2, 14 | Medium nut | Grimo |
| 21 | Northern Blais™ | A | Yes | | 4 | 8, 25 | 1.0g. nut, 35% kernel | Grimo |
| 22 | NITKA © | A x E | Yes | M | 4a | 5, 17 | 1.1g. nut, 52% kernel | Z's Nutty |
| 23 | Photon | A x E | Yes | M | 4a | ND | 1.1g. nut, 44% kernel | Z's Nutty |
| 24 | Cheryl(NY 110) | A x E | Yes | | 5a | 10, 12 | 1.5g. nut, 34% kernel | Grimo? |
| 25 | The Beast | E x A | Yes | E | 5b | **8**, 23 | 43% kernel, aggressive grower, Taller European type tree | Great Plains, Arbor Day |
| 26 | Grand Traverse | E x A | Yes | M | 5b | **11,25** | 1.3g nut, 40% kernel | Great Plains, Arbor Day, Z's Nutty |
| 27 | Truxton | A x E | Yes | M | 5b | ND | 1.3g. nut, 48% kernel | Z's Nutty |
| 28 | Gene™ (NY 398) | A x E | Yes | | 5b | 15, 23 | 0.81g. nut, 39% kernel | Grimo, Z's Nutty(Geneva) |

# Hybrid Hazel Cultivars

## USDA zone 6 & 7 cultivars

Plant genetics from Rutgers & OSU, Cornell and Grimo

Rutgers releases can be purchased from Foggy Bottom Nursery.

For availability see Growers web site.

| | Name | Heritage - European, American, Asian | EFB Resistance | Pollen (Early, Mid., Late) | Cold hardiness, USDA Zone | S- alleles, ND=Not Determined | Nut Quality Comments | Buy from |
|---|---|---|---|---|---|---|---|---|
| 29 | Carmela™(208P) | A x E | Yes | | 6a | 23, 25 | Large Nut | Grimo |
| 30 | Linda(NY104) | A x E | Yes | | 6a | 14, 23 | 1.0g. nut, 32% kernel | Grimo |
| 31 | Slate™(NY616) | A x E | Yes | | 6a | 1, 23 | 0.81g. nut, 39% kernel | Grimo |
| 32 | Alex(186M) | A | Yes | | 6b | ND | 1.1g. nut, 44% kernel | Grimo |
| 33 | Matt(208D) | A | Yes | | 6b | 11, 13 | 1.5g. nut, 41% kernel | Grimo |
| 34 | Raritan PPAF | E | Yes | M | 6b/7a | **3**, 22 | 1.1g. nut,48% kernel | Foggy Bottom |
| 35 | Monmouth PPAF | E | Yes | E, M | 6b/7a | **1, 12** | 1.2g. nut, 52% kernel | Foggy Bottom |
| 36 | Somerset PPAF | E | Yes | M | 6b/7a | **3**, 10 | 1.1g. nut, 55% kernel | Foggy Bottom |
| 37 | Hunterdon PPAF | E | Yes | M | 6b/7a | 1, **3** | 1.2g. nut, 46% kernel | Foggy Bottom |

# Hybrid Hazel Cultivars

## References:


1. "Growing Nuts in the North," Carl Weschcke, https://www.gutenberg.org/files/18189/18189-h/18189-h.htm
2. Leadbetter, C.W., J.M. Capik, M. Pisetta, and T.J. Molnar*. 2015. "Sources of resistance to eastern filbert blight in hazelnuts from the Republic of Georgia". Scientia Horticulturae 193:269– 275.
3. Grimo website and personnel communications: Home - Grimo Nut Nursery
4. Cooperative Extension Bulletin E368, "Choosing Plants for a Hazelnut Orchard in New Jersey", Megan Muehlbauer, Agriculture and Natural Resources Agent, Hunterdon County, John Capik, Field Researcher, Department of Plant Biology, Thomas J. Molnar, Associate Professor, Department of Plant Biology
5. Upper Midwest Hazelnut Growers Conference, UMHDI 1st Generation Selections, March 9, 2019.
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7. "Welcome to the new era of Hazelnut Orchards!" Jeff Zarnowski, Z's Nutty Ridge LLC, 2020'
8. "Starting Out in Nut Trees", Jeff Zarnowski, Z's Nutty Ridge LLC, 2019'
9. Shawn A. Mehlenbacher, "Geographic Distribution of Incompatibility Alleles in Cultivars and Selections of European Hazelnut", J. AMER. SOC. HORT. SCI. 139(2):191–212. 2014.

# Hybrid Hazel Selections

- Thank You!

- More cultivar announcements coming soon.