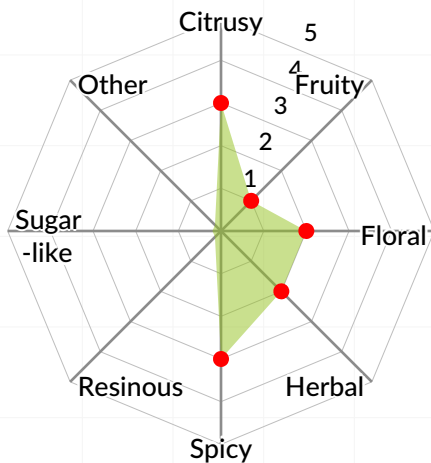


## AROMA EVALUATION



## VISUAL EVALUATION



## AROMA SPECIFICATION

Tea, spicy, green fruit, pepper

## GENETIC ORIGIN

Zenith x Hopsteiner male

## AGRONOMIC ASPECTS

### GROWING

Yield (kg/ha)	2,000 - 2,500
Maturity	Early
Main Growing Country	Germany

### RESISTANCE AGAINST DISEASES

Downy mildew	Tolerant
Powdery mildew	Tolerant

## CHEMICAL INGREDIENTS

### BITTER COMPONENTS

Alpha-Acid %	8.0 - 10.0
Beta-Acid %	4.0 - 5.0
Co-Humulone % rel.	27 - 30
Hard Resins : Alpha-Acid	1.20 - 1.40

### POLYPHENOLS

Total Polyphenoles	4.0 - 5.0
Xanthohumol (EBC 7.7)	0.9 - 1.0

### AROMA COMPONENTS

Total Oils (ml/100g)	1.5 - 2.0
Beta-Caryophyllene: Humulene	0.37 - 0.40
Linalool % of total Oil	0.6 - 0.8
Linalool: Alpha-Acid	0.08 - 0.10

## HOP ALTERNATIVES

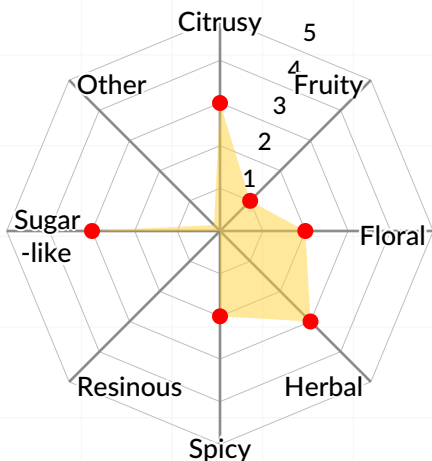
### BREWHOUSE

Perle, Aurora, Hallertauer Tradition, Northern Brewer

## HOPS HOTLINE

800.339.8710

## AROMA EVALUATION



## VISUAL EVALUATION



## AROMA SPECIFICATION

orange, candied lime, fruity, floral

## GENETIC ORIGIN

Zeus x (98004 x USDA 19058m).

## AGRONOMIC ASPECTS

### GROWING

Yield (kg/ha)	3,000 - 3,500
Yield (lbs/acre)	2,700 - 3,150
Maturity	Very Late
Main Growing Country	USA
Acreage (ha)	255

### RESISTANCE AGAINST DISEASES

Downy mildew	Tolerant
Powdery mildew	Susceptible

## CHEMICAL INGREDIENTS

### BITTER COMPONENTS

Alpha-Acid %	14.0 - 17.0
Beta-Acid %	3.0 - 5.0
Co-Humulone % rel.	29 - 34
Hard Resins : Alpha-Acid	0.14 - 0.24

### POLYPHENOLS

Xanthohumol (EBC 7.7)	0.8 - 1.0
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### AROMA COMPONENTS

Total Oils (ml/100g)	1.6 - 2.4
Beta-Caryophyllene: Humulene	0.58
Farnesene % of total Oil	0.00 - 1.00
Linalool % of total Oil	0.2 - 0.3
Linalool: Alpha-Acid	0.01 - 0.02

## HOP ALTERNATIVES

### BREWHOUSE

Zeus, US Magnum, Nugget

### DRY HOPPING

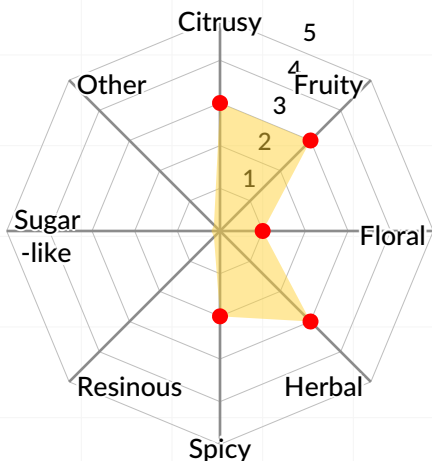
Chinook, Centennial

Bravo is tried and true in the kettle, offering a polished and pleasant bitterness profile. Candied lime and sweet fruit notes emerge when used as a late hop or dry hop addition. Bravo is "the bittering hop of choice" among many brewers.

**Hop Highlights:**  
 14–17% Alpha  
 3–5% Beta  
 High Geraniol  
 Pleasant Bitterness

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## AROMA EVALUATION



## VISUAL EVALUATION



## AROMA SPECIFICATION

fruity, citrusy, herbal

## GENETIC ORIGIN

Open pollinated of a Fuggle seedling, itself derived from crosses between Fuggle and the Russian hop Serebrianka.

## AGRONOMIC ASPECTS

### GROWING

Yield (kg/ha)	1,600 - 2,200
Yield (lbs/acre)	1,400 - 2,000
Maturity	Medium Early
Main Growing Country	USA
Acreage (ha)	2896

### RESISTANCE AGAINST DISEASES

Downy mildew	Tolerant
Powdery mildew	Tolerant

## CHEMICAL INGREDIENTS

### BITTER COMPONENTS

Alpha-Acid %	4.5 - 7.0
Beta-Acid %	4.5 - 7.0
Co-Humulone % rel.	33 - 40
Hard Resins : Alpha-Acid	0.27 - 0.56

### POLYPHENOLS

Xanthohumol (EBC 7.7)	0.1 - 0.4
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### AROMA COMPONENTS

Total Oils (ml/100g)	0.8 - 1.5
Beta-Caryophyllene: Humulene	0.32
Farnesene % of total Oil	4.00 - 8.00
Linalool % of total Oil	0.4 - 0.6
Linalool: Alpha-Acid	0.09 - 0.10

## HOP ALTERNATIVES

### BREWHOUSE

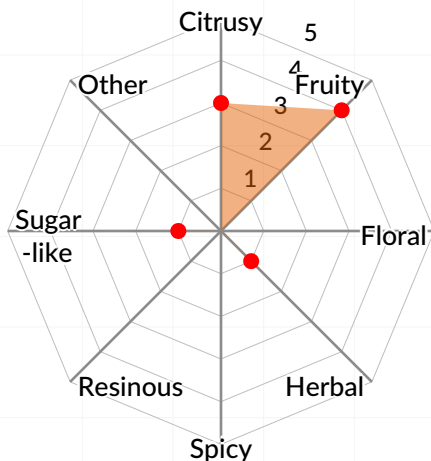
Centennial, Lemondrop

### DRY HOPPING

Centennial, Lemondrop

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## AROMA EVALUATION



## VISUAL EVALUATION



## AROMA SPECIFICATION

Tropical mango, pear, stone fruit, and candied lemon

## GENETIC ORIGIN

The lineage goes back to Brewer's Gold, Bullion, Comet and Fuggle and was released in 1999

## AGRONOMIC ASPECTS

### GROWING

Yield (kg/ha)	2,650 - 2,880
Yield (lbs/acre)	2,300 - 2,500
Main Growing Country	USA

## CHEMICAL INGREDIENTS

### BITTER COMPONENTS

Alpha-Acid %	13.0 - 17.0
Beta-Acid %	7.0 - 8.0
Co-Humulone % rel.	28 - 33

### AROMA COMPONENTS

Total Oils (ml/100g)	2.5 - 3.3
Farnesene % of total Oil	0.10

## HOP ALTERNATIVES

### BREWHOUSE

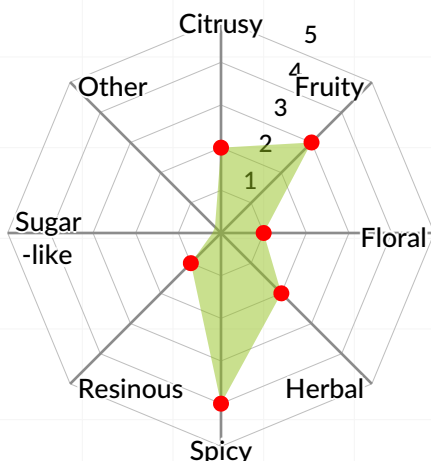
Galena, Nugget, Bitter Gold

### DRY HOPPING

Bitter Gold

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## AROMA EVALUATION



## VISUAL EVALUATION



## AROMA SPECIFICATION

fruity, apple, pepper

## GENETIC ORIGIN

A Galena cross (751513M) originating in Germany, released in 1993.

## AGRONOMIC ASPECTS

### GROWING

Yield (kg/ha)	1,700 - 2,100
Yield (lbs/acre)	1,500 - 1,900
Maturity	Late
Main Growing Country	Germany
Acreage (ha)	2200

### RESISTANCE AGAINST DISEASES

Wilt diseases	Resistant
Downy mildew	Resistant
Powdery mildew	Susceptible
Aphid	Susceptible

## CHEMICAL INGREDIENTS

### BITTER COMPONENTS

Alpha-Acid %	11.0 - 16.0
Beta-Acid %	5.0 - 7.0
Co-Humulone % rel.	21 - 29
Hard Resins : Alpha-Acid	0.11 - 0.29

### POLYPHENOLES

Total Polyphenoles	2.6
Xanthohumol (EBC 7.7)	0.4 - 0.5

### AROMA COMPONENTS

Total Oils (ml/100g)	1.9 - 2.8
Beta-Caryophyllene: Humulene	0.20 - 0.30
Farnesene % of total Oil	0.00 - 1.00
Linalool % of total Oil	0.2 - 0.3
Linalool: Alpha-Acid	0.01 - 0.02

## HOP ALTERNATIVES

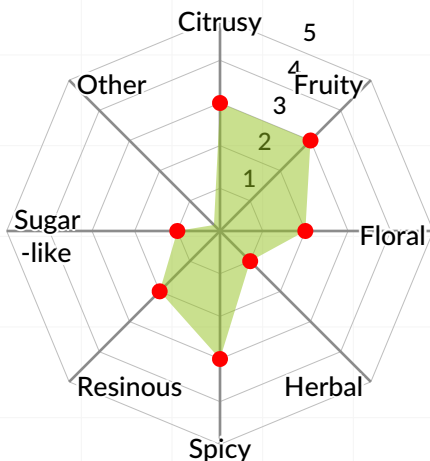
### BREWHOUSE

Hallertauer Taurus, Herkules, Hallertauer Merkur

## HOPS HOTLINE

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## AROMA EVALUATION



## VISUAL EVALUATION



## AROMA SPECIFICATION

pepper, spicy, resinous, orange

## GENETIC ORIGIN

A German high alpha cross variety, bred in Huell.

## AGRONOMIC ASPECTS

### GROWING

Yield (kg/ha)	2,500 - 2,700
Maturity	Very Late
Main Growing Country	Germany
Acreage (ha)	5759

### RESISTANCE AGAINST DISEASES

Wilt diseases	Resistant
Downy mildew	Susceptible
Powdery mildew	Susceptible

## CHEMICAL INGREDIENTS

### BITTER COMPONENTS

Alpha-Acid %	13.0 - 17.0
Beta-Acid %	4.0 - 5.5
Co-Humulone % rel.	31 - 38
Hard Resins : Alpha-Acid	0.14 - 0.24

### POLYPHENOLES

Total Polyphenoles	3.5
Xanthohumol (EBC 7.7)	0.6 - 0.8

### AROMA COMPONENTS

Total Oils (ml/100g)	1.4 - 2.4
Beta-Caryophyllene: Humulene	0.28 - 0.30
Farnesene % of total Oil	0.00 - 1.00
Linalool % of total Oil	0.3 - 0.8
Linalool: Alpha-Acid	0.02 - 0.05

## HOP ALTERNATIVES

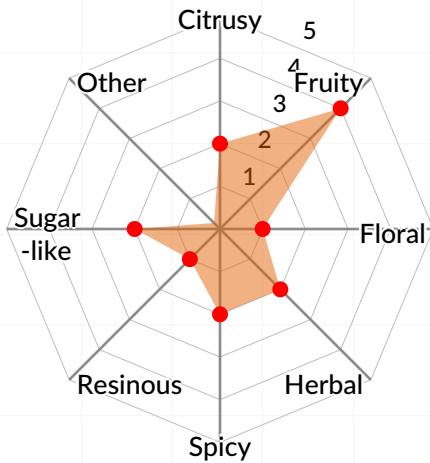
### BREWHOUSE

Hallertauer Taurus, Hallertauer Magnum, Hallertauer Merkur

### HOPS HOTLINE

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## AROMA EVALUATION



## VISUAL EVALUATION



## AROMA SPECIFICATION

orange, vanilla, berry, tropical fruits

## GENETIC ORIGIN

50% Eastern Gold, 25% Apollo, Cascade, USDA 19058

**HOPS HOTLINE**  
**800.339.8710**

## AGRONOMIC ASPECTS

### GROWING

Yield (kg/ha)	2,200 - 2,600
Maturity	Late
Main Growing Country	USA

### RESISTANCE AGAINST DISEASES

Downy mildew	Susceptible
Powdery mildew	Resistant
Aphid	Resistant

## CHEMICAL INGREDIENTS

### BITTER COMPONENTS

Alpha-Acid %	13.0 - 17.0
Beta-Acid %	5.5 - 6.0
Co-Humulone % rel.	33 - 39

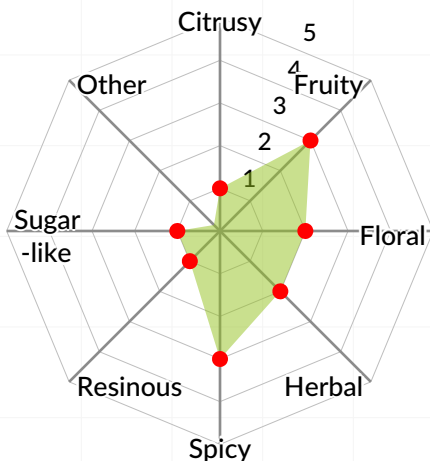
### POLYPHENOLS

Xanthohumol (EBC 7.7)	0.8 - 1.0
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### AROMA COMPONENTS

Total Oils (ml/100g)	1.5 - 2.5
Beta-Caryophyllene: Humulene	0.35 - 0.40
Linalool % of total Oil	0.2 - 0.4
Linalool: Alpha-Acid	0.01 - 0.02

## AROMA EVALUATION



## VISUAL EVALUATION



## AROMA SPECIFICATION

tea, spicy, green fruit, pepper

## GENETIC ORIGIN

A German variety bred in Huell resulting from a cross between Northern Brewer and 63/5/27M.

## AGRONOMIC ASPECTS

### GROWING

Yield (kg/ha)	1,800 - 2,000
Maturity	Medium to Late
Main Growing Country	Germany
Acreage (ha)	2966

### RESISTANCE AGAINST DISEASES

Downy mildew	Tolerant
Powdery mildew	Susceptible

## CHEMICAL INGREDIENTS

### BITTER COMPONENTS

Alpha-Acid %	4.0 - 9.0
Beta-Acid %	2.5 - 4.5
Co-Humulone % rel.	29 - 35
Hard Resins : Alpha-Acid	0.15 - 0.70

### POLYPHENOLS

Total Polyphenoles	4.1
Xanthohumol (EBC 7.7)	0.4 - 0.6

### AROMA COMPONENTS

Total Oils (ml/100g)	0.5 - 1.3
Beta-Caryophyllene: Humulene	0.30 - 0.33
Farnesene % of total Oil	0.00 - 1.00
Linalool % of total Oil	0.2 - 0.6
Linalool: Alpha-Acid	0.05 - 0.07

## HOP ALTERNATIVES

### BREWHOUSE

Akoya, Northern Brewer, Aurora, Hallertauer Tradition

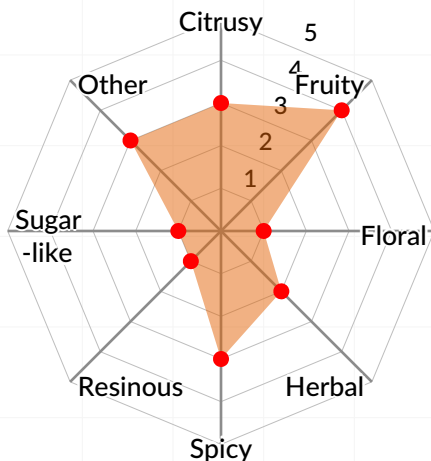
### DRY HOPPING

Akoya, Aurora, Northern Brewer

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## AROMA EVALUATION



## VISUAL EVALUATION



## AROMA SPECIFICATION

menthol, ice wine, pineapple

## GENETIC ORIGIN

94/075/758 x 97/060/720 (div. Huell material)

## AGRONOMIC ASPECTS

### GROWING

Maturity	Very Late
Main Growing Country	Germany
Acreage (ha)	174

### RESISTANCE AGAINST DISEASES

Wilt diseases	Resistant
Downy mildew	Susceptible
Powdery mildew	Susceptible
Aphid	Susceptible

## CHEMICAL INGREDIENTS

### BITTER COMPONENTS

Alpha-Acid %	19.0 - 23.0
Beta-Acid %	4.0 - 6.0
Co-Humulone % rel.	22 - 28
Hard Resins : Alpha-Acid	0.15 - 0.17

### POLYPHENOLES

Total Polyphenoles	3.3
Xanthohumol (EBC 7.7)	0.7 - 1.0

### AROMA COMPONENTS

Total Oils (ml/100g)	2.4 - 4.4
Beta-Caryophyllene: Humulene	0.40
Farnesene % of total Oil	0.00 - 1.00
Linalool % of total Oil	0.1 - 0.4
Linalool: Alpha-Acid	0.01 - 0.02

## HOP ALTERNATIVES

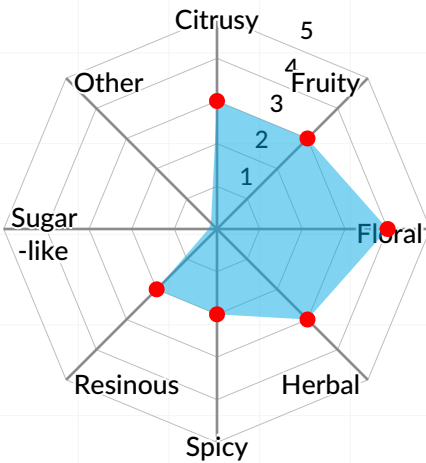
### BREWHOUSE

Herkules

### HOPS HOTLINE

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## AROMA EVALUATION



## AROMA SPECIFICATION

**citrusy, spicy, floral**

## GENETIC ORIGIN

A cross between two new varieties 83/17/20 and 80/56/6 bred in Huell.

## AGRONOMIC ASPECTS

### GROWING

Yield (kg/ha)	1,600 - 1,900
Maturity	Medium Early
Main Growing Country	Germany
Acreage (ha)	473

### RESISTANCE AGAINST DISEASES

Wilt diseases	Resistant
Downy mildew	Susceptible
Powdery mildew	Resistant
Aphid	Tolerant

## CHEMICAL INGREDIENTS

### BITTER COMPONENTS

Alpha-Acid %	2.0 - 4.5
Beta-Acid %	4.0 - 7.0
Co-Humulone % rel.	12 - 17
Hard Resins : Alpha-Acid	0.34 - 1.20

### POLYPHENOLES

Total Polyphenoles	4.5
Xanthohumol (EBC 7.7)	0.3 - 0.4

### AROMA COMPONENTS

Total Oils (ml/100g)	0.6 - 1.4
Beta-Caryophyllene: Humulene	0.40 - 0.50
Farnesene % of total Oil	0.00 - 1.00
Linalool % of total Oil	0.8 - 1.3
Linalool: Alpha-Acid	0.29 - 0.40

## VISUAL EVALUATION



## HOP ALTERNATIVES

### BREWHOUSE

Hallertauer Tradition, Spalter Select

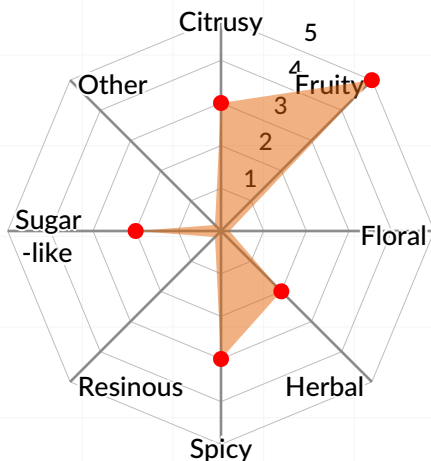
### DRY HOPPING

Hallertauer Mittelfrueh

## HOPS HOTLINE

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## AROMA EVALUATION



## VISUAL EVALUATION



## AROMA SPECIFICATION

Tropical fruits, mango, passion fruit

## GENETIC ORIGIN

Cascade x Hopsteiner male

**HOPS HOTLINE**  
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## AGRONOMIC ASPECTS

### GROWING

Yield (kg/ha)	2,800 - 3,300
Maturity	Late
Main Growing Country	Germany

### RESISTANCE AGAINST DISEASES

Downy mildew	Tolerant
Powdery mildew	Tolerant

## CHEMICAL INGREDIENTS

### BITTER COMPONENTS

Alpha-Acid %	9.0 - 10.0
Beta-Acid %	5.0 - 6.0
Co-Humulone % rel.	45 - 55
Hard Resins : Alpha-Acid	1.20 - 1.40

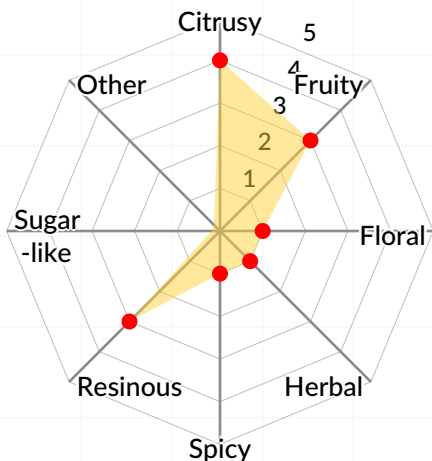
### POLYPHENOLS

Total Polyphenoles	5.0 - 6.0
Xanthohumol (EBC 7.7)	0.7 - 0.8

### AROMA COMPONENTS

Total Oils (ml/100g)	1.5 - 2.0
Beta-Caryophyllene: Humulene	0.80 - 0.90
Linalool % of total Oil	0.2 - 0.5
Linalool: Alpha-Acid	0.03 - 0.05

## AROMA EVALUATION



## VISUAL EVALUATION



## AROMA SPECIFICATION

pineapple, pine, citrus

## GENETIC ORIGIN

50 % Nugget, 25 % Zeus, 25 % USDA 19058m

## AGRONOMIC ASPECTS

### GROWING

Yield (kg/ha)	2,800 - 3,100
Maturity	Late
Main Growing Country	USA

### RESISTANCE AGAINST DISEASES

Downy mildew	Tolerant
Powdery mildew	Tolerant

## CHEMICAL INGREDIENTS

### BITTER COMPONENTS

Alpha-Acid %	13.0 - 15.0
Beta-Acid %	4.0 - 5.0
Co-Humulone % rel.	22 - 26

### POLYPHENOLS

Total Polyphenoles	2.5 - 3.0
Xanthohumol (EBC 7.7)	0.5 - 0.7

### AROMA COMPONENTS

Total Oils (ml/100g)	2.5 - 4.0
Beta-Caryophyllene: Humulene	0.30 - 0.40
Linalool % of total Oil	0.6 - 1.0
Linalool: Alpha-Acid	0.05 - 0.10

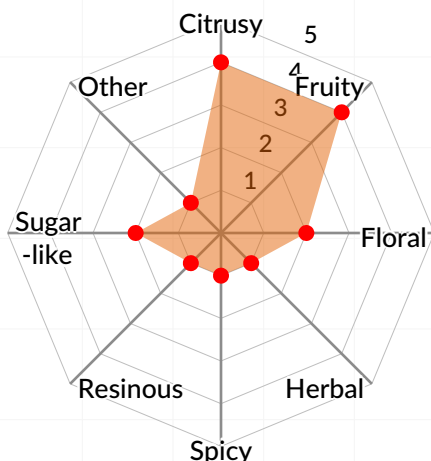
Sultana is BIG. A monster of a plant with gigantic cones, she has a high total oil content to boot! With pineapple, pine and bright citrus notes, Sultana is sure to make "one hell of an IPA!"

### Hop Highlights:

13–15% Alpha  
4–5% Beta  
High Total Oil  
High Yield

**HOPS HOTLINE**  
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## AROMA EVALUATION



## VISUAL EVALUATION



## AROMA SPECIFICATION

fruity, citrus, tropical, passion fruit

## GENETIC ORIGIN

Trident™ is comprised of three unique Pacific Northwest-grown hop varieties

## AGRONOMIC ASPECTS

### GROWING

Main Growing Country USA

## CHEMICAL INGREDIENTS

### BITTER COMPONENTS

Alpha-Acid %	11.0 - 14.0
Beta-Acid %	4.0 - 5.0
Co-Humulone % rel.	20 - 30

### AROMA COMPONENTS

Total Oils (ml/100g)	1.5 - 3.0
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## HOP ALTERNATIVES

### DRY HOPPING

Hazy IPA, American Pale Ale, IPA, Lager

Trident™ is a specialized blend with a much wider range of aroma and flavor characteristics than any single hop variety could generate on its own. Although, Trident™ is suitably balanced as is, it could also be added with others to build an even more unique and potent flavor profile.

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