

Hop Substitutions

Update: The first version of our [data-driven hop substitute tool](#) is here!

There are well over five hundred [hop varieties available](#) for use in brewing beer. If a beer recipe calls for a particular variety of hop that it is unavailable, there is a good chance that a substitution can be made without much of a difference.

Hop substitutions need to be chosen carefully. The alpha and beta acid contents should be close to ensure the bitterness and stability is similar. Hops also have different essential oil percentages, which will change the [flavor and aromas](#). These oils should also be close when swapping one hop for another, but these are only essential to keep aromas similar.

 [Print this Page](#)

Hop	Substitutions
Adeena	Hallertau Mittelfruh , Styrian Golding
Admiral	Target , Northdown , Challenger
African Queen	Amarillo , Cascade , Simcoe , Citra , Mosaic
Agnus	Magnum (US) , Nugget , Target , Columbus
Ahtanum	Amarillo , Cascade , Centennial , Willamette
Akoya	Perle (US) , Perle (GR) , Aurora , Hallertau Tradition , Northern Brewer (US) , Northern Brewer

Altus	Apollo
Amarillo	Cascade , Centennial , Chinook , Summer , Simcoe
Apollo	Magnum (US) , Magnum (GR) , Columbus , Tomahawk , Zeus , CTZ , Nugget
Aquila	Cluster , Galena
Aramis	Willamette , Challenger , Ahtanum , Centennial , Strisselspalt , EKG , Saaz (US) , Hallertau Mittelfruh
Ariana	Huell Melon , Mandarina Bavaria , Hallertau Blanc
Aurora	Styrian Golding , Perle , Northern Brewer (US) , Northern Brewer (GR)
Azacca	Amarillo , Citra , Delta , Pekko
Banner	Aquila , Cluster , Galena

<u>Belma</u>	<u>Substitutions</u> <u>Huell Melon</u> , <u>Pacific Gem</u>
<u>Bergamot</u>	<u>XJA2-436</u>
<u>Bianca</u>	<u>Sunbeam</u>
<u>Bitter Gold</u>	<u>Galena</u> , <u>Nugget</u>
<u>Boadicea</u>	<u>Green Bullet</u> , <u>Cascade</u> , <u>Chinook</u>
<u>Bobek</u>	<u>Fuggie</u> , <u>Styrian Golding</u> , <u>Willamette</u>
<u>Bramling Cross</u>	<u>East Kent Goldings</u> , <u>Bullion</u> , <u>Northern Brewer (US)</u> , <u>Northern Brewer (GR)</u> , <u>Galena</u>
<u>Bravo</u>	<u>Columbus</u> , <u>Tomahawk</u> , <u>Zeus, CTZ</u> , <u>Zeus</u> , <u>Chinook</u> , <u>Centennial</u> , <u>Nugget</u>
<u>Brewer's Gold (GR)</u>	<u>Chinook</u> , <u>Galena</u> , <u>Nugget</u> , <u>Brewer's Gold (US)</u>
<u>Brewer's Gold (US)</u>	<u>Galena</u> , <u>Brewer's Gold</u> , <u>Chinook</u> , <u>Galena</u> , <u>Nugget</u>
<u>Brooklyn</u>	<u>Moutere</u>
<u>Bullion</u>	<u>Brewers Gold</u> , <u>Northern Brewer (US)</u> , <u>Northern Brewer (GR)</u> , <u>Galena</u> , <u>Bramling Cross</u> , <u>Mount Ranier</u>
<u>Callista</u>	<u>Hallertau Tradition</u> , <u>Grungeist</u>
<u>Calypso</u>	<u>Galena</u> , <u>Cascade</u> , <u>Huell Melon</u> , <u>Belma</u>
<u>Canadian Redvine</u>	<u>Newport</u> , <u>Magnum</u> , <u>Galena</u> , <u>Cascade</u>
<u>Cascade</u>	<u>Amarillo</u> , <u>Centennial</u> , <u>Ahtanum</u> , <u>Summit</u>
<u>Cashmere</u>	<u>Cascade</u>
<u>Cekin</u>	<u>Styrian Golding</u> , <u>Brewers Gold</u> , <u>Aurora</u>
<u>Celeia</u>	<u>Styrian Golding</u> , <u>Bobek</u> , <u>Saaz (CZ)</u>

<u>Centennial</u>	<u>Cascade</u> , <u>Chinook</u> , <u>Columbus</u> , <u>Tomahawk</u> , <u>Zeus, CTZ</u> , <u>Amarillo</u>
<u>Challenger</u>	<u>Northern Brewer (US)</u> , <u>Northern Brewer (GR)</u> , <u>Perle (US)</u> , <u>Target</u> , <u>Northdown</u>
<u>Chelan</u>	<u>Galena</u> , <u>Nugget</u>
<u>Chinook</u>	<u>Nugget</u> , <u>Columbus</u> , <u>Tomahawk</u> , <u>Zeus, CTZ</u> , <u>Northern Brewer (US)</u> , <u>Galena</u>
<u>Citra</u>	<u>Simcoe</u> , <u>Mosaic</u> , <u>Centennial</u> , <u>Cascade</u>
<u>Cluster</u>	<u>Galena</u> , <u>Chinook</u> , <u>Eroica</u> , <u>Nugget</u>
<u>Columbia</u>	<u>Centennial</u> , <u>Chinook</u>
<u>Columbus</u>	<u>CTZ</u> , <u>Tomahawk</u> , <u>Zeus</u> , <u>Centennial</u> , <u>Chinook</u> , <u>Galena</u> , <u>Nugget</u> , <u>Millennium</u>
<u>Comet</u>	<u>Galena</u> , <u>Citra</u>

<u>Hop Crystal</u>	<u>Substitutions</u> <u>Mount Hood</u> , <u>Hersbrucker</u> , <u>Strisselspalt</u> , <u>Liberty</u> , <u>Ultra</u> , <u>Hallertau</u>
<u>CTZ</u>	<u>Columbus</u> , <u>Tomahawk</u> , <u>Zeus</u>
<u>Dana</u>	<u>Fuggie</u> , <u>Willamette</u>
<u>Delta</u>	<u>Fuggie</u> , <u>Willamette</u> , <u>Cascade</u>
<u>Dr. Rudi</u>	<u>Green Bullet</u>
<u>East Kent Goldings</u>	<u>Golding</u> , <u>Fuggie</u> , <u>Willamette</u>
<u>Ekuanot</u>	<u>Chinook</u> , <u>Summit</u> , <u>Galena</u> , <u>Cluster</u>
<u>El Dorado</u>	<u>Citra</u> , <u>Nelson Sauvin</u> , <u>Rakau</u>
<u>Ella</u>	<u>Perle (US)</u> , <u>Palisade</u> , <u>Galaxy</u>
<u>Endeavour</u>	<u>Bramling Cross</u> , <u>Pilgrim</u>
<u>Enigma</u>	<u>Nelson Sauvin</u> , <u>Hallertau Blanc</u>
<u>Equinox</u>	<u>Ekuanot</u>
<u>Eroica</u>	<u>Brewer's Gold</u> , <u>Chinook</u> , <u>Cluster</u> , <u>Galena</u> , <u>Nugget</u>
<u>Eureka</u>	<u>Columbus</u> , <u>Tomahawk</u> , <u>Zeus</u> , <u>CTZ</u> , <u>Apollo</u> , <u>Merkur</u> , <u>Simcoe</u> , <u>Summit</u>
<u>Falconer's Flight</u>	<u>Citra</u> , <u>Simcoe</u> , <u>Amarillo</u> , <u>Sorachi Ace</u> , <u>Summit</u> , <u>Cascade</u>
<u>Falconer's Flight 7CS</u>	<u>CTZ</u> , <u>Centennial</u> , <u>Citra</u> , <u>Columbus</u> , <u>Chinook</u> , <u>Cluster</u> , <u>Cascade</u> , <u>Crystal</u>
<u>First Gold</u>	<u>Whitbread Golding Variety</u> , <u>East Kent Golding</u> , <u>Willamette</u>
<u>Flyer</u>	<u>Willamette</u> , <u>East Kent Goldings</u>
<u>Fuggie</u>	<u>Willamette</u> , <u>Styrian Golding</u> , <u>East Kent Goldings</u>

<u>Galaxy</u>	<u>Simcoe</u> , <u>Citra</u> , <u>Amarillo</u>
<u>Galena</u>	<u>Brewer's Gold</u> , <u>Columbus</u> , <u>Tomahawk</u> , <u>Zeus</u> , <u>CTZ</u> , <u>Nugget</u>
<u>Glacier</u>	<u>Fuggie</u> , <u>Styrian Golding</u> , <u>Willamette</u>
<u>Godiva</u>	<u>Wai-iti</u> , <u>Hallertau Blanc</u>
<u>Golden Star</u>	<u>Fuggie</u>
<u>Golding</u>	<u>East Kent Golding</u> , <u>Fuggie</u> , <u>Willamette</u> , <u>Styrian Golding</u> , <u>Progress</u> , <u>Whitbread Golding Variety</u>
<u>Green Bullet</u>	<u>Liberty</u> , <u>Hallertau</u> , <u>Mount Hood</u> , <u>Ultra</u> , <u>Crystal</u>
<u>Grungeist</u>	<u>Callista</u>
<u>Hallertau</u>	

<u>Hallertau (US)</u>	<u>Liberty</u> , <u>Mount Hood</u> , <u>Hallertau Mittelfruh</u> , <u>Crystal</u> , <u>Hallertau Tradition</u>
<u>Hallertau Blanc</u>	<u>Nelson Sauvin</u> , <u>Enigma</u>
<u>Hallertau Gold</u>	<u>Hallertau Mittelfruh</u> , <u>Tettnanger</u> , <u>East Kent Golding</u> , <u>Crystal</u> , <u>Mount Hood</u>
<u>Hallertau Mittelfruh</u>	<u>Hallertau</u> , <u>Liberty</u> , <u>Vanguard</u> , <u>Hallertau Tradition</u>
<u>Hallertau Taurus</u>	<u>Magnum (GR)</u> , <u>Magnum (US)</u> , <u>Citra</u> , <u>Hallertau Tradition</u> , <u>Merkur</u> , <u>Herkules</u>
<u>Hallertau Tradition</u>	<u>Hallertau Mittelfruh</u> , <u>Tettnanger</u> , <u>East Kent Golding</u> , <u>Crystal</u> , <u>Mount Hood</u>
<u>Harlequin</u>	<u>Mosaic</u>
<u>HBC 692</u>	<u>Talus</u>
<u>Helga</u>	<u>Hallertau</u> , <u>Hallertau Mittelfruh</u>
<u>Herald</u>	<u>Pioneer</u> , <u>Pilgrim</u>
<u>Herkules</u>	<u>Taurus</u> , <u>Warrior</u>
<u>Hersbrucker</u>	<u>Hallertau</u> , <u>Mount Hood</u> , <u>Liberty</u> , <u>Spalt</u>
<u>Horizon</u>	<u>Magnum (US)</u> , <u>Magnum (GR)</u> , <u>Nugget</u>
<u>Huell Melon</u>	<u>Belma</u> , <u>Jarrylo</u>
<u>Idaho 7</u>	<u>Azacca</u> , <u>El Dorado</u> , <u>Cashmere</u> , <u>Citra</u> , <u>Idaho Gem</u> , <u>Amarillo</u> , <u>Chinook</u> , <u>Columbus</u>
<u>Idaho Gem</u>	<u>Azacca</u> , <u>El Dorado</u> , <u>Cashmere</u> , <u>Citra</u> , <u>Idaho 7</u> , <u>Cascade</u>
<u>Jarrylo</u>	<u>Motueka</u> , <u>Nelson Sauvin</u> , <u>Mosaic</u>
<u>Jester</u>	<u>Cascade</u>

<u>Junga</u>	<u>Nugget</u> , <u>Target</u> , <u>Galena</u>
<u>Kazbek</u>	<u>Saaz (CZ)</u>
<u>Kohatu</u>	<u>Wai-iti</u> , <u>Motueka</u>
<u>Lambic</u>	<u>Fuggle</u>
<u>Lemondrop</u>	<u>Cascade</u> , <u>Motueka</u> , <u>Liberty</u> , <u>Mandarina Bavaria</u> , <u>Centennial</u>
<u>Liberty</u>	<u>Hallertau</u> , <u>Mount Hood</u> , <u>Crystal</u>
<u>Loral</u>	<u>Glacier</u> , <u>Nugget</u> , <u>Strisselspalt</u> , <u>Tardif De Bourgogne</u>
<u>Lubelska</u>	<u>Saaz (CZ)</u> , <u>Saaz (US)</u> , <u>Tettnang</u> , <u>Stirling</u>
<u>Magnat</u>	<u>Magnum (GR)</u> , <u>Magnum (US)</u> , <u>Lubelski</u>

<u>Magnum</u>	<u>Magnum (GR), Magnum (US), Saablen</u>
Hop	Substitutions
Magnum	<u>Magnum (US), Nugget, Taurus, Columbus, Tomahawk, Zeus, CTZ</u>
(GR)	
Magnum	<u>Galena, Magnum (GR), Nugget, Columbus, Horizon, Northdown, Northern Brewer (US)</u>
(US)	
Mandarina	<u>Cascade, Huell Melon, Lemondrop, Perle (US)</u>
Bavaria	
Marco Polo	<u>CTZ, Columbus, Tomahawk, Zeus</u>
Marynka	<u>Tettnanger</u>
Medusa	<u>Zappa</u>
Melba	<u>Galaxy</u>
Meridian	<u>Citra, Glacier, Centennial</u>
Merkur	<u>Magnum (GR), Magnum (US), Hallertau Taurus, Hallertau Tradition</u>
Millennium	<u>Nugget, Columbus, Tomahawk, Zeus, CTZ</u>
Minstrel	<u>Challenger</u>
Mosaic	<u>Citra, Simcoe</u>
Motueka	<u>Saaz (US), Sterling</u>
Mount Hood	<u>Hallertau, Hersbrucker, Liberty, Crystal, Hallertau Mittelfruh</u>
Mount	
Rainier	<u>Fuggie, Hallertau</u>
Multihead	<u>Medusa</u>
Nectaron	<u>Waimea, Citra, Mosaic</u>
Nelson	
Sauvin	<u>Hallertau Blanc, Enigma, Motueka, Riwaka</u>

Newport	<u>Brewer's Gold, Fuggie, Galena, Magnum (GR), Magnum (US), Nugget</u>
Northdown	<u>Northern Brewer (US), Northern Brewer (GR), Target, Challenger, Admiral</u>
Northern	
Brewer (GR)	<u>Northern Brewer (US), Brewers Gold, Chinook, Perle (US), Perle (GR)</u>
Northern	
Brewer (US)	<u>Galena, Perle (US), Magnum (GR), Magnum (US), Chinook, Northern Brewer (GR)</u>
Nugget	<u>Galena, Magnum (US), Columbus, Tomahawk, Zeus, CTZ</u>
Olympic	<u>Brewers Gold, Chinook, Galena</u>
Omega	<u>Super Galena, Challenger</u>

<u>Opal Hop</u>	<u>East Kent Golding</u> , <u>Styrian Golding</u> , <u>Tettnanger</u>
<u>Orion</u>	<u>Northern Brewer (GR)</u> , <u>Perle (GR)</u> , <u>Challenger</u>
<u>Pacific Crest</u>	<u>Saaz (US)</u> , <u>Saaz (CZ)</u> , <u>Fuggie</u> , <u>Tettnang</u>
<u>Pacific Gem</u>	<u>Cluster</u> , <u>Magnum (GR)</u> , <u>Magnum (US)</u> , <u>Galena</u> , <u>Belma</u>
<u>Pacific Jade</u>	<u>Hallertau</u> , <u>Saaz (CZ)</u> , <u>Cluster</u>
<u>Pacific Sunrise</u>	<u>Pacific Gem</u>
<u>Pacifica</u>	<u>Hallertau</u>
<u>Palisade</u>	<u>Willamette</u> , <u>Glacier</u>
<u>Paradigm</u>	<u>Saaz</u> , <u>Mosaic</u> , <u>Citra</u> , <u>Galaxy</u>
<u>Pekko</u>	<u>Saaz (CZ)</u> , <u>Azacca</u>
<u>Perle (GR)</u>	<u>Northern Brewer (US)</u> , <u>Northern Brewer (GR)</u> , <u>Perle (US)</u>
<u>Perle (US)</u>	<u>Perle (GR)</u> , <u>Northern Brewer (US)</u> , <u>Northern Brewer (GR)</u> , <u>Cluster</u> , <u>Galena</u>
<u>Phoenix</u>	<u>UK Challenger</u> , <u>UK Northdown</u>
<u>Pilgrim</u>	<u>Challenger</u> , <u>Pioneer</u> , <u>Challenger</u>
<u>Pilot</u>	<u>Galena</u>
<u>Pioneer</u>	<u>Yeoman</u> , <u>Herald</u> , <u>Omega</u>
<u>Polaris</u>	<u>Herkules</u>
<u>Premiant</u>	<u>Styrian Golding</u> , <u>Saaz (CZ)</u>
<u>Pride of Ringwood</u>	<u>Centennial</u> , <u>Galena</u> , <u>Cluster</u>
<u>Progress</u>	<u>Golding</u> , <u>Fuggie</u>
<u>Rakau</u>	<u>Amarillo</u> , <u>Summit</u>

<u>Relax</u>	<u>Monroe</u>
<u>Riwaka</u>	<u>Saaz (CZ)</u> , <u>Citra</u> , <u>Calypso</u> , <u>Centennial</u> , <u>Motueka</u>
<u>Saaz (CZ)</u>	<u>Polish Lublin</u> , <u>Saaz (US)</u> , <u>Sterling</u> , <u>Tettnang</u>
<u>Saaz (US)</u>	<u>Saaz (CZ)</u> , <u>Polish Lublin</u> , <u>Sterling</u> , <u>Tettnang</u> , <u>Sorachi Ace</u>
<u>Saaz Late</u>	<u>Saaz (CZ)</u> , <u>Saaz (US)</u>
<u>Santiam</u>	<u>Citra</u> , <u>Spalt</u> , <u>Spalter Select</u> , <u>Tettnang</u>
<u>Saphir</u>	<u>Hallertau Mittelfruh</u> , <u>Hallertau</u> , <u>Spalter Select</u>
<u>Satus</u>	<u>Nugget</u> , <u>Galena</u>
<u>Simcoe</u>	<u>Summit</u> , <u>Magnum (US)</u> , <u>Amarillo</u> , <u>Mosaic</u> , <u>Cascade</u> , <u>Centennial</u> , <u>Citra</u> , <u>Columbus</u>

<u>Simcoe</u>	<u>Samuel</u> , <u>Magnum (CZ)</u> , <u>Aromatic</u> , <u>Moreau</u> , <u>Cascade</u> , <u>Centennial</u> , <u>Star</u> , <u>Strisselspalt</u>
<u>Hop Sládek</u>	Substitutions <u>Saaz (CZ)</u> , <u>Saaz (US)</u> , <u>Northern Brewer (GR)</u> , <u>Northern Brewer (US)</u>
<u>Smaragd</u>	<u>Hallertau Mittelfruh</u> , <u>Opal</u>
<u>Smooth Cone</u>	<u>Cluster</u>
<u>Sonnet</u>	<u>East Kent Golding</u> , <u>Hersbrucker</u> , <u>Crystal</u> , <u>Saaz (CH)</u> , <u>Saaz (US)</u>
<u>Sorachi Ace</u>	<u>Southern Cross</u>
<u>Southern Aroma</u>	<u>Motueka</u>
<u>Southern Brewer</u>	<u>Southern Promise</u> , <u>Fuggie</u>
<u>Southern Cross</u>	<u>Sorachi Ace</u>
<u>Southern Promise</u>	<u>Southern Brewer</u>
<u>Southern Star</u>	<u>Mosaic</u> , <u>Ekuanot</u> , <u>El Dorado</u> , <u>Mandarina Bavaria</u> , <u>Southern Cross</u> , <u>Warrior</u>
<u>Sovereign</u>	<u>Fuggie</u>
<u>Spalt</u>	<u>Saaz (CZ)</u> , <u>Tettnang</u> , <u>Ultra</u> , <u>Tettnanger</u> , <u>Santiam</u> , <u>Liberty</u> , <u>Hallertau</u>
<u>Spalter Select</u>	<u>Tettnanger</u> , <u>Saaz (CZ)</u> , <u>Spalt</u> , <u>Perle (GR)</u> , <u>Hallertau Tradition</u>
<u>Sterling</u>	<u>Saaz (US)</u> , <u>Mount Hood</u>
<u>Sticklebract</u>	<u>Northern Brewer (GR)</u> , <u>Hersbrucker</u> , <u>Hallertau</u> , <u>Sorachi Ace</u> , <u>Simcoe</u>
<u>Strata</u>	<u>Galaxy</u> , <u>Mosaic</u>
<u>Strisselspalt</u>	<u>Crystal</u> , <u>Hersbrucker</u> , <u>Mount Hood</u> , <u>Liberty</u> , <u>Hallertau</u>

<u>Styrian Golding</u>	<u>Fuggie</u> , <u>Willamette</u> , <u>Bobek</u>
<u>Sultana (Denali)</u>	<u>Columbus</u> , <u>Tomahawk</u> , <u>Zeus</u> , <u>CTZ</u> , <u>Nugget</u>
<u>Summer</u>	<u>Palisade</u> , <u>Saaz (US)</u>
<u>Summit</u>	<u>Columbus</u> , <u>Tomahawk</u> , <u>Zeus</u> , <u>CTZ</u> , <u>Warrior</u> , <u>Millennium</u> , <u>Simcoe</u> , <u>Amarillo</u> , <u>Cascade</u>
<u>Sun</u>	<u>Magnum (GR)</u> , <u>Magnum (US)</u> , <u>Galena</u> , <u>Zeus</u>
<u>Super Galena</u>	<u>Galena</u> , <u>Nugget</u> , <u>Cluster</u> , <u>Chinook</u>
<u>Super Pride</u>	<u>Pride of Ringwood</u>

<u>Hop Sussex</u>	<u>Substitutions</u> <u>Progress</u> , <u>Whitbread Golding Variety</u> , <u>Fuggie</u>
<u>Sybilla</u>	<u>Perle (US)</u> , <u>Perle (GR)</u> , <u>Northern Brewer (US)</u> , <u>Northern Brewer (GR)</u> , <u>Magnum (GR)</u> , <u>Magnum (US)</u> , <u>N</u>
<u>Sylva</u>	<u>Hallertau Mittelfruh</u> , <u>Helga</u> , <u>Saaz (US)</u> , <u>Northern Brewer (US)</u>
<u>Tahoma</u>	<u>Glacier</u>
<u>Talus</u>	<u>Sabro</u>
<u>Tardif de Bourgogne</u>	<u>Strisselspalt</u>
<u>Target</u>	<u>Fuggie</u> , <u>Willamette</u>
<u>Teamaker</u>	<u>Crystal</u>
<u>Tettnang (US)</u>	<u>Tettnanger</u> , <u>Fuggie</u> , <u>Santiam</u> , <u>Spalter Select</u> , <u>Spalt</u>
<u>Tettnanger</u>	<u>Tettnang (US)</u> , <u>Spalter Select</u> , <u>Spalt</u> , <u>Saaz (GR)</u> , <u>Lubelski</u>
<u>Tillicum</u>	<u>Galena</u> , <u>Chelan</u>
<u>Tomahawk</u>	<u>Columbus</u> , <u>CTZ</u> , <u>Zeus</u> , <u>Centennial</u> , <u>Chinook</u> , <u>Galena</u> , <u>Nugget</u> , <u>Millennium</u>
<u>Topaz</u>	<u>Galaxy</u> , <u>Citra</u> , <u>Cascade</u> , <u>Riwaka</u> , <u>Rakau</u> , <u>Amarillo</u>
<u>TriplePearl</u>	<u>Perle (US)</u>
<u>Triskel</u>	<u>Strisselspalt</u> , <u>Ahtanum</u> , <u>Centennial</u> , <u>Chinook</u> , <u>Simcoe</u>
<u>Triumph</u>	<u>Nugget</u> , <u>Hallertau</u>
<u>Tsingdao Flower</u>	<u>Cluster</u>
<u>Ultra</u>	<u>Hallertau</u> , <u>Crystal</u> , <u>Liberty</u> , <u>Mount Hood</u> , <u>Saaz (US)</u> , <u>Tettnanger</u>
<u>Vanguard</u>	<u>Hallertau</u> , <u>Hersbrucker</u> , <u>Mount Hood</u> , <u>Liberty</u>

<u>Vic Secret</u>	<u>Galaxy</u>
<u>Vienna Gold</u>	<u>Cluster</u>
<u>Wai-iti</u>	<u>Riwaka</u>
<u>Waimea</u>	<u>Pacific Jade</u>
<u>Wakatu</u>	<u>Hallertau Mittelfruh</u> , <u>Nelson Sauvin</u>
<u>Warrior</u>	<u>Columbus</u> , <u>Tomahawk</u> , <u>Zeus</u> , <u>CTZ</u> , <u>Nugget</u> , <u>Magnum (GR)</u> , <u>Magnum (US)</u> , <u>Summit</u>
<u>Whitbread Golding Variety (WGV)</u>	<u>Fuggie</u>

<u>Hop</u>	<u>Substitutions</u>
<u>Wild Loyalist</u>	<u>Saaz (US)</u> , <u>Styrian Golding</u>
<u>Willamette</u>	<u>Glacier</u> , <u>Fuggie</u> , <u>Tettnang (US)</u> , <u>Styrian Golding</u> , <u>East Kent Golding</u>
<u>Wurttemberg</u>	<u>Tettnanger</u>
<u>XJA2/436</u>	<u>Simcoe</u> , <u>Centennial</u> , <u>Bergamot</u>
<u>Yakima Cluster</u>	<u>Chinook</u> , <u>Cluster</u>
<u>Yakima Gold</u>	<u>Cluster</u>
<u>Yellow Sub</u>	<u>Amarillo</u>
<u>Yeoman</u>	<u>Target</u>
<u>Zagrava</u>	<u>Saaz (US)</u> , <u>Tettnanger</u> , <u>Lubelski</u> , <u>Spalter Select</u>
<u>Zenith</u>	<u>Yeoman</u> , <u>Northern Brewer (US)</u>
<u>Zeus</u>	<u>Columbus</u> , <u>Tomahawk</u> , <u>Zeus</u> , <u>CTZ</u> , <u>Centennial</u> , <u>Chinook</u> , <u>Galena</u> , <u>Nugget</u> , <u>Millennium</u>
<u>Zythos</u>	<u>Amarillo</u> , <u>Cascade</u> , <u>Simcoe</u>