

American Organic Hop Grower Association

December 8, 2009

Mr. Robert Pooler, Program Manager
USDA/AMS/TMP/NOP
1400 Independence Ave. SW
Room 2646, Ag Stop 0268
Washington, DC 20250

Dear Mr. Robert Pooler, Program Manager:

Please accept the enclosed petition for the removal of hops (*Humulus Lupulus*) from the National Organic Program's National List of Allowed and Prohibited Substances, Section 205.606, as a non-organically produced agricultural product allowed in or on processed products labeled as "organic". We respectfully ask for the expedited review of this petition as it is a petition to remove a substance from the National List. In addition, because hops are an agricultural crop produced on a seasonal basis, timing is critical to the organic producers.

In order to comply with the submission guidelines, we are also submitting, in duplicate, paper copies of the enclosed petition to the address listed above. Each submission includes the following:

1. Petition to remove hops from the National List, Section 205.606
2. Letters of Support:
 - Anheuser-Busch, Inc. – Paul A. Cobet, Director of Technical Center
 - Hopunion LLC – Ralph Olson
 - Sierra Nevada Brewing Co. – Ken Grossman, Owner/President
 - Lakefront Brewery, Inc. – Russell J. Klisch, President
 - Seven Bridges Cooperative Microbrewery, Inc. – Amelia Slayton, President & CEO
3. Exhibits:
 - A. List of Organic Hop Varieties
 - B. U.S. Hop Production, 1983-1985
 - C. List of Hop Varieties
 - D. Briess Malt & Ingredients Co: Products
 - E. Letter from Reser's Fine Foods, Inc. (Tawnie Brown, Corporate Purchasing Manager, Raw Materials)
 - F. Hop Substitutability Guides

- G. *Brew Your Own Magazine: Comparing and Selecting Hops, India Pale Ale*
- H. *Organic Supply and Demand* by Kathryn Trim
- I. Importance of Forward Contracting in the Hop Industry
- J. Spot Market and the Hop Industry

We appreciate your assistance in expediting the review our petition. Please do not hesitate to contact us in the event you need any additional information.

Respectfully,

Meghann Quinn

Meghann Quinn

American Organic Hop Grower Association

Address: 941 N. 5th St., Coeur d'Alene, ID 83814

Phone: 208.664.0307

Email: meghann@usorganichops.com

**Petition to the USDA National Organic Standards Board
to remove hops from the National Organic Program's
National List of Allowed and Prohibited Substances, Section 205.606**

Item A:

The American Organic Hop Grower Association is submitting this petition to remove hops from the National Organic Program's National List as a non-organically produced agricultural product allowed in or on processed products labeled as "organic" (section 205.606).

Item B:

- 1) Substance Name: Hops (*Humulus lupulus*)

- 2) Petitioner's Name: **American Organic Hop Grower Association (AOHGA)**
Contact: Meghann Quinn
Email: meghann@usorganichops.com
Phone: 208.664.0307
Website: www.usorganichops.com

3) Type of Product & Function:

Hops are an agricultural ingredient that fulfills an essential role in the beer brewing process. Hops contribute flavor, bitterness, aroma, and clarifying agents to beer while acting as a natural preservative.

4) Mode of Action:

In the brewing of beer, milled barley malt is steeped in hot water to enzymatically convert starches to fermentable sugars. The spent grain is then removed from the water solution (mash), and the mash is boiled for sterilization. During this boil, hop cones or pellets are added to the brew kettle. During the boil, the most active bittering component of the hops, the alpha acids, are converted to iso-alpha acids. This thermally catalyzed reaction must occur in the brew kettle to dissolve these bittering compounds in the water mash. At the end of this boiling period, usually about an hour, the resulting solution is referred to as "wort". Additional hops can be added at any time during this process. Hop cones or hop powder from the hops are then removed from the wort, along with coagulated protein resulting from the boil. The clear wort is then cooled and yeast is added to convert the sugars in the wort to ethanol and carbon dioxide in the finished beer.

5) Substance Source and Manufacturing/Processing Description:

In the United States, hops are primarily grown on family owned and operated farms in the Pacific Northwest, with the majority of hop farms located in Washington's Yakima Valley. In 2008, Washington

State produced 30,595 acres of hops, which made up 75% of the U.S. commercial hop production. Behind Washington was Oregon with 6,370 acres (15.5%) and Idaho with 3,933 acres (9.5%) (*Hop Growers of America*).

The hop plant is a perennial climbing vine that begins its growth cycle each spring, is harvested between late-August and early-October each year, and lies dormant underground over the winter months. A mature hop vine will typically grow 20 feet or more in one growing season. The female hop vine produces small green cones, generally ½ to 2 inches long, which are used in the brewing of beer, while the male is only used in breeding. Inside the female cones are the lupulin glands, whose resins and oils contain alpha acids and beta acids. Alpha acids contribute to the bitterness of beer while beta acids impact the aroma of beer.

During harvest, each vine is cut from the top and bottom using specialized machinery and placed into the back of a truck to be transported to the harvest facility. At the harvester, the hop vines are individually fed into the picking machine where the cones are stripped from the vine and cleaned of excess leaves and debris. The hop cones are then sent via conveyor belt to the hop kiln where they are dried at 140° F for 7-9 hours until their moisture content is between 8-10%. After drying, the hops are cooled for 24 hours before being compressed into 200 pound bales wrapped in burlap or synthetic plastic. From there, hops are transported to a warehouse and placed in cold storage.

6) Reviews:

The petitioner is not aware of any previous reviews by state or private certification programs or other organizations of the petitioned substance.

7) EPA, FDA, & State Regulatory Authority Registrations: Not applicable

8) Product Number: Not applicable

9) Physical Properties and Chemical Mode of Action: Not applicable/petition to remove from list

10) Safety Information: Not applicable/petition to remove from list

11) Research Information:

The majority of the information included in this petition is obtained from the petitioner's experience in growing and marketing hops. However, additional information and statistics were gathered from the following sources:

- Hop Growers of America – www.usahops.org
- Hopunion LLC – www.hopunion.com
- Yakima Chief, Inc – www.yakimachief.com

- Petition submitted by Clarkson Soy Products in August 2008, requesting the removal of “fluid lecithin” from the general category of “Lecithin – unbleached” from the National List
- Additional websites, charts, and letters of support are included as attachments to this petition

In order to fully understand the contrasting opinions to those presented in this petition, the petitioner thoroughly reviewed the previous petitions submitted to the NOSB supporting the inclusion of hops onto the National List of Approved and Prohibited Substances, Section 205.606. The petitions were submitted by Peak Organic Brewing Company in August 2006 and Anheuser-Busch in January 2007.

12) Petition Justification Statement for the Removal of a Non Organically Produced Agricultural Product from the National List (section 205.606):

In preparing this petition, careful attention has been taken to use words that provide clear meaning and understanding. Presently, the word “form” is being used by organic certifiers to describe hop varieties, but it has also been used by other parties to describe hop products – whole, pellet, extract. In order to avoid confusion, the petitioner uses the terms as follows:

- Hop Variety = Form
- Type of Hop = Aroma, High Alpha, or Dual Purpose
- Style of Beer = e.g. India Pale Ale (IPA), Pale Ale, Stout, Pilsner, etc.

The organic hop industry has made significant advances since the NOSB recommendation to include hops on the National List in June 2007. Hop farmers in the Pacific Northwest, as well as other growing regions throughout the U.S., are now producing organic hops on at least 100 acres of farmland, resulting in tens of thousands of pounds of organic hops produced domestically in 2009. This effort has resulted in at least nine new organic hop varieties, bringing the total number of available organic hop varieties to at least thirty (Exhibit A). However, there are currently organic hops sitting unsold in warehouses and with distributors across the country. At the same time, non-organic hops are being purchased for use in organically labeled beer. The use of non-organic hops in organic beer has significantly reduced the demand for organic hops, which, in turn, will cause organic acreage to be removed from production. The current inclusion of hops on the National List has a significant negative impact on the organic hop industry.

Furthermore, hops and chia (*salvia hispanica* L.) are the only two products placed on the National List as generic commodities. The rest of the products on the National List are derivatives of the base commodity, which has had no impact on the organic production of the commodity itself. Examples are celery and peppers. With hops on the National List as a generic commodity, the NOP goal of essentially removing products from the list via the sunset provision can only be achieved when all hop varieties (forms) are available organically on the spot market – a situation contrary to the norm in the organic marketplace.

In the following sections, the petitioner will explore the reasons that the NOSB recommended the inclusion of hops on the National List in 2007 and will explain why these reasons are no longer applicable.

Appropriate Form: Prior petitioners argued that hops are not interchangeable and that certain varieties are needed for certain styles of beer, and because not all hop varieties are available organically, hops needed to be included on the National List.

As previously stated, at least thirty varieties of organic hops are now grown, which is nearly triple the number of non-organic hop varieties that were grown and used to make beer in the U.S. two decades ago (Exhibit B). With the relatively recent development of hop breeding programs, over 175 varieties of hops now exist, and new ones are being developed each year (Exhibit C). Therefore, it is unreasonable to expect that hops will have a readily accessible organic version of every variety.

With respect to most (if not all) crops, the number of available organic varieties does not equal the number of non-organic varieties. For example, Briess Malt & Ingredients, Co. lists only 13 organic varieties of barley on their website but have included approximately 40 non-organic varieties (Exhibit D). In addition, Reser's Fine Foods told us, "Product limitations were...a concern in developing our finished goods, we used varieties and cuts that were available at the current time... Not all items that are available conventionally are available organically. Knowing this, we have worked with the available organic ingredients to develop our finished goods" (Exhibit E). The hop industry should not be expected to abide by a different standard.

Additionally, very few hop varieties are entirely unique in flavor, and, in fact, many varieties are considered substitutes for one another, especially high-alpha (or bittering) hops. Because these hops are utilized at the beginning of the boil to obtain the isomerized alpha acids, many different high-alpha hop varieties will provide a similar effect at this point in the brewing process. See Exhibit F for more detail on the substitutability of hop varieties.

The formula for any style of beer does not require any particular hop variety. While an IPA is typically brewed with a hop high in alpha acids (the bittering substances), an IPA can instead be brewed with a hop lower in alpha acids; the brewer would just have to use more hops. In a table provided by *Brew Your Own*, a how-to homebrew magazine, 59 different varieties are listed as "appropriate hops" to consider when brewing an IPA, and each variety has one or more possible substitutes listed (Exhibit G). Russell Klisch, the President of Lakefront Brewery, the country's oldest certified organic brewer, states, "Today, there are over 29 varieties of organic hops that can be purchased by brewers, which will allow them to make any style of beer known" (Attachment 1). Because there is no required hop for any particular style of beer, brewers have a number of options for which hops to utilize in the brewing process. Many styles use two or more varieties in combination. In the end, the choice essentially comes down to the brewer's personal preference.

Appropriate Quality: Previous petitioners did not claim that the quality of organic hops is inferior to non-organic hops. In fact, each harvest, the quality of organic hops has improved and will continue to improve as long as there is a market demand for organic hops.

Appropriate Quantity: Previous petitioners stated that the U.S. organic hop supply is fragile due to the susceptibility of hops to insect pests and disease. Although hops in general are difficult to grow, over the past two years, hop farmers have proven that they are capable of growing organic hops, free from the chemicals that are present on non-organic hops. Organic hop farmers have developed a number of successful agronomic practices, which has resulted in the production of tens of thousands of pounds of organic hops.

However, the quantity of organic hops available is affected by the unique nature of the hop market and its reliance on forward contracting. In the article *Organic Supply and Demand*, Kathryn Trim wrote, “Like any business, the organic supply industry operates on supply and demand. If enough processors tell ingredient suppliers they want an organic version of something, then the...suppliers will make it” (Exhibit H). This is true with the hop supply industry as well.

Under the present policy, an organic brewer will often choose not to enter into forward contracts for a variety it uses in its organic beer, which discourages the organic grower from planting that variety. Later, that brewer will purchase a non-organic version of the same variety, claiming that the hop is not commercially available organically. (In fact, many times a brewer will have contracts already in place for non-organic hops.) The brewer has taken advantage of two factors – the fact that hops are on the National List and the reluctance of the producer to grow uncontracted, or spot, hops. This situation will continue to occur as long as hops remain on the National List.

Because hop growing is a specialized and capital intensive enterprise requiring long-term planning, hops have historically been purchased using multi-year production contracts with very few hops produced for the spot market each year. Brewer’s Supply Group, a hop distributor, posted the following excerpt on their website (Exhibit I).

“We encourage brewers, both small and large, to contract forward for their requirements. This provides some stability in the market for all in the supply chain... By contracting a given variety forward, the hop dealer can make firm forecasts to the growers who will then make the investment in time and materials to ensure that his product is available and of good quality. The large brewers will continue to drive the demand curve for any given variety. So if craft brewers favor a hop which is in decline, contracting is essential to encourage the grower to continue production.”

Other hop merchants, including Haas, Steiner and Hopunion, have also recently made similar recommendations (Exhibit I).

Not only is forward contracting the industry norm, hop growers are actually discouraged from growing hops that are not under contract. During the 2009 harvest, many hop farmers left uncontracted hops hanging in the fields. In a September 2009 memo to U.S. hop growers, John I. Haas (Exhibit J) states:

“Any production exceeding contracted volumes is unnecessary... Harvesting this unneeded, extra production will actually only diminish the growers’ profitability as it will cost harvesting, storage, and processing. It is unlikely that these hops will find a market in the near future... While it goes against the grain of every hop grower to leave perfectly good hops hanging in the field, we can only recommend that growers harvest only up to their contract volumes.”

Forward contracting for ingredients is a common practice in the organic industry as well. Tawnie Brown, a corporate purchasing manager for Reser’s Fine Foods, confirmed the importance of forward contracting their organic products. With regard to securing their organic products, she states, “Products are so specialized and grown for only what is committed to that we even had to book or contract product before it was in the ground” (Exhibit E).

If hops remain on the National List and brewers therefore have no incentive to enter into forward contracts for their organic hop needs, the organic hop industry will decline in size. It is not financially feasible for growers to continue producing excess hops for the spot market. Removing hops from the National List is essential to developing a viable organic hop industry.

Commercial Availability Evaluation Criteria

Region of Production: Previous petitioners claimed that because the current hop growing regions in the U.S. are so concentrated, sufficient separation between organic and non-organic hops cannot be achieved to ensure that organic hops are not affected by insects and disease. However, within the concentrated growing region of the Yakima Valley, four of the world’s largest hop growing operations have planted nearly 75 acres of organic hops. Their success in growing organic hops alongside their non-organic counterparts proves that sufficient separation between organic and non-organic hops is not a prerequisite to successful organic hop farming. Notably, the Yakima Valley leads the nation in the production of organically certified apples, which are grown alongside non-organically grown apple acreage. Contamination is rarely an issue in apples or other crops and should not be considered relevant for hops.

Outside of the Yakima Valley, growers in other regions of the U.S. are also successfully growing organic hops, including in Oregon, Colorado, Wisconsin, California, and Maine. At least three hop growers in Oregon are producing organic hops, and New Belgium Brewing Co. has funded a research project through Colorado State University to grow organic hops in Colorado. In California, Sierra Nevada Brewing Company has planted organic hops at their brewery; Peak Organic Brewing Company has been working with local farmers to cultivate organic hop production in Maine; and Lakefront Brewery has

formed a partnership with Wisconsin farmers to grow organic hops in their home state. Additionally, in interior British Columbia, Left Fields Farm grows over seven different varieties of organic hops for Crannóg Ales (Exhibit A).

Overseas, hop growers in Europe and New Zealand have been growing high-quality organic hops for decades. In fact, it has been argued that organic hops grown in New Zealand are of superior quality because the island has not been exposed to the insects and disease that are prevalent on U.S. farms. At the time of the NOSB recommendation, the petitioners agreed that the organic hops grown internationally were of good quality but claimed that hops traveling long distances are easily contaminated. For decades, hops have been shipped overseas between the United States, Europe, and New Zealand, with little regard to contamination issues. A letter from Ralph Olson of Hopunion LLC states, "I have over the years bought organic hops from Europe and New Zealand and have...been satisfied with their quality" (Attachment 1). The hops from these countries are pelletized and in vacuum-sealed foil pouches inside cardboard boxes, so contamination is not an issue.

Number of Suppliers and Amount Produced: According to the NOSB Committee Recommendation in March 2007, the petitioners did not mention "number of suppliers, acres under organic cultivation, or global demand or supply of organic hops." However, Peak Organic Brewing Company included a letter from Hopunion CEO Ralph Olson as an attachment to their petition that states, "This letter is to inform you that no hops are currently being grown organically in the U.S." While that may have been the state of the industry over two years ago, organic hops are now being grown in the United States. Olson describes the change in organic hop growing in recent years by stating, "The U.S. grower has made great progress in developing hops that are favorable to being grown organic(ally)... The growers have now made a firm commitment to furthering the process from my perspective" (Attachment 1).

Specific figures for the number of organic hop farmers or total pounds of organic hops produced are not easily accessible; however, the petitioner believes that at the time of the ruling in 2007, one or two U.S. farmers were growing hops organically. Now, at least eight hop farmers are growing organically in the Pacific Northwest with an unknown number of small farms and breweries doing so in other areas of the country. This number is significant considering the total number of hop farming operations in the U.S. is approximately seventy. Very few commodities have such a high percentage of producers involved with organic production.

Weather Events/Production Threats: No information was given, still not applicable.

Trade related Issues: No information was given, still not applicable.

Conclusion:

Since the placement of hops on the National List in June 2007, organic hop production in the United States has made dramatic strides. Currently, at least eight producers are growing over 100 acres of

organic hops in the Pacific Northwest alone, and new organic hop growing regions are being cultivated in Colorado, Wisconsin, California, and Maine. At least thirty varieties of organic hops now exist, which offers a sufficient number of varieties to brew any style of beer. However, the marketplace for organic hops is being adversely impacted by the continued placement of hops on the National List. Removing hops from the List is essential to the viability of present and future organic hop production.

The American Organic Hop Grower Association requests that the National Organic Standards Board remove hops from Section 205.606 of the National Organic Program's National List of Approved and Prohibited Substances.

Attachments:

1. Letters of Support:
 1. Anheuser-Busch, Inc. – Paul A. Cobet, Director of Technical Center
 2. Hopunion LLC – Ralph Olson
 3. Sierra Nevada Brewing Co. – Ken Grossman, Owner/President
 4. Lakefront Brewery, Inc. – Russell J. Klisch, President
 5. Seven Bridges Cooperative Microbrewery, Inc. – Amelia Slayton, President & CEO

2. Exhibits:
 - A. List of Organic Hop Varieties:
 - i. 606 Organic
 - ii. New Zealand Hops
 - iii. Crannóg Ales
 - B. U.S. Hop Production, 1983-1985
 - C. List of Hop Varieties:
 - i. NCGR-Corvallis *Humulus* Catalog (Hops)
 - ii. Freshops: USDA Named Hop Variety Descriptions
 - iii. Hop Growers of America: Alpha, Super Alpha, and Aroma Varieties
 - D. Briess Malt & Ingredients Co: Products
 - E. Letter from Reser's Fine Foods, Inc. (Tawnie Brown, Corporate Purchasing Manager, Raw Materials)
 - F. Hop Substitutability Guides:
 - i. *Brew Your Own Magazine* (March-April 2008): Homebrew Hop Guide
 - ii. Michael Ferguson, B.J.'s Restaurant and Brewery: Hop Varieties and Substitutions
 - iii. Brew365.com: Hop Substitution Chart
 - iv. Brewers Supply Group: Hop Variety Table
 - G. *Brew Your Own Magazine*: Comparing and Selecting Hops, India Pale Ale
 - H. *Organic Supply and Demand* by Kathryn Trim
 - I. Importance of Forward Contracting in the Hop Industry:
 - i. Brewer's Supply Group: Hops
 - ii. John I. Haas, Inc.: Market Report
 - iii. Hopsteiner: Guidelines for Hop Buying
 - iv. Ralph Woodall, Hopunion: *Hop Contracting for Brewers Large and Small*
 - J. Spot Market and the Hop Industry:
 - i. John I. Haas, Inc.: Memo to U.S. Growers
 - ii. John Foyston, The Oregonian: *Ups and Downs of Hops*



Anheuser-Busch, Inc.
ONE OF THE ANHEUSER-BUSCH COMPANIES

November 18, 2009

To the Review Board,

Please accept this letter as a request to remove hops (*Humulus Lupulus*) from the USDA National Organic Program's National List of Allowed and Prohibited Substances, Section 205.606.

As the world's largest brewer, Anheuser-Busch InBev agrees that organic beer should be brewed with organic hops. The organic beers we have brewed in recent years have used 100% certified organic hops. In our experience, we have had no trouble sourcing organic hops in the varieties (form), quantities, and quality necessary for our organic beers.

Since 2007, when Anheuser-Busch submitted a petition to add specific varieties to the National List, many changes have occurred in the organic hop industry. The reasons the petition was submitted are no longer valid; therefore, we fully support the removal of hops from the National List.

Please do not hesitate to contact me for any additional information.

Sincerely,

Paul A. Cobet
Director, Technical Center

HOPUNION

LLC.

P.O. Box 9697

Yakima, WA 98909

Phone: 1-800-952-487 Fax: 1-800-952-4874

November 17, 2009

To whom it may concern,

I have seen many changes in organic hop farming in the last few years. In the US there are now I believe seven growers that have approximately 100 acres of organic hops being grown. I have received some of these hops and have found them to be of good quality. I have over the years bought organic hops from Europe and New Zealand and have also been satisfied with their quality. Not all varieties are being grown organically at this time, but on the other hand many now are being grown. The US grower has made great progress in developing hops that are favorable to being grown organic and the growers have now made a firm commitment to furthering the process from my perspective. Should you have any questions or desire addition information, please don't hesitate to call me at DD 509 574-5123 or cell 509 952-8251.

Best Regards

Ralph Olson
Hopunion LLC





November 25, 2009

TO THE REVIEW BOARD:

Please accept this letter as a request to remove hops (*Humulus Lupulus*) from the USDA National Organic Program's National List of Allowed and Prohibited Substances, Section 205.606.

Sierra Nevada Brewing Co. agrees that organic beer should be brewed with organic hops. Please consider the following:

- The organic industry has changed considerably in the past few years.
- The reasons the NOSB recommended to include hops on the National List in 2007 are no longer valid.
- The acreage, number of growers, and number of varieties have increased.
- The number of organic hop varieties available is sufficient to brew any style of beer.
- The quality of organic hops is very good.

In our experience, we have had no trouble sourcing organic hops in the varieties (form), quantities, and quality necessary for our beers, and have purchased ample quantities of organic hops from Yakima, Washington. In addition to those we purchase, Sierra Nevada grows and uses its own organic hops and barley grown onsite in Chico, CA.

Since 2007, many changes have occurred in the organic hop industry. The reasons the petition was submitted are no longer valid; therefore, we fully support the removal of hops from the National List.

Please do not hesitate to contact me for any additional information.

Sincerely,
SIERRA NEVADA BREWING CO.

A handwritten signature in black ink, appearing to read "Ken Grossman", written over a horizontal line.

Ken Grossman
Owner, President

KG:llh

November 16, 2009

To the Review Board,

Please let this letter serve as a request to remove hops from being listed on the USDA National Organic Program's National List of Allowed and Prohibited Substances, section 205.606.

As the country's oldest organic certified brewer, our brewery has always felt it is possible to make great beer organically with the hops that are available on the market. Our brewery has never made an organic beer without using 100% organic hops in the beer, and has won many awards in doing so. Today there are over 29 varieties of organic hops that can be purchased by brewers which will allow them to make any style of beer known. Organic hops are also in great supply and I have never experienced any shortages in buying organic hops.

To continue the policy of allowing non-organic hops in organic beer will diminish consumer confidence in the organic certification model. There are currently over 80 acres of organic hops currently being grown in the United States alone. These farmers have shown that it is possible to grow hops and create a thriving industry in this country where five years ago there was none. By not removing hops from the National List be devastating to efforts that these farmers have put forth over the past few years.

Please contact me with any questions regarding this matter.

Sincerely,
Russell J. Klisch, President
Lakefront Brewery, Inc.
Milwaukee, WI



Seven Bridges Cooperative Microbrewery, Inc.

325A River Street, Santa Cruz, CA 95060

Telephone: (831) 454-9665/ (800) 768-4409 Fax: (831) 466-9844

Website: www.breworganic.com E-mail: 7bridges@breworganic.com

November 25, 2009

I am writing to declare our support for a formal petition to the National Organic Standards Board to remove hops from the National List. We are committed to being a strong partner in the united effort of hop growers, hop dealers, and organic beer brewers who have been adversely affected by the loophole in USDA National Organic Standards that allows beer to be certified organic when brewed with conventionally grown hops.

Seven Bridges has sold organic hops to small brewers since 1997. For 12 years our business has struggled to become a viable business in a market with little support for the growth of an organic hop industry. U.S. organic brewers have always been allowed to use conventionally grown hops in their beer, and we were bitterly disappointed to see hops added to the list when the standards could have required a switch to organic. By adding hops to the national list, (the only agriculturally produced plant on the list), the growth of the U.S. organic hop industry was stymied.

Allowing the USDA certified organic seal on beer that is made without organic hops is misleading to organic consumers and erodes consumer confidence in the organic label. Furthermore, allowing non-organic hops in organic beer is discouraging the efforts of U.S. growers and distributors of organic hops. By creating a deadline for producers of organic beer by which they are required to use organic hops, the industry will have more incentive to succeed in this change, and it will better support efforts in the supply side of the industry to meet the demand.

Rather than a boost to the industry that could have resulted from stronger standards for organic beer, the organic hop industry in America has struggled to become viable. The few successful efforts to produce organic hops in America on a large scale have been the result of large cash infusions from a few large breweries in a select few farms. Growers and brokers without this support have had very limited success. Lack of support from the brewing industry or government has made very difficult for organic hop growers and brokers to succeed in the U.S.

In the past 12 months our organic hop sales to commercial breweries totaled \$136,000. Of that total, \$90,500 was sold to breweries in Canada. More than half of the breweries we have attempted to sell organic hops said no thanks. Several breweries told us the truth: organic hops cost more than they wish to pay. Breweries that continue to use non organic hops in their USDA certified organic beer have an unfair competitive advantage over breweries who choose to follow higher ethical and purity standards and use only organic hops in the organic beer they brew.

Most of the hops we sell are from Europe and New Zealand, because weak demand for organic hops in the United States by commercial brewers has contributed to a lack of production of market quality hops that are competitively priced. Until U.S. growers can meet the demand, the current supply of imported organic hops can provide the volume, quality, and variety needed to remove hops from the national list. Removing hops from the list as quickly as possible will create the market demand that is needed to provide funding to organic hop growers. This funding will help to develop the infrastructure which is desperately needed to help organic hop growers in the United States, large and small, to produce the quality and variety the brewing industry demands at a price that it can afford.

We believe organic beer should always contain organic hops in order to be labeled as organic. Most of our customers and supporters share this view and we have been collecting petition signatures for the past 6 months requesting hops be removed from the National list. To date we have collected about 500 signatures, some on a paper petition and some with an online petition. We plan to continue gathering signatures and raising awareness about this issue until the day hops are removed from the National list. We will gladly forward these petitions to the USDA NOSB upon request, or will present them at the next meeting if possible.

If you would like more information about any of the subjects raised in this letter if there is anything else we can do to help improve the standards for organic beer in the United States, please do not hesitate to contact me.

Sincerely,

Amelia Slayton
President and CEO

List of Organic Hop Varieties

	Variety Name	Type of Hop	Source (<i>see subsequent attachments</i>)
1	American Cascade	Aroma	606 Organic
2	American Centennial	Mid Alpha Aroma	606 Organic
3	American Challenger	Mid Alpha Aroma	Crannóg Ales
4	American Chinook	High Alpha Aroma	606 Organic
5	American Fuggle	Aroma	Crannóg Ales, 606 Organic
6	American Golding	Aroma	Crannóg Ales, 606 Organic
7	American Hallertau	Aroma	606 Organic
8	American Liberty	Aroma	Crannóg Ales
9	American Magnum	High Alpha	Crannóg Ales
10	American Mt. Hood	Aroma	Crannóg Ales
11	American Nugget	High Alpha	Crannóg Ales
12	American Palisades	Mid Alpha Aroma	606 Organic
13	American Summit	High Alpha	606 Organic
14	American Willamette	Aroma	Crannóg Ales
15	Belgian Admiral	Mid Alpha Aroma	606 Organic
16	Belgian Challenger	Mid Alpha Aroma	606 Organic
17	Belgian Saaz	Aroma	606 Organic
18	German Hershbrucker	Aroma	606 Organic
19	German Opal	Aroma	606 Organic
20	German Perle	Mid Alpha Aroma	606 Organic
21	German Saphir	Aroma	606 Organic
22	German Spalt Select	Aroma	606 Organic
23	German Tradition	Aroma	606 Organic
24	UK Kent Goldings	Aroma	606 Organic
25	New Zealand Cascade	Aroma	New Zealand Hops, 606 Organic
26	New Zealand Hallertaur	Aroma	New Zealand Hops, 606 Organic
27	New Zealand Pacific Gem	High Alpha	New Zealand Hops, 606 Organic
28	New Zealand Rakau	Mid Alpha Aroma	606 Organic
29	New Zealand Riwaka	Aroma	New Zealand Hops
30	New Zealand Saaz (Motueka)	Aroma	New Zealand Hops, 606 Organic

Organic Hops

Supplier:	Seven Bridges Cooperative
Contact:	Amelia Slayton
Address:	325A River Street Santa Cruz, CA 95060
Phone:	831-454-9665
E-mail:	7bridges@breworganic.com
Website:	www.breworganic.com
NOP Certifier:	CCOF Certification Services, LLC
Product Name:	<u>organic hops, whole and pelletized</u>
Description:	American Cascade (available 10/1/09), American Chinookilable (available 10/1/09), American Palisades, American Summit, German Tradition, German Perle, German Saphir, German Hershbrucker, German Spalt Select, German Opal, Belgian Saaz, Belgian Admiral, Belgian Challenger, Fuggles, Kent Goldings, New Zealand Hallertaur, New Zealand Pacific Gem, New Zealand Cascade, New Zealand Saaz (Motueka), New Zealand Rakau
Available Sizes:	1- 2 oz. Retail packages for homebrew shops and health food stores. Bulk available to licensed breweries who can verify they are producing an all organic product.
Supplier:	Roy Farms
Contact:	Jim Boyd
Address:	401 Walters Road Moxee, WA 98936
Phone:	509-452-3494
E-mail:	Jim@royfarms.com
Website:	none
NOP Certifier:	Washington State Department of Agriculture
Product Name:	Organic Whole cone, dried hops
Description:	The following varieties are available: Hallertau, Centennial, Cascade. Crop Year 2008 Sold Out. Crop Year 2009 – All Available.
Available Sizes:	200 lb bales <u>only</u> , no further processing offered
Supplier:	Perrault Farms, Inc.
Contact:	Jason Perrault
Address:	11051 Lateral A Road, Toppenish, WA 98948
Phone:	(509) 848-2497
E-mail:	jason@perraultfarms.com
Website:	none
NOP Certifier:	Washington State Department of Agriculture
Product Name:	Pelletized Organic Hops
Description:	Varieties Available (2008 Crop): Palisade® (YCR-4), Summit. Varieties Available (2009 Crop): Palisade® (YCR-4), Summit, Cascade.
Available Sizes:	44 lb carton
Supplier:	The Oregon Hophouse
Contact:	Patrick Leavy
Address:	22675 Butteville Road, NE, Aurora, OR 97002
Phone:	503-678-6840
E-mail:	none
Website:	none
NOP Certifier:	Oregon Tilth Certified Organic
Product Name:	Organic Hops

Description:	Quantities of the following varieties available in 2011: Fuggle, Golding, Magnum, Liberty
Available Sizes:	Variable Sizes

Supplier:	B.T. Loftus Ranches, Inc.
Contact:	Mike Smith
Address:	1209 Morrier Lane Yakima WA 98901
Phone:	509-452-3931
E-mail:	mike.smith@loftusranches.com
Website:	none
NOP Certifier:	Washing State Department of Agriculture (WSDA)
Product Name:	Organic Hops
Description:	Palisade© Organic
Available Sizes:	11 lb and 44 lb vacuum sealed pellets

This information is accurate to the best of our knowledge. The information is provided by the company listed. Although NOP certification was verified before listing, you should confirm that yourself before purchasing any organic product.

Please let us know about any problems you may have when using this site. You may contact 606organic via [email](#).



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Hop varieties

[AROMA](#) | [DUAL PURPOSE](#) | [HIGH ALPHA](#) | [ORGANIC](#)

ORGANIC HOPS

The development of organic hops is a response to the worldwide trend of reducing horticultural sprays and to restrict fertilisers to organic manures.

Organic hop farming is a positive management system, not just a case of halting the use of sprays and fertilisers. Organic status is a hard regime for those who want to be sure that chemicals are not used in hop production, but organic is currently the only acceptable and legally recognised standard of chemical-free produce and products.

In New Zealand certification of organic hop production is provided by the New Zealand Biological Producers and Consumers Council, whose trade name is Bio-Gro New Zealand Ltd.

We can currently offer five varieties grown under the organic regime, and fully Bio-Gro Certified hop cones and hop pellets are available as follows:



Hallertau Aroma:

8-10% alpha. Balanced mix of floral and citrus characteristics

Pacific Gem:

13-16% alpha. Strong bittering hop with delicate blackberry/floral nose

Motueka:

7-8% alpha. Unique citrus aroma

Riwaka:

6-7% alpha. Citrus and passionfruit aromas

NZ Cascade:

5-8% alpha. Bold spicy grapefruit aroma

(These varieties are available as either organic or conventional)

In our experience the varieties grown under the organic regime have an increased alpha level compared to the same varieties under the normal commercial production.

For further reading see our article "[Organic Hop Production in New Zealand](#)"



BIO-GRO New Zealand

*For additional info please contact nzhops@nzhops.co.nz
 or call +64 3 544 8989*

Hop Varieties

AROMA HOPS

- Motueka
- Riwaka
- Pacifica
(Formerly Pacific Hallertau)
- NZ Cascade

DUAL PURPOSE HOPS

- Hallertau Aroma
- Nelson Sauvin

HIGH ALPHA HOPS

- Green Bullet
- Pacific Gem
- Pacific Jade
- Southern Cross
- Super Alpha

ORGANIC HOPS

Hop Products

- Cone Hops
- Pellets
- CO₂ Hop Extract

Enquiry Form

NAME:

COMPANY:

EMAIL:

MESSAGE:

SUBMIT



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Our Hops

Left Fields also grows hops for Crannóg Ales. Our hopyard was planted in 2000, and began full production in the fall of 2002.

We grow 7+ varieties of hops, in two yards totalling just over 1 acre. The hopyards are fully certified organic, and are the basis for ongoing research into organic hop production on a small scale for our bioregion.

Our hops are processed on-farm, in a dryer of our own design.

All hop rhizomes for Left Fields originally came from [Freshops](#), which supplies organic hops, hop rhizomes, cultivation information, and non-organic hops to homebrewers and the craft beer industry. We now propagate our own rhizomes for commercial sales.

We are currently growing Golding, Fuggles, Nuggett, Willamette, Mt. Hood, Challenger and Cascade hops, with a few plants each of other varieties. This lineup changes as we learn which hops do best under organic cultivation, and which work best for our brewery.



Source: <http://www.crannogaales.com/farm.html#hops>

U. S. HOP ADMINISTRATIVE COMMITTEE

Table 3
11/26/85

ALL VARIETIES - ACREAGE, YIELD & PRODUCTION

<u>Total</u>										
Clust.	1/	17,783	13,785	11,619	2,005	2,010	2,036	35,656	27,701	23,651
Cascades		4,763	2,768	2,407	1,790	1,839	1,753	8,524	5,091	4,220
English	2/	4,541	2,542	345	2,066	2,079	1,870	9,381	5,284	648
Galena		3,847	4,822	5,015	1,479	1,683	1,631	5,688	8,116	8,179
Eroica		1,459	1,493	1,726	2,062	2,095	1,660	3,008	3,009	2,866
Nugget		232	1,032	1,992	1,478	1,217	1,478	343	1,256	2,944
Olympic		-0-	84	281	-0-	1,726	1,872	-0-	145	525
Fuggles		1,877	1,632	1,485	1,109	1,280	1,063	2,083	2,089	1,579
Willamettes	3/	1,448	2,129	2,486	1,569	1,256	1,625	2,273	2,573	4,034
Chinook		-0-	-0-	142	-0-	-0-	1,894	-0-	-0-	269
Other	4/	753	542	659	996	1,720	1,217	750	932	802
Total		36,990	30,800	28,100	1,846	1,824	1,769	68,111	56,167	49,713

- 1/ Includes Talieman. (In 1985 there were 305 acres of Talieman in Idaho, 32 in Washington.)
- 2/ Includes Bullions and Brewers Gold.
- 3/ Includes minor quantity of Columbian.
- 4/ Includes Hallertau, Tettnang & various exp. aroma & super alphas varieties.
- 5/ Included in "Totals."
- 6/ Less than 100 acres. Included with dash, to avoid disclosing individual operations.

Note 1: Above computed yields after rounding state total acres to nearest 100 and yields to nearest 10 lbs. may vary slightly from actual state yields.

Note 2: The sum of individual items do not agree with totals because of rounding total state acreage to nearest 100 acres and state average yields to nearest 10 lbs. per acre.

Note 3: Galena, Eroica, Nugget, Olympic & Chinook yields not necessarily representative because of high percentage of lower yielding baby yards the past 3 yrs.

SOURCE: State totals from USDA. Variety breakdown from HAC records.

U. S. HOP ADMINISTRATIVE COMMITTEE

Table 3
11/26/85

ALL VARIETIES -- ACREAGE, YIELD & PRODUCTION

	<u>Acres</u>			<u>Yield Per Acre (lbs.)</u>			<u>Production (1,000 lbs.)</u>		
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
-- -- --Harvested-- -- --									
<u>Washington</u>									
Clust. 1/	16,064	12,465	10,645	2,013	2,041	2,056	32,336	25,442	21,885
Cascades	3,353	2,155	1,977	1,899	1,877	1,787	6,369	4,046	3,533
English 2/	2,778	2,190	196	2,058	2,007	1,680	5,717	4,396	290
Galena	3,009	3,884	3,957	1,488	1,687	1,544	4,477	6,554	6,504
Eroica	611	619	853	2,103	2,160	1,742	1,285	1,337	1,485
Nugget	127	864	1,047	1,409	1,192	1,458	179	1,030	1,527
Olympic	-0-	84	278	-0-	1,726	1,871	-0-	145	520
Fuggles	74	91	72	NA	NA	NA	5/	5/	5/
Willamettes	-0-	4	4	-0-	NA	NA	-0-	5/	5/
Chinook	-0-	-0-	109	-0-	-0-	1,834	-0-	-0-	200
Other 4/	339	239	344	911	1,791	1,172	309	428	403
Sub-Total	26,500	22,700	19,500	1,930	1,920	1,870	51,145	43,584	36,465
<u>Oregon</u>									
Clusters	138	138	25	2,398	2,246	1,840	331	310	46
Cascades	1,021	463	249	1,557	1,749	1,799	1,590	810	448
English 2/	1,727	316	149	2,083	2,573	2,382	3,597	813	355
Galena	17	117	195	1,471	1,684	1,554	25	197	303
Eroica	13	44	45	1,846	1,659	1,978	24	73	89
Nugget	84	147	925	1,952	1,388	1,517	164	204	1,403
Olympic	-0-	-0-	3	-0-	-0-	2,000	-0-	-0-	0
Fuggles	1,803	1,541	1,414	1,111	1,212	1,043	2,004	1,867	1,473
Willamettes 3/	1,448	2,125	2,482	1,570	1,256	1,624	2,273	2,668	4,032
Other 4/	27	29	41	1,370	1,448	1,195	37	42	49
Sub-Total	6,300	4,900	5,500	1,590	1,420	1,490	10,017	6,958	8,195
<u>Idaho</u>									
Clust. 1/	1,172	1,052	948	2,060	1,663	1,814	2,414	1,749	1,720
Cascades	389	150	181	1,452	1,567	1,320	565	235	239
English 2/	36	36	-0-	1,861	2,056	-0-	67	74	-0-
Galena	821	821	363	1,445	1,663	1,590	1,186	1,365	1,372
Eroica	835	830	828	2,035	1,927	1,559	1,699	1,599	1,291
Nugget	21	21	20	-0-	1,048	1,200	-0-	22	24
Chinook	-0-	-0-	33	-0-	-0-	2,091	-0-	-0-	69
Other 4/	305	274	274	1,075	1,281	1,197	328	351	328
Sub-Total	3,600	3,100	3,100	1,740	1,750	1,630	6,264	5,425	5,053
<u>California</u>									
Clusters	409	NA	6/	1,406	NA	6/	575	201	6/
Other 4/	82	-0-	6/	1,305	-0-	6/	107	-0-	6/
Sub-Total	500	100	6/	1,370	2,000	6/	685	200	6/

List of Hop Varieties

1	Admiral (U.K)	45	Comet
2	Ahil	46	Coobs
3	Ahtanum	47	Crystal
4	Alliance	48	Defender
5	AlphAroma	49	Density
6	Amarillo® VGXP01 c.v.	50	Dunav
7	Apollo	51	Early Cluster
8	Apolon	52	Early Prolific
9	Aquila	53	Early Promise
10	Aromat	54	East Kent Golding
11	Atlas	55	Eastern Gold
12	Aurora	56	Eastern Green
13	Backa	57	Eastwell Golding
14	Banner	58	Elsaesser
15	Bianca	59	Eroica
16	Blato	60	First Choice
17	Blisk	61	First Gold (U.K.)
18	Blue Northern Brewer	62	Francia
19	Boadicea	63	Fuggle (U.K.)
20	Bobek	64	Fuggle (U.S.)
21	BOR	65	Furano Ace
22	Bramling	66	Galena
23	Bramling Cross	67	Glacier
24	Bravo	68	Golden Star
25	Brewer's Gold	69	Golding
26	Brewer's Gold (German)	70	Green Bullet
27	Buket	71	Groene Bel
28	Bullion	72	Grunbell Slovenia
29	Calicross	73	Hallertauer
30	Canadian Redvine	74	Hallertauer Gold
31	Canterbury Golding	75	Hallertauer Magnum
32	Canterbury Whitebine	76	Hallertauer Mittelfrüh
33	Cascade	77	Hallertauer Tradition
34	Cekin	78	Hersbrucker
35	Celeia	79	Horizon
36	Centennial	80	Hueller Anfang
37	Cerera	81	Hueller Aroma
38	Chelan	82	Hueller Bitter
39	Chinook	83	Hueller Hallertauer
40	Cicero	84	Janus
41	Citra™, HBC 394	85	Kazak 2000
42	College Cluster	86	Kent Golding
43	Columbia	87	Keyworth's Early
44	Columbus/Tomahawk®/Zeus (CTZ)	88	Keyworth's Mid-season

89	Kirin
90	Kitamidori
91	Landhopfen
92	Late Cluster
93	Liberty
94	Lucan
95	Magnum
96	Marynka
97	Millennium
98	Mt. Hood
99	Nadwislanska
100	Nelson Sauvin (N.Z.)
101	Neoplanta
102	New Zealand Hallertauer
103	Newport
104	Nordgaard
105	Northern Brewer (German)
106	Northern Brewer (U.S.)
107	Northwest Golding
108	Nugget
109	Olympic
110	Omega
111	Oregon Cluster
112	Orion
113	Pacific Gem (N.Z.)
114	Palisade®, YCR 4
115	Perle (German)
116	Perle (U.S.)
117	Petham Golding
118	Petrovacki Rani
119	Phoenix (U.K.)
120	Pioneer (U.K.)
121	Pocket Talisman
122	Polish Lublin / Lubelski
123	Precoce d'Bourgogne
124	Premiant
125	Pride of Kent
126	Pride of Ringwood
127	Progress (U.K.)
128	Record
129	Ringwood Special
130	Saazer
131	Saazer Osvald
132	Saladin
133	Santiam
134	Saphir (German)
135	Satus

136	Savinja Golding
137	Saxon
138	Serebrianka
139	Shinshuwase
140	Sladek
141	Simcoe®, YCR 14
142	Sirem
143	SmoothCone
144	Sorachi Ace
145	Southern Brewer
146	Southern Cross
147	Spalter Select (U.S.)
148	Spalter
149	Spalter Select (German)
150	Star
151	Sterling
152	Sticklebract
153	Strisselspalter
154	Styrian Aurora
155	Styrian Golding
156	Summit™
157	Sun
158	Sunbeam
159	Sunshine
160	Super Galena
161	SuperAlpha
162	Swiss Tettninger
163	Symphony
164	Talisman
165	Tardif d'Bourgogne
166	Teamaker
167	Tettninger (German)
168	Tettninger (U.S.)
169	Tillicum
170	Tolhurst
171	Toyomidori
172	Tradition (German)
173	Ultra
174	Universal
175	Vanguard
176	Viking
177	Vojvodina
178	Warrior®, YCR 5
179	WGV - Whitbread's Golding (U.K.)
180	Willamette
181	Wuerttemberger
182	Wye Challenger

183	Wye Northdown
184	Wye Saxon
185	Wye Target
186	Wye Viking
187	Yakima Cluster
188	Yeoman
189	Yugoslavia Golding
190	Zatecki Cerven
191	Zenith
192	Zlatan

This list was compiled by referencing the following sources:

- NCGR-Corvallis *Humulus* Catalog (Hops)
- Freshops: USDA Named Hop Variety Descriptions
- Hop Growers of America: Alpha, Super Alpha, and Aroma Varieties
- *Brew Your Own Magazine* (March-April 2008): Homebrew Hop Guide

**See subsequent attachments for these documents*

NCGR-Corvallis *Humulus* Catalog

Hops

Hop Cultivars and Selections

Follow links to the Germplasm Resources Information Network (GRIN) for additional accession information.
Catalog last updated: 02 November 2009

[NCGR-Corvallis Distribution Policies](#)

Traits listed are intended for preliminary subgrouping of accessions. Traits are from germplasm release notices, published reports, or observations made at NCGR-Corvallis.

- [Ahil = PI 558720](#) (160.002) - *Humulus lupulus* L. - VIRUS INFECTED
- [Ahil - Serbia = CHUM 1484](#) (1484.001) - *Humulus lupulus* var. *lupulus*
- [AlphAroma = PI 558775](#) (627.002) - *Humulus lupulus* L. - VIRUS TESTED
- [Apolon = PI 559175](#) (162.002) - *Humulus lupulus* L. - VIRUS INFECTED
- [Apolon - Serbia = CHUM 1482](#) (1482.001) - *Humulus lupulus* var. *lupulus*
- [Aquila = PI 559179](#) (271.002) - *Humulus lupulus* L. - VIRUS INFECTED
- [Aromat = PI 558953](#) (185.002) - *Humulus lupulus* L. - VIRUS INFECTED
- [Aromat - Serbia = CHUM 1538](#) (1538.001) - *Humulus lupulus* var. *lupulus*
- [Atlas = PI 558719](#) (159.002) - *Humulus lupulus* L. - VIRUS INFECTED
- [Atlas - Serbia = CHUM 1483](#) (1483.001) - *Humulus lupulus* var. *lupulus*
- [Aurora = PI 559174](#) (161.002) - *Humulus lupulus* L. - VIRUS INFECTED
- [BC-11 = PI 559265](#) (570.003) - *Humulus lupulus* L. - VIRUS TESTED
- [Backa = PI 558718](#) (158.004) - *Humulus lupulus* L. - VIRUS TESTED
- [Backa - Serbia = CHUM 1463](#) (1463.001) - *Humulus lupulus* var. *lupulus*
- [Backa E - Serbia = CHUM 1467](#) (1467.001) - *Humulus lupulus* var. *lupulus*
- [Banner = PI 558759](#) (611.002) - *Humulus lupulus* L. - VIRUS INFECTED
- [Blato = PI 641267](#) (807.002) - *Humulus lupulus* L. - VIRUS INFECTED
- [Blisk = PI 559177](#) (166.002) - *Humulus lupulus* L. - VIRUS INFECTED
- [Blisk - Serbia = CHUM 1485](#) (1485.001) - *Humulus lupulus* var. *lupulus*
- [Bobek = PI 558704](#) (139.002) - *Humulus lupulus* L. - VIRUS INFECTED
- [Bobek - Serbia = CHUM 1486](#) (1486.001) - *Humulus lupulus* var. *lupulus*
- [Bramling = PI 558686](#) (207.002) - *Humulus lupulus* L. - VIRUS INFECTED
- [Brewer's Gold = PI 302781](#) (130.002) - *Humulus lupulus* L. - VIRUS TESTED
- [Brewer's Gold - Serbia = CHUM 1512](#) (1512.001) - *Humulus lupulus* var. *lupulus*
- [Buket = PI 558714](#) (153.002) - *Humulus lupulus* L. - VIRUS INFECTED
- [Buket - Serbia = CHUM 1487](#) (1487.001) - *Humulus lupulus* var. *lupulus*
- [Bullion - Serbia = CHUM 1513](#) (1513.001) - *Humulus lupulus* var. *lupulus*
- [Bullion 10A = PI 558668](#) (132.004) - *Humulus lupulus* L. - VIRUS TESTED
- [Calicross = PI 558728](#) (175.002) - *Humulus lupulus* L. - VIRUS TESTED
- [Calicross - Serbia = CHUM 1534](#) (1534.001) - *Humulus lupulus* var. *lupulus*
- [Canadian Red Vine = PI 617389](#) (917.003) - *Humulus lupulus* L.
- [Canterbury Golding = PI 617391](#) (919.005) - *Humulus lupulus* L. - VIRUS TESTED
- [Canterbury Whitebina = CHUM 1556](#) (1556.001) - *Humulus lupulus* var. *lupulus*
- [Cascade = PI 558681](#) (196.002) - *Humulus lupulus* L. - VIRUS TESTED
- [Cascade \(19\) - Serbia = CHUM 1481](#) (1481.001) - *Humulus lupulus* var. *lupulus*
- [Cascade \(73\) - Serbia = CHUM 1535](#) (1535.001) - *Humulus lupulus* var. *lupulus*
- [Cascade 56013 - Serbia = CHUM 1536](#) (1536.001) - *Humulus lupulus* var. *lupulus*
- [Cekin = PI 617363](#) (891.002) - *Humulus lupulus* L. - VIRUS INFECTED
- [Cekin - Serbia = CHUM 1489](#) (1489.001) - *Humulus lupulus* var. *lupulus*
- [Celeia = PI 617361](#) (889.004) - *Humulus lupulus* L. - VIRUS TESTED
- [Celeia - Serbia = CHUM 1490](#) (1490.001) - *Humulus lupulus* var. *lupulus*
- [Cerera = PI 617362](#) (890.002) - *Humulus lupulus* L. - VIRUS INFECTED
- [Cerera - Serbia = CHUM 1491](#) (1491.001) - *Humulus lupulus* var. *lupulus*
- [Chinook = PI 558693](#) (243.002) - *Humulus lupulus* L. - VIRUS TESTED
- [Chinook - Serbia = CHUM 1531](#) (1531.001) - *Humulus lupulus* var. *lupulus*
- [Cicero = PI 617364](#) (892.002) - *Humulus lupulus* L. - VIRUS TESTED
- [Cicero - Serbia = CHUM 1492](#) (1492.001) - *Humulus lupulus* var. *lupulus*
- [College Cluster = CHUM 1522](#) (1522.001) - *Humulus lupulus* var. *lupulus*
- [Columbia = PI 558672](#) (180.003) - *Humulus lupulus* L. - VIRUS INFECTED



- [Columbia - Serbia = CHUM 1537](#) (1537.001) - Humulus lupulus var. lupulus
- [Comet - Serbia = CHUM 1530](#) (1530.001) - Humulus lupulus var. lupulus
- [Coobs = CHUM 1523](#) (1523.001) - Humulus lupulus var. lupulus
- [Crystal = PI 558868](#) (720.002) - Humulus lupulus L. - VIRUS TESTED
- [Defender = PI 284730](#) (184.002) - Humulus lupulus L. - VIRUS INFECTED
- [Density - Serbia = CHUM 1516](#) (1516.001) - Humulus lupulus var. lupulus
- [Dunav = PI 558717](#) (157.002) - Humulus lupulus L. - VIRUS INFECTED
- [Dunav - Serbia = CHUM 1465](#) (1465.001) - Humulus lupulus var. lupulus
- [Early Cluster E-2 = PI 559280](#) (602.002) - Humulus lupulus L. - VIRUS INFECTED
- [Early Prolific = PI 558711](#) (147.003) - Humulus lupulus L. - VIRUS TESTED
- [Early Promise = PI 558713](#) (151.002) - Humulus lupulus L. - VIRUS TESTED
- [Earlybird Gold. = CHUM 1517](#) (1517.001) - Humulus lupulus var. lupulus
- [Earlybird Promis \[Early Promise\] = CHUM 1518](#) (1518.001) - Humulus lupulus var. lupulus
- [Eastern Green-Kirin C827 = PI 617401](#) (929.002) - Humulus lupulus L. - VIRUS TESTED
- [Eastwell Golding = PI 617382](#) (910.003) - Humulus lupulus L. - VIRUS TESTED
- [Elsasser = PI 558687](#) (209.003) - Humulus lupulus L. - VIRUS TESTED
- [Eroica = PI 558947](#) (134.004) - Humulus lupulus L. - VIRUS TESTED
- [Eroica - Serbia = CHUM 1528](#) (1528.001) - Humulus lupulus var. lupulus
- [First Choice = PI 558726](#) (173.002) - Humulus lupulus L. - VIRUS TESTED
- [First Choice - Serbia = CHUM 1521](#) (1521.001) - Humulus lupulus var. lupulus
- [Francia B-5 = CHUM 1547](#) (1547.001) - Humulus lupulus var. lupulus
- [Francia B-8 = CHUM 1548](#) (1548.001) - Humulus lupulus var. lupulus
- [Fuggle \(125\) - Serbia = CHUM 1587](#) (1587.001) - Humulus lupulus var. lupulus
- [Fuggle \(57\) - Serbia = CHUM 1519](#) (1519.001) - Humulus lupulus var. lupulus
- [Fuggle H = PI 558664](#) (812.003) - Humulus lupulus L. - VIRUS TESTED
- [Fuggle N - Serbia = CHUM 1520](#) (1520.001) - Humulus lupulus var. lupulus
- [Fuggle Tetraploid = PI 558692](#) (241.003) - Humulus lupulus L. - VIRUS TESTED
- [Furano Ace = PI 617402](#) (930.005) - Humulus lupulus L. - VIRUS INFECTED
- [Galena = PI 558673](#) (181.002) - Humulus lupulus L. - VIRUS INFECTED
- [Gold Brauer = CHUM 1493](#) (1493.001) - Humulus lupulus var. lupulus
- [Golden Star = PI 558689](#) (211.002) - Humulus lupulus L. - VIRUS TESTED
- [Golden Star - Serbia = CHUM 1515](#) (1515.001) - Humulus lupulus var. lupulus
- [Green Bullet = PI 558771](#) (623.002) - Humulus lupulus L. - VIRUS TESTED
- [Groene Bel = PI 558721](#) (165.002) - Humulus lupulus L. - VIRUS INFECTED
- [Groene Bel - Serbia = CHUM 1553](#) (1553.001) - Humulus lupulus var. lupulus
- [Grunbell Slovenia \[Groene Bel\] = CHUM 1480](#) (1480.001) - Humulus lupulus var. lupulus
- [Hallertauer Gold = PI 617291](#) (819.006) - Humulus lupulus L. - VIRUS TESTED
- [Hallertauer Magnum = PI 617287](#) (815.002) - Humulus lupulus L. - VIRUS TESTED
- [Hallertauer Tradition = PI 617292](#) (820.005) - Humulus lupulus L. - VIRUS TESTED
- [Hallertauer mf tetraploid USDA 21397 = PI 558778](#) (630.002) - Humulus lupulus L. - VIRUS TESTED
- [Hallertauer mittelfruher = PI 558736](#) (203.002) - Humulus lupulus L. - VIRUS TESTED
- [Hersbrucker - Serbia = CHUM 1498](#) (1498.001) - Humulus lupulus var. lupulus
- [Hersbrucker 6 - Serbia = CHUM 1500](#) (1500.001) - Humulus lupulus var. lupulus
- [Hersbrucker 8 - Serbia = CHUM 1501](#) (1501.001) - Humulus lupulus var. lupulus
- [Hersbrucker 9 - Serbia = CHUM 1502](#) (1502.001) - Humulus lupulus var. lupulus
- [Hersbrucker A - Serbia = CHUM 1499](#) (1499.001) - Humulus lupulus var. lupulus
- [Hersbrucker-6 = PI 558756](#) (608.003) - Humulus lupulus L. - VIRUS TESTED
- [Hersbrucker-8 = PI 558761](#) (613.002) - Humulus lupulus L. - VIRUS TESTED
- [Hersbrucker-9 = PI 558791](#) (643.003) - Humulus lupulus L.
- [Hersbrucker-G = PI 558734](#) (199.002) - Humulus lupulus L. - VIRUS INFECTED
- [Hersbrucker-alpha = PI 558793](#) (645.002) - Humulus lupulus L. - VIRUS TESTED
- [Hersbrucker-red stem - Serbia = CHUM 1503](#) (1503.001) - Humulus lupulus var. lupulus
- [Htel 1/22 = CHUM 1470](#) (1470.001) - Humulus lupulus var. lupulus
- [Htel 1/23 = CHUM 1471](#) (1471.001) - Humulus lupulus var. lupulus
- [Htel 2/23 = CHUM 1472](#) (1472.001) - Humulus lupulus var. lupulus
- [Htel 4/12 = CHUM 1474](#) (1474.001) - Humulus lupulus var. lupulus
- [Htel 4/6 = CHUM 1473](#) (1473.001) - Humulus lupulus var. lupulus
- [Htel 6/4 = CHUM 1475](#) (1475.001) - Humulus lupulus var. lupulus
- [Htel 7/18 = CHUM 1476](#) (1476.001) - Humulus lupulus var. lupulus
- [Htel 8/27 = CHUM 1478](#) (1478.001) - Humulus lupulus var. lupulus
- [Hueller Anfang = CHUM 1504](#) (1504.001) - Humulus lupulus var. lupulus
- [Hueller Aroma = CHUM 1505](#) (1505.001) - Humulus lupulus var. lupulus
- [Hueller Bitterer - Serbia = CHUM 1506](#) (1506.001) - Humulus lupulus var. lupulus
- [Hueller Hallertauer mittelfruher \(?\) = CHUM 1507](#) (1507.001) - Humulus lupulus var. lupulus

- [Huller \[Hueller Bitterer\] = PI 558946](#) (126.003) - Humulus lupulus L. - VIRUS TESTED
- [Huller \[Hueller Bitterer\] = PI 558894](#) (746.002) - Humulus lupulus L. - VIRUS TESTED
- [Janus = PI 284732](#) (600.002) - Humulus lupulus L. - VIRUS INFECTED
- [K-11 = CHUM 1563](#) (1563.001) - Humulus lupulus var. lupulus
- [K-14 = CHUM 1564](#) (1564.001) - Humulus lupulus var. lupulus
- [K-15 = CHUM 1565](#) (1565.001) - Humulus lupulus var. lupulus
- [K-18 = CHUM 1566](#) (1566.001) - Humulus lupulus var. lupulus
- [K-23 \(Robusta\) = CHUM 1567](#) (1567.001) - Humulus lupulus var. lupulus
- [K-38 = CHUM 1568](#) (1568.001) - Humulus lupulus var. lupulus
- [K-39 = CHUM 1569](#) (1569.001) - Humulus lupulus var. lupulus
- [K-46 = CHUM 1570](#) (1570.001) - Humulus lupulus var. lupulus
- [K-51 = CHUM 1571](#) (1571.001) - Humulus lupulus var. lupulus
- [K-57 = CHUM 1572](#) (1572.001) - Humulus lupulus var. lupulus
- [K-6 \(Aroma\) = CHUM 1562](#) (1562.001) - Humulus lupulus var. lupulus
- [K-60A = CHUM 1574](#) (1574.001) - Humulus lupulus var. lupulus
- [K-60B = CHUM 1575](#) (1575.001) - Humulus lupulus var. lupulus
- [K-62A = CHUM 1576](#) (1576.001) - Humulus lupulus var. lupulus
- [K-62B = CHUM 1577](#) (1577.001) - Humulus lupulus var. lupulus
- [K-65 = CHUM 1578](#) (1578.001) - Humulus lupulus var. lupulus
- [K-66 = CHUM 1579](#) (1579.001) - Humulus lupulus var. lupulus
- [K-69 = CHUM 1580](#) (1580.001) - Humulus lupulus var. lupulus
- [K-78 = CHUM 1582](#) (1582.001) - Humulus lupulus var. lupulus
- [K-79B = CHUM 1581](#) (1581.001) - Humulus lupulus var. lupulus
- [K-90 = CHUM 1583](#) (1583.001) - Humulus lupulus var. lupulus
- [K-94A = CHUM 1584](#) (1584.001) - Humulus lupulus var. lupulus
- [K-95 = CHUM 1585](#) (1585.001) - Humulus lupulus var. lupulus
- [K-98 = CHUM 1586](#) (1586.001) - Humulus lupulus var. lupulus
- [Kazak 2000 = PI 655077](#) (1592.001) - Humulus lupulus L. - VIRUS TESTED
- [Kazakh 2000 = PI 635262](#) (1025.007) - Humulus lupulus var. lupulus - VIRUS TESTED
- [Keyworth's Early = PI 558703](#) (138.002) - Humulus lupulus L. - VIRUS INFECTED
- [Keyworth's Midseason = PI 558949](#) (149.003) - Humulus lupulus L.
- [Kirin C-601 = PI 617409](#) (937.002) - Humulus lupulus L. - VIRUS TESTED
- [Kirin II = PI 558695](#) (246.003) - Humulus lupulus L. - VIRUS TESTED
- [Kirin No 5AI = CHUM 1557](#) (1557.001) - Humulus lupulus var. lupulus
- [Kirin No 5YI = CHUM 1558](#) (1558.001) - Humulus lupulus var. lupulus
- [Kitamidori = PI 617387](#) (915.003) - Humulus lupulus L. - VIRUS TESTED
- [Landhopfen = PI 558685](#) (205.002) - Humulus lupulus L. - VIRUS TESTED
- [Late Cluster seedling = PI 558621](#) (77.004) - Humulus lupulus L. - VIRUS TESTED
- [Liberty = PI 558869](#) (721.002) - Humulus lupulus L. - VIRUS TESTED
- [Lubelska = PI 558795](#) (647.002) - Humulus lupulus L. - VIRUS TESTED
- [Lubelska \(Lubelski\) \[Lublin\] = PI 558709](#) (145.002) - Humulus lupulus L. - VIRUS INFECTED
- [Lublinsky - Serbia = CHUM 1546](#) (1546.001) - Humulus lupulus var. lupulus
- [Lucan = PI 641268](#) (808.002) - Humulus lupulus L. - VIRUS INFECTED
- [Magnum - Serbia = CHUM 1509](#) (1509.001) - Humulus lupulus var. lupulus
- [Mt. Hood = PI 535808](#) (597.002) - Humulus lupulus L. - VIRUS TESTED
- [NZ Hallertauer = PI 617360](#) (888.003) - Humulus lupulus L.
- [Nadwislanska \(Nadwislanski\) = PI 558706](#) (141.003) - Humulus lupulus L. - VIRUS TESTED
- [Neoplanta = PI 558716](#) (156.002) - Humulus lupulus L. - VIRUS INFECTED
- [Neoplanta - Serbia = CHUM 1466](#) (1466.001) - Humulus lupulus var. lupulus
- [Newport = PI 632858](#) (1332.001) - Humulus lupulus L. - VIRUS TESTED
- [Nordgaard 1478 = PI 558732](#) (183.002) - Humulus lupulus L. - VIRUS INFECTED
- [Northern Brewer = PI 558710](#) (146.002) - Humulus lupulus L. - VIRUS TESTED
- [Nugget = PI 558948](#) (135.002) - Humulus lupulus L. - VIRUS TESTED
- [Olympic - Serbia = CHUM 1529](#) (1529.001) - Humulus lupulus var. lupulus
- [Omega = PI 617380](#) (908.003) - Humulus lupulus L. - VIRUS TESTED
- [Oregon Cluster = CHUM 1533](#) (1533.001) - Humulus lupulus var. lupulus
- [Orion = PI 617385](#) (913.003) - Humulus lupulus L. - VIRUS TESTED
- [Osvald Saazer Clone 114 - Serbia = CHUM 1542](#) (1542.001) - Humulus lupulus var. lupulus
- [Osvald Saazer Clone 1267 - Serbia = CHUM 1543](#) (1543.001) - Humulus lupulus var. lupulus
- [Osvald Saazer Clone 31 - Serbia = CHUM 1540](#) (1540.001) - Humulus lupulus var. lupulus
- [Osvald Saazer Clone 72 - Serbia = CHUM 1541](#) (1541.001) - Humulus lupulus var. lupulus
- [Osvald Saazer Clone 72Y = PI 617281](#) (800.002) - Humulus lupulus L. - VIRUS TESTED
- [PPC = CHUM 1468](#) (1468.001) - Humulus lupulus var. lupulus
- [Pacific Gem = PI 617282](#) (803.002) - Humulus lupulus L. - VIRUS TESTED

- [Perle = PI 558667](#) (530.002) - Humulus lupulus L. - VIRUS TESTED
- [Perle - Serbia = CHUM 1494](#) (1494.001) - Humulus lupulus var. lupulus
- [Petham Golding \(seedling?\) = PI 558724](#) (169.002) - Humulus lupulus L. - VIRUS INFECTED
- [Petrovacki Rani = CHUM 1469](#) (1469.001) - Humulus lupulus var. lupulus
- [Pocket Talisman = PI 559276](#) (142.002) - Humulus lupulus L. - VIRUS INFECTED
- [Precoce de Bourgogne = PI 558683](#) (198.002) - Humulus lupulus L. - VIRUS TESTED
- [Precoce de Bourgogne - Serbia = CHUM 1550](#) (1550.001) - Humulus lupulus var. lupulus
- [Pride of Kent = PI 558712](#) (148.002) - Humulus lupulus L. - VIRUS TESTED
- [Pride of Ringwood = PI 559178](#) (177.003) - Humulus lupulus L.
- [Record - Serbia = CHUM 1554](#) (1554.001) - Humulus lupulus var. lupulus
- [Ringwood Special = CHUM 1561](#) (1561.001) - Humulus lupulus var. lupulus
- [Saazer - Serbia = CHUM 1544](#) (1544.001) - Humulus lupulus var. lupulus
- [Saazer 36 = PI 558783](#) (635.002) - Humulus lupulus L. - VIRUS TESTED
- [Saazer 38 = PI 558784](#) (636.002) - Humulus lupulus L. - VIRUS TESTED
- [Saladin = CHUM 1495](#) (1495.001) - Humulus lupulus var. lupulus
- [Santiam = PI 604554](#) (999.002) - Humulus lupulus L. - VIRUS TESTED
- [Savinja Golding = PI 255973](#) (201.005) - Humulus lupulus L. - VIRUS TESTED
- [Seed Lot #2 = CHUM 1588](#) (1588.001) - Humulus lupulus var. lupulus
- [Seed Lot #3 = CHUM 1589](#) (1589.001) - Humulus lupulus var. lupulus
- [Seed Lot #4 = CHUM 1590](#) (1590.001) - Humulus lupulus var. lupulus
- [Seed Lot #5 = CHUM 1591](#) (1591.001) - Humulus lupulus var. lupulus
- [Serebrianka - Serbia = CHUM 1549](#) (1549.001) - Humulus lupulus var. lupulus
- [Shinshuwase - Serbia = CHUM 1559](#) (1559.001) - Humulus lupulus var. lupulus
- [Shinshuwase = PI 264597](#) (191.002) - Humulus lupulus L. - VIRUS TESTED
- [Sirem = CHUM 1545](#) (1545.001) - Humulus lupulus var. lupulus
- [Smooth Cone = PI 558725](#) (171.002) - Humulus lupulus L. - VIRUS TESTED
- [Sorachi Ace = PI 617403](#) (931.003) - Humulus lupulus L. - VIRUS TESTED
- [Southern Brewer = PI 558676](#) (190.002) - Humulus lupulus L. - VIRUS TESTED
- [Southern Cross = PI 617404](#) (932.002) - Humulus lupulus L. - VIRUS TESTED
- [Spalter - Serbia = CHUM 1496](#) (1496.001) - Humulus lupulus var. lupulus
- [Spalter Select = PI 617288](#) (816.002) - Humulus lupulus L. - VIRUS TESTED
- [Star - Serbia = CHUM 1555](#) (1555.001) - Humulus lupulus var. lupulus
- [Stickelbract = PI 558769](#) (621.002) - Humulus lupulus L. - VIRUS INFECTED
- [Strisselspalter - Serb = CHUM 1551](#) (1551.001) - Humulus lupulus var. lupulus
- [Styrian Golding = PI 558666](#) (129.003) - Humulus lupulus L. - VIRUS TESTED
- [Sunbeam = PI 617286](#) (814.002) - Humulus lupulus L. - VIRUS TESTED
- [Sunshine = PI 558705](#) (140.002) - Humulus lupulus L. - VIRUS TESTED
- [SuperAlpha = PI 558774](#) (626.002) - Humulus lupulus L. - VIRUS INFECTED
- [Swiss Tettanager = PI 558678](#) (193.004) - Humulus lupulus L. - VIRUS TESTED
- [Talisman = PI 558670](#) (170.003) - Humulus lupulus L. - VIRUS TESTED
- [Tardif de Bourgogne = PI 558677](#) (192.003) - Humulus lupulus L. - VIRUS TESTED
- [Tardif de Bourgogne - Serbia = CHUM 1552](#) (1552.001) - Humulus lupulus var. lupulus
- [Teamaker = PI 558864](#) (716.002) - Humulus lupulus L. - VIRUS TESTED
- [Tettanager = PI 558682](#) (197.002) - Humulus lupulus L. - VIRUS TESTED
- [Tettanager - Serbia = CHUM 1497](#) (1497.001) - Humulus lupulus var. lupulus
- [Tolhurst = PI 558898](#) (750.002) - Humulus lupulus L. - VIRUS INFECTED
- [Toyomidori = PI 617386](#) (914.003) - Humulus lupulus L. - VIRUS TESTED
- [USDA 19005M Late Cluster seedling = PI 558559](#) (11.003) - Humulus lupulus L. - VIRUS TESTED
- [USDA 19058M = PI 518760](#) (38.003) - Humulus lupulus L. - VIRUS TESTED
- [USDA 19085M = PI 558561](#) (13.004) - Humulus lupulus L. - VIRUS TESTED
- [USDA 19173M = PI 558598](#) (53.003) - Humulus lupulus L. - VIRUS TESTED
- [USDA 21055 Com x \(BG x Fu-Colo 2-1\) = PI 558691](#) (240.002) - Humulus lupulus L. - VIRUS TESTED
- [USDA 21072M = PI 558567](#) (19.002) - Humulus lupulus L. - VIRUS TESTED
- [USDA 21084 Yug. Sol IV/12 = PI 558615](#) (71.002) - Humulus lupulus L. - VIRUS INFECTED
- [USDA 21087M = PI 558607](#) (63.002) - Humulus lupulus L. - VIRUS TESTED
- [USDA 21090M = PI 558602](#) (58.002) - Humulus lupulus L. - VIRUS TESTED
- [USDA 21110M \(Bu x 64035M\) = PI 559277](#) (598.004) - Humulus lupulus L. - VIRUS TESTED
- [USDA 21117M = PI 558589](#) (44.002) - Humulus lupulus L. - VIRUS TESTED
- [USDA 21119 \(19105 x 19046M\) = PI 559103](#) (410.002) - Humulus lupulus L. - VIRUS TESTED
- [USDA 21121 \(19005 x 19046M\) = PI 559069](#) (372.002) - Humulus lupulus L. - VIRUS TESTED
- [USDA 21125 \(19005 x 19046M\) = PI 559063](#) (365.002) - Humulus lupulus L. - VIRUS TESTED
- [USDA 21127 \(19005 x 19046M\) = PI 559070](#) (373.002) - Humulus lupulus L. - VIRUS TESTED
- [USDA 21167 Hybrid-2 = PI 558680](#) (195.002) - Humulus lupulus L. - VIRUS INFECTED
- [USDA 21184M = PI 558601](#) (56.002) - Humulus lupulus L. - VIRUS TESTED

- [USDA 21368 Atlas tet. x \(NB x 21049-TC\) USDA 21368 = PI 558945](#) (797.002) - Humulus lupulus L. - VIRUS TESTED
- [USDA 21369 Atlas tet. x \(NB x 21049-TC\) USDA 21369 = PI 558752](#) (604.003) - Humulus lupulus L. - VIRUS TESTED
- [USDA 21606 English 27/57/264 = PI 617357](#) (885.002) - Humulus lupulus L. - VIRUS INFECTED
- [USDA 60013M = PI 558604](#) (60.003) - Humulus lupulus L. - VIRUS TESTED
- [USDA 60023M = PI 558591](#) (46.003) - Humulus lupulus L. - VIRUS TESTED
- [USDA 60026M H. lupulus Colorado 2-1 = PI 558556](#) (8.003) - Humulus lupulus L. - VIRUS TESTED
- [USDA 63015M = PI 558608](#) (64.001) - Humulus lupulus L. - VIRUS INFECTED
- [USDA 63015M = PI 558608](#) (64.003) - Humulus lupulus L. - VIRUS TESTED
- [USDA 64033M = PI 558594](#) (49.002) - Humulus lupulus L. - VIRUS TESTED
- [USDA 64037M = PI 558564](#) (16.002) - Humulus lupulus L. - VIRUS TESTED
- [USDA 65009 = PI 558638](#) (250.002) - Humulus lupulus L. - VIRUS INFECTED
- [Ultra = PI 558866](#) (718.004) - Humulus lupulus L. - VIRUS TESTED
- [Universal = PI 641269](#) (809.002) - Humulus lupulus L. - VIRUS INFECTED
- [Vojvodina = PI 558715](#) (155.003) - Humulus lupulus L. - VIRUS TESTED
- [Vojvodina - Serbia = CHUM 1464](#) (1464.001) - Humulus lupulus var. lupulus
- [Whitbred's Golding = PI 617381](#) (909.004) - Humulus lupulus L. - VIRUS TESTED
- [Willamette - Serbia = CHUM 1532](#) (1532.001) - Humulus lupulus var. lupulus
- [Willamette = PI 558665](#) (128.003) - Humulus lupulus L. - VIRUS TESTED
- [Wuerttemberger = PI 617392](#) (920.004) - Humulus lupulus L. - VIRUS TESTED
- [Wuerttemberger \(48\) - Serbia = CHUM 1510](#) (1510.001) - Humulus lupulus var. lupulus
- [Wuerttemberger \(49\) - Serbia = CHUM 1511](#) (1511.001) - Humulus lupulus var. lupulus
- [Wye Challenger = PI 558731](#) (182.002) - Humulus lupulus L. - VIRUS TESTED
- [Wye Challenger - Serbia = CHUM 1526](#) (1526.001) - Humulus lupulus var. lupulus
- [Wye Northdown \[Wye Northern\] = PI 558730](#) (179.002) - Humulus lupulus L. - VIRUS TESTED
- [Wye Northdown \[Wye Northern\] - Serbia = CHUM 1524](#) (1524.001) - Humulus lupulus var. lupulus
- [Wye Saxon = PI 558708](#) (144.002) - Humulus lupulus L. - VIRUS TESTED
- [Wye Target - Serbia = CHUM 1525](#) (1525.001) - Humulus lupulus var. lupulus
- [Wye Viking = PI 558707](#) (143.003) - Humulus lupulus L. - VIRUS TESTED
- [Wye Viking - Serbia = CHUM 1527](#) (1527.001) - Humulus lupulus var. lupulus
- [Yeoman = PI 558753](#) (605.003) - Humulus lupulus L. - VIRUS TESTED
- [Yugoslavia Golding = PI 250809](#) (204.002) - Humulus lupulus L. - VIRUS TESTED
- [Zatecki Cerveni = CHUM 1539](#) (1539.001) - Humulus lupulus var. lupulus
- [Zenith = PI 558757](#) (609.004) - Humulus lupulus L. - VIRUS TESTED
- [Zlatan = PI 641270](#) (810.002) - Humulus lupulus L. - VIRUS INFECTED

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USDA Named Hop Variety Descriptions**Source: Oregon State University High Alpha Acid Breeding Program**

(vf = virus free)	Hop variety profiles are listed in alphabetical order.	
Ahil 21050 Alliance 66050 AlphAroma 21406 Apolon 21051 Aquila 21222 Atlas 21052 Aurora 21053 Backa 56002 Backa 21080 Banner 21287 Bianca 21698 Blato 21527 Blisk 21238 Blue Northern Brewer 21079 Bobek 21239 BOR 704 21285 Bramling 21284 Bramling Cross 68051 Brewer's Gold 19001 Brewer's Gold vf 21116 Buket 21240	Bullion 64100 Bullion 10A, vf 21056 Bullion 6A 21196 Calicross 66054 Canadian Redvine 21679 Canterbury Golding 21681 Cascade 56013 Cascade, vf 21092 Cekin 21613 Celeia 21611 Centennial 21507 Cerera 21612 Chelan (no USDA Nr.) Chinook 21226 Cicero 21614 Columbus (no USDA Nr.) Columbia 21040 Comet 62013 Crystal 21490 Defender 62053 Density 62052	Dunav 21081 Early Cluster 65103 Early Prolific 21276 Early Promise 21277 Eastern Gold 21678 Eastern Green 21700 East Kent Golding 21680 Eastwell Golding 21669 Elsaesser 21170 Eroica 21183 Eroica, vf 21220 F-10 (no USDA Nr.) First Choice 66055 Fuggle 19209 Fuggle H 48209 Fuggle H, v.f. 21650 Fuggle N 21016 Fuggle tetraploid 21003 Furano Ace 21701
Galena 21182 Galena v.f. 21699 Golden Star 21039 Green Bullet 21404 Groene Bel 21216 Hallertauer Gold 21671 Hallertauer Tradition 21672 Hallertauer Magnum 21670 Hallertauer mf 56001 Hallertauer mf 21014 Hallert. mf tetraploid 21397 N.Zealand Hallertauer 21610 Herbrucker 6 21514 Herbrucker 8 21515 Herbrucker 9 21516 Herbrucker alpha 21518 Herbrucker E 21179 Herbrucker G 21185 Herbrucker Pure 21673 Herbrucker red-stem 21517 Horizon 21373 Hueller Bitter 21097	Hybrid-2 21167 Janus 62051 Kent Golding 21680 Keyworth's Early 21278 Keyworth's Mid-season 21279 Kirin II 21286 Kitamidori 21677 Landhopfen 21172 Late Cluster, L16 21011 Late Cluster, L8 65104 Liberty 21457 Lubelski-Pulawy 21113 Lubelski-Pulawy, vf 21523 Lucan 21528 Mt.Hood 21455 Nadwislanska 21114 Nadwislanska, vf 21524 Neoplanta 21082 Nordgaard 1478 21215 Northern Brewer 64107 Northern Brewer, vf 21093 Nugget 21193	Olympic 21225 Omega 21667 Orion 21675 Pacific Gem 21609 Perle 21227 Petham Golding 68052 Pocket Talisman 21115 Precoce d'Bourgogne 21168 Pride of Kent 21280 Pride of Ringwood 66052 Progress 66051 Record 21078 Saazer 21077 Saazer 36 vf 21521 Saazer 38 vf 21522 Saazer tetraploid 21534 Saazer Oswald 72C 21532 Saazer Oswald 72C, vf 21538 Saazer Oswald 72Y 21525 Saazer Oswald 72Y, vf 21535
Santiam 21664 Savinja Golding 61020 Saxon 21282	Sun (no USDA Nr.) Sunbeam 21697 Sunshine 21281	Vanguard Sel.Nr. 8251-167 (no USDA Nr.) Viking 21283 Wye Viking 21283

Serebrianka 21045	SuperAlpha 21405	Vojvodina 21083
Shinshuwase 60042	Symphony (no USDA Nr.)	Whitbread's Golding 21668
Sirem 21214	Talisman 65101	Willamette 21041
SmoothCone 66056	Tardif d'Bourgogne 21169	Wuerttemberger 21682
Sorachi Ace 21702	Tettninger 21015	Wye Challenger 21043
Southern Brewer 21187	Tettninger (Swiss) 61021	Wye Saxon 21282
Southern Cross 21703	Tetnanger A 21496	Wye Target, v1 21112
Spalter 21186	Tettninger B 21497	Yakima Cluster, L 1 65102
Spalter Select 21674	Tillicum (no USDA Nr.)	Yeoman 21498
Star 21217	Tolhurst 21396	Yugoslavia Golding 61019
Sterling 21689	Toyomidori 21676	Zenith 21499
Sticklebract 21403	Ultra 21484	Zeus (no USDA Nr.)
Strisselspalter 21173	Universal 21531	Zlatan 21533
Syrian 21049	US Tettninger 21197	

USDA ACCESSION NO. : 19001

SELECTION: Seedling selection made in 1919 at Wye College, England

GENUS: Humulus

SPECIES: lupulus

CULTIVAR: Brewer's Gold

PEDIGREE: Wild Manitoba BB1 x Open Pollinated (OP)

PRIMARY SITE: USDA World Hop Cultivar Collection, OSU East Farm

ORIGIN: Selected by E. S. Salmon at Wye College, England, in 1919. The mother plant BB1

was obtained in 1916 as a cutting from a wild hop growing at Morden, Manitoba. It was believed to have been a genuine wild North American hop.

DATE RECEIVED: Before 1950

METHOD RECEIVED: Unknown, probably rhizomes

AVAILABILITY: No restrictions, commercial variety

REFERENCES: Salmon, E. S. Two new hops: Brewer's Favourite and

Brewer's Gold. J. South-East Agricultural College, Wye, Kent, England 34:93-105. 1934.

Burgess, Hops, Interscience Publishers, New York 1964.

Romanko, R. R., in S. S. Steiner's Guide to American Hops. S. S. Steiner Inc., New York, 1986

2nd edition

MATURITY: Late

LEAF COLOR: Light green

SEX: Female

DISEASES: Downy Mildew: moderately resistant

Verticillium wilt: resistant

Viruses: infected with all five major hop viruses

VIGOR: Excellent, occasionally uneven spring regrowth

YIELD: High, 1500-2400 lbs/acre

SIDE ARM LENGTH: 24-36 inches

ALPHA ACIDS: 9.2% (10 year range: 7.1 to 11.3%)

BETA ACIDS: 4.8% (10 year range: 3.3 to 6.1%)

COHUMULONE: 39 (10 year range: 36 - 45)

STORAGE STABILITY: Poor

OIL: 1.96 ml/100 g (10 year range: 1.38 to 3.42). Humulene 11.3% Caryophyllene 6.5%; myrcene 66.7%; no farnesene. H/C ratio = 1.73

MAJOR TRAITS: Excellent yield potential, excellent pickability, heavy cone weight, good parent for crossing.

OTHER INFORMATION: Identical to USDA 21116. This cultivar was a major hop variety, particularly in Oregon until it was discontinued from commercial production in 1985 after the advent of superalpha hops which had higher alpha-acids content and improved storage stability. Brewer's Gold is the ancestor of most major high-alpha hops grown around the world today (1997). It is still grown commercially in some parts of the world, notably Belgium and Spain.

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USDA ACCESSION NO.: 19209

SELECTION: Obtained from England, probably Wye College, prior to 1950

GENUS: Humulus

SPECIES: lupulus

CULTIVAR: Fuggle

PEDIGREE: Unknown

PRIMARY SITE: USDA World Hop Cultivar Collection, OSU East Farm, Corvallis, Oregon

ORIGIN: Seedling found in the hop yard of George Stace at

Horsmonden, Kent, England, in 1861 and introduced by

Richard Fuggle of Benchley in 1875.

DATE RECEIVED: Prior to 1950

METHOD RECEIVED: Unknown

AVAILABILITY: No restrictions, commercial cultivar

REFERENCES: A. H. Burgess. Hops, Botany, Cultivation, and Utilization. World Crops Books, Interscience Publishers Inc., New York 1964, p. 40.

Romanko, R. R., in: Steiner's Guide to American Hops.

S. S. Steiner Inc. New York, 1973, p. 19.

MATURITY: Early

MATURITY: Early

LEAF COLOR: Dark green

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From Washington and Idaho's arid climate to Oregon's lush Bavarian-like landscape, U.S. hop growers produce a wide range of aroma, alpha and super-alpha hops. This page details alpha hop varieties that are grown in the U.S. It is not a comprehensive list of every hop variety, but rather a guide that describes some of the most popular American varieties used by brewers around the world.

The Hop Growers of America encourages you to sample the diverse selection of premium hops grown in the United States. Please refer to the merchant contact information under the Site Tools section of this website for information on ordering hops from the USA.

Information on the hop varieties featured on this website was provided by the American Dwarf Hop Association, Brewers Supply Group, Hop Breeding Company, Hopunion LLC, John I. Haas, Inc., S.S. Steiner, Inc., and Yakima Chief Inc.

Alpha Varieties...

Chelan

Chelan is a high alpha variety with a very high percentage of beta acids. The variety was developed through the John I. Haas, Inc., breeding program and released in 1994. It is a daughter of Galena and therefore has analytical data similar to Galena.

Yield (kilos per hectare)	2200 - 2688
Yield (lbs per acre)	2000 - 2400
Alpha Acids	12.0 - 14.5%
Beta Acids	8.5 - 9.8%
Alpha-Beta Ratio	1.4 - 1.5
Cohumulone (% of alpha acids):	33 - 35%
Total Oils (Mls. per 100 grams dried hops)	1.50-01.9
Myrcene (as % of total oils)	45 - 55%
Caryophyllene (as % of total oils)	9 - 12%
Humulene (as % of total oils)	12 - 15%
Farnesene (as % of total oils)	<1%
Storage (% alpha acids remaining after 6 months storage at 20°C)	80%
Possible Substitutions	Galena

Chinook

Chinook was developed by the U.S.D.A. breeding program in Washington State and released in 1985 as a high alpha variety. It has a medium strength aroma profile and is becoming increasingly popular with U.S. craft brewers. Chinook is often used in Pale Ales, IPA's, Stouts, Porters, and in Lagers for bittering.

Yield (kilos per hectare)	1904 - 2352
Yield (lbs per acre)	1700 - 2100
Alpha Acids	12.0 - 14.0%
Beta Acids	3.0 - 4.0%
Alpha-Beta Ratio	3.5 - 4.0
Cohumulone (% of alpha acids):	29 - 35%
Total Oils (Mls. per 100 grams dried hops)	1.7 - 2.7
Myrcene (as % of total oils)	35 - 40%
Caryophyllene (as % of total oils)	9 - 11%
Humulene (as % of total oils)	18 - 23%
Farnesene (as % of total oils)	<1%
Storage (% alpha acids remaining after 6 months storage at 20°C)	68%
Possible Substitutions	Nugget, Columbus

Cluster

Cluster is the oldest hop variety grown in the U.S. Until the late 1970's, Cluster was one of only



a few varieties growing in the U.S. and accounted for most of the country's hop acreage. It is an excellent general purpose hop with well-balanced bittering potential and aroma properties. The storage stability of its alpha acids is among the best in the world.

Yield (kilos per hectare)	1904 - 2352
Yield (lbs per acre)	1700 - 2100
Alpha Acids	5.5 - 8.5%
Beta Acids	4.5 - 5.5%
Alpha-Beta Ratio	1.2 - 1.5
Cohumulone (% of alpha acids):	37 - 43%
Total Oils (Mls. per 100 grams dried hops)	0.4 - 0.8
Myrcene (as % of total oils)	45 - 55%
Caryophyllene (as % of total oils)	6 - 7%
Humulene (as % of total oils)	15 - 18%
Farnesene (as % of total oils)	<1%
Storage (% alpha acids remaining after 6 months storage at 20°C)	84%
Possible Substitutions	Galena

Galena

Galena is a high alpha variety that was developed in the Idaho state breeding program in 1978. It has balanced bittering properties combined with an agreeable aroma profile. Galena's storage stability is excellent. It has often used in both English and American-style Ales.

Yield (kilos per hectare)	1904 - 2352
Yield (lbs per acre)	1700 - 2100
Alpha Acids	11.5 - 13.5%
Beta Acids	7.2 - 8.7%
Alpha-Beta Ratio	1.5 - 1.6
Cohumulone (% of alpha acids):	36 - 40%
Total Oils (Mls. per 100 grams dried hops)	0.9 - 1.3
Myrcene (as % of total oils)	55 - 60%
Caryophyllene (as % of total oils)	4.5 - 5.5%
Humulene (as % of total oils)	10 - 13%
Farnesene (as % of total oils)	<1%
Storage (% alpha acids remaining after 6 months storage at 20°C)	79%
Possible Substitutions	Nugget, CTZ

Nugget

Nugget is a high alpha variety released in 1983 from the U.S.D.A. breeding program in Oregon. It is characterized by a mild herbal aroma, a low proportion of cohumulone, and good storage stability. Nugget is the second most widely grown hop variety in Oregon, and also has significant acreage in Washington State.

Yield (kilos per hectare)	2016 - 2464
Yield (lbs per acre)	1800 - 2200
Alpha Acids	11.5 - 14.0%
Beta Acids	4.2 - 5.8%
Alpha-Beta Ratio	2.4 - 2.8
Cohumulone (% of alpha acids):	22 - 26%
Total Oils (Mls. per 100 grams dried hops)	1.8 - 2.2
Myrcene (as % of total oils)	48 - 55%
Caryophyllene (as % of total oils)	7 - 9%
Humulene (as % of total oils)	16 - 19%
Farnesene (as % of total oils)	<1%
Storage (% alpha acids remaining after 6 months storage at 20°C)	76%
Possible Substitutions	Galena, CTZ, Magnum

Tillicum

Tillicum is a high alpha variety with a very high content of beta acids. The variety was developed through the John I. Haas, Inc. breeding program and released in 1995. It is a daughter of Galena and a full sister to Chelan and therefore has analytical data similar to both varieties.

Yield (kilos per hectare)	2016 - 2464
Yield (lbs per acre)	1800 - 2200
Alpha Acids	12.0 - 14.5%
Beta Acids	9.3 - 10.5%
Alpha-Beta Ratio	1.3 - 1.4
Cohumulone (% of alpha acids):	31.5 - 38.5%
Total Oils (Mls. per 100 grams dried hops)	1.5 - 1.9
Myrcene (as % of total oils)	45 - 55%
Caryophyllene (as % of total oils)	6.8 - 8.0%
Humulene (as % of total oils)	13 - 16%
Farnesene (as % of total oils)	<1%
Storage (% alpha acids remaining after 6 months storage at 20°C)	80%
Possible Substitutions	Galena, Chelan

Warrior®, YCR 5

Warrior® is a high alpha variety of recent origin developed by Yakima Chief Ranches. It is characterized by its mild aroma profile and its bittering properties due to its low cohumulone content. It is a very stable hop variety offering a neutral, clean bittering effect.

Yield (kilos per hectare)	2352 - 2800
Yield (lbs per acre)	2100 - 2500
Alpha Acids	14.5 - 16.5%
Beta Acids	4.3 - 5.3%
Alpha-Beta Ratio	3.1 - 3.4
Cohumulone (% of alpha acids):	22 - 26%
Total Oils (Mls. per 100 grams dried hops)	1.3 - 1.7
Myrcene (as % of total oils)	40 - 50%
Caryophyllene (as % of total oils)	9 - 11%
Humulene (as % of total oils)	15 - 19%
Farnesene (as % of total oils)	<1%
Storage (% alpha acids remaining after 6 months storage at 20°C)	76%
Possible Substitutions	Nugget, Columbus, Magnum



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Super Alpha Varieties...

Apollo

This super high alpha variety was developed by the Hopsteiner Breeding Program and released in 2006. It is resistant to powdery and downy mildew. The very high alpha, good storage stability and low cohumulone ratio makes it an excellent choice for bittering. Added late into the boil it provides a strong grapefruit and hoppy note.

Yield (kilos per hectare)	2,900 – 3,350
Yield (lbs per acre)	2,600 – 3,000
Alpha Acids	15.0 – 19.0%
Beta Acids	5.5 – 8.0%
Alpha-Beta Ratio	3.0 - 3.5
Cohumulone (% of alpha acids):	24 – 28%
Total Oils (Mls. per 100 grams dried hops)	1.5 – 2.5
Myrcene (as % of other oils)	30.0 – 50.0%
Caryophyllene (as % of other oils)	14.0 – 20.0%
Humulene (as % of other oils)	20.0 – 35.0%
Farnesene (as % of other oils)	< 1.0%
Storage(% alpha acids remaining after 6 months storage at 20° C)	80 – 90%
Similar Hop Varieties	Nugget, CTZ

Bravo

Bravo is a second generation super high alpha variety that was developed by the Hopsteiner Breeding Program and released in 2006. It has good resistance to powdery mildew. Bravo is an excellent bittering hop that provides pleasant fruity and floral aroma characteristics.

Yield (kilos per hectare)	3,000 – 3,470
Yield (lbs per acre)	2,700 – 3,100
Alpha Acids	14.0 – 17.0%
Beta Acids	3.0 – 4.0%
Alpha-Beta Ratio	4.5 - 5.5
Cohumulone (% of alpha acids):	29.0 – 34.0%
Total Oils (Mls. per 100 grams dried hops)	1.6 – 2.4
Myrcene (as % of other oils)	25.0 – 50.0%
Caryophyllene (as % of other oils)	10.0 – 12.0%
Humulene (as % of other oils)	18.0 – 20.0%
Farnesene (as % of other oils)	< 1.0%
Storage (% alpha acids remaining after 6 months storage at 20° C)	70%
Similar Hop Varieties	CTZ

Columbus/Tomahawk®/Zeus (CTZ)

These three varieties are often grouped together and labeled as CTZ. They are referred to as Super High Alpha varieties, having alpha acid content of between 14.5-16.5%. Together they make up approximately a quarter of the entire U.S. hop acreage.

Yield (kilos per hectare)	2800 - 3249
Yield (lbs per acre)	2500 - 2900
Alpha Acids	14.5 - 16.5%
Beta Acids	4.0 - 5.0%
Alpha-Beta Ratio	3.3 - 3.6
Cohumulone (% of alpha acids):	28 - 32%
Total Oils (Mls. per 100 grams dried hops)	2.0 - 3.0
Myrcene (as % of total oils)	40 - 50%
Caryophyllene (as % of total oils)	9 - 11%
Humulene (as % of total oils)	12 - 18%
Farnesene (as % of total oils)	<1%



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Storage (% alpha acids remaining after 6 months storage at 20° C)	52%
Possible Substitutions	Galena, Chinook, Nugget

Millennium

Millennium is a high alpha variety bred in the John I. Haas, Inc. breeding program and released in 2000. Its brewing profile is comparable to Nugget and Columbus, being used primarily as a bittering hop with strong alpha potential.

Yield (kilos per hectare)	2464 - 2913
Yield (lbs per acre)	2200 - 2600
Alpha Acids	14.5 - 16.5%
Beta Acids	4.3 - 5.3%
Alpha-Beta Ratio	3.1 - 3.4
Cohumulone (% of alpha acids):	28 - 32%
Total Oils (Mls. per 100 grams dried hops)	1.8 - 2.2
Myrcene (as % of total oils)	30 - 40%
Caryophyllene (as % of total oils)	9 - 12%
Humulene (as % of total oils)	23 - 27%
Farnesene (as % of total oils)	<1
Storage (% alpha acids remaining after 6 months storage at 20° C)	76%
Possible Substitutions	Nugget, Columbus

Summit™

Summit™ is a high alpha variety of recent origin that was bred by the American Dwarf Hop Association. It is the first high alpha variety that can be grown commercially on a low as well as a high trellis in the U.S. The variety exhibits unusually high alpha acids content, high alpha/beta ratios, excellent storage-stability and powdery mildew resistance. It is the first dwarf hop to be bred for production in the United States and it's currently the only hop being grown on low trellis in the Yakima Valley. Summit is a superior bittering hop with earth aromatic notes and a subtle hint of citrus.

Yield (kilos per hectare)	2500 - 3100
Yield (lbs per acre)	2200 - 2700
Alpha Acids	16 - 18%
Beta Acids	4.0 - 6.0%
Alpha-Beta Ratio	3.0 - 4.0
Cohumulone (% of alpha acids):	26 - 33%
Total Oils (Mls. per 100 grams dried hops)	1.5 - 2.5
Myrcene (as % of total oils)	30 - 50%
Caryophyllene (as % of total oils)	10 - 15%
Humulene (as % of total oils)	15 - 25%
Farnesene (as % of total oils)	< 1%
Storage (% alpha acids remaining after 6 months storage at 20° C)	85%
Possible Substitutions	CTZ, Warrior, Millennium

Super Galena

Super Galena is a super high alpha variety developed by the Hopsteiner breeding program and released in 2006. It has relatively high contents of both alpha and beta acids, making it a good bittering hop with pleasant aroma. Super Galena is comparable to Galena in its aroma and bitterness profile, but offers a substantially higher yield and complete resistance to all current hop powdery mildew strains found in the U.S.

Yield (kilos per hectare)	2800 - 3100
Yield (lbs per acre)	2500 - 2800
Alpha Acids	13-16%
Beta Acids	8-10%
Alpha-Beta Ratio	1.6
Cohumulone (% of alpha acids):	35-40%
Total Oils (Mls. per 100 grams dried hops)	1.5-2.5
Myrcene (as % of total oils)	45-60%
Caryophyllene (as % of total oils)	6-14%
Humulene (as % of total oils)	19-24%
Farnesene (as % of total oils)	<1%
Storage (% alpha acids remaining after 6 months storage at 20° C)	78-80%
Possible Substitutions	Galena



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Aroma Varieties...

Amarillo® VGXP01 c.v.

Amarillo® is an aroma variety of recent origin, discovered and introduced by Vigil Gamache Farms Inc. in Washington State. It is used for its aromatic qualities, as well as its bittering properties due to its lower cohumulone content.

Yield (kilos per hectare)	1350-1800
Yield (lbs per acre)	1200-1600
Alpha Acids	8-11%
Beta Acids	6-7%
Alpha-Beta Ratio	1.6
Cohumulone (% of alpha acids):	21-24%
Total Oils (Mls. per 100 grams dried hops)	1.5-1.9
Myrcene (as % of total oils)	68-70%
Caryophyllene (as % of total oils)	2-4%
Humulene (as % of total oils)	9-11%
Farnesene (as % of total oils)	2-4%
Storage (% alpha acids remaining after 6 months storage at 20° C)	Good (above average %)
Possible Substitutions	Cascade, Centennial



Cascade

Cascade is an aroma hop that was developed by the U.S.D.A. breeding program in Oregon and released in 1972. It contains low amounts of alpha acids. The aroma is of medium strength and provides a unique floral/spicy character with well balanced bittering potential. It is the most popular hop with the U.S. craft brewing industry.

Yield (kilos per hectare)	1792 - 2240
Yield (lbs per acre)	1600 - 2000
Alpha Acids	4.5 - 7.0%
Beta Acids	4.8 - 7.0%
Alpha-Beta Ratio	0.9 - 1.0
Cohumulone (% of alpha acids):	33 - 40%
Total Oils (Mls. per 100 grams dried hops)	.7 - 1.4
Myrcene (as % of total oils)	45 - 60%
Caryophyllene (as % of total oils)	3.5 - 5.5%
Humulene (as % of total oils)	8 - 13%
Farnesene (as % of total oils)	3 - 7%
Storage (% alpha acids remaining after 6 months storage at 20° C)	48-52%
Possible Substitutions	Centennial, Amarillo

Centennial

Centennial is an aroma variety that was released in 1990. It is considered a very balanced hop and sometimes referred to as a super Cascade. It is well suited for Ale style beers and has been used in Wheat beers.

Yield (kilos per hectare)	1700-2000
Yield (lbs per acre)	1500-1750
Alpha Acids	9.5-11.5%
Beta Acids	3.5-4.5%
Alpha-Beta Ratio	2.7
Cohumulone (% of alpha acids):	28-30%
Total Oils (Mls. per 100 grams dried hops)	1.5-2.5
Myrcene (as % of total oils)	58%
Caryophyllene (as % of total oils)	5%
Humulene (as % of total oils)	11%
Farnesene (as % of total oils)	0%
Storage (% alpha acids remaining after 6 months storage at 20° C)	60-65%

Possible Substitutions	Cascade
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Citra™, HBC 394

Citra™ is a special aroma hop variety developed by the Hop Breeding Company (a joint venture between John I. Haas, Inc. and Select Botanicals Group, LLC). It was released in 2007. Citra™ has fairly high alpha acids and total oil contents with a low percentage of cohumulone content. The variety imparts interesting citrus and tropical fruit characters to beer.

Yield (kilos per hectare)	1600-1800
Yield (lbs per acre)	1400-1600
Alpha Acids	11-13
Beta Acids	3.5-4.5
Alpha-Beta Ratio	2.9-3.1
Cohumulone (% of alpha acids):	22-24%
Total Oils (Mls. per 100 grams dried hops)	2.2-2.8
Myrcene (as % of total oils)	60-65%
Caryophyllene (as % of total oils)	6-8%
Humulene (as % of total oils)	11-13%
Farnesene (as % of total oils)	0%
Storage (% alpha acids remaining after 6 months storage at 20° C)	75%
Possible Substitutions	Unknown

Glacier

Glacier is a dual-purpose hop with well balanced bittering properties and a pleasant aroma profile. It was released in 2000 from the Washington State University breeding program. It is commonly used in beer styles such as Pale Ale, ESB, Bitter, English-Style Pale Ale, Porter, and Stout.

Yield (kilos per hectare)	2750-2900
Yield (lbs per acre)	2400-2600
Alpha Acids	5.5%
Beta Acids	8.2%
Alpha-Beta Ratio	0.7
Cohumulone (% of alpha acids):	11-13%
Total Oils (Mls. per 100 grams dried hops)	0.7-1.6
Myrcene (as % of total oils)	33-62%
Caryophyllene (as % of total oils)	6.5-10%
Humulene (as % of total oils)	24-36%
Farnesene (as % of total oils)	<1%
Storage (% alpha acids remaining after 6 months storage at 20° C)	72%
Possible Substitutions	Willamette

Golding

Golding hops consist of a group of traditional English aroma varieties which have been cultivated since 1790. Several selections now exist, but the variety grown in the U.S. is Canterbury Golding. It is very popular among U.S. ale breweries, especially for English-style beers.

Yield (kilos per hectare)	1344 - 1680
Yield (lbs per acre)	1200 - 1500
Alpha Acids	4.0 - 6.0%
Beta Acids	2.0 - 3.0%
Alpha-Beta Ratio	1.9 - 2.1
Cohumulone (% of alpha acids):	23 - 28%
Total Oils (Mls. per 100 grams dried hops)	0.7 - 1.0
Myrcene (as % of total oils)	25 - 35%
Caryophyllene (as % of total oils)	13 - 16%
Humulene (as % of total oils)	35 - 45%
Farnesene (as % of total oils)	<1%
Storage (% alpha acids remaining after 6 months storage at 20° C)	66%
Possible Substitutions	UK East Kent Golding, Styrian Golding

Mt. Hood

Named after the famous Oregon volcano, Mt. Hood is an aroma variety that was released in 1989 from the U.S.D.A. breeding program in Oregon. It is very similar to the German Hallertauer and Hersbrucker varieties. Mt. Hood has low alpha acids, beta acids, and cohumulone, but high humulene content. It has a mild aroma and is typically used in Lagers, Pilsners, Bocks and Wheat beers.

Yield (kilos per hectare)	1624 - 1960
Yield (lbs per acre)	1450 - 1750
Alpha Acids	4.0 - 7.0%
Beta Acids	5.0 - 8.0%
Alpha-Beta Ratio	0.8 - 0.9
Cohumulone (% of alpha acids):	21 - 23%
Total Oils (Mls. per 100 grams dried hops)	1.2 - 1.7
Myrcene (as % of total oils)	30 - 40%

Caryophyllene (as % of total oils)	13 - 16%
Humulene (as % of total oils)	30 - 38%
Farnesene (as % of total oils)	<1%
Storage (% alpha acids remaining after 6 months storage at 20° C)	55%
Possible Substitutions	German Hallertau, Hersbrucker

Palisade®, YCR 4

Palisade is an aroma variety bred by Yakima Chief Ranches. It is used in brewing for its aromatic properties and moderate bittering. It has good resistance to powdery mildew.

Yield (kilos per hectare)	2400-3400
Yield (lbs per acre)	2200-3000
Alpha Acids	5.5-9.5%
Beta Acids	6.0-8.0%
Alpha-Beta Ratio	1
Cohumulone (% of alpha acids):	24-29%
Total Oils (Mls. per 100 grams dried hops)	1.4-1.6
Myrcene (as % of total oils)	9-10%
Caryophyllene (as % of total oils)	16-18%
Humulene (as % of total oils)	19-22%
Farnesene (as % of total oils)	0%
Storage (% alpha acids remaining after 6 months storage at 20° C)	Good (above average %)
Possible Substitutions	Willamette

Simcoe®, YCR 14

Simcoe® is a bittering/aroma variety bred by Yakima Chief Ranches and released in 2000. It is used for its aromatic qualities, as well as its bittering properties due to its low cohumulone content. It imparts a unique, pine-like aroma, and is often used in American Ales.

Yield (kilos per hectare)	2650-2880
Yield (lbs per acre)	2300-2500
Alpha Acids	12-14%
Beta Acids	4-5%
Alpha-Beta Ratio	2.8
Cohumulone (% of alpha acids):	15-20%
Total Oils (Mls. per 100 grams dried hops)	2.0-2.5
Myrcene (as % of total oils)	60-65%
Caryophyllene (as % of total oils)	5-8%
Humulene (as % of total oils)	10-15%
Farnesene (as % of total oils)	0%
Storage (% alpha acids remaining after 6 months storage at 20° C)	Good (above average %)
Possible Substitutions	Summit, Magnum

Sterling

Sterling is an aroma variety that was released in 1998. It has excellent noble hop aroma and smooth bitterness. It has gained major brewery acceptance and is finding favor as a Saaz replacement. Sterling has an herbal, spicy aroma with hints of floral and citrus. It is typically used in Pilsners and Lagers.

Yield (kilos per hectare)	1650-1860
Yield (lbs per acre)	1400-1600
Alpha Acids	4.5-5.0%
Beta Acids	5.0-6.0%
Alpha-Beta Ratio	0.8
Cohumulone (% of alpha acids):	21-23%
Total Oils (Mls. per 100 grams dried hops)	0.6-1.0
Myrcene (as % of total oils)	44-48%
Caryophyllene (as % of total oils)	20-22%
Humulene (as % of total oils)	6-8%
Farnesene (as % of total oils)	13-15%
Storage (% alpha acids remaining after 6 months storage at 20° C)	60-75%
Possible Substitutions	Saaz

Willamette

Named after Oregon's Willamette River, which runs through that state's hop growing region, Willamette was released in 1976 from the U.S.D.A. breeding program. The variety is characterized by a low alpha acids content and mild aroma.

It is the most popular American aroma hop accounting for approximately 20% of total U.S. hop acreage. The aroma can be described as mild, slightly spicy, and pleasant.

Yield (kilos per hectare)	1456 - 1792
Yield (lbs per acre)	1300 - 1600
Alpha Acids	4.0 - 6.0%
Beta Acids	3.5 - 4.5%
Alpha-Beta Ratio	1.3 - 1.4
Cohumulone (% of alpha acids):	30 - 35%

Total Oils (Mls. per 100 grams dried hops)	1.0 - 1.5
Myrcene (as % of total oils)	30 - 40%
Caryophyllene (as % of total oils)	6.5 - 8.2%
Humulene (as % of total oils)	20 - 27%
Farnesene (as % of total oils)	5 - 6%
Storage (% alpha acids remaining after 6 months storage at 20° C)	60-65%
Possible Substitutions	Fuggie, Tettnang, Styrian Golding



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- Maltster's Reserve Series
- Base Malts
- High Temp Kilned Malts
- Smoked Malt
- Carapils® Malts
- Caramel Malts
- Specialty Malts
- Dark Roasted Malts
- Roasted Barley
- Gluten Free Syrups
- Malt Extracts
- Adjuncts
- Organics

Products Overview

The Ingredients for Success

This is where, as they say, the rubber meets the road. All the history – all the family pride – doesn't mean much if we can't back it up with the finest specialty malts in the industry. This is where



130 years of handcrafted passion proves itself. You can taste it in our robust flavors. You can see it in our rich colors. And you can count on it performing the way you expect. Scroll down for a list of all standard Briess malts, or **click on the links on the left for detailed product information.**



Maltster's Reserve Series—
Seasonal Malts For Seasonal Brews [download Sell Sheet](#)
 Caracrystal Malt (Jan-Feb-Mar) [download Sell Sheet](#)
 To Be Announced In 2010 (Apr-May-Jun)
 To Be Announced in 2010 (Jul-Aug-Sep)
 To Be Announced in 2010 (Oct-Nov-Dec)

Brewers Malts
 6-Row Brewers Malt
 2-Row Brewers Malt
 Pilsen Malt
 Red Wheat Malt
 White Wheat Malt

High Temp Kilned Malts
 Vienna Malt
 Pale Ale Malt
 Ashburne® Mild Malt

Munich Malts
 Bonlander® Munich Malt
 Aromatic Malt
 Munich 10L
 Munich 20L

Carapils® Malt
 Carapils® Malt
 2-Row Carapils® Malt

Specialty Malts

Victory® Malt
 Special Roast Malt
 Extra Special Malt
 Rye Malt
 Smoked Malt

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Roasted Caramel Malts

Caramel 10L
 2-Row Caramel 10L
 Caramel 20L
 2-Row Caramel 30L
 Caramel 40L
 2-Row Caramel 40L
 Caramel 60L
 2-Row Caramel 60L
 Caramel 80L
 2-Row Caramel 80L
 Caramel 90L
 Caramel 120L
 2-Row Caramel 120L
 Caramel Vienne 20L
 Caramel Munich 60L

Dark Roasted Malts

Chocolate Malt
 2-Row Chocolate Malt
 Dark Chocolate Malt
 Black Malt
 2-Row Black Malt

Certified Organic Malts

Brewers Malt
 Pale Ale Malt
 Munich Malt
 Carapils® Malt
 Victory® Malt
 Caramel 20L
 Caramel 60L
 Caramel 120L
 Chocolate Malt
 Black Malt
 Roasted Barley
 Maltoferm® 10000 Light LME
 Maltoferm® 10001 Light DME

Roasted Barley

Roasted Barley
 Black Barley

LME & DME—

Unhopped brewer's grade malt extracts

CBW® Pilsen Light
 CBW® Golden Light
 CBW® Bavarian Wheat
 CBW® Munich LME
 CBW® Sparkling Amber

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CBW® Traditional Dark

Gluten Free Syrups

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BriesSweet™ White Sorghum Syrup 45DE

BriesSweet™ Brown Rice Syrup 45DE

Pure Malt Colorants

Maltoferm™ A-6000 Black LME

Maltoferm™ A-6001 Black DME

Brewers Flakes & Adjuncts

Barley Flakes

Yellow Corn Flakes

Oat Flakes

Rice Flakes

Rye Flakes

Red Wheat Flakes

Torrified Wheat

(Insta Grains® Soft Red Wheat Whole Kernel)

Rice Hulls

Corn Syrup

Dextrose

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Meghann Quinn
941 N. 5th Street
Coeur D'Alene, ID 83814

Dear Meghann,

Listed below are answers in regards to sourcing and securing organic ingredients.

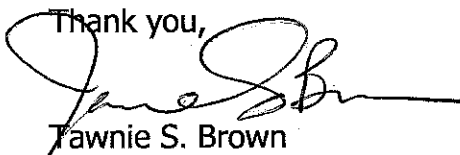
*any ingredient that we wanted the same consistent product each time we ordered we had to either do a Booking Agreement or Contract for the ingredient.

*if we under projected our needs we were unable to get product again until the next growing season. If we over projected product there was no other home for it so we had to take it at the end of contract with no exceptions.

*products are so specialized and grown for only what is committed to that we even had to Book or Contract product before it was in the ground. For example if we were purchasing canned 1/4" diced tomatoes we had to book the product before the plantings went into the ground.

*product limitations were also a concern in developing our finished goods; we used varieties and cuts that were available at the current time. For instance we like to use a 1/2" diced tomato but in organic only 1/4" diced, puree and 26% crushed were available. Not all items that are available conventionally are available organically. Knowing this, we have worked with the available organic ingredients to develop our finished goods.

Please feel free to contact me if you have an concerns or questions.

Thank you,


Tawnie S. Brown
Corporate Purchasing Manager – Raw Materials
Reser's Fine Foods, Inc

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HOMEBREW HOP GUIDE

name	alpha acid %	typical beer styles	possible substitutes	flavor description
Admiral (U.K.)	13.5 to 16%	Ale	U.K. Target, U.K. Northdown, U.K. Challenger	Known for its bittering potential.
Ahtanum	4 to 6.3%	Lager, American ales	Cascade, Amarillo	Floral, citrus, sharp and piney.
Amarillo	8 to 9%	Ale, IPA	Cascade, Centennial	Citrusy, flowery.
Bramling Cross (U.K.)	5 to 7%	ESB, bitter, pale ale	U.K. Kent Golding, U.K. Progress, Whitbread Goldings Variety	Quite mild, fruity currant aroma.
Bravo	14-17%	American-style IPA?		
Brewer's Gold	7 to 8.5%	English ale	Bullion	Bittering hop with neutral aroma character.
Brewer's Gold (German)	6 to 7%	Ale, heavier German-style lagers	Northdown, Northern Brewer, Galena, Bullion	Black currant, fruity, spicy.
Bullion	6.5 to 9%	IPA, ESB, stout	Columbus, Northern Brewer, German Brewer's Gold	A rich hop primarily used for bittering. Intense black currant aroma.
Cascade	4.5 to 7%	Pale ale, IPA, porter, barleywine	Centennial, Amarillo, possibly Columbus	Flowery, citrusy. Can have a grapefruit flavor.
Centennial	8 to 11.5%	All ale styles, has been used with wheat beer	Cascade, Columbus, Chinook	Medium with floral and citrus tones.
Challenger (U.K.)	6.5 to 8.5%	English-style ales, porter, stout, ESB, bitter	U.S. or German Perle, Northern Brewer	Mild to moderate, quite spicy.
Chinook	10 to 14%	Pale ale, IPA, stout, porter, lager	Nugget, Columbus, Northern Brewer, U.K. Target	Mild to medium-heavy, spicy, piney and grapefruit.
Cluster	5.5 to 8.5%	Ale and lager (good aroma for ale, good bittering for lager)	Galena	Medium and quite spicy.
Columbus	11 to 16%	IPA, pale ale, stout	Tomahawk, Zeus	Pungent.
Crystal	2 to 4.5%	Lager, pilsner, ESB	Mt. Hood, Hersbrucker, French Strisslespalt, Liberty, Hallertauer	Mild, spicy and flowery.
First Gold (U.K.)	6.5 to 8.5%	Ale, ESB	U.K. Kent Golding, maybe Crystal	A little like Golding family; spicy.
Fuggle (U.S.)	4 to 5.5%	Any English-style beer or American ale	U.K. Fuggle, Willamette, Styrian Golding, U.S. Tetnanger	Mild, woody and fruity.
Fuggle (U.K.)	4 to 5.5%	All English-style ales, ESB, bitter, lager	U.S. Fuggle, Willamette, Styrian Golding	Mild, pleasant and hoppy.
Galena	10 to 14%	Ale, porter, stout, ESB, bitter	Nugget, Pride of Ringwood, Chinook	Citrusy.
Glacier	3.3 to 9.7%	English ales, stout, porter	Willamette, U.S. Fuggles	Mild flavor, earthy aroma.
Golding (U.S.)	4 to 6%	Pale ale, ESB, all English-style beer	U.K. Golding, Whitbread Golding Variety, U.K. Progress, and possibly the Fuggle family Willamette or Fuggles	Mild, extremely pleasant and gently hoppy.
Green Bullet (New Zealand)	11 to 14%		Liberty, Ultra, Hallertauer Tradition, Crystal, Mt. Hood	Dual purpose hop.
Hallertauer (U.S.)	3.5 to 5.5%	Lager, pilsner, bock, wheat	Liberty, German Tradition, Ultra	Very mild, pleasant and slightly flowery, some spicy.
Hallertauer Gold	6 to 6.5%	Lager	U.S. Hallertauer	Known for aromatic properties similar to Hallertauer.
Hallertauer Mittelfrüh	3 to 5.5%	Lager, bock, wheat, maybe pilsner	Vanguard	Mild and pleasant.
Hallertauer Tradition (Ger.)	3.5 to 5.5%	Mild-flavored beers	Crystal, Liberty	Very fine, similar to German Hallertau Mittelfrüh.
Hersbrucker (German)	3 to 5.5%	Lager, pilsner, bock, wheat	Mt. Hood, French Strisslespalt	Mild to semi-strong, pleasant and hoppy.
Horizon	11 to 14%	Ale, lager	Magnum or a high-alpha hop	Floral and spicy.
Kent Golding (U.K.)	4 to 5.5%	All English-style ales, ESB, bitter	U.S. Golding, WGV, U.K. Progress	Gentle, fragrant, and pleasant.
Liberty	3 to 6%	Lager, pilsner, bock, wheat	Hallertauer Tradition, Hallertauer, Mt. Hood	Mild and clean aroma, slightly spicy character.
Magnum	13 to 15%	All beers, particularly lager, pilsner, stout	Northern Brewer	Good, bitter quality.
Mt. Hood	3 to 8%	Lager, pilsner, bock, wheat	Crystal, French Strisslespalt, Hersbrucker	Mild, pleasant and clean, somewhat pungent and resinous.
Newport	13-17%	any	Galena, Nugget	Fairly pungent.

name	alpha acid %	typical beer styles	possible substitutes	flavor description
Nelson Sauvin (N.Z.)	12-14%			Unique hop with grape-like character.
Northdown (U.K.)	7.5 to 9.5%	All ales, porter		Mild, pleasant, delicate aroma.
Northern Brewer (U.S.)	6 to 10%	ESB, bitter, English pale ale, porter, California (steam) beer	Mugget, Chinook	Medium-strong.
Northern Brewer (German)	7 to 10%	ESB, bitter, English pale ale, porter	Chinook, U.S. Northern Brewer	Medium-strong with some wild American tones.
Northwest Golding	4 to 5%	Ale, porter, stout, ESB, bitter		Known for aromatic properties.
Nugget	11 to 14.5%	Light lager	Columbus, Chinook, U.K. Target, Galena	Herbal.
Pacific Gem (New Zealand)	13-15%			Bittering hop with a woody character.
Palisade	5.5 to 9.5%		perhaps Cascade	some "American" characteristics.
Perle (U.S.)	6 to 9.5%	Pale ale, porter, German styles	Northern Brewer, Cluster, Galena, Chinook	Floral, slightly spicy.
Perle (German)	6 to 8.5%	Pale ale, porter, lager	U.S. Perle, Northern Brewer	Moderately intense, good and hoppy.
Phoenix (U.K.)	4.2 to 5.5%	All ales	U.K. Northdown, U.K. Kent Golding, U.K. Challenger	Similar to U.K. Challenger.
Pioneer (U.K.)	8 to 10%	Ale, ESB	U.K. Kent Golding	A mild, typical English aroma.
Polish Lublin	3 to 4.5%	Pilsner	U.S. Saaz, Czech Saaz, U.S. Tettnanger	Mild and typical of noble aroma types, spicy, herbal.
Pride of Ringwood (Australia)	7 to 10%	Australian lager	Galena, Cluster	Quite pronounced, but not unpleasant.
Progress (U.K.)	5 to 7.5%	Ale, bitter, ESB, porter	U.K. Kent Golding, Fuggie	Moderately strong, good aroma.
Saaz (Czech)	3 to 4.5%	Pilsner	U.S. Saaz, Polish Lublin	Very mild with pleasant hoppy notes.
Saaz (U.S.)	3 to 5%	Pilsner, lager, wheat	Czech Saaz, Polish Lublin	Very mild, earthy and spicy.
Santiam	5 to 7.9%	Lager, American ale, pilsner	German Tettnanger, German Spalt, German Spalt Select	Floral, slightly spicy.
Satus	12.5 to 14%		Galena	Known for its bittering and aromatic properties.
Saphir (German)	2.5-4.5%	Lagers	any noble hop	Mild aroma hop.
Simcoe	12 to 14%	hoppy American ales		A bittering and aromatic hop. Piney aroma.
Sorachi Ace (Japan)	13 to 18%			Bittering hop with lemony aroma.
Spalt (German)	4 to 5.5%	Lager	U.S. Saaz, U.S. Tettnanger, German Spalt Select	Mild and pleasant, slightly spicy.
Spalt Select (German)	4 to 6%	Lager, and any beer in which noble aroma is appropriate	U.S. Saaz, U.S. Tettnanger, German Spalt	Very fine Spalter-type aroma.
Spalt Select (U.S.)	3 to 5%	German lagers	Tettnanger, Saaz	Medium intensity and pleasant hoppy qualities. Medium-strong aroma with wild American tones.
Sterling	6 to 9%	Lager, ale, pilsner	Saaz, Polish Lublin	Herbal, spicy, pleasant aroma, hint of floral and citrus.
Strissespalt (France)	3 to 5%	Pilsner, lager, wheat	Mt. Hood, Crystal, Hersbrucker	Medium intensity, pleasant, hoppy.
Styrian Golding (Slovenia)	4.5 to 8%	All English-style ales, ESB, bitter, lager	U.S. Fuggie, U.K. Fuggie, Willamette	Delicate, slightly spicy.
Target (U.K.)	9.5 to 12.5%	All ale and lager	Fuggie, Willamette	Pleasant English hop aroma, quite intense.
Tettnanger (U.S.)	3.4 to 5.2%	German ales and lagers, American lagers, wheat	German Spalt, Czech Saaz, Santiam	An aromatic hop, mild and slightly spicy.
Tettnanger (German)	3.5 to 5.5%	Lager, ale	German Spalt, German Spalt Select, U.S. Tettnanger, Saaz	Mild and pleasant, slightly spicy, herbal.
Tomahawk	15 to 17%	Ale	Columbus, Zeus	Primarily a bittering hop.
Tradition (German)	5 to 7%	Lager, pilsner	Hersbrucker, Hallertauer Mittelfrüh	Very fine and similar to Hallertauer Mittelfrüh.
Vanguard	4 to 5.67%		Saaz, Hallertauer Mittelfrüh	Aroma similar to continental European types.
Warrior	15 to 17%	Ale, stout	Nugget	A bittering and aromatic hop.
WGV (Whitbread Golding Variety) (U.K.)	5 to 7%	Ale	U.K. Kent Golding, U.K. Progress	Quite pleasant and hoppy, moderately intense.
Willamette	3.5 to 6%	Pale ale, ESB, bitter, English-style ale, porter, stout	U.S. Fuggie, U.S. Tettnanger, Styrian Golding	Mild and pleasant, slightly spicy, fruity, floral, a little earthy.
Yakima Cluster	6 to 8.5%			Used as a kettle hop for bittering.
Zeus	13 to 17%		Columbus, Tomahawk	Aromatic and pleasant.

hop Varieties and Substitutions

Variety	Type	Average Alpha Acid Percent	Origin	Possible Substitutions
Admiral (RH 40)	Bittering	11.5-14.5	England	Target, Challenger
Ahtanum	Aroma	5.7-6.3	U.S.	Cascade, Amarillo
Amarillo	Aroma	6-8	U.S.	Cascade, Centennial, Chinook, Ahtanum
Bramling Cross	Dual	5-7	England	Progress, Golding
Brewer's Gold	Dual	5.5-8.5	Germany, China	Bullion
Bullion	Bittering	6-9	England	Brewer's Gold
Cascade	Dual	4-7	U.S.	Centennial, Amarillo, Columbus
Centennial	Dual	8-11.5	U.S.	Cascade/Columbus 70/30 blend, Chinook
Challenger	Dual	6.5-8.5	England	Perle, Northern Brewer
Chinook	Dual	11-14	U.S.	Nugget, Columbus, Northern Brewer, Target
Cluster	Dual	5.5-8.5	U.S.	Nugget, Columbus, Northern Brewer, Target
Columbus	Bittering	14-16	U.S.	Nugget, Chinook, UK Target, Northern Brewer, Tomahawk, Zeus
Crystal	Aroma	2.4-5	U.S.	Mt. Hood, Hersbrucker, Hallertauer, Liberty
Eroica	Bittering	9-13	U.S.	Galena, Nugget, Chinook
First Gold	Dual	6.5-8.5	England	Kent Golding, Crystal
Fuggle	Dual	3.5-5.5	U.S., England	Willamette, Styrian Golding, U.S. Tettnanger
Galena	Bittering	10-14	U.S.	Nugget, Chinook, Pride of Ringwood
Golding	Aroma	4-6	U.S., Canada	Other Golding, UK Progress, Fuggle
Green Bullet	Dual	8-14	New Zealand	Liberty, Ultra, Mt. Hood, Tradition, Crystal
Hallertauer Magnum	Bittering	10-12.5	Germany	Columbus, Nugget
Hallertauer Mittelfruh	Aroma	3.5-5.5	Germany	Liberty, Tradition, Ultra
Hallertauer Tradition	Aroma	4-7	Germany	Crystal, Liberty
Hersbrucker	Aroma	2.5-5.5	Germany, U.S.	Mt. Hood, Strisselspalt
Horizon	Dual	11-14	U.S.	Magnum
Kent Golding	Aroma	4-6.5	England	Other Golding, UK Progress
Liberty	Aroma	3.5-5	U.S.	Hallertauer, Tradition, Mt. Hood
Lublín/Lubelski	Aroma	3-5	Poland	Saaz, Sterling
Mount Hood	Aroma	3-8	U.S.	Crystal, Hersbrucker, Strisselspalt
Northern Brewer	Dual	7-10	U.S., Germany	Nugget, Chinook
Nugget	Bittering	9-14	U.S., Germany	Columbus, Chinook, Target, Galena
Olympic	Dual	11-13	U.S.	Chinook
Perle	Dual	5-9.5	U.S., Germany	Northern Brewer, Galena, Cluster, Chinook
Phoenix	Dual	8.5-11.5	England	Northdown, Kent Golding, Challenger
Pioneer	Dual	8-10	England	Kent Golding
Pride of Ringwood	Dual	7.5-11	New Zealand	Galena, Cluster
Progress	Dual	5-7.5	England	Kent Golding, Fuggle
Saaz	Aroma	3.5-5	Czech Republic	Lublín
Santium	Aroma	5-7.9	U.S.	Tettnanger, Spalter, Spalter Select
Spalter	Aroma	3-6	Germany	Tettnanger, Spalter Select, Santium
Spalter Select	Aroma	3.5-6	Germany	Tettnanger, Spalter, Santium
Sterling	Aroma	6	U.S.	Saaz, Lublín
Strisselspalt	Aroma	3-4	France	Mt. Hood, Crystal, Hersbrucker
Styrian Golding	Aroma	4.5-6	Slovenia	Fuggle, Willamette
Target	Bittering	9.5-13	England	Fuggle, Willamette
Tettnanger	Aroma	3.5-5.5	Germany, U.S.	Spalter, Spalter Select, Saaz
Tomahawk	Bittering	15-17	U.S.	Columbus, Zeus
Ultra	Aroma	2.3-5	U.S.	Liberty, Tradition, Saaz
Vanguard	Aroma	4-5	U.S.	Saaz, Mittelfruh
Whitbread Golding Variety	Dual	5-7.5	England	Golding, UK Progress
Willamette	Dual	4-6	U.S.	Fuggle, Tettnanger, Styrian Golding
Zeus	Bittering	13-17	U.S.	Columbus, Tomahawk

Source: Michael Ferguson, B.J.'s Restaurant and Brewery

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**How much
beer is in
your keg?**

???????

Hop Substitution Chart

Hop Variety	Possible Substitutes
Admiral	Target, Northdown, Challenger
Ahtanum	Amarillo, Centennial, Simcoe
Amarillo	Cascade, Centennial, Summit, Ahtanum
Boadicea	Cascade(?), I'm not sure...
Brewers Gold	Bullion, Chinook, Galena, Nugget
Bullion	Columbus, Northern Brewer
Cascade	Amarillo, Centennial, Summit
Centennial	Amarillo, Cascade, Columbus, Summit
Challenger	Perle, Admiral
Chinook	Brewers Gold, Columbus, Galena, Nugget, Northern Brewer, Eroica
Cluster	Galena, Eroica
Columbus	Magnum, Chinook, Northern Brewer, Warrior, Millennium, Bullion
Crystal	Mt. Hood, Liberty, Hallertauer, Tettnanger, Strisselspalt
E.K. Goldings	Fuggie, Progress, First Gold
Eroica	Galena
First Gold	E.K. Goldings
Fuggie	Willamette, Styrian Golding, Tettnanger, Newport
Galena	Brewers Gold, Nugget, Cluster, Chinook, Eroica, Newport
Glacier	Willamette, Fuggie, Tettnanger, Styrian Goldings
Hallertau	Liberty, Tettnanger, Mt. Hood, Vangaurd,

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	Tradition
Horizon	Magnum
Liberty	Hallertau, Tettnanger, Mt. Hood, Crystal, Ultra
Lublin	Saaz, Sterling
Magnum	Horizon, Newport
Marynka	Northern Brewer(?)
Millenium	Nugget, Columbus
Mt. Hood	Hallertauer, Liberty, Crystal, Strisselspalt
Northern Brewer	Nugget, Chinook, Columbus, Bullion, Perle, Styrian Aurora
Newport	Galena, Nugget, Fuggle, Magnum
Northdown	Admiral, Challenger
Nugget	Cluster, Galena, Brewers Gold, Warrior, Eroica, Target, Millenium
Perle	Challenger, Northern Brewer
Premiant	?
Progress	Fuggles, E.K. Goldings
Saaz	Sladek, Lublin, Sterling, Ultra, Vangaurd
Santiam	Tettnanger, Spalt, Liberty, Hallertau
Saphir	?
Simcoe	Northern Brewer (?)
Sladek	Saaz, Lublin
Spalt	Santiam, Liberty, Tettnanger, Hallertau
Sterling	Saaz, Lublin
Strisselspalt	Mt. Hood, Crystal
Styrian Aurora	Northern Brewer
Styrian Goldings	Fuggle, Willamette
Summit	Amarillo, Cascade
Target	Nugget, Fuggle, Willamette, Admiral
Tettnanger	Hallertau, Liberty, Fuggle
Tradition	Hallertauer
Ultra	Liberty, Hallertau, Saaz
Vangaurd	Saaz, Hallertauer
Warrior	Nugget, Columbus



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AN INTEGRATED APPROACH TO INGREDIENT SUPPLY



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Home > Summit Hop Analysis

Hop Variety	Alpha Acid Range %	Beta Acid Range %	Co-H	Total Oil mls/ 100 gr.	Possible Substitutes
Ahtanum	3.5-5.5	5.0-5.5	32	1.0-1.5	Challenger / Perle / Cascade / Amarillo®
Amarillo®	8.0-11.0	6.0-7.0	22	1.5-1.9	High Apha Cascade
Cascade	4.5-6.5	4.5-6.5	37	0.8-1.4	Amarillo®
Centennial	9.5-11.5	3.5-4.5	30	1.5-2.3	Challenger / Cascade / Columbus Blend
Challenger	6.5-8.5	3.0-4.0	22	1.0-1.5	Perle / Centennial
Chinook	12.0-14.0	3.0-4.0	32	1.5-2.5	Mixture of 50 / 50 Galena & Cluster
Cluster	5.5-8.0	4.0-6.0	39	0.4-0.8	Fuggles
Crystal	4.0-5.5	5.0-6.7	21	0.8-2.1	Mt Hood / Liberty / Hallertau aroma
CTZ	14.0-18.0	4.5-5.8	32	2.0-3.5	Galena / Chinook / Nugget
First Gold	6.5-8.5	3.0-4.2	33	0.7-1.3	
Fuggle	4.0-5.5	2.2-3.1	26	0.7-1.1	Willamette
Galena	11.5-13.5	7.2-8.4	40	0.8-1.2	CTZ / Nugget
Glacier	5.2-6.2	8.0-8.5	12	0.7-1.6	
Golding	4.5-6.5	2.0-3.0	23	0.8-1.0	Styrian Golding
Hallertau mf	3.5-5.5	3.5-5.5	22	1.0-1.5	Hersbrucker
Hersbrucker	3.0-5.0	3.8-6.2	23	0.6-1.1	Hallertau mf
Horizon	10.0-13.0	6.5-8.5	18	1.2-2.6	Magnum
Liberty	3.5-6.0	2.9-5.0	27	0.8-1.0	Mt.Hood / Hallertau
Magnum	12.0-14.0	4.2-4.9	25	1.5-2.1	Northdown
Mt. Hood	4.0-6.5	3.6-5.9	23	1.9-2.3	Liberty
Northdown	7.0-10.0	4.4-6.2	29	1.2-2.2	Magnum
Northern Brewer	7.0-9.0	3.2-4.1	29	1.2-1.8	Nugget
Nugget	12.0-13.5	4.0-5.0	27	1.5-2.2	Northern Brewer / CTZ
Perle	5.5-8.5	3.1-4.7	29	0.7-1.2	Challenger
Progress	5.0-7.5	1.8-2.7	27	0.5-0.8	Fuggle
Saaz	2.5-4.5	2.8-5.0	26	0.4-0.8	Sterling
Simcoe	12.0-14.0	4.5-5.0	18	2.0-2.5	Magnum / Summit
Spalter	4.0-5.5	3.3-4.3	23	0.5-0.9	Any Hallertau aroma

Select					variety
Sterling	4.5-5.0	5.0-6.0	22	0.6-1.0	Saaz
Styrian Golding	4.0-6.0	2.0-3.0	28	0.5-1.0	Fuggle
Summit	16.0-18.0	4.5-5.0	28	2.4-2.6	Simcoe
Target	10.0-12.5	4.5-5.7	35	1.2-1.4	Magnum
Tettnanger	3.0-5.0	2.7-4.5	25	0.5-1.0	Any Hallertau aroma variety
Tradition	4.5-6.5	3.7-5.0	28	0.7-1.3	Mt.Hood / Liberty / Crystal
Warrior	15.0-17.0	4.5-5.5	25	1.0-2.0	Magnum
Willamette	4.5-7.0	3.0-4.7	32	0.9-1.5	Fuggle

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Comparing and Selecting Hops

So how do I choose the right hops for my beer? With such a wide range of flavor and aroma characteristics, this chart can serve as a helpful guide to more than eighty varieties. Whether you are trying to duplicate a style or are looking to experiment, the following list can help to get you started. Just select a beer style below and a chart will pull up with appropriate hops to consider for your recipe.

Name	Alpha Acid %	Possible Substitutions	Flavor Description
Admiral (U.K.)	13.5-16%	U.K. Challenger, U.K. Northdown, U.K. Target	Known for its bittering potential.
Ahtanum	4-6.3%	Amarillo, Cascade	Floral, citrus, sharp, and piney.
Amarillo	8-9%	Cascade, Centennial	Citrusy, flowery.
Apollo	15-19%	Zeus	A high alpha acid varietal known for its disease resistance.
Bramling Cross (U.K.)	5-7%	U.K. Kent Golding, U.K. Progress, Whitbread Golding Variety	Quite mild, fruity currant aroma.
Bravo	14-17%	Apollo, Zeus	
Brewer's Gold (U.S.)	7-10%	Bullion	Bittering hop with neutral aroma character.
Brewer's Gold (German)	6-7%	Bullion, Galena, Northdown, Northern Brewer	Black currant, fruity, spicy.
Bullion (U.K.)	6.5-9%	Columbus, Northern Brewer	A rich hop primarily used for bittering. Intense blackcurrant aroma.
Cascade (U.S.)	4.5-7%	Amarillo, Centennial, possibly Columbus	Pleasant, flowery, spicy, and citrusy. Can have a grapefruit flavor.
Cascade (New Zealand)	6-8%	Ahtanum, Cascade, Centennial	Similar to US Cascade, has floral, citrus grapefruit character.
Centennial	8-11.5%	Cascade, possibly Columbus	Medium with floral and citrus tones.
Challenger (U.K.)	6.5-8.5%	Northern Brewer, U.S. or German Perle	Mild to moderate, quite spicy.
Chinook	10-14%	Columbus, Northern Brewer, Nugget, U.K. Target	Mild to medium-heavy, spicy, piney, and grapefruity.
Cluster	5.5-8.5%	Galena	Medium and quite spicy.
Columbus	11-16%	Chinook, Northern Brewer, Nugget, U.K. Target	Pleasant, with pungent aroma.
First Gold (U.K.)	6.5-8.5%	maybe Crystal, U.K. Kent Golding	A little like Golding family, spicy.
Fuggle (U.K.)	4-5.5%	Styrian Golding, U.S. Fuggle, Willamette	Mild, pleasant, hoppy, and robust.
Fuggle (U.S.)	4-5.5%	Styrian Golding, U.K. Fuggle, U.S. Tettnanger, Willamette	Mild and pleasant, earthy and fruity.

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Have you ever aged any of your beers?

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Name	Alpha Acid %	Possible Substitutions	Flavor Description
Galena	10-14%	Chinook, Nugget, Pride of Ringwood	Medium but pleasant hoppiness, citrusy.
Glacier (U.S.)	5-9%	Styrian Golding, U.S. Fuggle, U.S. Tettnanger, Willamette	Dual purpose hop with a citrus earthy aroma.
Golding (U.S.)	4-6%	U.K. Golding, U.K. Progress, Whitbread Golding Variety	Mild, extremely pleasant, and gently hoppy.
Horizon	11-14%	Magnum or a high-alpha hop	Pleasantly hoppy.
Kent Golding (U.K.)	4-5.5%	U.K. Progress, U.S. Golding, Whitbread Golding Variety	Gentle, fragrant, and pleasant.
Magnum	13-15%	Northern Brewer	Known for bittering value and quality.
Nelson Sauvin (New Zealand)	12-14%		Unique hop with grape-like flavor
Newport	13-17%	Galena, Nugget	Fairly pungent.
Northdown (U.K.)	7.5-9.5%		Fruity with some spiciness.
Northern Brewer (German)	7-10%	Chinook, U.S. Northern Brewer	Medium-strong with some wild tones.
Northern Brewer (U.S.)	6-10%	Chinook, Nugget	Medium-strong with some wild tones.
Northwest Golding	4-5%		Known for aromatic properties.
Nugget	11-14.5%	Chinook, Columbus, Galena, U.K. Target	Quite heavy and herbal.
Olympic	11-13%	Chinook	Mild to medium, citrusy aroma, spicy.
Pacific Gem (New Zealand)	13-15%		Bittering hop with a woody character.
Pacific Jade (New Zealand)	12-14%		A "soft" bittering hop with spicy and citrus aroma qualities.
Palisade	5.5-9.5%	Perhaps Cascade	Some "American" characteristics.
Perle (German)	6-8.5%	Northern Brewer, U.S. Perle	Moderately intense, good and hoppy, fruity and a little spicy.
Perle (U.S.)	6-9.5%	Chinook, Cluster, Galena, Northern Brewer	Known for its aromatic and bittering properties, pleasant and slightly spicy.
Phoenix (U.K.)	8-13%	U.K. Challenger, U.K. Kent Golding, U.K. Northdown	Similar to U.K. Challenger.
Pioneer (U.K.)	8-10%	U.K. Kent Golding	A mild, typical English aroma.
Pride of Ringwood (Australia)	7-10%	Cluster, Galena	Quite pronounced, woody, earthy, herbal.
Progress (U.K.)	5-7.5%	Fuggle, U.K. Kent Golding	Moderately strong, good aroma.
Riwaka (New Zealand)	4.5-6.5%	Czech Saaz, possible American "C" hops	Citrusy, grapefruit aroma hop
Satus	12.5-14%	Galena	Known for its bittering and aromatic properties.
Simcoe	12-14%		A bittering and aromatic hop.
Sorachi Ace (Japan)	13-16%		Bittering hop with lemony aroma
Southern Cross (New Zealand)	11-14%		Piney, resinous bittering hop
Styrian Golding (Slovenia)	4.5-6%	U.K. Fuggle, U.S. Fuggle, Willamette	Delicate, slightly spicy.
Summit	16-18%	Simcoe	Ultra high-alpha bittering hop
Sun	12-16%	Magnum or a high-alpha hop	High-alpha hop with intense character



not a Fake Ale

Name	Alpha Acid %	Possible Substitutions	Flavor Description
Super Alpha (New Zealand)	10-12%		Earthy, piney bittering hop.
Super Pride (Australia)	14%	Pride of Ringwood	A high alpha variety bred from Pride of Ringwood.
Target (U.K.)	9.5-12.5%	Fuggie, Willamette	Pleasant English hop aroma, quite intense.
Tomahawk	15-17%	Columbus	Primarily a bittering hop.
Warrior	15-17%	Nugget	A bittering and aromatic hop.
WGV (Whitbread Golding Variety) (U.K.)	5-7%	U.K. Kent Golding, U.K. Progress	Quite pleasant and hoppy, moderately intense.
Willamette	3.5-6%	Styrian Golding, U.S. Fuggie, U.S. Tettnanger	Mild and pleasant, slightly spicy, fruity, floral, a little earthy.
Yakima Cluster	6-8.5%		Used as a kettle hop for bittering.
Zeus	13-17%	Columbus	Aromatic and pleasant.

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Organic ingredients are ramping up to meet processors' needs. Advance planning is the best sourcing ingredient.

By Kathryn Trim | 03/27/2007



Not too long ago the only place you could find organic products was at a farmers market or natural foods store. But after watching sales of organic foods steadily grow at 15-20 percent for the past decade, these days everyone wants a piece of the organic pie.

Top processors including Kraft and General Mills have started organic lines or are buying organic companies to add to their portfolios. Wal-Mart is planning to double its organic offerings this year. Retailers such as Safeway and Super Target have launched their own private labels, with Super Target having gone the extra step to get USDA certification as an organic retailer. McDonalds is serving organic coffee. The shelves at 7-Eleven are stocked with organic snacks.

According to the 2005 Manufacturer's Survey from Organic Trade Assn. (OTA, www.ota.com), U.S. sales of organic products have surpassed \$14 billion a year, with processed foods (foods other than produce, dairy or meat) representing more than 42 percent of sales. Compared to the 2 percent annual growth of conventional groceries, organic offers an exciting opportunity. However, although the green organic seal has the potential to generate a lot of green, can the organic supply keep up with the ever growing demand?

The answer from those in the industry is an enthusiastic yes. But before you try to order 5 million pounds of organic flour, you must first understand the organic world and how it differs from the conventional food world.

The organic supply chain

Organic may be a big opportunity, but at roughly 3 percent of the market it's still a small industry compared to conventional foods. And while there are some who have been pioneering the grass roots organic movement for decades, the U.S. National Organic Program (NOP) is a mere five years old. As a result, there are fewer suppliers to choose from and a less formal infrastructure than that of the conventional processing world. This means you have to go about sourcing in a different way.

"To source organic ingredients effectively, processors must look at the supply chain with a different lens. Sometimes it means connecting with the source at the ground level, planning and making a commitment," said Grace Marroquin, ingredient broker and president of Marroquin Ingredients (www.marroquin-ingredients.com), Santa Cruz, Calif. "To truly be successful in organic processing, it takes commitment both to the suppliers as well as to the organic industry itself. You must see organic as long term, not just some fad, and be willing to weather a few growing pains along the way."

The supply situation changes from season to season depending on weather, demand and other factors; what is in short supply now could be in surplus next year. Some items that have been more challenging to source include hazelnuts, apricots, brown rice syrup, oats, blueberries and some exotic fruits such as goji berry. Because of skyrocketing demand for organic dairy product, byproducts such as organic lactose and whey protein concentrates have not been commercially available in the U.S. Other minor ingredients such as colors and flavors also have been challenging to source, but lately more and more suppliers are coming out with organic versions.

Overall, those in the organic world are responsive to demand and have made great strides in a short time. In 2005 alone,



Kellogg developed its own line of organic cereals, while Kraft bought an organic company.

more than a million new acres were converted to organic for a total of 4 million acres of farmland, 2.3 million in cropland and 1.7 million in rangeland and pasture, according statistics released just this past December by USDA. Trade organizations like OTA are working to get more research dollars to aid farmers in transitioning to organic.

Industry leaders such as Stonyfield Farm and farmer-owned cooperative Organic Valley spent an estimated \$2 million on incentives and technical assistance to help dairy farmers convert or boost their production in 2006, and Horizon Organic Dairy's "HOPE" program has helped some 250 family farms convert to organic since 1991.



As a result, organic milk is expected to have a surplus in the spring and summer of 2007. Strong demand could catch up with supply by early 2008, according to Stonyfield Farm officials, but in the meantime this surplus could likely result in production of other organic dairy byproducts that have been scarce.

"It is all interconnected, and as the demand in one area grows and suppliers rise to meet it, other areas will grow and expand as well," says Marroquin.

Horizon Organic and other milk suppliers have been so successful at cultivating an organic milk supply there may be a surplus this spring and summer.

Suppliers around the world are ramping up production to help meet the supply needs of organic. Reports from The Organic Monitor show organic ingredients such as beans, seeds and nuts are increasingly coming from China, Turkey, Brazil and other countries. Organic herbs and spices are being imported from India, Paraguay and Ethiopia. Increasing volumes of organic fresh fruits and vegetables are coming in from African and Asian countries. Latin America and Australia are established sources of organic meat products.

Devise your own plan

The key word here is "plan." Most organic farms are small, family-owned operations where each acre is carefully planned and planted based on strategic estimates. Thus, unlike conventional agribusiness operations, many organic farms usually do not end up with a huge surplus to sell at spot market come harvest time. This leads to the appearance of a lack of supply, when it really comes down to a lack of planning on the part of the buyer.

Organic suppliers are more than happy to meet the need, but in order to do so they have to plant the seed. Many organic ingredient suppliers are developing higher stocks of inventory that are readily available at short notice. But to get what you need, for larger orders especially, buyers should make arrangements with suppliers before growing season to ensure the needed ingredients are planted.

"To best way to ensure supply is through proper forecasting and communication with suppliers. In some cases, this may mean having to plan up to 18 months in advance of when the product is needed," says Holly Givens, OTA public affairs advisor. For example, last year there was an oversupply of white corn, and ingredient buyers were able to buy it readily on the spot market, Givens said. Based on the previous surplus, this year the farmers planted less; meanwhile manufacturers, who took for granted there would be plenty on the spot market, didn't contract with suppliers. Planning could have prevented this issue.

“We can have as much as you want as long as you let us know before growing season,” says Joe Lombardi, business manager at National Starch Food Innovation (www.foodinnovation.com), Bridgewater, NJ., which markets Novation organic functional starches. “There’s sufficient acreage available, but if we don’t put the seed in the ground then larger orders may have to wait till the next growing season.”

Communication is a big part of successful sourcing. “It’s about asking the right questions about supply and availability up front. A client needs to have an idea about how much they will need early in the process and when they will need it by,” says Camille Nava Janssens, director of sales for Marroquin Ingredients. To make sourcing even more efficient, her advice is to track and share sourcing information interdepartmentally, and perhaps even to create a sourcing database on the company server.

Planning and communication can happen at many different levels. For some it may be as easy as calling the supplier. Other times you need to go to farmer directly. “Sometimes you have to get more active lower in the chain to get what you want,” says Bob Anderson, president of the organic consultant group Sustainable Strategies and founder of Walnut Acres, one of the first nationally distributed organic product lines. When there was an oat shortage, Anderson helped companies work with oat cooperatives to ensure they had the raw material and then work with their preferred processor to get the quality desired.

Those new to the organic industry may want to get a little help, at least in the beginning, from a consultant or broker. Someone who knows the intricacies of the organic supply chain can help you find, plan and communicate with producers.

Anderson and others like him have helped many processors find what they need from producers around the globe, and brokers like Marroquin Ingredients have invested years working as a liaison between processors and producers to develop and import specialty ingredients such as organic yeast. The OTA lists consultants on its “Organic Pages” web directory. OTA also offers an “Ingredients Wanted” forum where processors can post ingredient requests (www.theorganicpages.com/topo/ingredientsourcing.html).

The final step in the plan of action is to make the commitment. “When you find what you need, lock it in,” says Anderson. “If you wait till the spot market, you may be too late or you’ll pay a premium that will eat away at your margins.”

This commitment often involves some risk sharing or co-venturing, including contracting with farmers or suppliers at some level. Because these are smaller operations, if one processor backs out on an order that the farmer based his crop on, it could bankrupt him. Givens suggests that, depending on the volume, processors might want to go so far as to help farmers convert to organic. It takes three years to convert land to organic. During that time, farmers must farm organically while they’re only getting conventional prices.

“The organic community is still a small community and we are still building infrastructure as we go,” adds Givens. “By working with farmers, you’re encouraging growth and by making this commitment you will be ensuring that they will have a market for their product when they are done with their transition.”

New ingredients meet demand

Like any business, the organic supply industry operates on supply and demand. If enough processors tell ingredient suppliers they want an organic version of something, then the ingredient suppliers will respond. “It is not a question of if the supply could be available, it’s about if there is enough demand to justify the time and money it cost to make that product,” explains Marroquin. “As demand grows, more players will step up to meet it.”



Even more category growth was anticipated after Wal-Mart made a big commitment to organics last summer. Will organic ingredient supply be able to keep pace with demand?

PL Thomas (www.plthomas.com), Morristown, N.J., is one of those that has stepped up, launching organic guar gum, carob powder and, most recently, an organic rosemary used as a non-synthetic preservative.

“With all the regulations, many clients won’t even bother with it unless it’s certified organic. That’s why we’re always wanting to do more,” says Rodger Jonas, national business manager. PL Thomas also plans on coming out with extracts such as maple, St. John’s bread, chicory and horehound.

In fact, organic is getting more flavorful everyday. “Four years ago, people thought organic flavor compounds were impossible but today organic products have many of the same flavor options as conventional,” says Tony Moore of Moore Ingredients (www.moorelab.com), Hamilton, Ohio. And the flavors are in plentiful supply, he adds, with the exception of some limitations with blueberry and organic exotics such as mangosteen and goji berry. Mastertaste (www.mastertaste.com), Teterboro, N.J., also has expanded its line of organic oleoresins, extracts, essential oils and concentrates.

Organic is getting more colorful, too. “Colors are used in such small quantities in processing in general, and even smaller in organic, so there just wasn’t enough demand. But today more and more people are asking for them,” says Helen Greaves, operations vice president at Food Ingredient Solutions, (www.foodcolor.com), Teterboro, N.J.

The first color to come out in organic was caramel, which is in greater use than other colors. Having been in the market for some time, organic caramel manufacturer Sethness Products Co. (www.sethness.com), Lincolnwood, Ill., has worked out supply kinks and has never turned away a food processor for lack of supply, says President Brian Sethness.

Food Ingredient Solutions makes organic reds from elderberry and beet, as well as ground paprika and turmeric for soup mixes or other products that don’t require complete solubility. Moore Ingredients recently came out with an organic turmeric and hibiscus, which are water soluble and can be used to create a range of yellows, oranges, pinks and reds. However, many colors are not commercially available quite yet.

Other ingredient challenges have less to do with agricultural availability than with paperwork. For instance, the exotic berry seabuckthorn, a popular high-antioxidant functional food, grows everywhere in Armenia but is still going through the USDA certification process. Acai, another popular wild berry from Brazil, went through the same challenge but now there is a solid supply thanks to companies such as Sambazon (www.sambazon.com), San Clemente, Calif., which made the effort to get it certified.

While waiting for the exotics to become available, processors can incorporate more readily available fruits with some of the same benefits, such as high-antioxidant cranberries. By working to convert farmers, Decas Cranberry (www.decascranberry.com), Carver, Mass., expects to double its organic supply next year.

One of the final frontiers of organic supply seems to functional ingredients — alternatives to emulsifiers, phosphates (used in meats) and stabilizers, says Lombardi. Prior to National Starch’s Novation line of functional native corn, tapioca and rice starches, most organic processors had to use traditional native starches, which don’t hold up to processing very well, according to Lombardi.

Ribus Ingredients (www.ribus.com), St. Louis, also answered the call for functionality with Nu-Flow anti-caking agent and flavor carrier, a replacement for synthetics such as silicone dioxide.

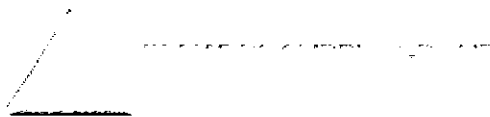
Overall, organic ingredient demand is being met with more and more products every day, strengthening the supply chain and forging a path for organic processors to meet the needs of organic consumers.

Notes to

Procurement

When a company says its ingredient is certified organic, make sure it is “USDA Certified Organic.” The European Union and other countries have their own certification programs, but these certifications are not considered valid in a USDA-certified product. In order for the end product to be approved by a USDA certifier and sold as organic in the U.S., every organic ingredient must be approved by a USDA-accredited certifier. You can find a list of these certifiers at:

www.ams.usda.gov/nop/CertifyingAgents/Accredited.html.



Our Philosophy

Brewers Supply Group offers a wide range of domestic and imported hops. Our hops are hand selected for quality by experts, who have a combined experience of over forty years in the hop industry. The drastic decline in the number of growers operating in the Yakima Valley will ultimately lead to less choice in varieties and quality. It is our philosophy, therefore, to buy only the very best quality from the best growers and to give the grower a sustainable return on his crop. Providing quality hops to the brewer doesn't just mean buying the best hops from the grower, good processing and packaging is also extremely important. We operate our own pelleting facility to maintain quality control and ensure that our hop pellets keep the fresh character of our whole cone hops. We extend this philosophy to our English, German, Czech and European varieties. We buy from the best growers and import the whole bales using cold transit routes and process here in the US where the equipment and storage conditions are far superior to those in Europe and the UK. Because of our distribution points across the US we are able to offer hops on contract or spot purchase from our warehouses, each of which are equipped with cold storage facilities.

Our division has one large advantage, we are not owned by hop farmers, hence we can choose the hop farmers we are buying from and make sure they supply the best quality hops!

Forward Contracting

We encourage brewers, both small and large, to contract forward for their requirements. This provides some stability in the market for all in the supply chain. The international hop market has overproduced hops for ten years, which has contributed to low pricing and the decline of the amount of hop farmers. We have now, however, entered an era of reduced production of hops worldwide and, as a consequence, a very limited amount of spot hops being available.

Many craft brewers have therefore become more acutely aware that there is a genuine need to contract for at least one year's supply of hops as some aroma varieties are already sold out shortly after harvest. The larger craft breweries have now wisely adopted a contracting philosophy of 2 to 3 years ahead.

By contracting a given variety forward the hop dealer can make firm forecasts to the growers who will then make the investment in time and materials to ensure that his product is available and of good quality. The large brewers will continue to drive the demand curve for any given variety. So if craft brewers favor a hop which is in decline, contracting is essential to encourage the grower to continue production. New or trend driven varieties tend to become short so contracting becomes a way of safeguarding supply. We will, of course, do our best to serve the spot buyer with any requirement he or she may have, but we can not guarantee that supply. We will, at time of harvest, (usually second week of September) offer a selection service in Yakima. Brewers may visit and examine the new harvest hops and discuss their needs. Please contact us in the summer in order to book an appointment.

Brewers Supply Group Hop Division:

P.O. Box 1401
Yakima, WA 98907

Outlook:

Considering that crop 2008 is virtually sold out already and the opportunity to add additional acreage for this year is very low, we recommend strongly to securing contracts from crop years 2009 up to 2016.

Breweries as well as the trade will need to re-stock but there is no chance, either because of the cost or, most likely, for lack of availability of hops, to do this from crop 2008. This needed restocking can perhaps take place with crop 2010 and up, when the new acreage worldwide will come into full production.

We also like to point out that demand for hop products coming from industries outside the brewing industry is growing at a fast pace. Hop-based products add unique functional features to the users, in some cases allow them to comply with laws or regulations, and in other cases simply add real value to their products and byproducts.

At this time, all hop feed stock materials for these new products come from US hop producers.

We hope to discuss your forward purchase needs within the next weeks and recommend rather acting sooner than later because the quantities are very limited for the front years.

John I. Haas, Inc.

| Key Data | Hop Acreage | Crop Quantities | World Hop Crop | Lab Values | Worldwide Use
 Alpha Acid Production | Alpha Values | World Wide Beer Productions
 | Alpha Acid Supply/ Demand | Hop Cycle |

Retrospective Based upon an estimated world beer output of 1,977 MHL in 2008, the supply of crop 2007 alpha acids was less than the world's demand.

The 2007 hop crops in Germany, the Czech Republic and other European hop growing countries were average in weight and alpha yields. In USA a late outbreak of powdery mildew negatively affected the weight and alpha yields of powdery mildew-susceptible varieties. In Slovenia a tornado devastated a large portion of the hop acreage just before harvest. After harvest, a large handler of Slovenian hops declared bankruptcy which led to additional problems in this market segment.



The undersupply of crop 2007 was much less extreme than the situation following crop 2006, when the supply was approximately 1,080 metric tons of alpha short of demand. Crop 2007 benefited from a larger worldwide acreage and improved growing conditions. Nevertheless, crop 2006 was a contributor to the overall decline hop inventories as brewers had to use their stocks to replace volumes not available on the market. Prior to crop 2007 brewer hop stocks were at a historically low level, which led to a short-lived spot market with extreme, ever-increasing price levels.

We currently expect that the demand for alpha for brewing year 2009 will be 7,631 metric tons. When taken into account with 2008 hop production, this means that there will be adequate supply available and may give brewers the option to rebuild their inventories.

Crop 2008 European hop growing conditions were above-average. Temperatures were moderate and precipitation in most growing areas was adequate. For these reasons, weight yields and alpha levels were above average in Germany, the Czech Republic, Slovenia and other areas.



These developments led many brewers of all sizes to purchase long term contracts beginning with crop 2008 and extending five or more crop years. The quantity of hops sold ahead reached unprecedented levels. This demand could only be met by planting new acres, especially in the USA. By late spring 2008 approximately 7,000 hectares (17,300 acres) were newly planted to hops worldwide.

The Chinese crop was also normal. Acreage was up nearly 43% as many new entrants appeared to take advantage of historically high hop prices. As a consequence, production was up by approximately 33% over 2007.

Prognosis

The world hop crop estimate for 2008 of 110,000 metric tons is approximately 18,600 metric tons larger than crop 2007. Crop 2008 alpha production is estimated to be ca. 9,439 mt.

In USA the 2008 crop was average in most respects other than the large increase in acres. The crop is estimated to be approximately 7,300 metric tons larger (26.6%) than crop 2007. The increase in plantings was primarily in super high alpha varieties, which will lead to a proportionally greater increase of alpha production from future crops.

World beer production during 2008 has lagged projections, particularly in Asia. For example, Chinese beer sales growth has been approximately half of the 12% that was expected. Around the world many brewers were forced to raise prices as a result of steep increases in the prices of raw materials and other inputs. At the same time, the increasingly unsure economic circumstances in many countries led consumers to limit their spending. In China, summertime

The crop 2008 spot market has been slow to start. Prior to harvest, the extreme prices for remaining crop 2007 material or forward contracts caused uncertainty in the marketplace. In Germany this has led to spot hops of all varieties once again being placed in pools. In the USA the high level of forward contracts and the mediocre crop means that there are very few

beer sales were surprisingly below expectations. This was caused by changes in government policies pertaining to security surrounding the Olympics as well as by the aftereffects of natural disasters on the economy.

Beer sales growth projections for 2009 are also modest, which will affect demand for hops. In addition, the difficult supply situation of the past two years has led brewers to become more economical in their use of hops via reduced hopping rates or increased usage of isomerized and/or downstream hop products.

spot hops available. In China brewers are taking a wait-and-see approach to the market.

While in total there are adequate stocks of spot hops available, a portion of the mathematical oversupply is dedicated to forward contracts that were put in place to rebuild hop inventories. There are still a number of brewers who need to purchase spot hops to meet their 2009 brewing year needs. The limited U.S. spot market is also a sign that Mother Nature retains an important role in the quantity of hops that actually end up on the market. This is a reminder of the value of forward contracts as a stabilizing influence on the market. ✖

Hop contracting for brewers large and small

By Ralph Woodall

(Note: Updated from a CBQ article in 2005)

As many brewers are aware they have an option to contract hops prior to the actual harvest.

This allows the brewers to cover their inventory needs into the following year. The larger Craft Brewers have been doing this all along but in the past few years smaller Craft Brewer and Brew Pubs are setting up inventories. In the case of some of the specialty hops such as: Centennial, Amarillo, Horizon, Liberty, No Brewers, Santiam, Crystal, this is done to avoid the variety not being available later in the year (These are sold out varieties this year).

This is evident this year with the shortage of Columbus, which is normally in good supply but the hop fire in Yakima this past October destroyed several thousand bales of Zeus, hence the Columbus is "sold out." For other varieties it is done to secure the same alpha percentage and still in other cases the brewers are actually selecting the raw hops lots to be used for their hop pellet yearly needs. As a general rule we do not encourage raw hop selection for brewers who are only buying smaller amounts of a particular variety of hop pellets as this can become an inventory problem. If too many different lots are chosen and we have to start and stop several times for each variety, this increases

production costs and slows down production.

For small raw hop users, lot selection is not as difficult but over the years this has made for logistic problems as coordination of lot selection can compromise either pelletizing or the production of mini and quarter bales as brewers in many cases are delayed in their selection for some reason or another. Rest assured we have plenty of good hops set aside to cover the brewers hop pellet and raw hop needs. We strive to supply the best hops available at any given time.

Also, if you contract, be willing to use any over contracted hops and if you underestimate plan to be open to potential substitutions or using another alpha lot of the same variety. The name of the game in contracting is to be flexible, regardless of how you determine your numbers, be they liberal or conservative. If sales increase above your expectations you will be short and if they drop below you will be long. This is part of what we call the "Double Edge Sword." In case of price, if the price goes up you are happy as you are getting at a lower price, but if the price goes down you may not think it is fair to have to pay more than others. You have to be willing to play the market as we do not adjust contract prices once the contract is signed. In the case of over projection of inventories, again you must be willing to work

these through your brew system until they are used up.

Keep in mind hop pellets are packed in vacuum sealed foils and are kept in our cold storage warehouses so they are very stable, and if unopened and kept in cold, can be good for many years. Also, keep in mind the quality of hops also changes from year to year so alphas and aromas of the new crop may not be as good of the previous year. If you plan to be in the brewing world for a long time you will see the differences and understand why we use averages in our Hop Variety Characteristics book. You will also learn how to react to these differences and still feel good about your hops and beer as you too are brewing the best beer you can at any given time.

To contract is up to each individual and we are open to work with you to cover your needs. Plan to have your numbers together based on the average alpha of the varieties you are using and base it on your best guess for production. Usually we suggest contracting your hop needs from late November to late November for domestics and late January to late January for imports. The 2006 crop availability for both domestic and import hop pellets were delayed on some varieties so keep this in mind. This "hop hedge" allows time for the new crop to be pelletized and also allow a buffer in case you underestimate

or we are delayed in production. You may get some better pricing when contracting but now contracts are prepaid or invoiced either Net 30 or some at 30-60-90 days from when inventory is set up.

Some larger brewer inventories can be invoiced as quarterly payments. As long as you have a steady cash flow there should not be any problem. Keep your accounting department advised as many contract hops have to be paid for by the following August first. This allows us to pay the grower prior to the delivery of the new hop crop. We try to discourage hoarding of hops and if you do please plan to keep them and not try to turn them in the following fall. Many of your fellow brewers would have liked to have had the opportunity to brew with the hops.

Please try and stay realistic to keep from causing a rush and subsequent shortage when there may not actually be one. As you can see there is a lot of information to think about so I trust this will give you some good insight into the contracting world. If you have any specific questions please do not hesitate give us a call at 1-800-952-4873.

We anticipate an early contracting season this year so it is now time to look at your numbers and give us a call. We are willing to work with any size brewery to cover their 2007 crop hop needs and would like to work with you.

Penny the Hopunion mascot passes away in January

As many of you are aware Penny was the cute little Chihuahua that was featured on several of our Holiday cards over the years.

She was especially cute as the sole "dogster" pulling the Hopunion sleigh a few years ago.

She was the special pet of Bob Rabe, our warehouse manager and his wife Donna.



Penny passed away in January at the age of 19.

We will always have a special place in our heart for little Penny and we thank Bob and Donna for allowing her to participate in our holiday spirit.

She was and will be one of the sparkles in our eyes.

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Memo to US Growers

September, 2009

As we head into the second half of harvest, we see a continuation of the exceptional yields first observed in aroma hops. Many of you have already taken the extraordinary step in harvesting aroma hops only to the contracted volume, leaving the remaining unsold hops hanging in the field. John I. Haas on its own farms has followed the same principle.

It is surprising that there are now hops left hanging in the field when just a year ago the industry could hardly supply the world-wide demand for hops. So what happened since winter/spring 2008, when brewers entered into many long-term contracts? First, the brewing industry was not left unscathed by the world-wide economic crisis. The anticipated growth in world beer output did not take place. Quite the opposite, in many areas of the world, beer consumption has significantly declined since last year. Secondly, in response to the unprecedented hop shortage after crop 2007, brewers adjusted their hopping formulas to stretch the available alpha by employing more efficient hop products.

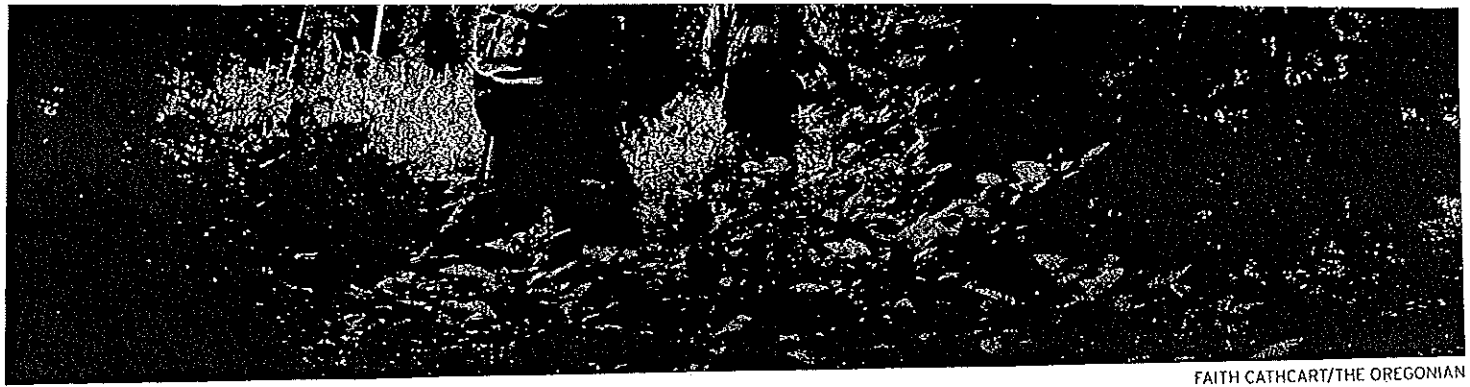
The resulting decreased hop consumption per barrel coupled with a decline in beer output has left the brewing industry with more hops contracted than actually need.

On top of this situation, we find ourselves with an unexpectedly large crop 2009. Therefore, any production exceeding contracted volumes is unnecessary from an overall world demand perspective. Furthermore, harvesting this unneeded, extra production will actually only diminish the growers' profitability as it will cost harvesting, storage and processing. It is unlikely that these hops will find a market in the near future.

There are two other important factors: First, the industry has essentially not increased its storage capacity since last fall when it took in about 80 million lbs of crop 2008. For crop 2009, there is enough quality capacity to store the contracted hops and some amount of spot hops, however, not all. Second, processing plants are virtually booked to capacity with existing contracted volumes. Spot hop processing would likely only be possible toward the end of the season, if at all.

While it goes against the grain of every hop grower to leave perfectly good hops hanging in the field, we can only recommend that growers harvest only up to their contract volumes.

John I. Haas, Inc.

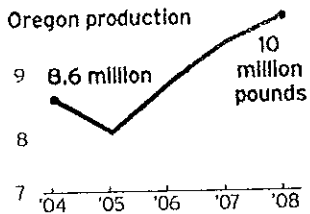


FAITH CATHCART/THE OREGONIAN

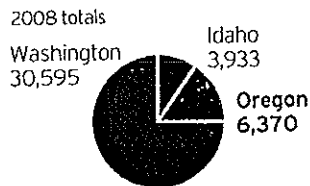
Leonel Acosta Calderon slashes the bottoms of hop vines at Sodbuster Farms near Keizer. Afterward, trucks thread through the rows so workers can gather the vines, which are taken to the processing barn and stripped of their cones by a huge, clattering machine. Cones are then cleaned, dried at 140 degrees and pressed into 200-pound bales.

Ups and downs of hops

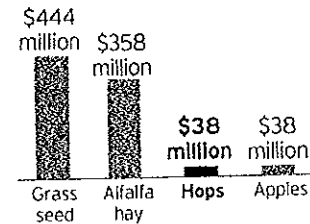
Oregon hops



Hops acreage



Oregon crop comparison



Sources: USA Hops, Oregon Department of Agriculture

Northwest growers, who put in 10,000 new acres to deal with a shortage in 2007, are awash in crops

By **JOHN FOYSTON**
THE OREGONIAN

The hops shortage of 2007 is over, buried in a glut of unsold hops. Don't expect craft beer prices to follow — the \$5 pint and \$9 six-pack are likely facts of life — but hops prices are now so low that some Oregon and Washington growers left hops unharvested this fall.

"The only time I've heard of hops left hanging was back when powdery mildew hit so hard that some yards weren't worth picking," says John Annen of Annen Brothers Farms and chairman of the Oregon Hop Commission.

"But never industrywide — these are perfectly good hops unpicked because there's no warehouse space and no spot market for uncontracted hops."



Two years ago, failed European crops, declining acreage worldwide, a Yakima warehouse fire and other factors conspired to send spot prices for beer's most distinctive ingredient soaring from \$2 and \$3 a pound to more than \$30 in some cases.

Washington, Oregon and Idaho growers reacted by putting nearly 10,000 new acres into production since then, and the 2008 crop was the biggest in years. This fall's harvest looks to be even better, though figures and spot prices are not available.

Gayle Goschie of Goschie Farms near Silverton sells much of the crop from her 370 acres through contracts to brewers large and small and added 80 acres this year to fill contracts with craft brewers.

Please see **HOPS**, Page A5



The latest on Oregon beer and brewers can be found at blog.oregonlive.com/thebeerhere

Pilots lose licenses

The Federal Aviation Administration said it has revoked the licenses of the two Northwest Airlines pilots who overflew their destination airport last week | **A2**

WEATHER
Mostly

As sales tank, lottery and bars locked in mutual dependence

By **BRENT WALTH**
THE OREGONIAN

The lottery's proposal to protect the cut of gambling profits paid to bars and taverns confirms a long-held suspicion about video gambling in Oregon: Many businesses need the lottery to prop them up, and state officials say they have no choice but to do so.

Oregon Lottery Director Dale Penn said in an

have fallen by nearly one-fourth since last year. Critics don't buy the argument, but Penn's reasoning underscores some unintended consequences of video gambling: As gambling sales tank, the lottery and its saloon partners are locked in a death grip of mutual dependence. "The argument is taverns have become accustomed to getting this money," activist Steve Novick says. "Well, children in Oregon schools have become accustomed to having teachers,