Mildew-Resistant Hops Tested by Brewing Industry

Production of beer depends on a continued stable supply of an agricultural commodity—hops. Geneticist John Henning is working to ensure that an emerging disease in hop production areas doesn't threaten the crop.

Henning works for ARS' Forage Seed and Cereal Research Center in Corvallis, Oregon, studying diseases that affect hops. In 1997, the newly invasive disease powdery mildew wiped out 10,000 of the 48,000 acres of hops in the United States. Before the accidental introduction of this disease, farmers spent considerable amounts to control another fungal disease, downy mildew. For the next few years, additional fungicides were able to keep both mildews under control—but it ended up costing growers $300 more an acre to do so. Something else had to be done.

All beer contains two types of hops. The bittering hop is used to make brew more bitter. The aroma hop is used for flavoring. Hops grow on 20-foot-long vines and are related to cannabis. The female plant is the only one grown for beer production.

In February 2002, Henning released Newport, the only bittering hop with a high level of genetic resistance to the two mildew strains. Such resistance reduces the cost of hop production and the amount of fungicides used because the fungus is not able to infest resistant plants. Mildew was a problem in Europe even before it destroyed more than 20 percent of the U.S. crop in 1997.

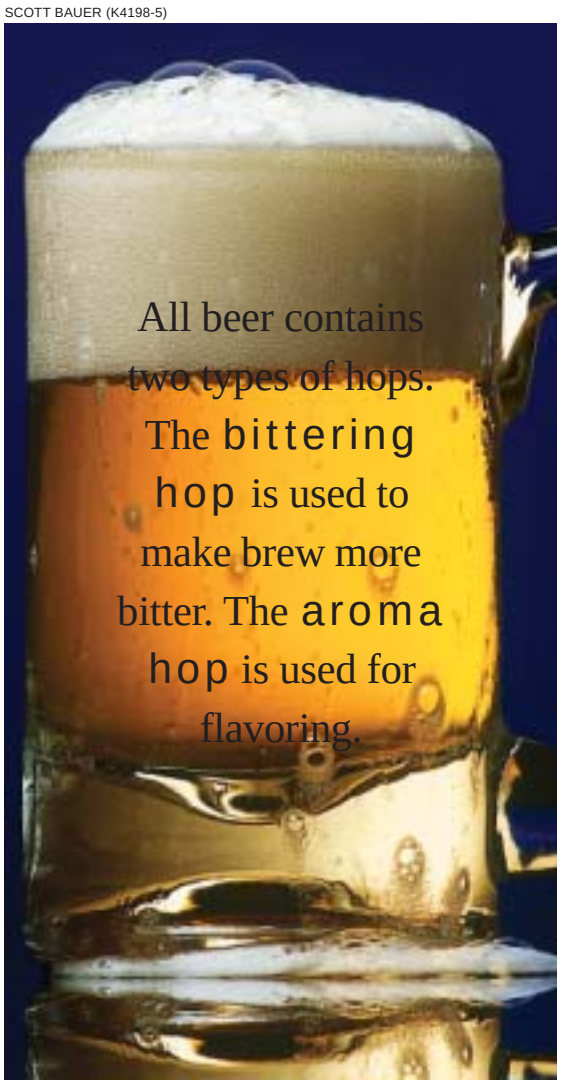
Newport produces large yields of hops and is considered grower friendly. One major brewery is conducting large-scale pilot brewing trials of the new hop, and another large brewery has requested samples to start its own tests so that the hop may one day be used commercially.

The original cross from which Newport originated was performed by geneticist Al Haunold before he retired in 1997. Haunold spent many years researching hops for ARS in Corvallis. Henning made the initial selection and collected data on Newport for several years before advancing it to commercial-size production nurseries in both Washington and Oregon.

Henning is also working towards developing germplasm for an aroma hop that is resistant to the two fungi. He has started making crosses to introduce the resistance genes into the aroma-type hop germplasm and plans on growing them on large-scale plots this year and next. He will then test them to see if they are resistant to fungi and acceptable for brewing use.

The beer industry makes good use of hop varieties developed by ARS geneticists, including two released by Henning. Horizon is used fairly extensively and Sterling to a lesser extent. At least one-third of the hops used in American beers have ARS origins, and some foreign beers contain ARS hops as well. Many of these hops were developed to make the beer taste better—more like popular European brands—rather than to protect against diseases.

SCOTT BAUER (K4198-5)



Henning states, "I'm responding to the needs of the brewing industry as quickly as possible in terms of developing new varieties of hops." It may take 10 to 15 years for geneticists to release a new hop variety, and they are looking at ways to speed it up.

"I'm getting closer to identifying the actual genes involved in genetic resistance that can be used as molecular markers, making selection 100 percent efficient," Henning explains. Hops are one of the few crops not currently developed with molecular markers. Once they can be, this will shave years off the time it takes to introduce a new variety.

Newport has been deposited into the National Clonal Germplasm Repository, in Corvallis. Like all other deposits in ARS' National Plant Germplasm System, it is available to researchers, breeders, and others with legitimate uses.—By **David Elstein,** ARS.

This research is part of Plant Diseases, an ARS National Program (#303) described on the World Wide Web at http://www.nps.ars.usda.gov.

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