yields calculated from small nursery plots near Corvallis ranged from 900 to 2500 kg ha\(^{-1}\), with a 7-yr average of 1350 kg ha\(^{-1}\). Yields in large 1.2-ha commercial plots near Salem, OR, ranged from 1330 to 2850 kg ha\(^{-1}\) from 1988 through 1992 (5-yr average: 2285 kg ha\(^{-1}\)). The 3-yr production average (1988–1991) for Washington and Idaho was 1310 and 1970 kg ha\(^{-1}\), respectively.

Crystals alpha and beta acids content during the 7-yr nursery testing period averaged 6.0 and 6.7%, respectively, with a columbeline content of 21% and a colupulone content of 35 to 40%. The alpha ratio (the proportion of alpha to beta acids) was 47%, indicating that Crystals beta acids content on average is slightly higher than the alpha acids content. Crystals relative proportions of alpha and beta acids, as well as the low columbeline and colupulone content, are similar to those of ‘Saazer’, a well-known Czech aroma hop (7). In contrast to Saazer, however, Crystal has little or no farnesene in its essential oil.

Similar to European aroma hops, Crystal's soft resins have relatively poor storage stability. In controlled room temperature storage tests, \approx 50\% of the original alpha acids were transformed to other products not measured spectrophotometrically.

Crystal's essential oil content is relatively high, ranging from 0.77 to 2.14 mL 100 g\(^{-1}\) of dried hop cones (80 g kg\(^{-1}\) moisture basis [8%]), with a 7-yr average of 1.38 mL 100 g\(^{-1}\). Oil composition ranges were 40 to 65% myrcene, 18 to 24% humulene, and 4 to 8% caryophyllene, with only trace amounts (0.1%) of farnesene, resulting in a ratio of humulene to caryophyllene of \approx 3.60, characteristic of imported European aroma hops.

Alpha acids content in commercial test plots in Oregon, Washington, and Idaho averaged 3.6, 3.0, and 1.7%, significantly lower than in the initial Oregon nursery plots. This may have been due in part to improper handling after harvest as indicated by an abnormally high Hop Storage Index (6) for one Washington and two Idaho harvests (0.47, 0.59, and 0.92, respectively). Beta acids content averaged 6.3, 4.8, and 4.6%, respectively, at the three test locations during the same period, while columbeline content ranged from 19 to 23% of the alpha acids.

Crystal has a columnar growth habit but, because of vigorous sidearm development with customary commercial umbrella-style stringing, individual plants grow together to form a nearly solid canopy late in the season. This poses no problems at harvest.

In Oregon, Crystal showed some infection by hop downy mildew [caused by Pseudoperonospora humuli (Miya\(\overline{e}\) & Takah.) G.W. Wilson] early in the season, particularly at the base of the plant, where dense shoot development is conducive to disease development. Vigorous sucker removal after training followed by one application of a registered systemic fungicide and one or two contact copper fungicide applications during the growing season are recommended to keep downy mildew under control. The disease was readily controlled in Oregon plots with fungicides authorized for use on hops except during the abnormally wet 1993 season, when a late secondary infection during flowering required an additional copper-based fungicide application.

Verticillium wilt (caused by Verticillium albo-atrum Reinke & Berthier or V. dahliei Kleb.) was not observed during 4 yr of commercial trials in Oregon, Washington, and Idaho and 7 yr of nursery trials near Corvallis. Crystal is free of potato and necrotic ringspot and apple mosaic, hop latent, and American hop latent viruses, which may be present in other cultivars grown commercially in the USA.

Crystal's major advantages are high yield potential and quality traits similar to prized European aroma hops now being imported into the USA. Interest in Crystal has come primarily from small brewers, whose access to imported European aroma hops sometimes is limited. Thus, Crystal's market may be limited, despite the rapid growth of many small regional brewers and their specialty beers.

Virus-free plants of Crystal will be maintained in the Hop Cultivar World Collection at the USDA Pacific Northwest National Clonal Germplasm Repository near Corvallis, OR, and under a cooperative agreement at the Irrigated Agriculture Research and Extension Center, Washington State University, Prosser, WA. Small amounts of planting stock will be supplied to interested scientists, growers, and the general public, depending on availability.


References and Notes


We thank the Hop Research Council for experimental assistance and financial support.

Published in Crop Sci. 34:279-280 (1994).

Registration of ‘Arthur’ Dahurian Wildrye

‘Arthur’ Dahurian wildrye (Elymus dahuricus Turcz. ex Griseb.) (Reg. no. CV-168, PI 574531) was released by the Agriculture Canada Research Station, Swift Current, SK, on 3 Mar. 1989. Arthur is the first of two cultivars of Dahurian wildrye registered for sale in Canada. Dahurian wildrye is a self-pollinated, hexaploid (2n=6x=42) (2), short-lived perennial caespitose grass native to Siberia, Mongolia, and China. Stands of Dahurian wildrye persist 2 to 3 yr in southwestern Saskatchewan. This short-lived perennial with high seeding vigor is well adapted for seeding in mixtures with long-lived grass species with low seeding vigor for improving the early productivity of dryland pastures. Arthur is characterized as having excellent establishment-year vigor, forage dry matter yield, and seed yield (1). Arthur was tested under the experimental designation SC D27621.

Breedling lines were selected on the basis of maturity and head type from a spaced-plant nursery that had been established from a single accession (Sc 1732) introduced from China and obtained from Dr. J.W. Morrison, Research Branch, Agriculture Canada, Ottawa, ON. The pure line breeding method was used in the development of Arthur and the resulting 23 F\(_1\) lines were included in performance trials.

In performance trials established at Swift Current in 1978,