12 Kansas locations. Larned has consistently outyielded Scout, averaging 7% more in Kansas. Larned is the first variety available for western Kansas that provides both Hessian fly resistance and top yield performance.

Breeder seed of Larned is maintained at the Ft. Hays Branch Exp. Stn., Hays, KS.

REGISTRATION OF GREENLEAF PUBESCENT WHEATGRASS[1]

(Reg. No. 12)

D. B. Wilson and S. Smoliak[2]

'GREENLEAF' pubescent wheatgrass [*Agropyron trichophorum* (Link) Richt.] was developed at the Agriculture Canada Research Station, Lethbridge, Alberta. It received License No. 1043 on 28 June 1966, but a complete description of this cultivar and its performance has only recently been published.[3]

Stands of pubescent wheatgrass were established at Lethbridge in 1956 with commercial seed obtained from Davenport, Washington, and Bismarck, North Dakota. In 1958, a total of 2,024 selections were placed in a plant observation nursery. Open-pollinated progenies of 57 superior forage types were grown in the greenhouse and rated for seedling vigor and early plant growth. Of the highest yielding lines with superior seedling vigor and early plant growth, 14 were evaluated in the field and 12 of these were combined to form a synthetic strain. The strain was designated L1747 during subsebuent testing before being licensed as Greenleaf.

Greenleaf was developed primarily as a winterhardy cultivar for pasture and hay production on dryland or irrigated land in southern Alberta. It has good seedling vigor and also has some tolerance to saline soils and areas of low soil moisture. It is a perennial, creeping-rooted, sod-forming grass and is adapted to the Brown and Dark Brown Chernozemic soils.

Glumes, lemmas, and rachis of Greenleaf are more pubescent than those of 'Topar' pubescent wheatgrass. The foliage is green to bright green.

Seed of Greenleaf is being multiplied through the breeder, foundation, and certified seed classes. Breeder seed is being maintained by the Agriculture Research Station at Lethbridge.

[1] Registered by the Crop Sci. Soc. of Am. Accepted 6 July 1978.

[2] Research scientists, Agriculture Canada Research Station, Lethbridge, Alberta.

[3] D. B. Wilson and S. Smoliak. 1977. Greenleaf pubescent wheatgrass. Can. J. Plant Sci. 57:289-291.

Registration of Germplasms

REGISTRATION OF KS77 ALFALFA GERMPLASM[1]

(Reg. No. GP 94)

E. L. Sorensen, D. L. Stuteville, and E. Horber[2]

KS77 alfalfa [*Medicago sativa* L.] was released by the Kansas Agric. Exp. Stn. and FR-SEA-USDA in November 1977. It provides resistance to Phytophthora root rot [*Phytophthora megasperma* Drechs.], downy mildew [*Peronospora trifoliorum* d By.], anthracnose [*Colletotrichum trifolii* Bain], pea aphid [*Acyrthosiphon pisum* (Harris)], and spotted alfalfa aphid [*Therioaphis maculata* (Buckton)] in one germplasm pool.

KS77 was derived from 'Arc' alfalfa by recurrent phenotypic selection in the seedling stage. Successive elimination under controlled conditions in the laboratory included one cycle of selecting for resistance to Phytophthora root rot, two cycles for downy mildew, and three cycles each for the pea aphid and spotted alfalfa aphid. More than 75 resistant plants were used to initiate each cycle. Eighty-three plants for the last cycle were intercrossed by hand in the greenhouse to produce syn 1 seed. Syn 2 seed was produced in an isolated field plot.

Based on percentage resistant plants in a field test at St. Paul, MN, KS77 has a level of Phytophthora root rot resistance about equal to that of 'Agate': KS77 = 31%, Agate = 34%, and 'Saranac' = 2%. Resistance to downy mildew, in a severe seedling test under controlled conditions in the laboratory, was 235 percent that of Saranac, which shows a high level of field resistance (KS77 = 43%, Arc = 7%, Saranac = 18%, and 'Kanza' = 1% resistant). Under field conditions at Manhattan, KS, anthracnose resistance of KS77 and Arc did not differ significantly (KS77 = 3.0, Arc = 2.5, Saranac = 5.0; L.S.D. (α0.05) = 1.7; rated 1 = least to 9 = most damage).

KS77 is resistant to the pea aphid based on percentages of seedling survival after infestation: KS77 = 88%, Arc = 43%, Kanza = 73%, and 'Ranger' = 6%. KS77 also is resistant to the biotypes of spotted alfalfa aphid in Kansas (KS77 = 78%, Arc = 0%, Kanza = 77%, and Ranger = 8%). Its resistance to the alfalfa weevil has not been evaluated.

In an irrigated trial at Manhattan, KS, 2-year average forage yields of KS77 and Arc did not differ significantly. Recovery after cutting and fall growth habit of KS77 and Arc were similar during the year of establishment.

Seed stocks of KS77 syn 2 will be maintained by the Dep. of Agronomy, Kansas State Univ., Manhattan. Twenty grams of seed will be supplied to research scientists on written request.

[1] Registered by the Crop Sci. Soc. Am. Cooperative investigations of the Kansas Agric. Exp. Stn. and FR-SEA-USDA. Accepted 25 Apr. 1978. Contribution No. 1667-j, Dep. of Agronomy, No. 676-j, Dep. of Plant Pathology, and No. 1204-j, Dep. of Entomology, Kansas State Univ., Kansas Agric. Exp. Stn., Manhattan, KS 66506.

[2] Research agronomist, FR-SEA-USDA, Dep. of Agronomy, Kansas State Univ., Manhattan, KS 66506; plant pathologist, Dep. of Plant Pathology, Kansas State Univ., and Dep. of Entomology, Kansas State Univ., Manhattan, respectively.

REGISTRATION OF COTTON GERMPLASM LINES, CA 1020 LT-76B AND CA 1371 LT-76B[1]

(Reg. No. GP 37 and GP 38)

J. R. Gipson and L. L. Ray[2]

Beginning in 1972 and continuing through 1976, from six to 12 experimental lines of cotton (*Gossypium hirsutum* L.) have been evaluated each year for fruiting and fiber development under varying night temperature regimes (2, 3). Night temperatures of 13, 25, and 37 C were maintained in field growth chambers which were mounted on tracks so they could be rolled off the plots during daylight hours (2).

Two experimental lines, CA 1020 LT-76B (GP 37) and CA 1371 LT-76B, (GP 38), showed an insensitivity to night temperature relative to the other entries, which included three standard cultivars in addition to the experimental lines. The response of CA 1020 LT-76B was in the fiber fineness parameter as measured by the micronaire instrument. At the lowest temperature, 13 C, the micronaire reading was higher for this line than for any other entry but it was relatively low at the high temperature (3). Gipson and Joham (1) showed that the fiber fineness parameter is sensitive to temperature with low micronaire readings associated with low temperatures. Cotton fiber with a very low micronaire is not desirable and is penalized in the market.

CA 1371 LT-76B initiates fruit three to four nodes lower than most standard cultivars. This character is also sensitive to temperature (4). Although some of the other experimental lines fruited at a low node under optional temperatures, CA 1371 LT-76B was the only line which gave a consistent response across all temperatures (2). The fruiting stage was reached in fewer days with this line and with less variation due to temperature.

Both lines were developed by the Texas Agricultural Experiment Station at Lubbock for adaptation to short season, narrow-row production systems. The plants of both lines are short statured and have short fruiting branches and stormproof bolls.

Stability of fruiting and fiber development over a range of temperatures would improve production efficiency and fiber quality in areas such as the Texas High Plains where climatic conditions are quite variable with suboptional temperatures often occurring during both early and late season.

Small seed lots of approximately 20 g may be obtained from the Foundation Seed Service, Texas Agricultural Experiment Station, College Station, TX 77843.

[1] Registered by the Crop Sci. Soc. of Am. Contribution (TA 13774) from the Texas Agric. Exp. Stn., Texas A&M Univ. Research and Extension Ctr., Lubbock, TX 79401. The work was supported in part by the USDA with funds made available through Cotton Incorporated. Accepted 1 Apr. 1978.

[2] Associate professor, Texas Tech Univ. (joint with Texas Agric. Exp. Stn.) and professor, Texas Agric. Exp. Stn., respectively, Lubbock, TX 79401.

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REGISTRATION OF USDA 21055 HOP GERMPLASM[1]

(Reg. No. GP 5)

Alfred Haunold, S. T. Likens, G. B. Nickerson, C. E. Horner, and C. E. Zimmermann[2]

A FEMALE hop genotype, USDA 21055, with unusually high alpha acid content and very high resin gland (lupulin) content was developed. The line consistently had a higher alpha acid content than the highest alpha acid lines in the USDA world collection of hops.

The genotype resulted from a 1968 cross between the female cultivar Comet[3], and a male seedling (selection 6616-35M). The male originated from a cross between the female cultivar 'Brewer Gold' and a male seedling from the female cultivar 'Fuggle' (Accession No. 19209) crossed to a wild American male collected in Colorado (Accession No. 60026M). The male parent of Comet is an indigenous North American male hop from Utah (Accession No. 58006M). Therefore, USDA 21055 contains at least 50% North American germplasm from its male ancestors 60026M, 58006M and the 'Wild Manitoba' female parent of Brewer's Gold[4]. Indigenous North American germplasm via the English cultivar Brewer's Gold has been recognized and used as a source of high alpha-acid genes for many years by hop breeders in various countries[5].

The new high-alpha genotype was first tested as selection 6806-80 as a single nursery plant from 1969-71 near Corvallis, Oregon. As a mature 2-year old plant, it produced 4,750 g of fresh hops, equivalent to 2,240 kg/ha of dried hops with a spectrophotometric analysis[6] of 18.5% alpha-acids and 4.4% beta-acids. This corresponds to a ratio of alpha/beta of over 4 and a resin gland (lupulin) content of approximately 30% by weight of the cone. In 1972 the permanent USDA Accession No. 21055 was assigned and the genotype was planted in a seedless 10-hill plot near Corvallis.

Yields of USDA 21055 in replicated test plots have averaged 1,380 kg/ha between 1974 and 1977. Alpha and beta-acid content over this same period averaged 14.7% and 5.7%, respectively. Lupulin content averaged 28% of the total cone weight. Cohumulone content of the alpha acids ranged from 42 to 45%. Essential oils[6] averaged about 2% of dry cone weight. The genotype was tested at Prosser, WA, since 1972 where its high quality potential and relatively low cone yield were confirmed. In a small commercial plot in the Yakima valley of Washington, USDA 21055 has consistently produced alpha-acid levels from 14.2 to 15.5% over a 4-year period beginning in 1974. Yield levels, however, were too low to be economically feasible.

The soft resins of USDA 21055 possess above average storage stability. Their storage index[7] is comparable or slightly better than that of Fuggle with 68 to 80% of the alpha-acids remaining after 6 months of storage at room temperature (22 C). 'Bullion' and Brewer's Gold under similar conditions lost about 60% of their initial 10 to 11% alpha-acid content.

USDA 21055 matures medium late (early September). It has deeply lobed leaves like its wild American ancestors with large numbers of leaf glands early in the spring, particulary on young leaves. The stem is coarse and covered with rows of hooked hairs which also abound on the leaf petiole. The cultivar produces a sparse number of shoots in early spring. Shoots can be trained easily and grow to the top of the trellis (5.5 m) at a rate comparable to commercial hop cultivars. USDA 21055 loses its apical dominance rapidly after the main shoots have grown over the top wire and does not form a head of foliage. Laterals grow to about 70 to 100 cm in length. Flowering occurs from early to mid-July. Occasionally a few sterile male flowers are found. Cone set is sparse with poor clustering. Lateral branches frequently terminate in a single large cone with pinnate leaves originating between bracts. Average cone weight of dry seedless cones of USDA 21055 is about 200 mg.

USDA 21055 is resistant to Downy mildew, *Pseudoperonospora humuli* (Miy. et Tak.) G. W. Wils., both in the cone and in the crown stage. Occasionally a young shoot in the spring shows primary infection but the crown generally does not become systemically infected. The genotype appears to be resistant to strains of Verticillium wilt (*Verticillium albo atrum*) found in Oregon and Washington. At Prosser, WA, USDA 21055 developed a type of stem canker and the plants were destroyed. This condition was not observed at any of the other test locations.

Owing to its poor clustering and cone set, which results in low cone yields, the genotype is unsuitable for commercial hop production under current market conditions. However, its high level of alpha acids and good lupulin content, coupled with good storage stability appears attractive to hop extractors and processors. USDA 21055 is an excellent germplasm source for superior alpha acids and high lupulin content plus good storage stability of the resins. Progeny tests from five crosses involving USDA 21055 and selected male genotypes confirmed that the cultivar transmits its desirable quality traits to its progeny with moderately high frequency.

The original breeder stock of USDA 21055 will be maintained by the Oregon Agric. Exp. Stn., Corvallis, OR 97331.

[1] Registered by the Crop Sci. Soc. Am. Contribution of FR-SEA-USDA in cooperation with the U.S. Brewers Association and the Washington and Oregon Agric. Exp. Stns. Technical Paper No. 4772. Accepted 8 May 1978.

[2] Research geneticist and chemist, respectively, FR, SEA, USDA; chemist, Dep. of Agricultural Chemistry, Oregon State Univ.; research plant pathologist, FR-SEA-USDA, Corvallis, OR 97331; and research plant physiologist, FR-SEA-USDA, Prosser, WA 99350.

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