good forage quality and acceptance by livestock. With available soil moisture and nutrients, regrowth also occurs in the fall months.

Slate shows good seedling growth and establishes well during the cool weather of fall or spring. Seed crops can sometimes be obtained in the first summer after fall establishment. Slate should be planted in rows for seed production and also for grazing if soil moisture is expected to be limiting. The strongly rhizomatous plants spread readily from rows with favorable soil moisture and fertility. Slate may be planted alone in close-drilled stands or in mixtures with other cool-season grasses on fertile, well-drained soil. It may be used as a principal component in mixtures with smooth bromegrass (*Bromus inermis*

Leyss.) and alfalfa (*Medicago sativa* L.) for production of hay, either with or without irrigation. Plants do not thrive on saline-alkali soil or with extensive flooding.

Slate intermediate wheatgrass is produced with selections of seed increase. The two designated parent lines are maintained separately in isolated field plantings at the Stockbridge Foundation, a part of the Iowa State University Experiment Station. The cultivar is constituted as a mixture of parent strains in equal amounts (Syn 1) and a foundation seed (Syn 0). Foundation seed (Syn 1) is harvested from plots planted with breeder seed. Certified seed is grown from foundation seed. It is the commercial class for conservation plantings.

Registration of Germplasms

REGISTRATION OF HOP GERMPLASM

(Reg. No. GP 2 to 4)

C. E. Horner, S. N. Brooks, A. Haunold, and S. T. Likens

Three male clones of hop (*Humulus lupulus* L.) that possess high resistance to downy mildew, caused by *Pseudoperonospora humuli* (Miy. & Tak.) G. W. Wils., have been identified and assigned Accession Numbers 64032M (Reg. No. GP 2), 64033M (Reg. No. GP 3), and 64037M (Reg. No. GP 4). All three clones originated from seed obtained in 1963 from the Department of Hop Research, Wye College, England. Clones 64032M and 64033M were selected from a progeny of the open-pollinated female 2L118; clone 64037M was selected from a progeny of open-pollinated female 7K491. The 3 clones were selected from about 4,000 seedlings after 2 cycles of inoculations with downy mildew in the greenhouse and 3 field-disease epidemics during 1964 to 1972. These male clones transmit downy mildew resistance to a larger proportion of their progeny than any we have tested to date.

Clone 64032M has conspicuously red stems, dark green leaves, and vigorous growth. It produces abundant pollen, coincident with flowering of medium- to late-maturing female varieties. Each anther has 4 to 6 lupulin glands, and the lupulin contains about 25% alpha acid and 45% beta acid. In a cross with the highly susceptible ‘Yakima Cluster’ cultivar, clone 64032M transmitted downy mildew resistance to 84% of 686 offspring in greenhouse tests. In a field test of seedlings from Yakima Cluster × 64032M, 200 were resistant, 55 were moderately resistant, and 41 were susceptible to downy mildew.

Clone 64033M has reddish-green stems, dark green leaves, and medium vigor. It produces a moderate amount of pollen, coincident with flowering of late-maturing female varieties. Each anther usually has four lupulin glands, and the lupulin contains about 50% alpha acid and 40% beta acid. In a cross with the highly susceptible Yakima Cluster, clone 64033M transmitted downy mildew resistance to 69% of 407 offspring in a greenhouse test. In a field test of seedlings from Yakima Cluster × 64033M, 94 were resistant, 96 were moderately resistant, and 16 were susceptible.

Clone 64037M has red stems, dark green leaves, and vigorous growth. It produces abundant pollen, coincident with flowering of medium- to late-maturing female 2Ll18; clone 64037M was selected from a progeny of the open-pollinated female 64033M were selected from a progeny of the open-pollinated female 64033M. Clone 64037M has reddish-green stems, dark green leaves, and vigorous growth. It produces abundant pollen, coincident with flowering of medium- to late-maturing female varieties. Each anther usually has four lupulin glands, and the lupulin contains about 50% alpha acid and 40% beta acid. In a cross with the highly susceptible ‘Yakima Cluster’ cultivar, clone 64037M transmitted downy mildew resistance to 84% of 686 offspring in greenhouse tests. In a field test of seedlings from Yakima Cluster × 64037M, 200 were resistant, 55 were moderately resistant, and 41 were susceptible to downy mildew.

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