New Winter Rye

productive winter annual cereal grain has high fertility in California tests

Coit A. Suneson

Spikes and seed of Merced—diploid—and Svalof Fourex—tetraploid—spring rye showing the size differences which are characteristic of all plant parts.

The first California certified seed of Svälof Fourex spring rye—introduced from Sweden—is expected to become available for commercial use after the 1959 harvest.

Svälof Fourex is a very productive winter annual cereal grain that does best on lighter soils; excels in total dry matter production, straw stiffness and plant height; and makes a good winter cover crop or a winter forage crop. However, it is not likely that Svälof rye will compete with barley or wheat in the production of grain for food or feed in California.

Neither yellow-dwarf virus nor common root rots, which are the most troublesome diseases in early fall sown cereals, have damaged Svälof Fourex seriously in tests at Davis and elsewhere in California.

Svälof Fourex resulted from 15 years of progeny test breeding in Sweden that first produced a new diploid spring rye that was, in some respects, superior to the leading Swedish variety. Tetraploids—plants with double the usual number of chromosomes—were obtained from the diploid plants by colchicine treatment. Finally, tetraploids were selected for high fertility as they normally produce large plants and also have large, but fewer, seeds.

Svälof Fourex has better fertility in the mild California climate than was expected from Swedish experience, a phenomenon presently under joint technical investigation by researchers in Sweden and at Davis.

Coit A. Suneson is Associate in Agronomy, University of California, Davis, and Research Agronomist, United States Department of Agriculture.

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Dr. O. Tedin and Dr. A. Hagberg of the Swedish Seed Association developed and named the new spring rye.

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before reaching this point. The minor variations in Curves C and F are not significant.

The marked warming between the surface and 20′ on Curve D is due to the heat added by the burners being well mixed in this layer by the opposing natural wind before reaching this mast. The added buoyancy of the air jet caused the main part of the warm air to rise above the orchard and show up as a much weaker maximum temperature response at 35′ on Curve E. That portion of the warm air jet under the tree canopy on Curve D had risen into the trees and damped out before reaching 210′ north so that there was no noticeable rise in the lower temperatures at this location. The minimum temperature in the orchard that morning was 34°F.

Similar handling of the data for March 25 produced about the same results, as indicated in the graphs and the table on page 5. Here data was also available for the 15′ temperatures during a wind machine plus burners test. At the 15′ level protection is less with the burners going than without because the extra heat rose above the 15′ level. In the graph on page 5 Curves A through C are very similar to those of March 20 even though the natural wind direction is different. The effect of the natural wind helping to blow the warm air rapidly from the wind machine toward the 50′ masts shows up in Curves D through F. With the natural wind helping, the warm air arrives at 100′ north quicker and with less mixing than before. In effect it appears that the warm air jet was split; some going under and some above the foliage due to the added frictional resistance of the foliage. The warm jet under the trees lifted into the foliage before reaching the mast at 210′ north and caused a little temperature rise at foliage level but none below. Curves E and F indicate maximum temperature responses at the 25′ level although decreasing in magnitude with distance. Evidently the natural wind carried the warm air past the mast before its additional buoyancy could lift it much higher. The minimum temperature was 33°F on the morning of March 25.

Although these interpretations have been the results of only two test nights, the area responses are considered representative for the under-tree wind machine under the test conditions. It is not possible to know how well this machine would have done mounted on a tower. However, rough comparisons can be made with tower machines tested in almonds at Chico. Tests in 1955 on a 25 BHP wind machine, 42′ above the ground, which turned through 360° in about four minutes showed a 1°F response over 1.8 acres at 10′ above the ground in a weak inversion of 4.5°F. A conventional wind machine with dual gasoline engines of 75 BHP each, 40′ above the ground, was tested in the same almond orchard in 1957. With a 7.3°F inversion it gave a 1°F gain over 14 acres, 2°F over 6.9 acres, and 3°F over 2.7 acres. The under-tree wind machine area responses fall between those of the two tower units. As air movement under the tree canopy is much stronger with the under-tree unit it should be more efficient in redistributing the heat from a few scattered orchard heaters. Although not yet tested it is thought that the combination of orchard heaters and an under-tree machine would be the most effective.

The addition of a large amount of heat from the burners on the low mounted wind machine causes the air jet to lift out of the orchard and the additional temperature gain in close to the machine does not seem to be worth the cost of the burner equipment and propane fuel.

Todd V. Crawford is Assistant Agricultural Engineer, University of California, Davis.

F. A. Brooks is Agricultural Engineer, University of California, Davis.

Rodney Vertrees provided the test peach orchard and the under-tree wind machine and assisted on test nights.

C. E. Barbee, Fred Lory, and Richard Miller of the Department of Agricultural Engineering, University of California, Davis, assisted in these studies.

Joe Ganser and Tom Beecroft, United States Weather Bureau, also assisted with forecasts and participation in the tests of March 20 and 25.

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