from trap plants and aphid catches (Fig. 1) suggest that the transmission of the virus by aphids and the effects of weather on vector populations are primary factors limiting disease development in maize. The incidence of SCMV in maize at Muuga and Kitale was lower in 1978 than in 1977, and aphid catches throughout 1978 were very low at both locations. Although these data may explain the periodicity of disease development, they do not resolve the question of SCMV distribution, because the distributions of aphid vectors (5), maize, and weed hosts (3, 7, 19) extend beyond the distribution of SCMV in maize.

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LITERATURE CITED

Races of Puccinia graminis f. sp. avenae in the United States During 1979

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ABSTRACT

Oat stem rust overwintered in south Texas and produced a large amount of inoculum in 1979. Unfavorable environmental conditions and a lack of virulence for Pg-2 and Pg-4 restricted disease development to the north. From 501 uredial collections, 1,372 isolates were obtained. NA-27 made up 94% of the isolates. No virulence was found for Pg-2 and Pg-4. Disease was most prevalent in 1979 than in 1978 but less prevalent than in the epidemic year of 1977. Stem rust was first observed on 27 February 1979 in a nursery in south Texas, where vast quantities of inoculum were produced. A rapid increase in disease was anticipated in central and northern Texas, but below-normal spring rainfall resulted in conditions unfavorable for disease increase.

By mid-June, traces of oat stem rust had been observed from northern Kansas to southern Minnesota. The earliest centers of stem rust infection in Minnesota resulted from inoculum that arrived in late May. These centers were widely scattered, and secondary spread indicated that they were as frequent as one per county. Although the initial infection was 20 days earlier than normal, the low initial prevalence of the disease plus marginal environmental conditions in June offset the potential effect of early disease onset on epidemic development. Thus, moderate losses occurred in fields initially infected, and light to moderate losses occurred in late-planted fields in the Dakotas and Minnesota.

MATERIALS AND METHODS
Collections from the United States were classified into ecological areas: area 1, the winter oat area of the southern states; area 2, eastern Oklahoma, northern Arkansas, eastern Missouri, Kentucky, Tennessee, and the southern counties of Illinois and Indiana; area 3, the northeastern states from Virginia northward; area 4, North and South Dakota, Nebraska, Kansas through Ohio and northward; and area 5, the western states and panhandle regions of Texas and Oklahoma. Collections from Mexico and Ontario Province of Canada were included for comparison.

Data pertaining to collections from commercial fields and naturally occurring hosts (field) were separated from data pertaining to collections from experimental plantings (nursery) to eliminate bias from unique host resistances or susceptibilities. No data were included from collections obtained

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from nurseries or areas adjacent to inoculated nurseries.

A collection consisted of a varying number of stems or leaves bearing stem rust uredia from a field, nursery, or individual plant or cultivar. Uredospores were removed from each collection and used to inoculate seedlings of the susceptible host, a second portion was removed as part of a bulk from each geographic area to inoculate the "universally" resistant series, seven cultivars selected over a period of years as resistant to oat stem rust. Thus, each infection of this series resulted from a uredospore produced in the field or nursery.

After inoculation, plants were placed in a dew chamber at 18 C overnight, followed by 3 hr of fluorescent light (10,000 lux) and temperatures gradually rising to 30 C. Plants were placed in an 18-30 C greenhouse for 10-14 days, and infection was then recorded. Race designations were based on the North American system (1). Rodney backcross selections were use as differential hosts.

RESULTS AND DISCUSSION

The 1979 stem rust race survey data (Table 1) are presented for the entire United States, the five ecological areas, Ontario, and Mexico. From 501 collections, 1,372 isolates were identified. Most of the collections (61%) were from area 4, the major oat-producing area. Area 3 collections were from Pennsylvania and West Virginia. Most area 1 collections were from winter oat nurseries in south Texas.

The most important race continued to be NA-27 (94% of the isolates). NA-16...
was much less prevalent in 1979 than in 1978 (3) and was similar to the epidemic year of 1977, when it was designated race 61 (2). As in previous years, races NA-1, 2, 3, 5, 7, and 24 were found only in Texas.

In the 1979 survey, no isolates were virulent for P_{g}-16 or a (Table 2). Only 1 and 2% of the isolates from the United States were virulent on P_{g}-9 and -15, respectively, compared with 84 and 96% from Ontario (Table 2). Collections from the United States were avirulent on the “universally” resistant series, except that those virulent on P_{g}-13 were also virulent on MN 730358. Virulence for P_{g}-9 and -13 was detected in south Texas and in area 4. Approximately 14% of the Texas (area 1) oat stem rust races were avirulent on genes P_{g}-2 and -4. Because most early collections were from south Texas, the effect of this inoculum was reduced by the presence of P_{g}-2 or -4, singly or in combination, in many of the spring oat cultivars.

Uredial collections from wild oats were made in California, Minnesota, and North and South Dakota. Among 206 isolates from 75 collections from wild oats, races NA-27 (96%) and NA-16 (4%) were most common. Race NA-16 made up a smaller percentage of the races identified from wild oats than in previous years.

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LITERATURE CITED