November. But in Ontario it might well be a later apple. The variety is now being grown at the National Fruit Trials in England, and, when fruited there, may possibly be identifiable with some variety growing in that incomparable collection.

Recent Developments in Strawberry Red Stele Race Distribution Studies

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In low-lying, heavy-textured, or poorly drained fields, strawberries frequently are attacked by *Phytophthora fragariae* Hickman, red stele, a root-rotting fungus which causes the vascular strands, or steles, of the roots to become red and rot. Plants infected with this fungus bear poorly, are very drought-susceptible, and usually die. Red stele is one of the most serious and most insidious diseases of strawberries. Since no adequate chemical control is yet available, growers must use resistant varieties wherever the disease occurs.

A source of immunity from all races of *P. fragariae* is not known in the genus *Fragaria,* to which the strawberry belongs. As more sources of the fungus are examined, the number of races able to attack hitherto-resistant varieties has increased. In the United States, five physiologic races are now recognized. These races are identified by the reactions of five differential strawberry varieties and selections (Table I). Limited studies of the occurrence and distribution of these races indicate that race A–1 definitely occurs in Arkansas, Connecticut, Delaware, Illinois, Maryland, Massachusetts, Ohio, and Tennessee. A–1 is probably present also in all the other states where red stele is known, as it appears to be the most common race. Race A–2 occurs in Maryland and Massachusetts.

All United States varieties with red stele resistance are resistant to races A–1 and A–2. Race A–3 has been identified in plants from Delaware, Illinois, Maryland, New Jersey, and Ore-

TABLE I. Key to races of *Phytophthora fragariae* recognized in the United States.

Race	Reactions[1] of the strawberry variety or selection				
	Blakemore	Md–683	Aberdeen	del Norte	Stelemaster
A–1	S	R	R	R	R
A–2	S	S	R	S	R
A–3	S	R	S	R	R
A–4	S	R	R	S	R
A–5	S	S	S	R	S

[1]S = susceptible; R = resistant.

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gon. In addition, commercial varieties having Aberdeen-type resistance, which A–3 is able to overcome, have been infected in many other states as well (Connecticut, Indiana, Massachusetts, Michigan, New York, Ohio, Pennsylvania, Tennessee, and Virginia). Siletz, Stelemaster, and Surecrop are resistant to A–3. Race A–4 has been found in collections from Maryland, Missouri, New York, and Tennessee. Stelemaster, Surecrop, and Siletz are resistant to A–4, but the del Norte clone of *Fragaria chiloensis* (the native Pacific beach strawberry) is susceptible. A–5 has been found only in experimental greenhouses where soils containing different races have been mixed together.

Strawberry plants are regularly shipped all over the United States. Because incipient red stele infections are hard to detect, additional races of the fungus are very likely to enter new regions of the country each year. Thus, a race originating in one locality is a potential threat to many strawberry-growing areas.

All commercial strawberry varieties bred for red stele resistance except Siletz have in their pedigree Aberdeen, Frith, or both varieties, as sources of resistance. Races that will overcome the resistance of Aberdeen, Frith or both combined, are known. Continued production of strawberries on many acres of excellent strawberry land infested with the red stele fungus requires the finding of broader sources of resistance. Siletz and certain advanced breeding lines derive resistance from *F. chiloensis* or *F. virginiana* in which a large number of different resistance genes probably exist. Most of the *F. chiloensis* and *F. virginiana* sources used so far, however, have proved to be susceptible to at least one race. The search continues for more resistant *F. chiloensis* and *F. virginiana* clones and for ways of incorporating into the strawberry the immunity found in closely related genera.

Hardiness of Dwarfing Apple Rootstocks

According to Gordon Yates, of La Crescent, Minnesota, the East Malling and Malling-Merton Rootstocks should be hardy enough for use in Minnesota. He bases this conclusion on the fact that there was little or no winter injury of one-year whips on these rootstocks, or in stool beds of them, following the severe winter of 1958–59 at La Crescent, provided the soil was covered with either weeds, mulch or sod. The winter involved was an especially good test for hardiness because it combined low temperatures with dry soil and lack of snow cover.

Promising Apples for Wisconsin

Idared variety appears most promising in Wisconsin. But the younger bearing trees don't have quite the color and uniformity in size as do the older ones. The Beacon variety was the best we have had in years. Good color and good size in most all of the areas of the state.—*G. C. Klingbeil, Univ. of Wisconsin, Madison, Wisc.*

Pears in Massachusetts

O. C. Roberts, of the University of Massachusetts reports that a survey of apple growers in his state indicates that twenty-five percent of them grow pears. The survey also revealed that of the pears grown, Bosc makes up 51% of the total number of trees, Bartlett—31.5%, Seckel—6.8%, and Clapp Favorite—6.2%.