A Strawberry Fruit Rot Caused by Alternaria tenuissima

C. M. Howard and E. E. Albregts

Assistant Professor (Asst. Plant Pathologist) and Assistant Professor (Asst. Soil Chemist), respectively, IFAS University of Florida, Agricultural Research Center, Dover 33527.

Florida Agricultural Experiment Stations Journal Series No. 4657.

ABSTRACT

During the past 3 years a new strawberry fruit rot caused by *Alternaria tenuissima* has been found in research plots and some commercial fields in Central Florida. Isolations from the fruit rot lesions usually yielded only *A. tenuissima*. Rot lesions similar to those in the field developed on surface-sterilized fruits inoculated with spore suspensions of the fungus. Losses from this disease have not been severe enough for it to be considered a problem in this area at this time.

Phytopathology 63:938-939.

Additional key words: Fragariae chiloensis var. *ananassa.*

Apparently there are no previous reports of strawberry *(Fragariae chiloensis* Duchesne var. *ananassa* Bailey) fruit rot caused by *Alternaria* species. Smart (5) isolated *Alternaria* sp. from fresh strawberries but made no mention of any fruit rot lesions associated with the *Alternaria*. Beneke et al. (1) frequently isolated *Alternaria* sp. from ripe and green strawberries that had not been surface-sterilized, occasionally from surface-sterilized ripe fruit and rarely from surface-sterilized green fruit. They reported that ripe fruits inoculated with these *Alternaria* sp. degraded more slowly than those inoculated with isolates of *Rhizopus, Botrytis,* or *Aspergillus* that had been obtained from fresh fruit. They made no mention of rot lesions in the field associated with *Alternaria*. Several investigators have reported *Alternaria* sp. associated with strawberry root rot (2, 3, 6), but have generally considered them to be nonpathogenic.

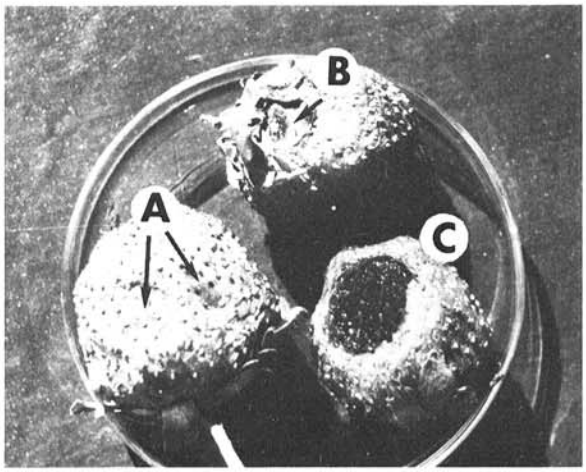

Fig. 1. Strawberry fruits infected by *Alternaria tenuissima.* **A)** Early lesion development with sparse sporulation by *A. tenuissima.* **B)** *Alternaria* lesion formed under the sepals. **C)** Advanced lesion with abundant sporulation by *A. tenuissima.*

During each of the last 3 years, a strawberry fruit rot caused by a species of *Alternaria* has been found in fields in Central Florida. The highest incidence of this disease occurred in research plots in which some fruit was allowed to become overripe before being harvested. It was also found occasionally in commercial fields. This disease has not yet been severe enough at any time to be considered a serious problem in Florida.

In the early stages of development, fruit rot lesions are irregular in shape and slightly sunken. A light green color develops on these lesions as the pathogen begins to sporulate. Advanced lesions are circular, sunken, firm and dark-green to almost black because of abundant sporulation by the pathogen. The lesions sometimes develop on the shoulder of the fruit, under the sepals. These three types of lesions are shown in Fig. 1. Lesions occur anywhere on the fruit. Only a species of *Alternaria* was isolated from these lesions.

MATERIALS AND METHODS.—Several *Alternaria* isolates were obtained from rotting fruit in 1971 and maintained on potato-dextrose agar (PDA). One of these isolates was used for a pathogenicity test in 1971. After 2 to 3 months in culture, however, all these isolates had nearly lost the ability to sporulate. Therefore a fresh isolate was obtained from the field in 1972. A single spore isolate obtained from this mass isolate was used in another pathogenicity test. A subculture was sent to Dr. E. G. Simmons, Head, Mycology Group, Pioneering Research Lab., Natick, Mass. who identified the fungus as *Alternaria tenuissima* (Fries) Wiltshire.

The isolates were grown on PDA in petri dishes until they sporulated. The cultures were then flooded with sterilized distilled water and the resulting spore suspensions were used as inoculum. There were 580 and 1,100 spores/ml in the inoculum used in the 1971 and 1972 tests, respectively.

In each test, ten ripe and ten green Tioga berries were surface-sterilized by immersion for 1 min in 95% ethyl alcohol followed by 20 min in 0.5% sodium hypochlorite solution. The berries were washed four times in sterilized distilled water and placed aseptically in autoclaved jars, 1 fruit/jar. Lids were loosely placed on the jars to maintain a sterile atmosphere but allow the escape of excess moisture. After the surface of the berries dried, small droplets of the spore suspension were placed at two points on the uninjured surface of each fruit. Control fruits received sterilized distilled water. The berries were then incubated at 25 ± 2 C under constant fluorescent lighting. The numbers of lesions in each series were recorded after 7 days.

RESULTS AND DISCUSSION.—The berries inoculated in the 1971 test were obtained from a field where *Alternaria* fruit rot was mild. In this test, lesions developed on ripe berries at 85% of the points of inoculation with *A. tenuissima* and at 35% of the inoculation points on ripe control fruits. Berries for the 1972 test were obtained from a field where little or no *Alternaria* fruit rot was present. In this test, lesions developed on ripe berries at 70% of the points inoculated with *A. tenuissima* and at 5% of the inoculation points on

control fruits. No *Alternaria* fruit rot lesions developed on any of the berries in either test which were inoculated while green, even though considerable ripening occurred after inoculation. Therefore, it appears that green fruits are resistant to infection by *A. tenuissima*. *A. tenuissima* was readily reisolated from berries on which lesions developed. Abundant aerial mycelium developed on most berries inoculated in the laboratory and sporulation on the lesions was sparse. Within 3 days after these berries were exposed to bright sunlight for approximately 1 hr, abundant sporulation occurred and the lesions appeared nearly identical to lesions in the field.

Neergaard (4) described *A. tenuissima* as highly pathogenic to *Godetia hybrida*, weakly pathogenic to sterile seedlings of cabbage and lettuce, and nonpathogenic to sterile seedlings of carrot, pea, onion, tomato, cucumber, wheat, *Senecio* and *Dianthus*. The work reported in this paper demonstrates that *A. tenuissima* is also pathogenic to ripe strawberries.

LITERATURE CITED

1. BENEKE, E. S., L. S. WHITE, & F. W. FABIAN. 1954. The incidence and pectolytic activity of fungi isolated from Michigan strawberry fruits. Appl. Microbiol. 2:253-258.
2. HILDEBRAND, A. A. 1934. Recent observations on strawberry root rot in the Niagara peninsula. Can. J. Res. 11:18-31.
3. MILLER, P. W. 1948. Studies on the cause of strawberry root rot in Oregon: second report of progress. Plant Dis. Reptr. 32: 309-316.
4. NEERGAARD, P. 1945. Danish species of Alternaria and Stemphylium. Einar Munksgaard, Publisher, Copenhagen and Humphrey Millford, Oxford Univ. Press, London. 560 p.
5. SMART, H. F. 1934. Microorganisms surviving the storage period of frozenpack fruits and vegetables. Phytopathology 24:1319-1331.
6. TRUSCOTT, J. H. L. 1934. Fungus root rots of the strawberry. Can. J. Res. 11:1-17.