

Four Postharvest Diseases of the Nigerian Red Pepper (*Capsicum annuum* L.)

NGWANMA U. UMA, Lecturer, Department of Biological Sciences, University of Lagos, Nigeria

ABSTRACT

Uma, N. U. Four postharvest diseases of the Nigerian red pepper (*Capsicum annuum* L.). Plant Disease 65:915-916.

Verticillium, Fusarium, and Alternaria rots caused by *Verticillium psalliotae*, two species of *Fusarium* (*F. moniliforme* and *Fusarium* sp.), and *Alternaria alternata*, respectively, were found on ripe pepper fruits in Lagos State, Nigeria. The type of rot produced by the different fungi varied. These four diseases of pepper have not been reported previously in Nigeria.

Fruits of the red pepper (*Capsicum annuum* L.) are attacked by *Colletotrichum capsici* (Synd.) Butl. & Bisby (11) and other fungi (3,10,12). Despite the widespread use of this pepper species to flavor and color various foods in Nigeria, there are no previous reports of diseases of *Capsicum annuum* in this country.

In 1978-1979, many diseased red pepper fruits were observed at markets in Lagos, where the local name of the species is *tatase*. Half-rotted fruits were collected and placed in fresh polythene bags. Within 12 hr, I made 50 cultures from lesion margins as suggested by Pathak (9). The fungi that grew from tissue pieces were obtained in pure culture and then maintained on potato-dextrose agar (PDA) (Oxoid Ltd., England).

Pathogenicity tests were carried out at 30 ± 2 C on wounded and unwounded, ripe, healthy pepper fruits that had been surface sterilized with 0.1% mercuric chloride for 2 min and rinsed in two changes of sterile distilled water. One batch of four fruits was wounded for a length of 5 mm along the pericarps with a sterile needle and inoculated with the mycelium and spores of each test fungus. The inoculation sites were covered with moist sterile cotton. The unwounded surfaces of a second batch of four fruits were inoculated with the mycelium and spores of each test fungus. A third batch of four fruits, which served as a control, was treated the same as the wounded batch, except that the fruits were not inoculated with fungi.

Each batch was placed into a fresh, moistened polythene bag and sealed. After incubation of 5-7 days, the symptoms produced by artificial inoculation were compared with those on

naturally infected fruits from the market. The experiment was repeated twice with each test fungus. The morphology of each pathogenic fungus was compared with that of the original culture. I identified each fungus isolated on the basis of microscopic examination (1,2), and identity was confirmed at the Commonwealth Mycological Institute (CMI), Kew, Surrey, England.

VERTICILLIUM ROT

The lesions were soft but not watery, shriveled, and bright red (Fig. 1). Whitish mycelial coatings were present on the surface of the lesion, with a thicker coating of the mycelium underneath. Repeated isolations and culturing of mycelial tips from the coatings yielded *Verticillium psalliotae* Treschow. The fungus produced rot on all wounded, healthy red pepper, but not on unwounded fruits. The CMI number of the culture is IMI 223085.

The literature I reviewed did not mention *V. psalliotae* as a parasite of higher plants (4). This is the first report



Fig. 1. Symptoms of Verticillium rot on Nigerian red pepper.

that this species is a wound pathogen of red pepper fruits in Nigeria.

FUSARIUM ROTS

Two different rots were observed. The first produced dry, depressed, shriveled, discolored lesions (Fig. 2A). A thick mycelial coating occurred on the undersurface of the lesion and on the seeds, which appeared swollen and water soaked. Repeated isolations from lesion margins and culturing of mycelial tips yielded a microspore state of a *Fusarium* sp. that produced rots on all wounded but not on unwounded pepper fruits. This fungus consistently produced a pink to violet color on water agar and PDA. It failed to produce macroconidia on PDA, water agar, cornmeal agar, or pepper extract agar. The CMI number of the culture is IMI 223101.

The second rot produced a depressed lesion with a yellowish center and bright red margins (Fig. 2B). Both the top and under surfaces of the lesion had white mycelial coatings. This fungus was more aggressive than the *Fusarium* sp. described above, and could completely destroy the pepper fruit in 7 days. In the advanced state of the disease, the stalk and placenta of the fruit became rotted and heavily coated with fungal mycelium and spores. The seeds, which were also coated with the mycelium, were flattened and dark around the embryo. Repeated isolations and culturing of mycelial tips from rotting regions yielded *F. moniliforme* Sheld., which only produced rot on wounded pepper fruits. The CMI number is IMI 223087.

F. moniliforme, which is found in warmer climates, is a common seedborne fungus in many corn producing countries (6). It also causes stem and root rot of asparagus (5). *F. moniliforme* and *Fusarium* sp. are reported for the first time as wound pathogens of red pepper fruits in Nigeria.

ALTERNARIA ROT

The fruits had small, light brown to ivory colored, depressed, necrotic spots about 2.5×2 cm in size after 7 days incubation at 30 ± 2 C (Fig. 2C and D). The affected tissue was dry, thin, and papery, often bearing dark spores. Repeated isolation from these lesions yielded *Alternaria alternata* (Fr.) Keissler, which produced rots on the wounded red pepper fruits only. Ten isolates of this fungus were made, and two that produced characteristic symptoms have the CMI numbers IMI 223096 and IMI 223098.

Accepted for publication 1 August 1981.

The publication costs of this article were defrayed in part by page charge payment. This article must therefore be hereby marked "advertisement" in accordance with 18 U.S.C. § 1734 solely to indicate this fact.

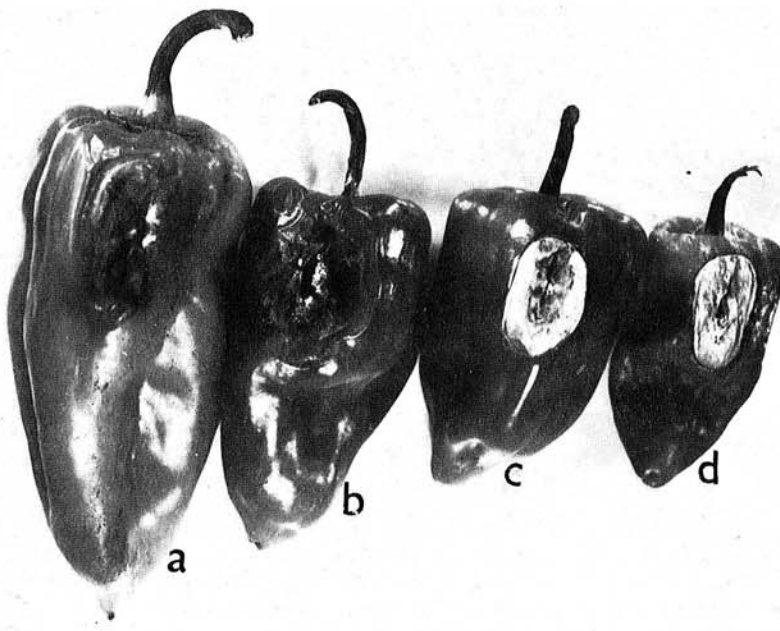


Fig. 2. Rot produced on Nigerian red pepper by (A) *Fusarium* sp., (B) *F. moniliforme*, and (C and D) *Alternaria alternata*.

This work has demonstrated for the first time that *A. alternata* is a wound pathogen of pepper fruits in Nigeria. This finding agrees with an earlier suggestion (7) that *A. alternata* is a weak parasite that attacks damaged or weakened plant tissues. McDonald and de Wildt (8)

indicated that *Alternaria* rot of bell peppers may become a major disease of pepper during the simulated wholesale and retail periods at the Rotterdam terminal market because of higher temperatures. Research should be directed towards determining the effect of

temperature on *Alternaria* rot of red peppers in Nigeria.

LITERATURE CITED

1. Barnett, H. L., and Hunter, B. B. 1972. Illustrated Genera of Imperfect Fungi. Burgess Publishing Co., Minneapolis, MN. 241 pp.
2. Barron, G. L. 1968. The Genera of Hyphomycetes from Soil. Robert and Krieger Publishing Co., New York. 364 pp.
3. Higgins, B. B. 1926. Anthracnose of pepper (*Capsicum annum* L.). *Phytopathology* 16:333-344.
4. Isaac, I. 1967. Speciation in *Verticillium*. *Annu. Rev. Phytopathol.* 5:201-222.
5. Johnston, S. A., Springer, J. K., and Lewis, G. D. 1979. *Fusarium moniliforme* as a cause of stem and crown rot of asparagus and its association with asparagus decline. *Phytopathology* 69:778-780.
6. Marasas, W. F. O., Kriek, N. P. J., Wiggins, V. M., Steyn, P. S., Towers, D. K., and Hastie, T. J. 1979. Incidence, geographic distribution and toxigenicity of *Fusarium* species in South African corn. *Phytopathology* 69:1181-1185.
7. McColloch, L. P., and Worthington, J. T. 1952. Low temperature as a factor in the susceptibility of mature green tomatoes to *Alternaria* rot. *Phytopathology* 42:425-427.
8. McDonald, R. E., and de Wildt, P. P. Q. 1980. Cause and extent of cullage of Florida bell peppers in the Rotterdam terminal market. *Plant Dis.* 64:771-772.
9. Pathak, V. N. 1974. Laboratory Manual of Plant Pathology. Oxford and IBH Publishing Co., New Delhi. 212 pp.
10. Seenappa, M. L., Stobbs, W., and Kempton, A. G. 1980. *Aspergillus* colonization of Indian red pepper during storage. *Phytopathology* 70:218-222.
11. Suryanarayana, D. 1978. Seed Pathology. Vikas Publishing House PVT Ltd., New Delhi. 111 pp.
12. Weber, G. F. 1973. Bacterial and Fungal Diseases of Plants in the Tropics. University of Florida Press, Gainesville. 673 pp.