

STEM CANKER AND PINK STAIN OF TEAK IN TANZANIA
ASSOCIATED WITH FUSARIUM SOLANI

D. Hocking¹

Abstract

Fusarium solani was consistently isolated from collar and stem cankers and from pink-stained wood of mature teak in Tanzania. Isolates killed seedlings when inoculated into collar wounds, resulting in pink-stained zones. This record extends the now broad host range of *F. solani* as a canker organism.

INTRODUCTION

Several recent reports of tree cankers caused by *Fusarium solani* generally agree that this fungus is a weak parasite, which attacks dormant or wounded trees and trees under environmental stress. Trees known to be subject to bark and cambial attack by *F. solani* include several poplars (1-4, 7, 11), several oaks (12), paper mulberry (8), sugar maple (9, 14), and tupelo (10). Infected trees at best lose vigor and later are downgraded through timber staining. In severe outbreaks, especially in poplars (3), windbreak and death can follow.

In a survey for root rots in East African teak (*Tectona grandis*) plantations (5, 6), small cankers were observed on scattered groups of 40-year-old trees in the Rau Forest near Moshi (Northern Region, Tanzania). This forest is on low-lying ground with a high water table for most of the year. Teak generally is better suited to well-drained, hilly country (13), and the situation of plantations in the low-lying, often waterlogged soil of the Rau Forest undoubtedly placed the trees under stress. Subsequent drying out during the periodic extended droughts in the area could lead to opening of bark fissures, particularly close to ground level, and thus provide an infection court.

OBSERVATIONS

The teak cankers consisted of slightly sunken bark fissures up to 16 inches long with a slight sap flow, which was reddish in color. They were mostly at or near ground level, but some occurred up to 10 feet above. Removal of surrounding bark showed pink staining of the underlying wood, similar to that described in *Fusarium* canker of poplar (3).

Cores bored from affected trees showed pink staining of sapwood and heartwood several inches beneath the bark. One tree (diameter under bark 18 inches) was sampled and sawn into inch-thick planks. Pink staining extended for 6 feet up the stem from the site of the canker, and was distributed across the stem both radially and circumferentially. There was no sign of rotting of wood.

Excavation of the main root system of this tree revealed no rotting, but the pink stain was found in the wood of main roots to a depth of 11 inches. Bark and underlying wood was sound.

ISOLATION AND INOCULATION

Isolations were attempted from 48 cankers on 23 trees from 6 sites within the Rau Forest, and from internal wood of 6 trees, one from each site.

Isolations from bark surrounding the cankers yielded *Fusarium solani* (Mart.) Sacc. in 90% of the attempts -- at least once from every canker. *Botryodiplodia theobromae* Pat., a common tropical saprophyte, was recovered from 13 cankers. Isolations from pink-stained internal wood yielded only *F. solani*. This fungus was isolated from stained internal wood up to 3 feet up the stem from external cankers but never from the fringe of staining, which clearly preceded the fungus.

Isolates of *F. solani* were inoculated onto 12 teak seedlings (1 inch diameter, 3 feet high) in the nursery. Half of the seedlings were wounded by cutting a 1-inch slit in the bark just above ground level. Inoculum consisted of an agar block from a young culture, held in place

¹Plant Pathologist, East African Tropical Pesticides Research Institute, Arusha, Tanzania; supplied by Canada under the Special Commonwealth African Assistance Plan. Present Address: Canada Department of Forestry, Edmonton, Alberta.

with a polythene film tied around the stem.

After 30 days the inoculum was removed. Slight sap flow had started from the wounded seedlings, and slightly sunken lesions were apparent around the bark slit. The lesions gradually spread, girdled, and finally killed the wounded seedlings after 30 to 60 days more. The wood underlying the lesions was pink-stained and only *F. solani* was recovered from all six wounded seedlings. No lesions developed on the unwounded seedlings. Six similarly wounded but not inoculated seedlings rapidly healed the wound and were not lesioned.

DISCUSSION

The successful invasion of only wounded seedlings by *F. solani* suggests that the lesions found on mature trees arose in opened natural fissures in the bark. While the seedlings were under satisfactory moisture conditions, the mature trees had been periodically subjected to both extremes of water stress, which probably rendered them less able to resist infection. Thus, the present observations agree with the general pattern of *F. solani* as a weak parasite only.

This further extension of the host range should lead to a greater awareness of the potential of this pathogen to damage plantation species.

Literature Cited

1. HERBEE, J. G. 1962. Development of *Fusarium* canker of black poplars. (Abst.) *Phytopathology* 52: 724.
2. BOYER, M. D. 1961. A *Fusarium* canker disease of *Populus deltoides* Marsh. *Can. J. Botany* 39: 1195-1204.
3. DOCHINGER, LEON S. 1967. Occurrence of poplar cankers caused by *Fusarium solani* in Iowa. *Plant Disease Repr.* 51: 900-903.
4. DOCHINGER, L. S., and C. E. SELISKAR. 1962. *Fusarium* canker found on yellow-poplar. *J. Forestry* 60: 331-333.
5. HOCKING, D. 1967. Root rot of teak. 2. Further field observations with new records of *Armillaria mellea*. *Pest Art. and News Summ. Sect. B* 13: 276-281.
6. HOCKING, D., and A. A. JAFFER. 1967. Field observations on root rot of teak. *FAO Plant Prot. Bull.* 15: 2-7.
7. LIPSCOMB, HARRIET ANN, and WESLEY WITCHER. 1965. Canker of tulip poplar caused by *Fusarium solani*. *Plant Disease Repr.* 49: 507-508.
8. SCHREIBER, LAWRENCE R., and LEON S. DOCHINGER. 1967. *Fusarium* canker on paper mulberry (*Broussonetia papyrifera*). *Plant Disease Repr.* 51: 531-532.
9. SKELLY, J. M. 1964. The nature and occurrence of an annual canker of *Acer saccharum* Marsh. in Pennsylvania. M.S. Thesis, Pennsylvania State Univ. 92 pp.
10. TOOLE, E. RICHARD. 1962. Tupelo lesion caused by *Fusarium solani*. *Plant Disease Repr.* 46: 732-733.
11. TOOLE, E. RICHARD. 1963. Cottonwood canker caused by *Fusarium solani*. *Plant Disease Repr.* 47: 1032-1035.
12. TOOLE, E. RICHARD. 1966. Stem canker of red oaks caused by *Fusarium solani*. *Plant Disease Repr.* 50: 160-161.
13. TROUP, R. S. 1921. *The silviculture of Indian trees*. Vol. II. Clarendon Press, Oxford.
14. WEIDENSAUL, T. C. 1968. Annual cankers of sugar maple caused by four species of *Fusarium*. (Abst.) *Phytopathology* 58: (in press).

EAST AFRICAN TROPICAL PESTICIDES RESEARCH INSTITUTE,
ARUSHA, TANZANIA