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A FUSARIUM FOLLOWING FROST-INJURY OF ROBINIA¹

J. C. GILMAN AND B. B. SPROAT

In the fall of 1935 a number of specimens of seedlings of *Robinia pseudo-acacia* L. were submitted to the Department of Botany of Iowa State College for the investigation of a canker which was girdling the stems of these plants at or about the ground line. On a majority of the specimens examined, the injury consisted of a sunken area approximately two centimeters in length

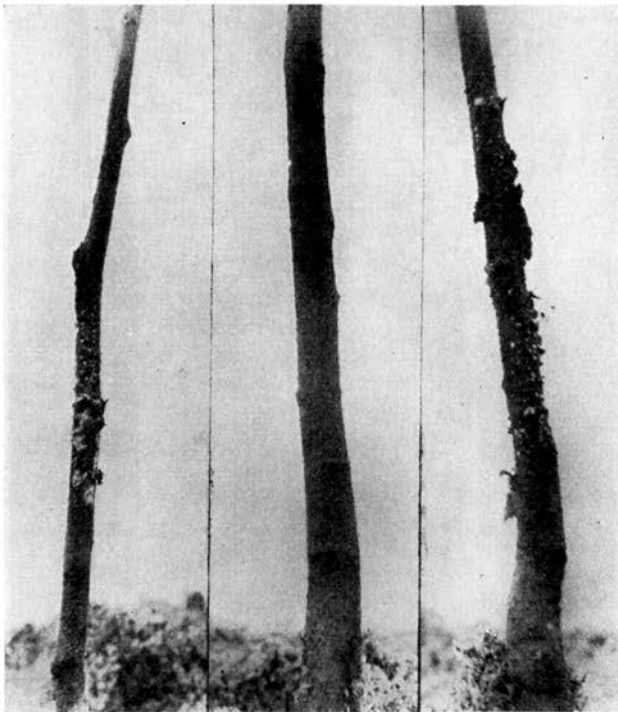


Fig. 1. Seedlings of *Robinia pseudo-acacia* showing cankers covered with sporodochia of *Fusarium sarcochroum*. Left and right cankered; center, healthy.

completely surrounding the stem. (Fig. 1). The wood under these cankers was materially browned and the cambium was dead. (Fig. 2). Many of these cankers were covered with orange

¹ Journal Paper No. J. 344 of the Iowa Agricultural Experiment Station, Ames, Iowa. Project No. 450.

sporodochia of a fungus which microscopic examination proved to be a member of the genus *Fusarium* (Fig. 4). A survey of the extent of the disease was made and the identity of the fungus and its relationship as a possible factor in the causation of the canker was investigated.

Five hundred plants from twenty bundles were removed from

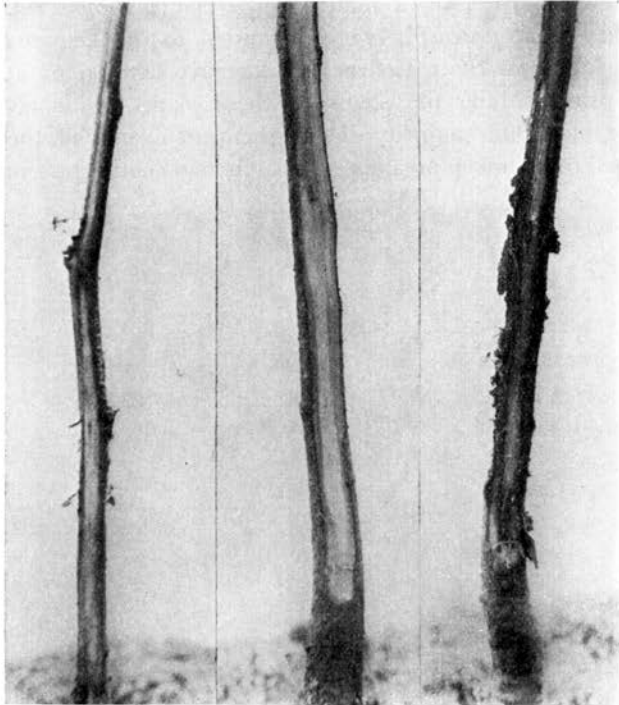


Fig. 2. Seedlings of *Robinia pseudo-acacia* showing internal symptoms following canker. These are the same seedlings as shown in Figure 1.

the heeling-in beds of the Soil Erosion Nursery at Ames and were examined. Sixty and six-tenths per cent of these plants showed cankers of greater or less extent and 23.4 per cent of the total showed sporodochia of the fungus on the cankers. These cankers were indiscriminately scattered on A, B, and C grades of stock. Seedlings showing similar cankers were observed in nurseries at Elsberry and Bethany, Missouri and at Havana, Illinois.

In order to obtain more definite information concerning the effects of the canker on the subsequent growth of the seedlings, samples of moldy, cankered without mold, and uninjured plants were placed in soil in the greenhouse and examined after ten days.

Table I. Effect of canker on growth of Robinia pseudo-acacia seedlings from various nurseries

Types of Plants	Ames Iowa			Elsberry Missouri			Havana, Illinois			Totals			
	Set	Grew		Set	Grew		Set	Grew		Set	Grew		
	No.	No.	Percent	No.	No.	Percent	No.	No.	Percent	No.	No.	Percent	
Moldy	40	37	92.5	24	18	75	12	12	100	76	67	88.2	
Canker	10	7	70.0	—	—	—	—	—	—	10	7	70.0	
Uninjured	20	19	95.0	10	9	90	12	12	100	42	40	95.2	
Field run	100	86	86.0	—	—	—	—	—	—	100	86	86.0	
										Total	228	200	87.7

The results are shown in Table I. These data indicate that there was little difference in subsequent growth between the moldy seedlings at Ames, 92.5 per cent, and the uninjured seedlings, 95 per cent. The seedlings which showed cankers without the mold did not grow as well but this figure may not be significantly less

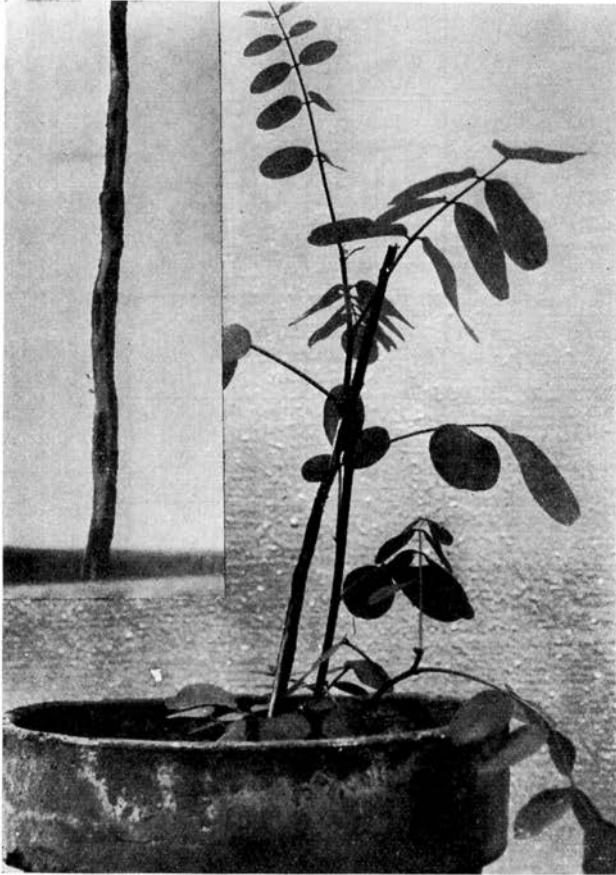


Fig. 3. Recovery of seedling of Robinia in greenhouse. Upper left shows plant at time of potting.

because the number of seedlings used was small. Similar differences were found with seedlings from Elsberry, Missouri and Havana, Illinois. It is interesting to note that the total per cent that grew in these selected seedlings is practically the same as that found when 100 seedlings of field run grade B stock were grown under similar conditions.

In order to study the effect of the fungus on the host fifty seed-

lings showing the presence of the sporodochia on the cankered areas were placed in six inch pots in the greenhouse and allowed to renew growth. After two weeks the buds began to swell and in a month's time 84 per cent of these plants had sent out leaves from adventitious buds below the canker. The cankered area did not increase, and, since the seedlings had been selected because of the presence of the fungus, it was concluded that the fungus was

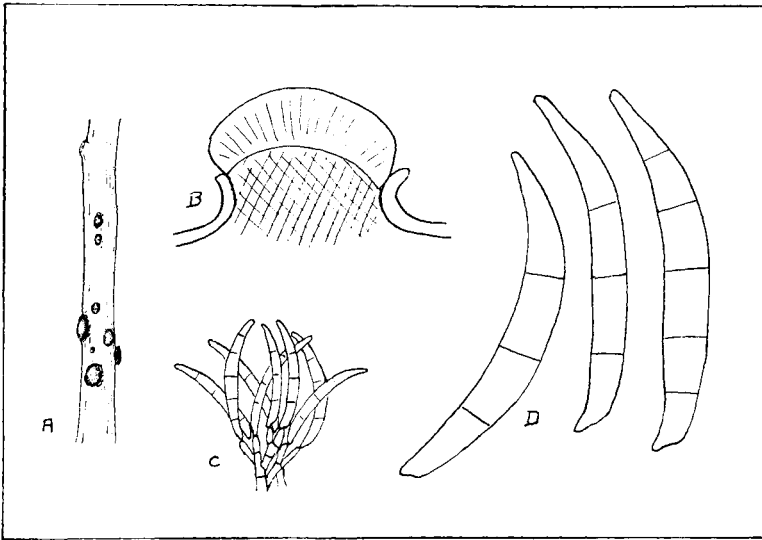


Fig. 4. *Fusarium sarcochroum*. A. Habitat. B. Diagrammatic section through a sporodochium. C. Portion of fruting layer of the sporodochium. D. Macroconidia. x1000.

not able to extend its activities into growing cells. A search of the literature showed the fungus to be *Fusarium sarcochroum* (Desm.) Sacc. which had previously been reported from Europe on *Robinia pseudo-acacia* but had not been previously found on this host in the United States.

Cooke and Ellis² reported this fungus as *Fusarium diplosporium* C. and E. from potato stems. Sherbakoff,³ did not find it in his studies on the *Fusarium* species on the potato tuber.

Examination of the weather data for the end of the growing season in Iowa showed that the temperature on October 4-7 had fallen below the freezing point on these days: the minimum temperatures at Ames were 24, 30, 20, and 31° F. respectively. The evidence therefore indicated that the primary cankers on these

² Cooke, M. C. and J. B. Ellis 1878. New Jersey fungi. *Grevillea* 7:38.

³ Sherbakoff, C. D. 1915. *Fusaria* of potatoes. New York, Cornell, Agr. Exp. Sta. Mem. 6.

seedlings were caused by frost injury with the *Fusarium* invading the injured tissue. This opinion is supported by the fact that Wollenweber and Reinking.⁴ Note that this fungus occurs on legumes following frost injury.

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⁴ Wollenweber, H. W. and O. A. Reinking, 1935. *Die Fusarien*. Paul Parey. Berlin, pp. 95-96.