J. Indian bot. Soc. 50 : 53-56.

EFFECT OF HOST DIFFUSATES ON GERMINATION OF CHLAMYDOSPORES OF *USTILAGO SCITAMINEA* SYD.[1]

By S. K. Saxena and Abrar M. Khan

Department of Botany, Aligarh Muslim University, Aligarh

Abstract

Bud, root and leaf diffusates stimulated the germination of chlamydospores of *U. scitaminea*. Highest increase in germination occurred in the diffusates from buds. Bud diffusates from 30 buds inhibited the germination of chlamydospores. On the other hand, when this diffusate was diluted with water the germination of chlamydospores increased with the increase in dilutions and in 1/100 dilution it was equal to that in water. Different collections of chlamydospores showed differences in the percentage germination.

Introduction

Although there are several reports in plant nematology that host diffusates have stimulating effect on the hatching of the larvae of nematodes but information regarding the effect of host diffusates in phytopathology is very little. (Ahmed and Khan, 1964, Shepherd, 1962). Flentje (1959) has reviewed the literature concerning the effect of host plant excretions on germination and growth of fungi. Spores of *Plasmodiophora brassicae* Wor. and *Fusarium solani* (Mart.) App., and oospores of *Pythium* sp. germinated readily when seedlings of host plants were grown in near vicinity (Macfarlane, 1952; Barton, 1957; Jackson, 1957). In the present paper an attempt has been made to determine the effect of (a) root, leaf and bud diffusates; (b) duration of bud diffusate and its concentration on the germination of chlamydospores of *Ustilago scitaminea* Syd.

1. Accepted for publication on August 14, 1970.

Materials and Methods

The chlamydospores of sugarcane smut (*U. scitaminea*) were collected from sugarcane variety Co 313 locally inoculated with collections from Aligarh, Punjab, Bengal, Bihar, Poona, Coimbatore and Cuddalore (Saxena and Khan, 1963, 1964). Bud diffusates were prepared by keeping two buds each of Co 245, Co 515, Co 517, Co 313, Co 846, Co 617 and B. O. 17 varieties of sugarcane separately in 10 ml sterile distilled water contained in petridishes for 12 hours unless stated otherwise. For preparing root diffusates 1, 2, 3, 6 and 8 one-week old roots of Co 313 were placed in 10 ml distilled water in petri-dishes for 12 hours. Similarly, three leaf pieces each from tip, middle, basal regions and leaf sheath were placed separately in 10 ml of sterile distilled water for 12 hours. Chlamydospores of *U. scitaminea* were transferred in 0.2 ml of the diffusates in the cavity of the slides which were kept in an incubation chamber at 25°C.

After 12 hours the chlamydospores that germinated and those which did not germinate were counted. Chlamydospores were also germinated in sterile distilled water to serve as control.

Results

Effect of bud diffusates.—It is clear from table I that bud diffusates obtained from Co 245, Co 515, Co 517, Co 313, Co 846, Co 617 and B. O. 17 varieties of sugarcane stimulated the germination of chlamydospores of *U. scitaminea* from Aligarh, Punjab, Poona, Bihar, Bengal, Coimbatore and Cuddalore. The germination of chlamydospores of Cuddalore collections in the diffusates ranged from 59-80 per cent while in distilled water it was only 47 per cent. Similarly, the germination of chlamydospores of Bihar and Coimbatore collections was mucher higher in bud diffusates than in water.

No significant difference was observed in the germination of chlamydospores in diffusates from different varieties of sugarcane, therefore diffusate of Co 24[illegible] variety of sugarcane was used in the remaining studies. Optimum germination of all the collections occurred in the diffusates prepared from 10 buds. There was little difference in the diffusates obtained from 2 and 5 buds. With a further increase in the number of buds, there was corresponding decrease in the germination of chlamydospores of all the collections. In the diffusates obtained from 30 buds the germination of the chlamydospores was less than in water.

The diffusates obtained from 30 buds was diluted to 1/2, 1/10, 1/20, 1/50 and 1/100 with distilled water and the germination of the chlamydospores was studied. The germination of chlamydospores of all the collections was low in the 'S' or 1/2 concentration of the diffusates. The germination increased with the increase in dilution of the diffusates. Highest ger-

TABLE I

RESULTS SHOWING THE EFFECT OF BUD DIFFUSATES ON THE GERMINATION OF CHLAMYDOSPORES OF *USTILAGO SCITAMINEA* SYD.

Variety of sugarcane	Percentage of germination of chlamydospores of collections from :						
	Aligarh	Punjab	Bengal	Bihar	Poona	Coimbatore	Cuddalore
Co 245	83	82	69	86	65	65	80
Co 515	79	80	76	93	82	86	70
Co 517	85	82	79	69	61	59	62
Co 313	89	80	85	89	79	55	79
Co 846	85	86	75	75	71	62	61
Co 917	85	89	79	81	61	59	63
B.O. 17	79	80	85	88	62	51	59
Control in water	63	71	67	62	52	29	47

Each percentage figure is based on the number of spores germinated out of 500 spores counted.

mination occurred in 1/50 dilution of the diffusates. In 1/100 of the dilution the germination was almost equal to that in water.

As pointed out above that highest germination took place in the diffusates obtained from 10 buds, therefore, the effect of duration of diffusates of similar number of buds was determined. Highest germination of the chlamydospores of all the collections was observed in the diffusates drawn after 12 hours. The germination was adversely influenced in case the diffusates were obtained from the buds kept for more than 24 hours.

Effect of root diffusates.—The germination of chlamydospores of all the collections was high in diffusates prepared from 6 roots. There was little difference in the diffusates obtained from 1, 2, 3 and 8 roots.

Effect of leaf diffusates.—It is evident from table II that diffusates obtained from different parts of both young and old leaves of sugarcane stimulated the germination of chlamydospores of all the collections but highest germination was observed in the diffusates obtained from leaf sheath region of young leaf.

TABLE II

EFFECT OF DIFFUSATES FROM DIFFERENT PARTS OF YOUNG AND OLD LEAF OF SUGARCANE ON THE GERMINATION OF CHLAMYDOSPORES OF *USTILAGO SCITAMINEA* SYD.

Portion of leaf	Percentage germination of chlamydospores of collections from :						
	Aligarh	Punjab	Bengal	Poona	Bihar	Coimbatore	Cuddalore
Young leaf							
Tip	68	71	70	60	60	40	41
Middle	68	75	75	65	62	42	45
Base	71	78	75	68	66	46	48
Leaf-sheath	79	82	79	69	70	48	51
Old leaf							
Tip	60	65	60	61	58	38	39
Middle	62	68	65	61	58	45	42
Base	62	69	69	64	59	46	44
Leaf-sheath	68	71	75	65	60	46	48
Water	65	70	64	48	58	35	45

Each percentage figure is based on the number of spores germinated out of 500 spores counted.

REFERENCES

AHMED, A., AND A. M. KHAN. 1964. Factors influencing larval hatching in root-knot nematode, *Meloidogyne incognita* (Kofoid and White, 1919) Chitwood, 1949. II—Effect of root-leachates and certain chemicals. *Indian Phytopathology* **17** : 102–109.

BARTON, R. 1957. Germination of oospores of *Pythium mamillatum* in response to exudates from living seedlings. *Nature, Lond.* **180** : 613–614.

FLENTJE, N. T. 1959. Physiology of Penetration and infection. In *Plant Pathology—Problems and Progress*. C. S. Holton et al. (Eds.). American Phytopathological Society. 76–87.

JACKSON, R. M. 1957. Fungistasis as a factor in the rhizosphere phenomenon. *Nature, Lond.* **180** : 96–97.

MACFARLANE, I. 1952. Factors affecting the survival of *Plasmodiophora brassicae* Wor. in the soil and its assessment by a host test. *Ann. appl. Biol.* **39** : 239–256.

SAXENA, S. K., AND A. M. KHAN. 1963. Studies on sugarcane smut caused by *Ustilago scitaminea* Syd. I—Effect of temperature on spore germination. *J. Indian bot. Soc.* **42** : 195–203.

——, AND ——. 1964. Studies on sugarcane smut caused by *Ustilago scitaminea* Syd. II—Effect of relative humidity on spore germination. *Ibid.* **43** : 61–68.

SHEPHERD, A. M. 1962. The emergence of larvae from cysts in the genus *Heterodera*. Technical Bull. No. 32 Commonwealth agric. Bureau.