

Germination of Sugarcane Smut Spores at Different Temperatures and Incubation Period

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Smut disease caused by fungus, *Ustilago scitaminea* Sydow is a serious disease of sugarcane in Bangladesh. The viability of smut spores is an important factor in causing smut disease. Mature whip ruptures and millions of tiny black spores (teliospores) are liberated and disseminated by wind. It has been estimated that one average sized whip contains about 5000 million spores (Mohan Rao and Prakasam, 1956). Thus, spores from a few whips can infect the entire crop in a country if all of them survive and come in contact with the host plant. However, this never happens in nature. Smut spores have no dormancy and germinate readily. The spores under suitable temperature and humidity conditions germinate readily. Luthra et al., (1938) reported that optimum temperature for germination is 30°C. Refay and Agarwala (1959) reported that smut spores collected from Co 332, Co 923 and Co 936 germinated well even at 6°C (21°C normal). Appalanarasayya (1964) reported that maximum spores germinated at 25°C. No work has been done on germination of smut spores at different interval of time under different temperatures in Bangladesh. Therefore, present investigation has been undertaken to investigate germination of smut spores at different intervals of time and temperatures under laboratory condition.

The experiment was conducted at Sugarcane Research & Training Institute (SRTI), Ishurdi, Pabna. Sugarcane smut whips of the variety Isd 2/54 covered with thin whitish membrane were collected from the village Arambaria of Thana Lalpur under the district of Natore. Germination test on water agar medium was done after 4 months of collection of smut spores. Spore suspension was made with sterilized water in test tube. Small amount of suspension was poured on water agar medium and shaken well so that it covers the whole surface of the medium in petridish. The petridish was then kept in an incubator for 3, 6, 12, 18 and 24 h at 15°C. Germination count was done after passing each interval of time. Thus other petridishes were kept in an incubator for the above noted times at temperatures 20, 25, 30 and 35°C one after another and germination count was recorded. During germination count ten readings were taken from ten different places of each petridish under compound microscope (100 magnification). From each place of focus, total number of spores and germinated spores were observed and counted. Thus average germination percentage of smut spores at different time intervals kept under different temperatures were calculated out (Table 1)

Table 1. Germination of smut spores at different temperatures and incubation period.

Temperatures Incubation period (h)	15°C	20°C	25°C	30°C	35°C	AV
3	0	0.03	0.4	1.1	0.3	0.4
6	0	23.3	20.5	10.6	6.0	12.1
12	0	54.0	57.8	32.6	15.5	32.0
18	0	74.0	71.1	59.6	31.5	47.2
24	0	76.2	84.9	74.6	34.3	54.0
AV	0	45.5	46.9	35.7	17.5	

Results of the investigation have been presented in the Table 1. The table shows that different germination percentages were obtained at different temperatures and incubation period. As the incubation period increased germination percentage was also increased, while identical germination was obtained at 20°C and 25°C temperatures. The Table 1 also shows that no germination occurred at 15°C upto 24 h incubation period of smut spores. The highest germination (84.9%) was obtained at 25°C and 24 h incubation period. However, these results differ from the report of Rafay and Agarwala (1959) who reported that smut spores collected from Co 332, Co 923 and Co 936 germinated well even at 6°C (21°C normal). However, they did not mention the incubation period. These results agree with the report of Appalanarasayya (1964) who reported that maximum spores were germinated at 25°C. In this case 84.9% germination was found at 25°C for 24 h and that was the highest germination percentage obtained in different temperatures tested. It can be concluded that since the highest germination of smut spores occurs under 25°C at 24 h incubation, longer incubation needs to be tested at different temperatures. However, until then germination of smut spores may be tested under 25°C at 24 h time interval in the laboratory.

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