TARC Notes

Effect of temperature on conidial size of *Sclerospora maydis*, *S. philippinensis* and *S. sorghi*

Corn downy mildew is the most important disease of corn in the tropical and sub-tropical regions of Asia. Up to the present, nine species of *Sclerospora* and *Sclerophthora* have been reported to attack corn[2]. However, these nine species have not been classified clearly from their conidial morphology. It is generally recognized that the morphology, physiology, pathogenicity, etc. of fungi vary according to culture conditions. In the case of fungi which grow on artificial media it is easy to examine them under the same conditions. All pathogens of corn downy mildew can not be grown on artificial media as they are obligate parasites, and they are widely distributed in various countries. Therefore, some of the data so far used in the classification were derived from the results of observations made under various natural conditions.

Three species of economic importance, *Sclerospora maydis*, *S. philippinensis* and *S. sorghi* collected from Southeast Asia were compared in relation to their morphological and physiological characteristics. This paper reports the effect of temperature on conidial size which is one of the important factors for the classification of these fungi.

Corn seedlings infected with *S. maydis*, *S. philippinensis* and *S. sorghi* were imported from Indonesia, the Philippines and Thailand, respectively. Fungi were maintained by inoculating conidia every month to corn seedlings planted in a greenhouse controlled at 22–32°C.

Infected leaves of corn were collected from the greenhouse at about 5:00 p.m. and washed with running water by using a sponge to remove dust on the leaves. The leaf blades were cut into slices about 11 cm long, and placed in plastic dishes with their lower surface facing a layer of 1.5% agar medium containing 0.01% $HgCl_2$. The plastic dishes were placed into vinylbags to maintain humidity

Table 1. Effect of temperature on conidial size of *Sclerospora maydis*, *S. philippinensis* and *S. sorghi*

Species	Temperature (°C)	Length (μ)		Width (μ)		Length/Width
		Range a)	Mean b)	Range	Mean	
S. maydis	14	22.1—29.7	26.4	20.5—28.6	25.7	1.02
	18	20.7—28.8	25.0	20.5—26.4	23.2	1.07
	22	20.3—29.3	24.1	18.8—27.5	23.3	1.03
	26	20.1—28.6	23.7	20.1—26.2	23.0	1.03
	28	19.9—27.9	24.0	19.9—25.8	23.4	1.03
S. philippinensis	14	33.4—51.7	43.7	18.1—25.3	20.8	2.09
	18	36.9—52.8	47.5	18.1—24.5	20.7	2.29
	22	38.6—64.2	51.6	18.1—25.1	20.2	2.54
	26	41.5—71.4	54.9	17.0—21.8	19.4	2.83
	28	41.7—76.0	56.4	15.1—22.7	18.4	3.07
S. sorghi	14	22.7—31.9	27.0	16.8—21.4	18.8	1.43
	18	20.7—37.3	28.8	16.6—26.0	19.9	1.44
	22	23.6—39.3	30.4	17.2—23.8	20.7	1.46
	26	24.0—39.7	31.3	17.9—25.5	20.9	1.50
	28	26.2—39.3	32.7	17.5—26.0	21.9	1.51

For each treatment, 6 plastic dishes were used and 30 conidia were measured in each plastic dish.

a) Maximum and minimum value in 180 conidia.

b) Average of 180 conidia.

conducive to sporulation, and then kept in a growth chamber set at 14, 18, 22, 26 and 28°C, respectively, for 15 hrs (6:00 p.m. to 9:00 a.m.). The size of conidia discharged on agar medium was measured at 400× magnification. The data are shown in Table 1.

In *S. maydis*, the length and the width of conidia ranging on the average 23.7–26.4μ and 23.0–25.7μ, respectively, were not affected by temperature. Ratio of length to width ranged 1.02–1.07, on the average. The shape of conidia was globular at all the temperatures tested.

In *S. sorghi*, the size of conidia tended to be larger as the temperature rose. The range of length and width of conidia was 27.0–32.7μ and 18.8–21.9μ on the average, respectively, and ratio of length to width was about 1.5 at all temperatures tested.

In *S. philippinensis*, conidia became longer with the increase in temperature. Conidia were only 43.7μ long at 14°C but reached a length of 56.4μ at 28°C on the average. There was no remarkable difference in the width of conidia ranging from 18.4μ to 20.8μ, on the average, although they tended to be narrower as the temperature increased. Therefore the ratio of length to width was only 2.09 at 14°C but 3.07 at 28°C on the average. In other words, conidia became more oblong-ellipsoid as the temperature rose.

Tasugi[3] and Leu[1] reported a change in conidial size of Peronosporaceae with temperature. In the present study, conidial size of *S. maydis* did not change with temperature while that of S. *philippinensis* and *S. sorghi* was affected by temperature.

In *S. sacchari* growing on sugar cane, Leu[1] reported that the effect of temperature on the length of conidia could be classified into 3 phases, 1) at 22–30°C, the average length was 41–45μ, 2) at 18°C, 36μ, and 3) at 10–14°C, 29–30μ. Width of conidia ranging from 17.6 to 20.1μ on the average was not affected by temperature. When comparing the conidial size of *S. sacchari* reported by Leu with that of the three species tested in this study, it was easy to distinguish *S. sacchari* and *S. maydis* under all temperatures tested, but distinction between *S. sacchari* at high temperature (22–30°C) and *S. philippinensis* at low temperature (14–18°C), and *S. sacchari* at low temperature (10–14°C) and *S. sorghi* at temperatures varying between 14 to 28°C was not possible. These findings suggest that the comparative study of conidial size of fungi causing corn downy mildew, for a purpose of classification, must be made at the same temperature. If conidia are formed under natural conditions, meteorological conditions conducive to sporulation must be taken into account to avoid misinterpretation.

1) Leu, L. S.: Effects of temperature on conidial size and sporulation of *Sclerospora sacchari*. *Plant Protection Bull.*, 15(3), 106–115 (1973).
2) Shaw, C. G.: The taxonomy of graminicolous downy mildews, with emphasis on those attacking maize. *Trop. Agric. Res.*, 8, 47–55 (1975).
3) Tasugi, H.: The variation in the size of conidia in some species of Peronosporaceae related to the temperature. *Syokubutsu oyobi Dobutsu*, 4(5), 871–880 (1936) [In Japanese].

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