Fluctuation of Sclerotia of *Thanatephorus cucumeris* in Relation to Development of Sheath Blight Disease of Rice

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ABSTRACT

Sclerotia of Sheath blight disease pathogen-*Thanatephorus cucumeris* could easily be found in the rice hills within one week after transplanting. Thereafter, the number of sclerotia in rice hills would be slightly increased with the increasing of plant growth and the lapse of time. However, the number of sclerotia would be significantly increased when the diseased rice plant reached panicle initiation stage due to the increasing of new sclerotia. The fluctuation of sclerotia in rice hills was greatly affected by the development of sheath blight disease. In other words, the more severe the disease was the more the sclerotia would form in rice hills. After harvesting, a large number of sclerotia would drop down on soil surface that surrounded rice stalks, while a few sclerotia would still remain in rice stalks.

INTRODUCTION

Sclerotium of *Thanatephorus cucumeris* has long been regarded at the primary inoculum source of shealth blight disease of rice [5,8] It was estimated that approximately 2,000 thousand sclerotia per hectare would drop down on soil surface of the paddy field with disease severity of 28.5 per cent[1] Leu[7] investigated from 13 sampling locations in Taiwan in 1979 reported that the number of sclerotia from single sampling spot (50 x 50 x 20 cm), varied from

561 to 13 with an average of 156.5. In Japan, Yamaguchi collected sclerotia from stubs and the soil around them and reported that 70% of the dropped sclerotia were found from stubs and the rest was found from the soil around them[9]

Since sclerotia were main primary inoculum source that the population of sclerotia not only could influence the disease occurence but also be used as disease forecaseting indicator[3,4]. Many reseacher, both in Taiwan and in Japan, have studied on distribution and survival of sclerotia, but seasonal fluctuation of sclerotia in rice field has not been well studied. Therefore, fluctuation of sclerotia of *Thanatephorus cucumeris* in relation to development of sheath blight disease was reported in this paper.

MATERIALS AND METHODS

The studies were conducted in Hsinchu & Pai-ho two locations during 1979 and 1980 by Taoyuan District Agricultural Improvement Station & Chia-Yi Agricultural Research Institute respectively. The rice variety Tainan 5 was employed in each experimental field. Each location set up one experimental field with the size of 6 x 8 m^2 and 10 x 12 m^2 respectively. Twenty rice plants were randomly sampled by cuting rice hills up to the soil surface every week after transplanting throughout the harvesting time. Number of sclerotia in rice hills, diseased tillers and lesion height were investigated. Other characterics of rice plant such as plant height, tiller number etc. were also recorded. After harvesting, sclerotia in rice stalks and on soil surface that surrounded rice stalks were also counted.

RESULTS AND DISCUSSIONS

1. Fluctuation of sclerotia in rice hills during rice growing period:

Sclerotia of shealth blight disease pathogen-*Thanatephorus cucumeris* could easily be found in rice hills within one week after transplanting. Thereafter, the number of sclerotia would be slightly increased with the increasing of plant growth and the lapse of time. However, the number of

sclerotia would be significantly increased when the diseased plant reached panicle initiation stage due to the increasing of new sclerotia in rice hills (Fig. 1,2,3,4).

2. Fluctuation of sclerotia in rice hills in relation to disease development:

The results of the field investigation, including 2 experimental field with 4 crop seasons, revealed that fluctuation of sclerotia in rice hills was greatly affected by development of sheath blight disease (Fig. 1,2,3,4).

In other words, the more severe the disease was the more the sclerotia would form in rice hills.

3. Number of sclerotia adhered in rice hills before disease occurrence in relation to disease incidence:

Only a few sclerotia could be found in rice hills before disease occured (Fig. 1,2,3,4). The average highest number of sclerotia adhered in rice hills before disease occurrence varied from 0.1 to 2.3 per hill. The results indicated that the number of sclerotia in rice hills before disease occurrence was not correlated with the disease incidence (Table 1), while climatic factors might play important roles in the development of sheath blight disease. It was reported that the infection of the disease would occur in temperature range of 23-35°C and relative humidity above 95 per cent[6]. Usually sheath blight disease occurs earlier in the 2nd crop season than that in the 1st crop season due to the high air temperature at the early growing stage of rice in the 2nd crop season and low air temperature in the 1st crop season[11].

4. Number of sclerotia remained in rice stalks and dropped down on soil surface after harvesting:

After harvesting a large number of sclerotia dropped down on soil surface that surounded rice stalk, while a few sclerotia would still remian in rice stalks (Table 2). However, after land preparation most of sclerotia would float on water surface and become primary inoculum source for the next crop season[5,8].

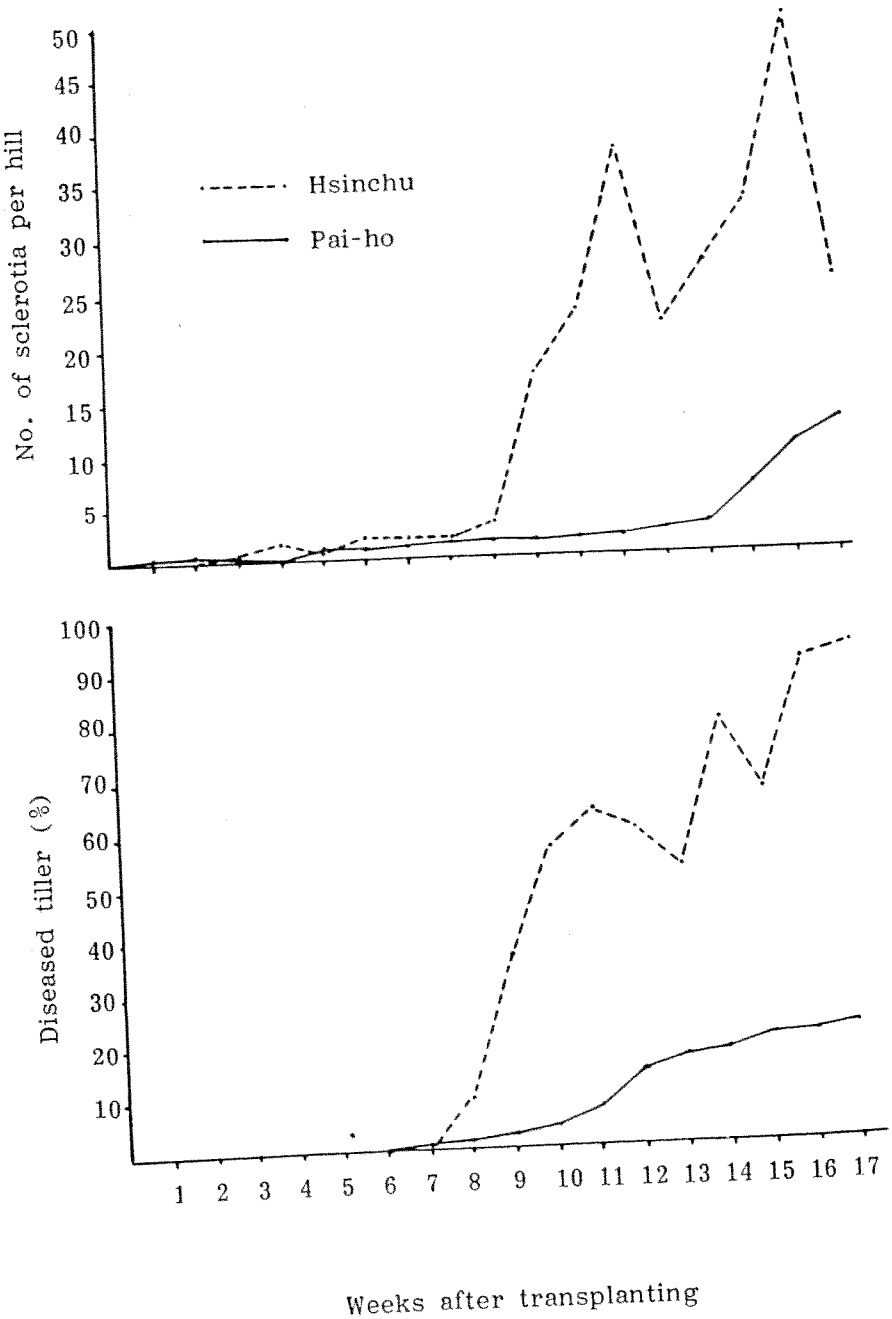

Fig. 1: Fluctuation of sclerotia in rice hills and disease development of sheath blight of rice in the 1st crop of 1979.

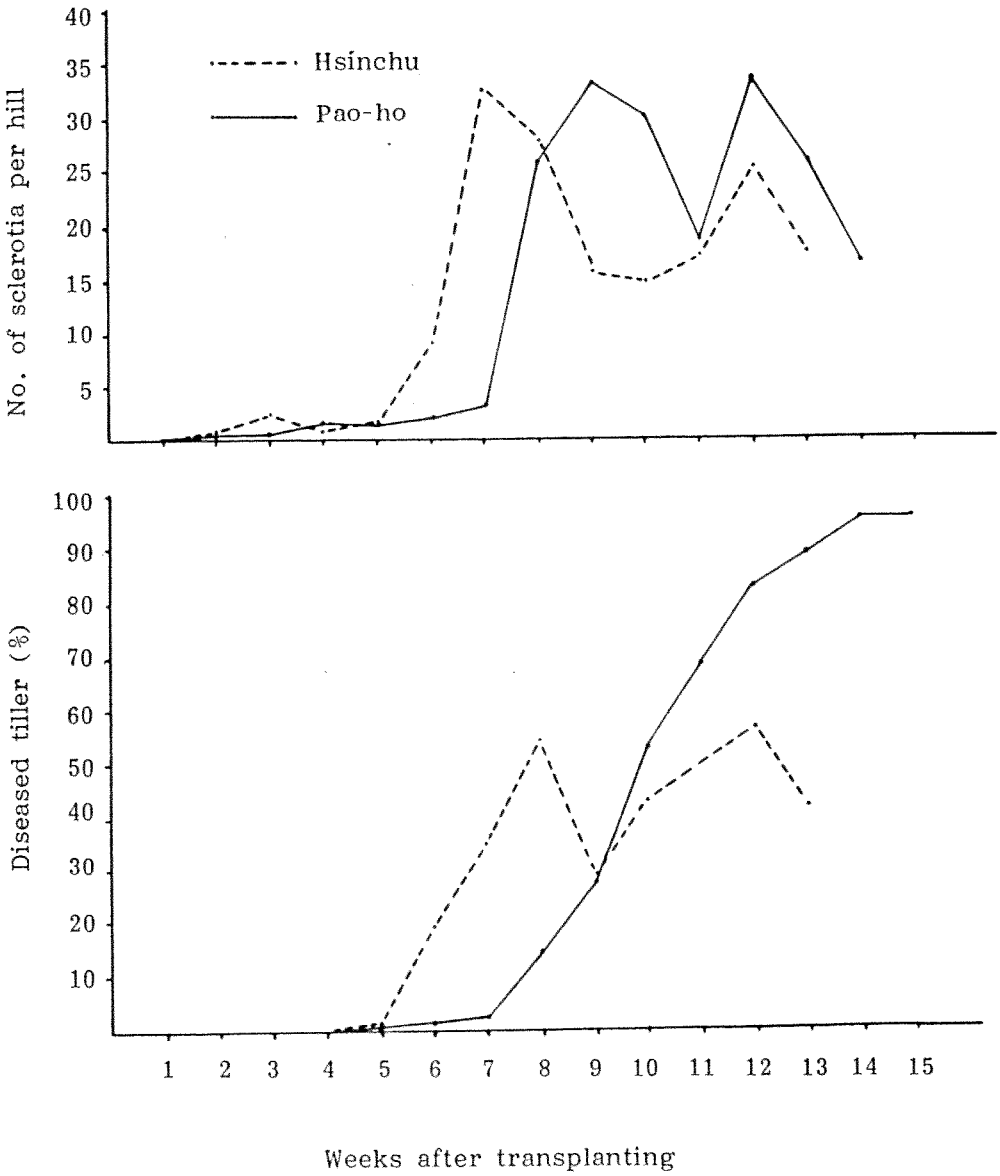

Fig. 2: Fluctuation of sclerotia in rice hill and disease development of sheath blight of rice in the 2nd crop of 1979.

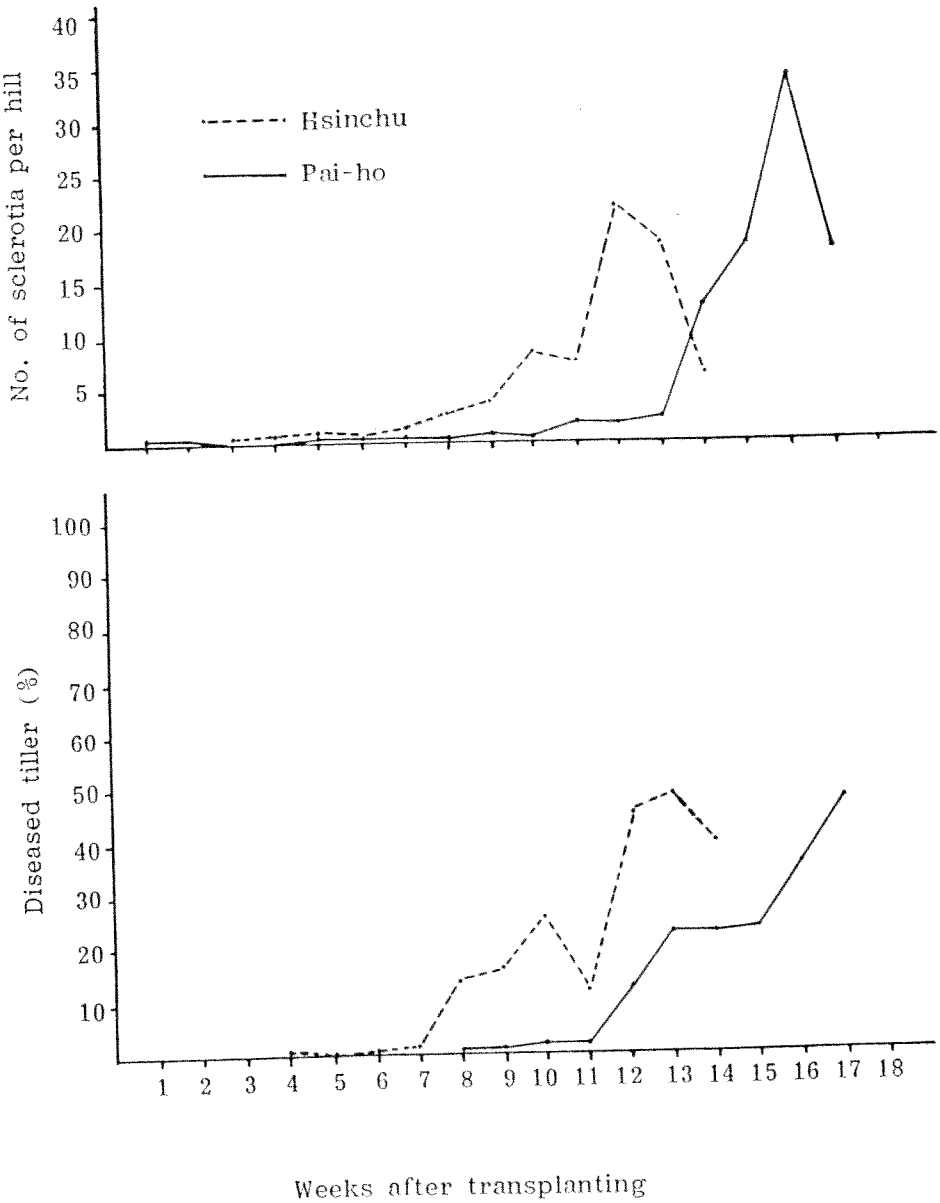

Fig. 3: Fluctuation of sclerotia in rice hill and disease development of sheath blight of rice in the 1st crop of 1980.

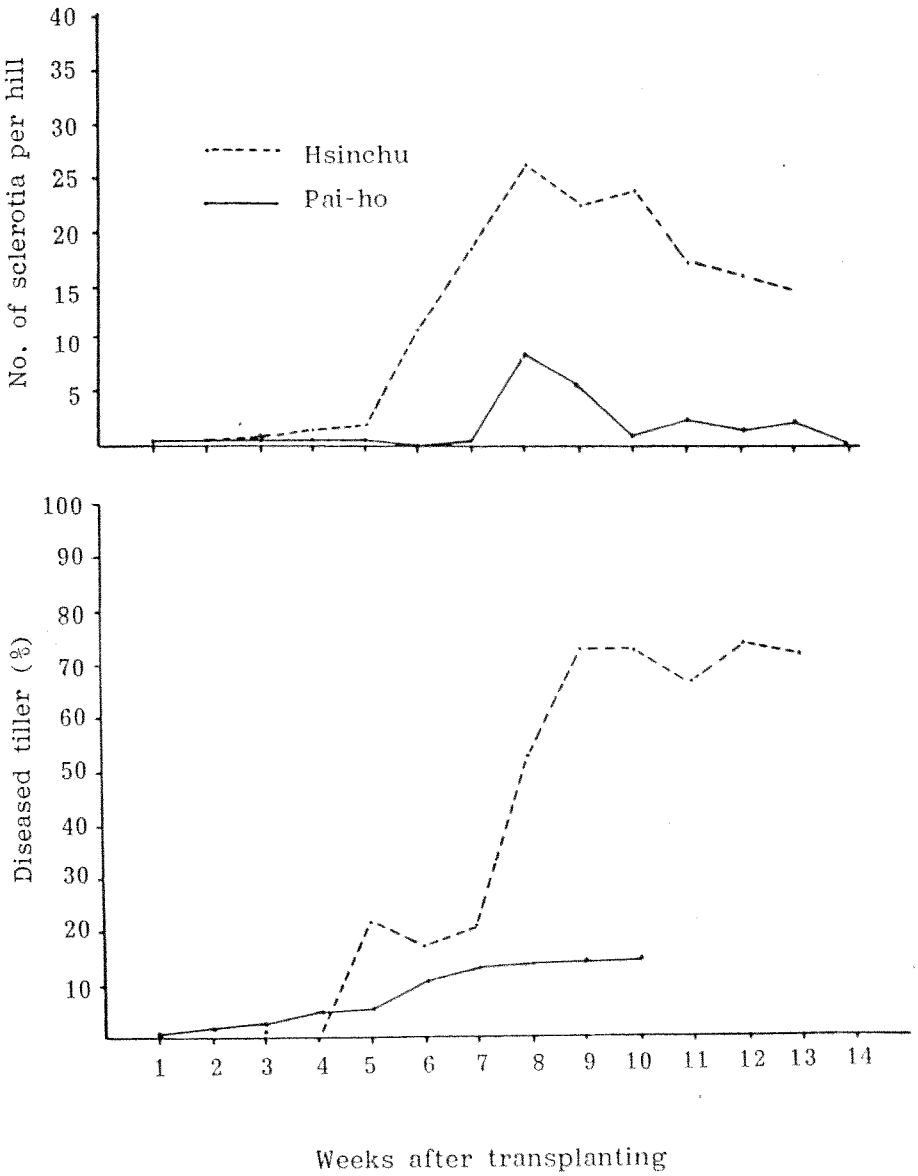

Fig. 4: Fluctuation of sclertia in rice hills and disease development of sheath blight of rice in the 2nd crop of 1980.

Table 1: Number of sclerotia in rice hills before disease occurrence in relation to disease incidence.

Crop season	Pai-ho		Hsinchu	
	No. of sclerotia[1]	Diseased tiller(%)[2]	No. of sclerotia	Disease tiller(%)
1979 1st crop	0.8	21.6	2.0	95.5
1979 2nd crop	1.1	95.0	2.3	55.9
1980 1st crop	0.4	55.0	0.2	48.1
1980 2nd crop	0.1	14.2	0.2	72.9

1. Highest number of sclerotia per hill before sheath blight occurrence.
2. Highest percentage of diseased tiller of sheath blight.

Table 2: Number of sclerotia remained in rice stalks and dropped down on soil surface harvesting in 1979.

Sclerotia located	Pai-ho		Hsinchu	
	1st crop	2nd crop	1st crop[1]	2nd crop
In rice stalks	7.3	6.2	—	8.7
On soil surface[2]	2.0	68.3	—	51.5

1. "—" Not investigated because of land preparation was done soon after harvesting.
2. Size of soil surface at Pai-ho and Hsinchu were 30 x 30 cm and 25 x 25 cm respectively.

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水稻紋枯病菌菌核消長及病勢進展

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摘　要

水稻紋枯病菌之菌核自插秧後一週內即可附著在稻欉內，以後隨著稻株之生長，附著在稻欉內之菌核數量僅略爲增加，但到了幼穗形成期以後，隨著病勢進展病株上開始形成新菌核，因此稻欉內之菌核數量顯著的增加。稻欉內菌核之消長與紋枯病之病勢進展有密切關係。換言之即紋枯病發生愈嚴重，稻欉內之菌核數量亦愈多。水稻收穫後，大多數之菌核可掉在稻椿周圍之土壤表面，少數菌核則仍留在稻椿內。

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