COMPARATIVE STUDIES OF FOUR ISOLATES OF PIRICULARIA SETARIAE 1) NISHIKADO FROM SETARIA SPECIES IN INDIA

by

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INTRODUCTION

Piricularia setariae NISHIKADO is known to cause blast disease on Setaria italica Beauv. Kawakami (1901–1902) first reported P. oryzae Cav. on S. italica, but NISHIKADO (1917) named the fungus P. setariae. In India, it was first reported by Mc Rae (1922). THOMAS (1940) reported that P. oryzae, the cause of paddy blast, could infect S. italica, but Piricularia species from S. italica failed to infect rice. RAMAKRISHNAN (1948) studied the two fungi along with Piricularia species from Eleucine coracana and Digitaria marginata Link and considered them to be physiologic races of P. oryzae, since the fungus from S. italica failed to infect rice and vice versa. WALLACE (1950) stated that Piricularia from E. coracana, though similar to P. oryzae, was almost certainly P. setariae. KULKARNI (1953) showed that Piricularia from S. italica resembled P. setariae rather than P. oryzae. Since much work on Piricularia from S. italica and S. glauca was not done, the work now reported was undertaken during 1954–56.

MATERIAL AND METHODS

Two isolates from S. italica were already available in the Plant Pathological Laboratory, Poona, India, one from Poona and the other from Madras. Single spore isolations from these two cultures were undertaken and maintained. In addition, one isolate was obtained from S. glauca. While undertaking single spore isolations from this isolate, two distinct colonies, one withish and the other blackish

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1) The species P. setariae is referred to by some authors as P. grisea.
2) Condensed from the thesis as a part of the work submitted by the author for Ph. D. of Poona University in 1956.
in colour were picked up and maintained. Thus, four isolates of \( P. \) \textit{setariae} were available for study. These isolates were named as under:

- S I P – \( S. \) \textit{italica} isolate from Poona
- S I M – \( S. \) \textit{italica} isolate from Madras
- S G P – \( S. \) \textit{glauc}a isolate from Poona (Blackish)
- S G R – \( S. \) \textit{glauc}a isolate from Poona (Whitish)

Pathogenicity, host range, varietal resistance, cultural and physiological character studies were then undertaken.

**Results**

(a) **Pathogenicity and host range studies**

All the isolates proved to be pathogenic only on \( S. \) \textit{glauc}a and \( S. \) \textit{italica} but the isolates from \( S. \) \textit{glauc}a (S G P and S G R) were more highly pathogenic than the rest. This difference was noticed on \( S. \) \textit{verticillata}, \( S. \) \textit{italica} (local) \( S. \) \textit{italica} (German) and \( S. \) \textit{italica} Co. and E.C. selections (from Niphad, India). Other \( S. \) \textit{italica} varieties were susceptible to all the isolates, while \( S. \) \textit{palludifusca} remained immune to all. E.C. selections 1744, 1745 and 1748, \( S. \) \textit{italica} German and Russian varieties showed a high degree of resistance. All the isolates were non-pathogenic on \textit{Aristida Setacea} Retz., \textit{Avena sativa} L., \textit{Cenchrus ciliaris} L., \textit{Chloris gayama} L., \textit{Dichanthium annulatum} Staff., \textit{D. caricosum} Staff., \textit{Echinochloa frumentacea}, \textit{E. stagnana} Beard., \textit{Eleusine coracana}, \textit{Ischaemum pilosum} Hack., \textit{Iseilema wightii} Anders., \textit{Oryza sativa} L., \textit{Panicum antidotale} Retz., \textit{P. miliare} Lam., \textit{P. miliaceum} L., \textit{P. repens} L., \textit{Paspalum scrobiculatum} L., \textit{Pennisetum polystachyon} Schum., \textit{P. typhoides}, \textit{Schima nervosum} Staff., \textit{Sorghum vulgare} Pers., \textit{Triticum vulgare} Vill. and \textit{Zea mays} L.,

(b) **Cultural characters**

On apricot juice, onion decoction, host leaf decoction dextrose (2 %) and Tochinai's synthetic agars, four different types of colonies could be distinguished; on potato dextrose and potato saccharose agars three types of colonies (SGP and SGR being similar and others different) and on oat meal and rice polished agars two types of colonies (SGR different and the rest similar) were formed.

(c) **Physiological characters**

All the isolates grew between 24\(^\circ\) and 30\(^\circ\) C., maximum growth being at 30\(^\circ\) C.

The isolates S I P and S G P were more or less similar in their carbon utilization. All utilised mannitol and sucrose in good quantities. Maltose was least utilised by S I P, S G P and S G R isolates whereas S I M showed poor growth in glucose. None of the isolates formed spores in any carbon source.

The isolate S G R showed the maximum utilization of cellulose. The isolate S I P was the weakest, while S G P and S I M isolates