

A study on protein content and protein profiles of *Phytophthora parasitica* isolates in relation to their serological groupings

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Six isolates of *Phytophthora parasitica* were tested for their protein content and protein profile. The virulent isolates showed maximum protein content in comparison to that showed by the avirulent ones. The virulent isolates also showed extra band of protein which may be considered to be contributing to their virulence. Among the tested ones, 14 isolates were in three serogroups and five isolates did not react with any of these three antisera. The total protein content and protein profile could not be found to be related with antigenic properties of the isolates. The virulent isolates P₅, P₃ and P₂₁ belonged to different serogroups and also differed in addition to their protein content and protein profile.

Key words : *Phytophthora parasitica* isolates, protein profile

INTRODUCTION

The presence of cross-reactive antigens are present in several species of pathogens. These cross reactive antigens are also called 'common antigens', when they are present in some of the pathogenic isolates. The antigens mostly being protein in nature, there may be a relation in between total protein, protein profile and the antigen properties. The present study has been made to determine the possible presence of common antigens among isolates of *Phytophthora parasitica* and their significance in relation to total protein content and protein profiles of the isolates.

MATERIALS AND METHODS

Fourteen number of isolates of *Phytophthora parasitica* were taken from the Pathology Department, B.C.K.V., Mohanpur, Nadia, India for this experiment.

The protein content of the isolates was measured according to Lowry *et al.* (1951) and their protein profile were done according to Laemmli, (1970). The serogrouping of the isolates against available antisera of only P₃, P₁₃, P₅ and P₁₁ isolates were

made by the method mentioned by Charudattan and Devay (1972).

RESULTS

The results (Table 1) showed that maximum protein content was in the isolate P₂ (88.46 mg) and minimum in isolate P₁₃ (57.67 mg). It was found that P₅ (83.69 mg) had the second highest amount of protein followed by P₁ (71.24 mg), P₆ (70.78 mg) and P₈ (70.17 mg). So, if the isolates were arranged in increasing order of their protein content it will be as : P₁₃ < P₈ < P₆ < P₁ < P₅ < P₂₁. Regarding protein

Table 1 : Proteins content and protein profile of different isolates of *P. parasitica*

Isolates	Protein (mg/g of mycelium)	Protein profile No. of band
P ₁	71.24	3
P ₅	83.69	3
P ₆	70.78	2
P ₈	70.17	2
P ₁₃	57.67	2
P ₂₁	88.46	3

P₂₁ = Highly virulent strain

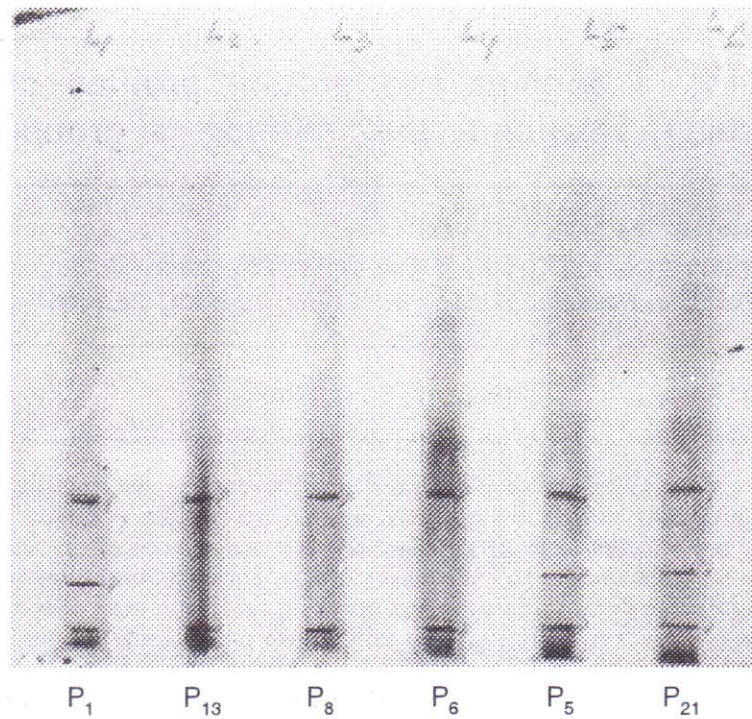


Fig. 1 : Protein profile of six isolates of *Phytophthora parasitica*

profiles of isolates of *P. parasitica* it was found (Fig.1) that in all the lanes (L₁ to L₆), the upper and lower bands were common. A middle protein band was found in lane 1 (P₁), 5 (P₅) and 6 (P₂₁) and not in lane 2 (P₁₃), 3 (P₈) and 4, (P₆) indicating that P₁, P₅ and P₂₁ have similar type of protein profile while P₁₃, P₈ and P₆ had a different one.

It was found from Table 2 that P₃ antiserum reacted with antigens of P₃, P₂₁ and P₂₂. The antisera of both P₁₃ and P₁₁ reacted with antigens of P₁₁, P₁₃ and P₁₆. The P₅ antiserum reacted with P₅ and P₁₀. So, these isolates were grouped into 3 serogroups, e.g., P₃ (P₃, P₉, P₂₁ and P₂₂), P₁₃ (P₁₁, P₁₃ and P₁₆) and P₅ (P₅ and P₁₀). The strains P₂, P₈, P₁₅, P₂₃ and P₂₄ did not react with none of these antisera. They may be in different groups in same group.

DISCUSSION

When protein content of six isolates was analysed, it was found that highest amount of protein was in the highly virulent isolate P₂₁ and lowest amount was in the less virulent isolate P₁₃ of *P. parasitica* (Table 1). Isolates containing higher protein content thus were more virulent than those having lesser amount of protein. Protein profile of the isolates were studied by determining the band pattern of the protein

(Kennedy and Duncan, 1995). It was found that the isolates P₁, P₅ and P₂₁ had an extra band of protein in contrast to the isolates P₆, P₈ and P₁₃ and former

Table 2 : Presence of common antigens among different isolates of *P. parasitica* on agar gel double diffusion test

Antigen	Antisera			
	P ₃	P ₁₃	P ₅	P ₁₁
P ₂	-			
P ₂	-	-	-	-
P ₃	+	-	-	-
P ₅	-	-	+	-
P ₆	-	-	-	-
P ₈	-	-	-	-
P ₉	+	-	-	-
P ₁₀	-	-	+	-
P ₁₁	-	+	-	+
P ₁₃	-	+	-	+
P ₁₅	-	-	-	-
P ₁₆	-	+	-	+
P ₂₁	+	-	-	-
P ₂₂	+	-	-	-
P ₂₃	-	-	-	-
P ₂₄	-	-	-	-

+ = common precipitation band(s) detected
 - = common precipitation bands(s) not detected

groups of isolates were more virulent than the later one. The presence of that extra band of protein might be responsible for their high protein content and thereby also for their virulence.

For better inter species identification serological tests were done (Merz *et al.*, 1969) excepting P₁ (the antiserum could not be executed). It was found that all the test isolates were not in same serogroup, but they were mainly in three serogroups i.e P₃ (P₃, P₉, P₂₁ and P₂₂), P₁₃ (P₁₁, P₁₃ and P₁₆) and P₅ (P₅ and P₁₀). This was also revealed from the experiment that highly virulent isolates P₅ and P₂₁, as characterized by their higher protein contents and extra band in their protein profiles, were not belonging to a single serogroup. The antigenic properties of those isolates of *P. parasitica* had no

bearing with their protein characters attributing to their virulence.

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