

Effect of Cellulose (A Polysaccharide) and Tomato Extract on Growth, Folin Positive Protein Production and Sporulation by Blight Pathogens

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Abstract

The growth, folin positive, protein production and sporulation by blight pathogens i.e. *Alternaria solani* (virulent pathogen) and *Alternaria triticina* (Avirulent pathogen) on modified Richard's liquid culture medium with tomato fruit extract of Pusa Ruby (Resistant variety) and Prince Long (Susceptible variety) having different concentration (0.10 and 1.0%) of cellulose (a polysaccharide) have been studied. The stimulation of folin-positive, protein production and sporulation was recorded whereas the growth was inhibited by the pathogens on both varieties when the concentration of cellulose was increased from 0.1 to 1.0% in the culture medium. The stimulation and inhibition depend upon the carbon source of the host and added carbohydrate (like cellulose) consisting of cellobiose units in long chain along with the host relations with the pathogen.

Introduction

Tomato (*Lycopersicon esculentum*), an economically important vegetable crop is often infected by the blight pathogens in the urban and rural areas of the Ranchi District of Jharkhand state. The blight pathogens *Alternaria solani* (Jones and Grout) and *Alternaria triticina* (Prabhu and Prasad) produce leaf blight disease on tomato and wheat. Growth, sporulation and production of pectic and cellulolytic enzymes have been reported in liquid media containing pectic or cellulosic carbon source¹. A wide variety of carbon sources help to grow cellulolytic fungi and cellulolytic enzyme produced only in the presence of cellulose^{2,3}. The pectolytic and cellulolytic enzymes are responsible for both maceration and killing effects during the disease development and are secreted in a routine manner as a feature of host-parasite interaction^{4,5,6}.

The present investigation is an attempt to study the growth, folin-positive, protein production and sporulation by blight pathogens i.e. *A. solani* and *A. triticina* on the extract of tomato fruit of resistant and susceptible varieties with different concentrations (0.10 and 1.0%) of cellulose.

Material and Methods

The blight pathogens *A. solani* and *A. triticina* were isolated from the leaf blight of tomato and wheat used for further investigation. The pathogens were grown on modified Richard's liquid culture medium and pH 6.0 was adjusted with phosphate buffer (0.1 M).

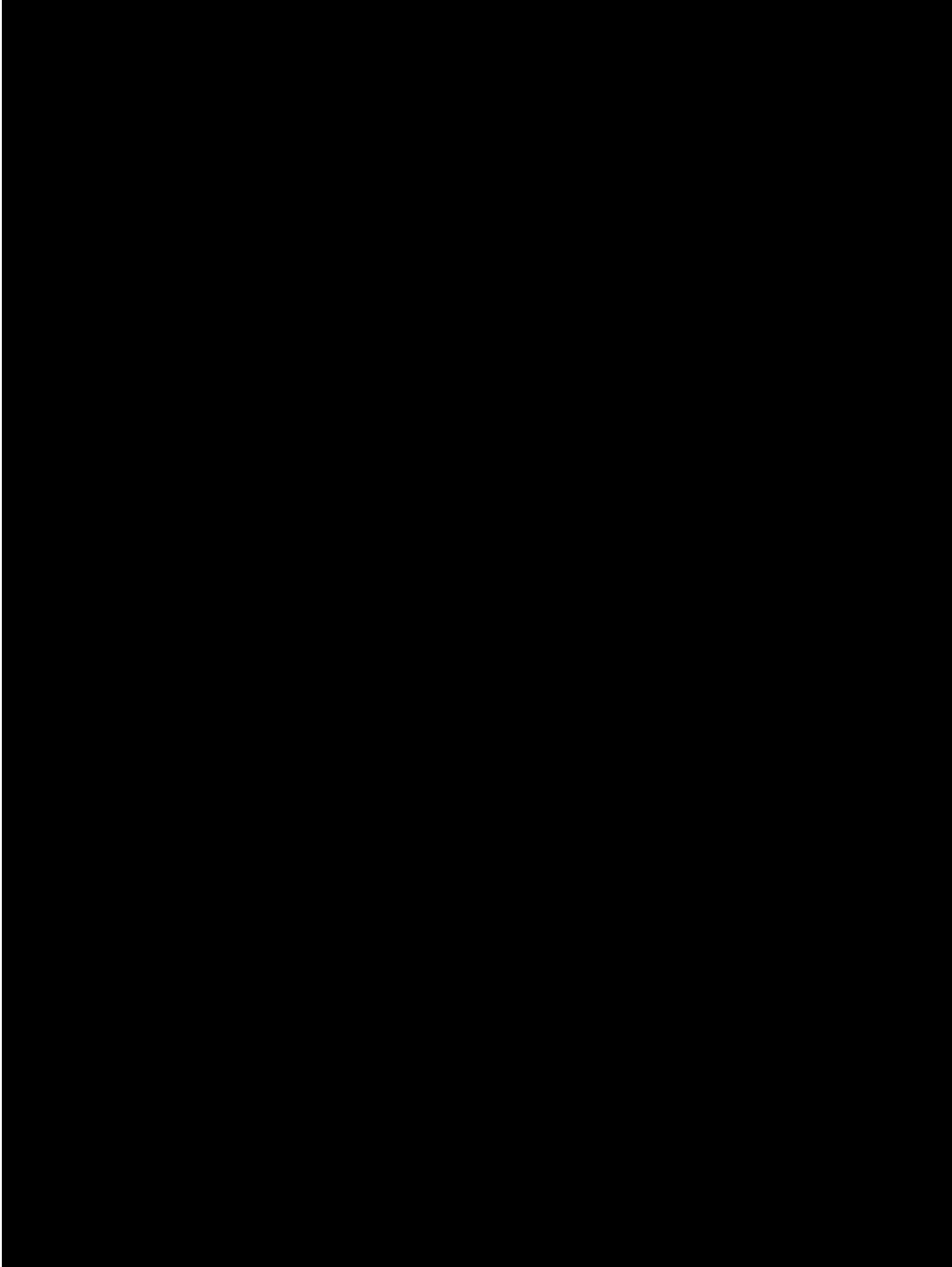
Extract of tomato fruit was obtained from 125 gm of healthy tomato fruit of Pusa Ruby and Prince Long variety and thereafter squeezed through centrifuge. 180-185 ml of each supernatant and 70-65 ml phosphate buffer (0.1 M) was mixed to prepare 250 ml double strength liquid medium to protect the strength of nutrients and finally 500 ml solution was prepared. Each solution was divided into 5 breakers measuring 100 ml and to each 100 mg, 250 mg, 500 mg, 750 mg and 1.0 gm cellulose was added to get 0.10%, 0.25%, 0.50%, 0.75% and 1.0% concentration. Thereafter 25 ml of different concentrations of cellulose was dispensed into each 250 ml Erlenmeyer flask to get 4 vials, 2 vials for *A. solani* and 2 vials for *A. triticina* of each variety. The medium without cellulose served as control. The flasks were autoclaved at Ca 1.06 Kg/Sq. cm for 15 minutes prior to use.

The experiment with a minimum of 20 cultures of both Pusa Ruby and Prince Long variety were repeated thrice. The cultures were maintained in dark at 24±1°C for a fortnight. Standard culture methods were followed^{7,8,9}.

Results and Discussion

The present investigation revealed the effect of cellulose in different concentrations (0.10%-1.0%) on growth, folin positive, protein production and sporulation by blight pathogens *A. solani* and *A. triticina* grown on Richard's liquid culture medium containing tomato fruit extract of both varieties. The growth was decreased by 4.0 and 36.2%

Key words : Cellulose, Tomato, *A. solani* and *A. triticina*.



and stimulation in folin-positive, protein production and sporulation by the virulent (*A. solani*) and avirulent (*A. triticina*) pathogens. The growth was inhibited with resistant (Pusa Ruby) and susceptible (Prince Long) variety, while the folin-positive, protein and spore production was stimulated with different concentration of cellulose. The extent of inhibition as well as stimulation was more in the inoculum of *A. triticina* in comparison to *A. solani*.

Sporulation, protein production and folin positive by virulent and avirulent pathogen in cultures depend not only on carbon source in the medium but also on the host parasite interaction and virulency of the pathogen.

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