The Asian Journal of Horticulture, 3 (1) : 58-60 (June-2008)

Nutritional and physiological studies on *Alternaria solani* causing early blight of tomato

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Accepted : March, 2008

ABSTRACT

Carbon occupies a unique position among the essential elements required by the living organisms. Among various carbon compounds tested in the present study, glucose supported maximum growth of *A. solani*, whereas minimum growth was observed in lactic acid. Among nitrogen sources tested threonine and aspergine supported maximum growth of *A. solani*. These two amino acids may be involved in vegetative and reproductive growth. The results of the present study indicated that, optimum pH for the growth of *A. solani* was in the range of 6.5 to 7.0. This shows *A. solani* prefers acidic to alkaline pH. Temperature is most important physical environmental factor for regulating vegetative and reproductive activity of the fungi. The fungus *A. solani* thrives well at a temperature of 25^0C followed by 30^0C.

Key words : Early blight, Tomato, *Alternaria solani*.

Tomato (*Lycopersicon esculentum* Mill) is an important vegetable crop grown in almost all the areas of the country. Among the fungal diseases, affecting tomato crop, early blight caused by Alternaria solani causes considerable yield losses. Most tomato cultivars are susceptible to this disease and depending upon age of the plant, environmental factors at the time of infection, yield losses range between 50 to 86 per cent (Mathur and Shekawat, 1986). The infection occurs on all the plant parts, *viz.*, leaves, stem, petiole, calyx and fruit. The disease is characterized by minute dark to brown usually round necrotic spots of 1 to 2 mm in diameter. Later, the spots get enlarged with characteristic concentric rings in the center to produce a target board effect and the colour of the spots changes from brown to dark brown. The adjacent spots eventually coalesce to form early blight leading to drying and defoliation. Hence, the present study was undertaken to know nutritional, physiological requirements of the pathogen causing early blight in tomato.

MATERIALS AND METHODS

Seven carbon sources were tried by incorporating them in Richard's broth. The quantity of each carbon compound tried was determined on the basis of their molecular weight so as to provide equivalent amount of carbon as that of sucrose present in the basal medium. The carbon compounds used were glucose, fructose, sucrose, lactose, maltose, dextrose and lactic acid and without any carbon source in basal medium was kept as control. The pH of the medium was adjusted to 7.0 by using 0.1 N sodium hydroxide or 0.1 N hydrochloric acid.

30 ml of each of the medium was taken in 100 ml flasks, sterilized and then inoculated with 5 mm discs taken from 9 days old culture of two isloates of *A. solani viz.*, Arabhavi (AS_1) and Dharwad (AS_2) and incubated at 27 ± 1^0C for 9 days. Three replications were maintained for each treatment. The dry mycelial weights were recorded and the data were analysed statistically.

Various nitrogen sources were incorporated in Richard's solution. The quantity of nitrogen required in each case was determined on the basis of their molecular weights, so as to provide an equivalent amount of nitrogen as that of potassium nitrate present in the basal medium. The nitrogen sources were Potassium nitrate, Ammonium sulphate, Ammonium chloride, Sodium nitrate, Urea, Threonine, Asparagine.

All the above nitrogen sources were mixed thoroughly and the pH of the medium was adjusted to 7.0 by using 0.1 N sodium hydroxide or 0.1 N hydrochloric acid. The growth of the fungus was studied as described under studies of carbon sources.

Potato dextrose broth was used as a basal medium to study the effect of pH on the growth of *A. solani*. The pH of the medium was adjusted to various levels namely 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0 by adding 0.1 N sodium hydroxide and 0.1 N hydrochloric acid and it was determined by electronic pH meter.

30 ml of the medium with known pH was added to 100 ml conical flasks and then the flasks were sterilized. 5 mm discs taken from 9 days old culture of two isolates of *A. solani viz.*, Arabhavi (AS_1) and Dharwad (AS_2)