

Effect of pH and salt levels on growth of *Fusarium oxysporum* f.sp.cumini isolate from cumin

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Abstract

The effect of different levels of pH and Sodium chloride (NaCl) salinity was studied on isolate of *Fusarium oxysporum* f.sp.cumini, a causal organism of wilt disease in cumin. The isolate differ significantly in their radial growth when tested at different levels of pH and NaCl concentration. Different levels of pH (5.0, 6.0, 7.0, 8.0 and 9.0) and NaCl concentration (0.10, 0.25, 0.50 and 0.75 percent) were maintained in growth media (Czepak-dox agar) media in petridishes. Radial growth observations were taken at 24 hour intervals up to one week. At 7th day Isolate showed maximum growth (9.0 cm) at Basic pH 8.0 followed by pH 9.0, while minimum growth (4.56 cm) was observed at pH 5.0. At neutral pH 7.0 moderate growths (4.98 cm) observed. At 7th day Isolate showed maximum growth (6.71) in 0.25 % NaCl concentration followed by 0.50 % NaCl, while minimum growth (5.01 cm) was observed at in control petridishes. Results indicates basic pH (8.0) and 0.25 % NaCl salinity is optimum for the of growth *Fusarium oxysporum* f.sp.cumini. These findings are useful to understand ecological survival of pathogen in respect of pH and salinity, which will be helpful in management strategy and laboratory evaluation of *Fusarium oxysporum* f.sp.cumini.

Cumin (*Cuminum cyminum* L.) locally known as Zeera in Hindi, belongs to order umbellales and family Umbelliferae and believed to have originated from Egypt (Edison *et al.*, 2). In India, cumin is one of the most important seed spice crop grown in the states of Rajasthan, Gujarat, Uttar Pradesh and Tamil Nadu. Rajasthan stands first in acreage and production. Major cumin producing districts in Rajasthan are Barmer, Jalor, Nagaur and Jodhpur.

Cumin wilt caused by *Fusarium oxysporum* f.sp. *cumini* is the major threat to cumin cultivation in arid and semi arid areas. This disease cause serious losses in seed yield. In these diseases wilt is most common, results in yield losses up to 35% in cumin in some districts of Rajasthan (Vyas and Mathur, 5). Many other plants are also adversely affected by these pathogens (Monga and Rathore *et al.*, 4). Edefic factor like soil pH and salinity affect plant growth as well as growth of microbes also. The effect of different levels of pH and Sodium chloride (NaCl) salinity were studies on radial growth of isolate of *Fusarium oxysporum* f.sp.*cumini*. Present work depicts the role of different pH, and salinity to understand ecological survival of pathogen which will be helpful in management strategy and laboratory evaluation.

Experiments were conducted at the ICAR-National Research Centre on Seed Spices, Tabiji, Ajmer, India. Fungal cultures and inoculums prepared by a virulent strain of Foc was isolated from the roots of naturally

infected cumin plants. A mycelial disc of *F. oxysporum* f. sp *cumini* was (5-mm) from 7-day-old cultures of the pathogen were inoculated in sterilized Petri plates containing CZA medium.

The Petri plates were incubated for a week and radial growth was recorded every day. The pH was adjusted in CZA medium by adding 1 N HCl and 1N NaOH. Sodium chloride salinity was adjust with the use of add NaCl in medium. The *F. oxysporum* f. sp *cumini* was inoculated at the center of the agar plates. The plates were incubated for a week in order to see the growth. Radial growth was measured by scale.

Radial growth of isolate (*Fusarium oxysporum* f. sp. *cumini*) tested at different levels of pH and NaCl concentration. Different levels of pH (5.0, 6.0, 7.0, 8.0 and 9.0) and NaCl concentration (0.10, 0.25, 0.50 and 0.75 percent) were maintained in growth media (Czepak-dox agar) media in Petri plates. Radial growth observations were taken at 24 hour intervals up to one week.

Effect of pH on radial growth was depicted in Figure 1. Radial growth observations were taken at 24 hour intervals up to one week. At 7th day Isolate showed maximum growth (9.0 cm) at Basic pH 8.0 followed by pH 9.0, while minimum growth (4.56 cm) was observed at pH 5.0. At neutral pH 7.0 moderate growths (4.98 cm) observed. The foremost acidic pH is not suitable for the growth of pathogen.

Effect of sodium chloride salinity on radial growth was depicted in Figure 2. At 7th day Isolate showed maximum growth (6.71) in 0.25 % NaCl concentration followed by 0.50 % NaCl, while minimum growth (5.01 cm) was observed at in control petridishes. Results indicates basic pH (8.0) and 0.25 5% NaCl salinity is optimum for the of growth *Fusarium oxysporum* f.sp. *cumini*.

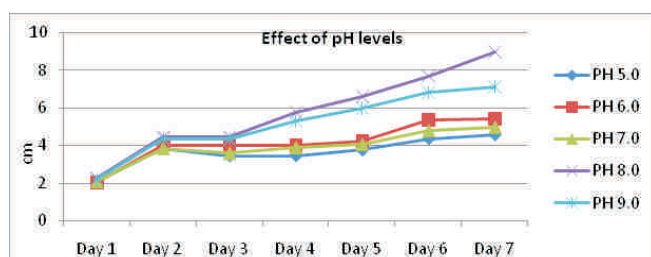


Fig 1: Effect of pH levels on radial growth of *Fusarium oxysporum* f.sp. *cumini* isolate up to one week.

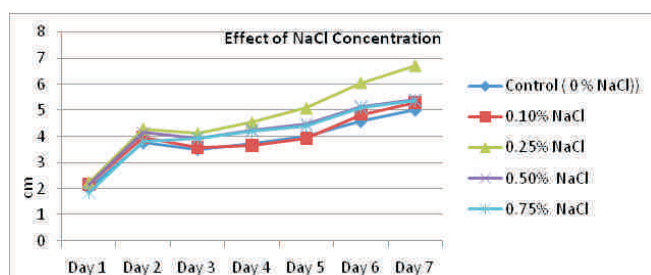


Fig 2: Effect of NaCl concentration on radial growth of *Fusarium oxysporum* f.sp. *cumini* isolate up to one week.

Effect of pH are in confirmation with the findings of Jamaria (3), The studies conducted by on *F. oxysporum* f. sp. *nivium* indicated that, as the pH decreases or increases from the optimum, the rate of amount of growth gradually decreases. Optimum pH for growth of *F. Oxysporum* f.sp. *ciceri* ranged from 6.5 to 7.0. Similar results were also obtained by Monga and Rathore, 4 in case of *R. Soloni* isolates causing root rot in cotton.

Results are in lieu with the finding of Saidi et al., 2010, increasing irrigation water salinity from 0.01 to 50 dS m⁻¹ showed negligible effects on growth of *Pythium* and after

optimum salinity level growth in bio mass of *Pythium* was reduced . Similar observations was also reported by Monga and Rathore, 4 in *R. solani*. Results indicates basic pH (8.0) and 0.25 5% NaCl salinity is optimum for the of growth *Fusarium oxysporum* f. sp. *cumini*. These findings are useful to understand ecological survival of pathogen in respect of pH and salinity, which will be helpful in management strategy and laboratory evaluation of *Fusarium oxysporum* f. sp. *cumini*.

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