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Alternaria Solani & Aspergillus Niger on Tomato Fruit of Eastern Zone of Nepal and North Bihar, India

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ABSTRACT

Tomato fruit is used commonly as vegetables of different preparations - tomato juice, tomato ketchup, tomato soup. 3 fruits of 96, 40 & 20 gms selected due to showing symptoms of early blight of *Alternaria solani* as well as symptoms of *Aspergillus niger*. The area 0.09 Cm^2 & 0.01 Cm^2 in the first tomato (96gms), 1.38 Cm^2 in second (40gms) and 1.47 Cm^2 in third (20gms). All the spotted area were cut off and observed on Date 21.12.2020 at 2-3 P.M in the laboratory, Department of Botany, M.M.A.M. Campus, Biratnagar.

1. Introduction

Tomato is an important cultivation in India and Nepal since one centuary. Annual production of the thirty most important crops that provide the bulk of food supply, of which tomato was sixteenth position as reported by FAO Production yearbook 1994 vol. 48 that 52.5 m tons. Regarding tomato, plant cultivated before the time of Columbus but whose antiquity is not known, where as world centres of origin of cultivated plants have been given to South American centre especially. The Peruvian-Ecuadorean-Bolivian Centre, it was introduced into Europe from Mexico by the Spanish. Initially, It was only for ornamental purposes and later consumed by Italian people. From Europe it was carried across the Pacific into Southeast - Asia before 1650. To-day it is widely cultivated in warm temperate & tropical region. World wide 77.5 milliontonnes of tomatoes are produced annually.

The major producing countries in order of importance are the united states followed by China, Turkey, Italy, India, Egypt, Spain, Iran, Greece, Mexico etc. Kochhar (1981;98)[20].

Lycopersicon esculentum Mill. (n=12) has different varieties, some of them are –

Variety 1 Pusa Ruby - early variety fruits ripen in 60 days after transplanting withstands hot and humid climate, fruits flat round in shape, medium sized, uniform deep red, heavy yielder, slightly acidic. Suitable for both hot & Cooler months. Good for fresh market and for making Ketchup Variety 2 Pusa Early Dwarf - Early varietis, fruits ripen in 60 days after a transplanting, with stands hot and humid climate, dwarf in growth, fruits medium sized, roundish uniform red coloured and heavy yielder, slightly earlier and fruits slightly bigger and smoother than Pusa Ruby. Suitable for both hot and cooler months.

Other varieties are variety 3 Sioux, variety 4 Marglobe, variety 5 Roma, variety 6 Punjab Chhuhara.

Uses –

Fresh ripen fruits are refreshing and appetizing and are Consumed now in salad or after cooking. Uuripe fruits are cooked and eaten. Large quantities of fruits are canned. Tomato are consumed also in the form of juice, paste, Ketchup, sauce, soup and powder Pandey & Anita (1988)[26].

According to Gopalan et.al (2007) 100 gms of ripen fruit of Tomato contains - moisture - 94g, Protein - o.9 g, Fat - 0.2g, Minerals - 0.5 g, Crude fibres - 0.8 g, Carbohydrate - 3.6 g, Energy – 20 k.cols, calcium - 40 mg, Phosphorus – 20 mg, Iron - 0.64 mg, carotene - 351 µg, Thiamine -0.12 mg, Riboflavin - 0.06 mg, Niacin - 0.4 mg, Free Folic acid – 14 mg, Total folic acid – 30 µg, vit. C-27 mg, Sod. - 12.9 mg, Pot - 146 mg, Cu - 0.19 mg, Mn - 0.26 mg, Zn - 0.41 mg, Cr - 0.015 mg, 5-11 mg, Cl – 6 mg, Oxalic acid - 4 mg.

2. Review of Literature

Datar & Mayee (1981&1982)[10,11] reported assessment of losses in tomato yield due to early blight and couidial dispersal of *Alternaria solani*. Details about the pathogen *Alternaria Solani* was given by Subramanian (1962-1965)[40,41,42], Hughes (1953)[16], Tubaki (1958)[43]& Dube (1985)[12]. Regarding *Aspergillus niger* Fennel (1973)[14] studied in details. Pandey & Anita (1988)[26] and Kochhar (1998)[20] mentioned the economic importance of tomato. Kawjilal et.al (2000)[18] studied the field diseases and potential of tomato cultivation in west Bengal. Keinath et. al (1996)[19] reported efficiency and economics of three fungicidal application Schedules for early blight Control and yield of fresh market tomato. Pandey & Pandey (2002)[25] mentioned the field Screening of different tomato germplasm lines against Septoria, Alternaria and Bacterial disease complex at seedling stage. Pound (1951)[28] demonstrated the effect of air temperature on incidence and development of early blight disease of tomato. Barksdale (1968)[5] found out the method of screening for resistance to early blight on tomato seedlings. Basu (1974)[6] studied the measurement of early blight, its progress and influence on fruit losses in nine tomato cultivars. Chairani & Vooripes (2006)[8] mentioned the pathogen *Alternaria solani*, genetics and breeding for resistance. Abhinandan et.al. (2004)[2] reported incidence of Alternaria leaf blight in tomato and efficacy of Commercial fungicides

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for its control. Rani et.al (2015)[32] discovered the resistant sources and epidemiology of early blight. Singh et.al. (2015)[39] also mentioned the resistance sources to leaf blight (*Bipolain's Sorokiana* & *Alternaria triticina*) in wheat and Triticale. Yadav et.al. (2015)[46] reported mass Sporulation of *A. Solani* causing early blight in tomato. Chandrashekhar et.al. (2015)[9] published their work on gene expression profiling of *Arabidiopsis thaliana*, Chitinase genes in response to *Alternaria brassicae* challenge. Prasad & Naik (2003)[29] evaluted the genotypes, fungicides and plant extracts against early blight of tomato caused by *Alternaria solani*. Poly & Srikanta (2012)[27] reported the assessment of yield loss due to early blight (A. solani) in tomato.

Kumar et.al. (2008)[21] mentioned the cultural, morphological, pathogenic and molecular variability amongst tomato isolates of *Alternaria solani*. Rao et.al. (2007a, & b)[33,34] mentioned biopriming induced changes in the activity of defense related enzymes for conferring resistance against *Alternaria* blight of Sunflower and efficacy of seed dressing fungicides and bio-agents on Alternaria blight and other seed quality parameters of sunflower. Rathod et.al. (2007)[35] studied on biochemical changes im healthy and infected leaves of wheat cultivars against *Alternaria alternata*. Mahapatra & Das (2016a,b & 2017)[22,233,24] mentioned linear regression model for assessing yield loss of mustard due to Alternaria leaf blight disease, about control measures spraying Schedule garlic bulb extract, moncozeb and Salicylic acid against Alternaria blight of Mustard & assessment of yield loss of mustard due to Alternaria blight in Gangetic plains of west Bengal. Akhtar (2017)[3] reported survival of Alternaria brassicola in cryo-preserved *Brassica spp.* Seeds. Sharma et.al. (2017)[36] mentioned pathogenic and genetic diversity among *Alternaria alternata* isolates of Potato from Himachal Pradesh, Madhya Pradesh and Uttar Pradesh. Prakash & Vishunavat (2017)[30] reported enhancing sporulation and determination of virulence, of *Alternaria Solani* isolates infecting, tomato. Javeria et.al. (2018)[17] Studied vegetative compability grouping of *Alternaria brassicolo* causing black leaf spot in cauliflower. Ajaibhai et.al (2018)[1] mentioned the management of Alternaria leaf blight of ground nut caused by *Alternaria alternate*.

3. Collection of tomato fruit

3 Tomato fruits showing symptoms were collected on Date 12/12/2020 & Date 13/12/2020.

1st Tomato –

1^{st} Tomato red colour, 96 gms, 459 C.cm, 3 visible spots area - 0.09, 0.01 and 0.01 Sq. Cm. respectively.

Remarkable Symptoms in 1^{st} Tomato - hard, brown yellowish and elevation of several Conidia and conidiophores of pathogens, piercing the epidermal and hypodermal region, in cortex a little growth (+).

2nd Tomato –

2^{nd} Tomato red, yellow, 40 gms, 215.556 C.Cm, spotted area - 1.38 C.cm in which 0.92 sq.cm. maximum growth of pathogens, 3 spots hidden in tissue but visible externally, white peripheral scar with apex is green in colour.

3rd Tomato –

3rd Tomato red, 20 gms, 196.04 C.cm, spotted area - 1.47 sq. cm in which dense spotted area - 0.36 sq. cm, black rounded - 3 colony, white -1, green base making groove on the fruit of Tomato.

4. Microscopic Observation

Date 21/12/2020 at 2-3 P.M. Place - laboratory, Dept. of Botany, M.M.A.M campus, Biratnagar, Nepal under the magnification- 40x, 100x & 400x, the following structures are visible-

A.

i. Mycelium – septate, intracellular and intercellular.

ii. Conidiophore - elongated in rows, some thickened wall cells of Conidia are visible. These are initial stage of Conidia.

iii. Dictyosporus condition (+).

iv. Identification as proposed by Hughes (1953)[16], Tubaki (1958)[43] and Subramanian (1962-1965)[40,41,42] i.e., *Alternaria Solani*.

B.

i. Mycelium - septate, brancheol (+).

ii. Conidiophore - Slender or elongated
- at apex Swollen.

iii. Conidia - two conidia attacked one to another in 100x.
- small hairs (+).

iv. Appearance - dominant black i.e., *Aspergillus niger*, identification based according to Ellis (1971)[13] & Fennel (1973)[14].

5. Discussion

First of all the fruits of Tomato is infected by *Alternaria solani* and packed to transport from field to market. During this period or even when in market *Aspergillus niger* infects the fruits. The plastic packing pot contain 20-25 kg. tomato in which lkg - 1.5kg infected tomato by *Alternaria solani* presents i.e., 5 - 7.5% Loss in productivity standard scale. Sometimes if not eradicated timely may be loss to 100% in the container. Being infected that area also attracts *Aspergillus niger* and finally two pathogen attack.

6. Climatie Condition

The maximum and minimum temperature from Dec. 2019 to Dec. 2020 is 40 ^{0}C and 8 ^{0}C respectively.

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