Disease scenario of tomato in mid-hills and sub-tropical plains of India

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Tomato is an important off season vegetable crops, grown during March to September in mid-hills of Himachal Pradesh, which fetches higher price in the plains. In sub-tropical plains, it is grown mostly from July to November and November to May depending on the location and climatic conditions. Due to inflow of new hybrids/varieties and possibly global warming, disease scenario is changing at a faster rate particularly during the last 2-3 decades across the country. This calls for continuous monitoring of crop plants for the occurrence and prevalence of biotic stresses particularly diseases which are responsible for heavy crop loss. Erratic and un-predictive weather conditions favouring particular diseases often led to huge crop loss. Unexpected rains and unusual morning fog during October 2005 has caused severe outbreak of bacterial spot in 6000 acres in AP (Singh, 2005). Keeping in view the sensitivity of tomato crop to various biotic stresses in mid hills and subtropical plains, a roving survey was undertaken in Solan (mid hills) and Chhattisgarh during 2011 and 2012 and Uttar Pradesh (subtropical plain) during 2011.

During the survey, in Solan (August, 2011, 2012), Raipur, Bilaspur and Durg (December, 2011, 2012) and Kanpur, Etah and Barabanki (May, 2011), at least five villages were randomly selected and in each village, at least five fields were covered. In each field, five spots of 10 plants were observed for prevalence of various diseases. Disease ratings developed for late blight (Henfling, 1987), *Septoria* leaf spot (Maluf *et al*., 1985), early blight and bacterial spot (Horsfall and Barratt, 1945), powdery mildew (Correll *et al*., 1988) were used for recording the severity of the disease. Based on disease ratings, Per cent Disease Index (PDI) was calculated by following the methods of Wheeler (1969). Incidence of leaf curl, bud blight, *Sclerotium* wilt was made by counting 15 plants in five randomly selected spots in each field (Sardana *et al*., 2010). Buckeye rot incidence was calculated by counting number of infected fruits out of 20 randomly selected fruits from five spots in each field.

Nine diseases *viz*., early blight (*Alternaria solani*), late blight (*Phytophthora infestans*), *Phoma* leaf spot (*Phoma lycopersici* (Syn. *Phyllosticta lycopersici*), *Septoria* leaf spot (*Septoria lycopersici*), bacterial spot (*Xanthomonas campestris* pv *vesicatoria*), bacterial wilt (*Ralstonia solanacearum*), powdery mildew (*Oidim* sp.), leaf curl (tomato leaf curl virus) and buck eye rot (*Phytophthora nicotianae* var. *parasitica*) were reported from Solan during both the years with varying intensities (Table 1). During 2011, bacterial spot was predominant (26.4%) while *Septoria* leaf spot dominated (41.1%) during 2012. High soil moisture with intermittent rainfall favour bacterial spot of tomato (Shukla and Gupta, 2005). Early blight once reported to be dominant (Bhardwaj *et al.*, 1995) occurred at moderate levels. Scenario of late blight, bacterial wilt, leaf curl and buck eye rot remained almost similar in both the years. Powdery mildew which occurred at low level during 2011 failed to appear in 2012. *Phoma* leaf spot is an emerging disease (Bharat and Gupta, 2013), which together with bacterial spot and late blight may further limit tomato production in mid hills. Moderate temperature and high rainfall (>800 mm) during the growing season may be responsible for growth, development and spread of late blight, *Septoria* leaf spot, bacterial leaf spot and buck eye rot in Solan. In Chhattisgarh, diseased scenario varied wherein early blight, *Fusarium* wilt, powdery mildew and leaf curl were prominent. *Phoma* leaf spot, *Septoria* leaf spot, late blight, bacterial spot and buck eye rot which are favoured by high moisture and moderate temperature in mid hills were absent in Chhattisgarh. On the contrary, *Fusarium* wilt which was absent in mid hills was noticed in Chhattisgarh albeit low level. *Fusarium* wilt is serious at 25 to 30 C (Sohi, 1984). Early blight was recorded at moderate level in both the years (12.9 to 36.4 %). Powdery mildew recorded at low level of 3.3 to 5.5 %. In UP, early blight was severe (80%) in Barabanki, followed by Etah and Kanpur wherein the severity was 52.4 and 47.9 %, respectively. Barabanki received 60 mm rainfall during May, 2011 which is 159 % higher than the normal (IMD, 2008-2012). This must have favoured early blight development and spread. Incidence of *Sclerotium* wilt was low (2.2%) in Kanpur and incidence of leaf curl was negligible. Rainfall had a role in disease scenario.

Table 1. Incidence / severity (%) of tomato diseases in Himachal Pradesh, Chhattisgarh and Uttar Pradesh

	Early blight		Late blight		*Phoma* leaf Spot		*Septoria* leaf Spot		Bacterial spot		Bacterial wilt		*Fusarium* wilt		Powdery mildew		Leaf curl		Buck eye rot		*Sclerotium* wilt
Districts	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I
Solan	9.0	17.4	4.8	3.25	19.6	8.1	7.5	41.1	26.4	6.7	0.2	1.6	-	-	1.2	-	1.2	1.2	-	-	-
Raipur		36.2	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	2.3	9.4	-	-	-
Bilaspur	13.8	23.6	-	-	-	-	-	-	-	-	-	3.3	5.0	-	3.1	5.5	27.3	14.6	-	-	-
Durg	12.9	36.2	-	-	-	-	-	-	-	-	-	-	-	-	0.07	-	7.7	10.0	-	-	-
Kanpur	47.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	-	-	-	2.2
Etah	52.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barabanki	80.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

= not recorded; I = 2011; II = 2012

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