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Occurrence and Distribution of Anthracnose of Chilliin Marathwada Region of Maharashtra State, India

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A B S T R A C T

An extensive roving survey carried out during both the year2017-18 and 2018-19 in the eight districts of Marathwada region for the incidence of anthracnose of chilli. The results revealed that overall disease intensity was higher during 2017-18 (31.29 %) as compared to 2018-19 (36.11 %). The disease was found to be predominant in all the eight districts of Marathwada region. However, the crop grown in the districts of Nanded followed by Aurangabad, Hingoli and Parbhani was found to suffer more severely with average disease intensity in the range of 24 to 36 per cent and 19 to 46 per cent during both the year, respectively. Osmanabad, Latur and Beed districts recorded minimum average disease incidence in both the year. The congenial weather conditions like heavy rainfall, higher relative humidity and moderate temperatures have helped in building up of heavy disease pressure in Nanded, Aurangabad, Hingoli and Parbhani districts.

Introduction

Chilli (*Capsicum annuum*L) also called as red pepper is an important spice-cum-vegetable crop of the world. India is the largest producer of dry chilli in the world. However, it suffers from biotic diseases caused by fungi, bacteria, viruses and nematodes resulting in huge loss of the crop. Among the fungal diseases infecting chilli crop, anthracnose or ripe fruit rot caused by *Colletotrichum capsici* (Syd.) Butler and Bisby has become a serious problem limiting the profitable cultivation and seed production throughout the major chilli growing regions of India (Gopinath *et al.*, 2006; Ramachandran *et al.*, 2008). Anthracnose is one of the most economically important disease reducing marketable yields from 10 to 80 per cent of the crop production in some developing countries (Poonpolgul and Kumphai, 2007). It is the major problem on matured fruits, causing severe losses due to both pre and post-harvest fruit decay (Hadden and Black, 1989; Bosland and Votava, 2003). The market value and nutritive value is degraded in infected fruits resulting in poor quality seed. Considering economic importance of antracnose of chilli, present studies were conducted to survey the disease in eight districts of Marathwada region of Maharashtra state.

Materials and Methods

A roving survey of randomly selected chilli crop fields, covering three Agro-climatic zones *viz*., Scarcity Zone (SZ), Assured Rainfall Zone (ARZ) and Moderate Rainfall Zone (MRZ) of Marathwada region of the Maharashtra state was undertaken, during the year 2017-18 and 2018-19, to assess fruit rot disease incidence and simultaneously to collect the disease samples. Chilli growing pockets / fields were identified from the records available at the office of Sub-Divisional Agriculture Officers of the respective districts.

In the selected chilli crop fields, a 10 m^2 area was randomly selected and in that counted total number of chilli plants and number of plants showing typical fruit rot symptoms was recorded and per cent fruit rot disease incidence and intensity was calculated by using following formula.

Per cent Disease Incidence

$$\frac{\text{No. of Plants Infected}}{\text{Total no. of Plants Observed}} \times 100$$

Results and Discussion

A roving survey to record anthracnose incidence was conducted during the year 2017-18 and 2018-19, covering 184 and 189 chilli crop fields of 08 districts, distributed under three agro-climatic zones *viz.*, Scarcity zone (03), Assured Rainfall zone (07) and Moderate rainfall zone (02) of Marathwada region of the Maharashtra state.

The results so obtained on anthracnose incidence are interpretedtahsil-wise in Table 1, district-wise in Table 2, chilli variety-wise in Table 3 and agro-climatic zone-wise in Table 4 (Fig. 1–6).

Tehsil-wise disease incidence of chillianthracnose

The results (Table 1) indicated a wide range of anthracnose disease incidence, during both the years of survey and it was ranged from 27.29 (Umarga) to 66.00 (Kandhar) and 25.61 (Tuljapur) to 53.72 (Loha) per cent, during the year 2017-18 and 2018-19 seasons, respectively. However, maximum anthracnose disease incidence was recorded in Kandhar tehsil (66.00 %), during the year 2017-18, followed by Himayatnagar tehsil (64.68 %) and Ardhapur tehsil (60.31 %), whereas, maximum anthracnose disease incidence was recorded in Loha tehsil (53.72 %), respectively during the year, 2018-19, followed by Naigaon tehsil (53.34 %) and Ardhaur tehsil (51.70 %).

Rest of the tehsils recorded anthracnose disease incidence in the range of 28.34 (Kalamb) to 58.66 (Mudkhed) per cent and 27.55 (Kalamb) to 53.34 (Naigaon) per cent, during the year, 2017-18 and 2018-19 seasons, respectively. The minimum disease incidence was recorded in Umarga tehsil (27.29 %), during the year 2017-18, followed by Kalamb tehsil (28.29 %) and Tuljapur tehsil (30.26%), whereas during the year 2018-19 the minimum disease incidence was recorded in Umarga tehsil (25.61%) followed by Kalamb (27.55%) and Umarga tehsil (28.25%).

District-wise disease incidence of anthracnose of chilli

The results revealed that maximum anthracnose disease incidence of 56.72 and 47.98 per cent was observed in Nanded district, during the year 2017-18 and 2018-19 respectively, with maximum pooled incidence of 52.35 per cent. This was followed by the districts of *viz.*, Aurangabad (52.08 %, 43.14 % and 47.61 %), Hingoli (46.07 %, 42.18 % and 44.12%), Beed (44.62 %, 37.09 % and

40.85 %), Parbhani (43.47 %, 38.64 % and 41.06 %), Jalna (41.43 %, 34.61 % and 38.08 %), Latur (35.86 %, 32.29 % and 34.07 %) and Osmanabad (31.35 %, 28.85 % and 30.10). Overall average anthracnose disease incidence was maximum (43.95 %) during the year, 2017-18and was comparatively minimum (38.10 %) during the year, 2018-19.

Variety-wise chilli anthracnose incidence

The result revealed that in Marathwada region, the chilli varieties purchased from local market are popularly grown by the farmers.

Table.1 Tehsil wise incidence of chilli anthracnose in the districts of Marathwada during the year 2017-18 and 2018-19

Sr. No.	Districts	Tehsils	2017-18		2018-19	
			No. of Fields	Average Incidence (%)	No. of Fields	Average Incidence (%)
Scarcity zone						
1.	**Aurangabad**	Vaijapur	3	54.19	3	47.37
		Gangapur	4	53.65	1	46.43
2.	**Beed**	Kej	3	47.10	2	40.24
		Georai	1	35.21	2	33.37
		Parli	2	39.42	4	35.34
3.	**Osmanabad**	Bhoom	3	36.77	1	32.00
		Paranda	2	33.00	4	30.36
Overall Average / Total:			**18**	**42.76**	**17**	**37.87**
Assured rainfall zone						
1.	**Aurangabad**	Paithan	2	47.70	3	38.91
		Aurangabad	3	54.24	2	47.31
		Phulmbri	1	47.42	4	37.67
		Sillod	4	55.27	1	41.16
2.	**Jalna**	Jalna	3	43.24	4	37.65
		Bhokardan	3	41.10	4	33.54
		Ambad	4	45.29	3	35.50
		Jafrabad	2	36.43	3	36.64
		Partur	2	38.06	4	34.00
		Mantha	3	44.44	2	30.33
3.	**Beed**	Georai	1	55.27	4	35.10
		Beed	5	36.43	2	36.38
		Majalgaon	2	54.24	3	39.00
		Kej	4	42.94	3	33.71
		Ambajogai	2	47.70	4	31.30
		Parli	3	43.24	1	49.00
4.	**Osmanabad**	Osmanabad	4	32.44	3	29.33

		Kalamb	3	28.34	3	27.55
		Tuljapur	4	30.26	2	25.61
		Umaraga	3	27.29	1	28.25
5.	**Latur**	Latur	4	37.00	2	29.44
		Chakur	3	36.54	2	32.31
		Udgir	5	31.24	4	34.81
		Renapur	2	33.15	5	30.64
		Ahmedpur	3	38.56	3	35.16
		Ausa	4	39.22	4	28.53
		Nilanga	4	35.34	3	35.13
6.	**Parbhani**	Parbhani	5	37.64	4	31.23
		Jintur	2	44.00	3	35.12
		Gangakhed	4	42.24	6	34.00
		Manwath	3	40.32	5	40.19
		Sailu	4	42.41	4	45.10
		Purna	2	42.40	1	36.45
		Pathri	5	43.12	5	43.60
		Sonpeth	3	51.20	4	39.62
		Palam	3	47.95	5	42.42
7.	**Nanded**	Loha	4	50.83	5	53.72
		Mukhed	6	53.42	2	42.12
		Deglur	4	51.86	4	47.52
		Naigaon	5	53.66	3	53.34
		Kandhar	2	66.00	1	42.67
8.	**Hingoli**	Sengaon	5	44.00	5	43.42
Overall Average / Total:			**140**	**43.18**	**136**	**37.25**
Moderate rainfall zone						
1.	**Nanded**	Nanded	4	54.63	4	49.50
		Ardhapur	5	60.31	4	51.70
		Mudkhed	1	58.66	5	46.64
		Bhokar	4	53.19	4	49.39
		Himayatnagar	2	64.68	5	43.22
2.	**Hingoli**	Basmat	3	41.83	4	44.24
		Hingoli	4	52.60	1	45.63
		Aundha	2	47.30	5	37.40
		Kalamnuri	1	44.61	4	40.19
Overall Average / Total:			**26**	**53.09**	**36**	**45.32**

Table.2 District-wise chilli anthracnose incidence, during the year 2017-18 and 2018-19

Districts	No. of Locations		Av. Incidence (%)		Pooled Mean (%)
	2017-18	2018-19	2017-18	2018-19	
Aurangabad	17	14	52.08	43.14	47.61
Beed	23	25	44.62	37.09	40.85
Hingoli	15	19	46.07	42.18	44.12
Jalna	17	20	41.43	34.61	38.02
Latur	25	23	35.86	32.29	34.07
Nanded	37	37	56.72	47.98	52.35
Osmanabad	19	14	31.35	28.85	30.10
Parbhani	31	37	43.47	38.64	41.06
Overall Average / Total	**184**	**189**	**43.95**	**38.10**	--

Table.3 Variety wise chilli anthracnose incidence, during the year, 2017-18 and 2018-19

Sr. No.	Chilli Varieties	No. of locations		Av. Incidence (%)		Pooled Mean Incidence (%)
		2017-18	2018-19	2017-18	2018-19	
1	KSP-1194	14	7	48.48	33.21	40.85
2	Arch-930	12	10	45.83	41.25	43.54
3	Amulya	15	13	47.54	45.45	46.49
4	Green Gold	18	11	39.93	37.33	38.63
5	Garima	11	23	47.17	46.47	46.82
6	Local	18	19	48.95	37.71	43.33
7	Parbhani Tejas	7	18	47.64	39.12	43.38
8	Sitara	17	7	37.43	31.17	34.30
9	Teja-4	5	17	40.32	33.51	36.91
10	Jwala	8	7	39.48	42.07	40.77
11	Pragati	14	16	40.74	31.83	36.28
Overall Average / Total		**184**	**189**	**43.95**	**38.10**	---

Table.4 Agro-climatic zone-wise chilli anthracnose incidence, during the year, 2017-18 and 2018-19

Sr. No	Agro-climatic Zone	No of locations		Av. Incidence (%)		Pooled Mean Incidence (%)
		2017-18	2018-19	2017-18	2018-19	
1	Scarcity zone	18	17	42.76	37.87	40.31
2	Assured rainfall zone	140	136	43.18	37.28	40.23
3	Moderate rainfall zone	26	36	53.09	45.32	49.20
	Overall Average/ Total	**184**	**189**	**46.34**	**40.16**	**43.25**

Fig.1 District-wise incidence of chilli anthracnose in Marathwada region (During the year 2017-18 and 2018-19)

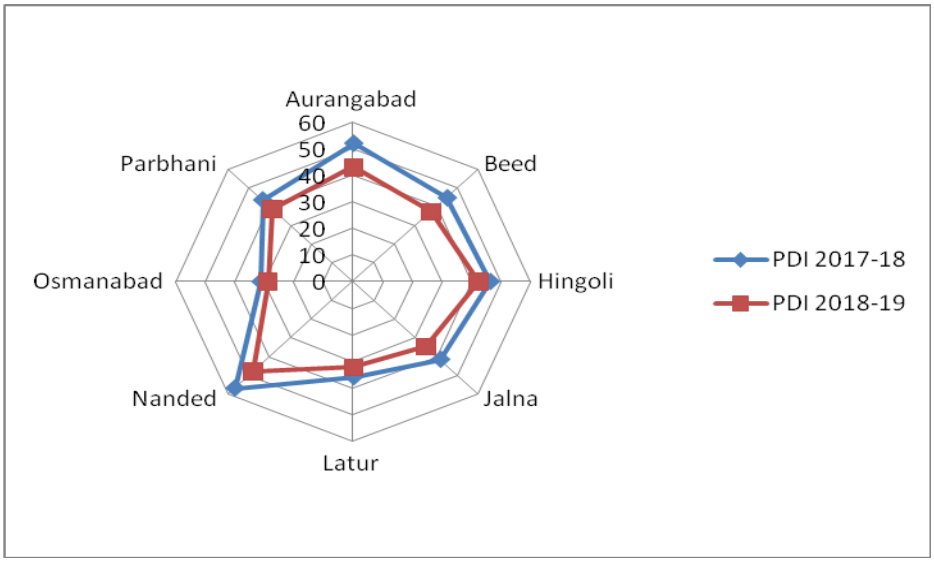


Fig.2 District-wise pooled mean incidence of chilli anthracnose in Marathwada region (During the year 2017-18 and 2018-19)

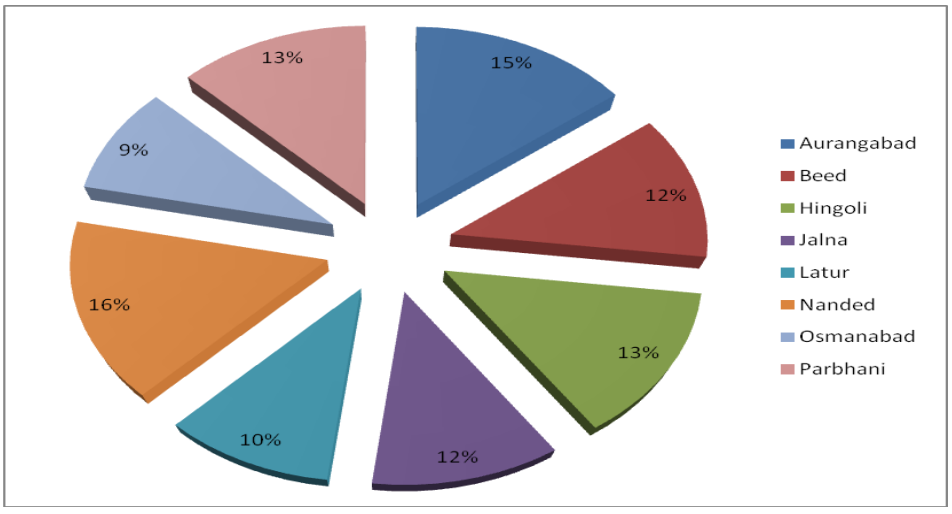


Fig.3 Variety-wise incidence of chilli anthracnose in Marathwada region (During the year 2017-18 and 2018-19)

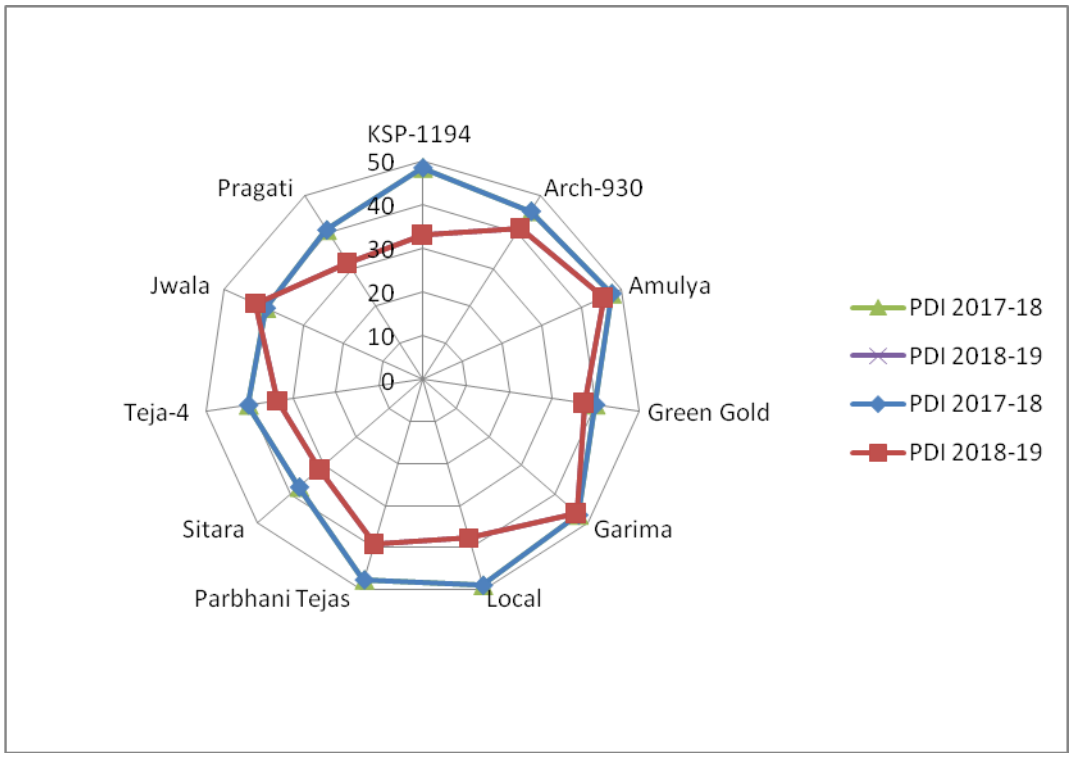


Fig.4 Variety-wise pooled mean incidence of chilli anthracnose in Marathwada region (During the year 2017-18 and 2018-19)

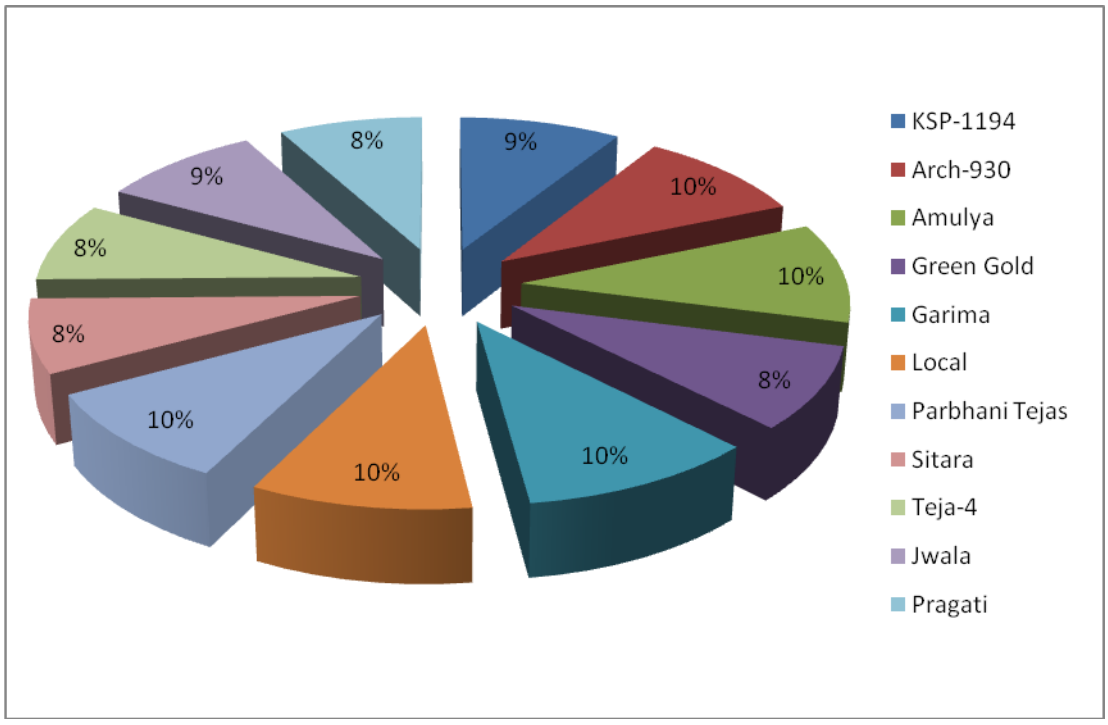


Fig.5 Agro-climatic zone wise incidence of chilli anthracnose in Marathwada region (During the year 2017-18 and 2018-19)

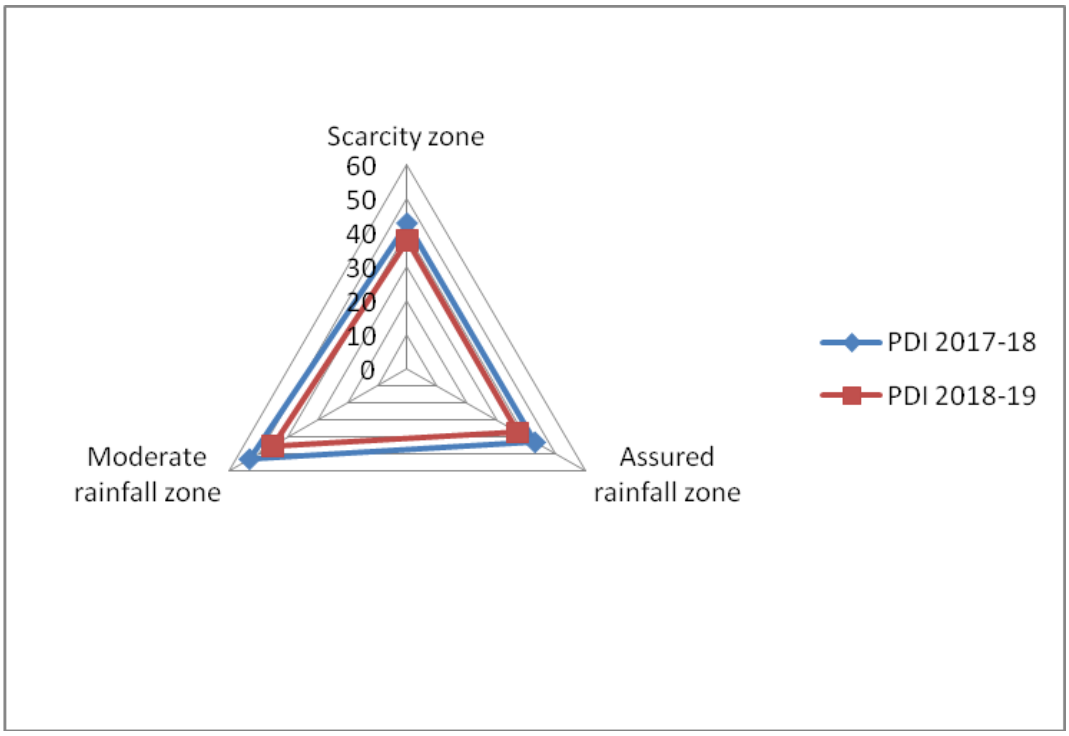
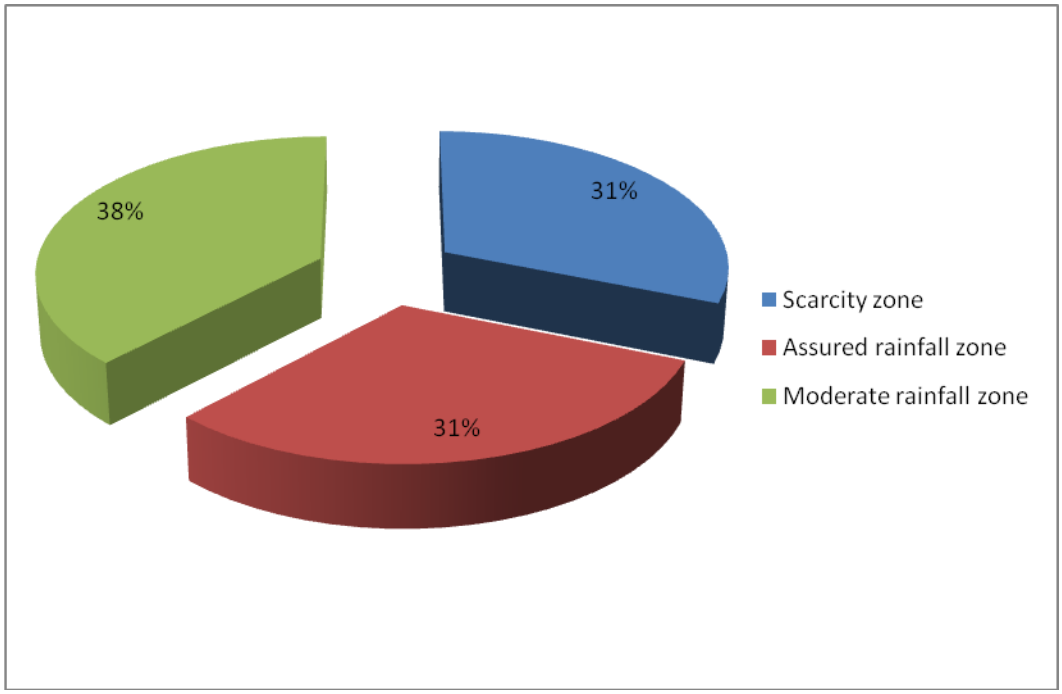


Fig.6 Agro-climatic zone wise pooled mean incidence of chilli anthracnose in Marathwada region (During the year 2017-18 and 2018-19)



Among overall 11 chilli varieties grown by the farmers of the Marathwada region surveyed (2017-18 and 2018-19), maximum anthracnose disease incidence was found in Local variety (48.95 %), during the year, 2017-18. This was followed by the varieties *viz.*, KSP 1194 (48.48 %), Parbhani Tejas (47.64 %) and Amulya (47.54 %) and maximum anthracnose disease incidence was found in Garima (46.47 %), during the year, 2018-19. This was followed by the varieties *viz.*, Amulya (45.45 %), Jwala (42.07 %) and Arch-930 (41.25 %). In rest of the varieties, the anthracnose incidence was ranged from 37.43 to 47.17 per cent and 31.17 to 39.12 per cent during the year, 2017-18 and 2018-19 respectively, with pooled mean incidence in the range of 12.01 to 35.80 per cent.

Agro-climatic zone-wise disease incidence of chilli anthracnose

The results revealed that among three agro-climatic zones *viz.*, Scarcity zone (SZ), Assured rainfall zone (ARZ) and Moderate rainfall zone (MRZ) surveyed, maximum anthracnose disease incidence of 53.09 and 45.32 per cent was observed during the year 2017-18 and 2018-19 respectively, with maximum pooled mean incidence of 49.20 per cent in Moderate Rainfall zone, followed by Scarcity Zone (42.76 %, 37.87 % and 40.31 %) and Assured rainfall zone (43.18 %, 37.28 % and 40.23 %). Overall average anthracnose incidence was maximum (46.34 %) during the year, 2017-18and was comparatively minimum (40.16 %) during the year, 2018-19.

From the results it has been inferred that anthracnose of chilli disease incidence varied at different locations of Marathwada region falling under various agro-climatic conditions, inoculum potential and varieties cultivated with different genetic makeup.

The results of the present studies are in accordance with results of previous workers who worked on antracnose of chilli. Thind and Jhooty (1985) conducted surveys of major chilli growing areas of Punjab during the year 1979-1982 and reported that *C. capsici*was widely prevalent and most damaging in all the areas surveyed and its incidence was varied between 66 to 84 per cent.Angadi (1999) carried out survey for the incidence of anthracnose of chilli caused by *C. capsici*in Raichur, Dharwad and Gadag districts. The disease was more prevalent in Raichur district than in Dharwad and Gadag districts. Ramachandran *et al.*, (2008) revealed that *C. capsici* as the most predominant species in the major chilli growing states of Karnataka and Andra Pradesh in India. Similar reports were also given by Sawant *et al.*, (2012), Katoch *et al.*, (2016), Saini *et al.*, (2016) and Yahaya *et al.*, (2016).

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