

LATE BLIGHT AN INCREASING THREAT TO SEED POTATO PRODUCTION IN NORTH –WESTERN PLAINS OF INDIA

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Abstract

North-Western plains of India due to their low aphid population in autumn season have emerged as prime seed producing areas in India and cater to a large demand of quality seed all over the country. Data recorded on appearance and build up of late blight for the past 27 years (1980-2006) revealed that the disease which used to occur in mild to moderate form and epiphytotic only once in 4 to 5 years is steadily assuming epiphytotic proportions almost every alternate year in the recent past. It appeared in epiphytotic form in 3 out of 4 years from 2003 to 2006. A comprehensive survey on loss in yield by late blight carried out during 2006-07 crop season revealed an average loss of 22% in productivity resulting in a net loss of around 0.16 million tons of potato in the state of Punjab alone. An increase in disease severity in recent years could be due to a change in the pathogen population. An analysis of 91 isolates of *Phytophthora infestans* collected from different areas in the region during 2006 revealed presence of 11 gene complex races in 58.5% of the isolates and tolerance to metalaxyl beyond 200ppm in 22.0% of the isolates as compared to simpler races and zero tolerance to metalaxyl recorded in the earlier years. Moreover, the disease now appears comparatively earlier in a higher temperature range of 14.0 – 27.5°C than its usual appearance after third week of November in a normal temperature range of 10 – 25 °C. During 2006 it appeared on November 8 which was the earliest recorded in past 27 years. An increasing severity of late blight, a shift in the pathogen population and an increasing tolerance to metalaxyl suggests for an appropriate disease management strategy.

Introduction

Late Blight in North –Western Plains of India
Sited at an altitude of about 300 m above mean sea level the sub-zone extends over Punjab, Haryana, Jammu and Kashmir and a part of Rajasthan adjoining Punjab. Due to low aphid population in the autumn crop season (October to early January) and development of "seed plot technique" by Central Potato Research Institute, the zone has emerged as a major seed producing area of the country. Though potato is grown here in about 0.14 million ha, about 10% of the total potato area in the country, it caters to about 30% demand of quality seed in India. Late blight generally occurs only in mild to moderate form but during certain years assumes epiphytotic proportions causing huge losses. Mancozeb alone or in combination with metalaxyl is used most frequently by the farmers to control the disease. The efficacy of metalaxyl in recent years has come down and the farmers are not able to manage the disease as efficiently as earlier. A detailed study on disease severity, pathogen population and loss in yield in different districts in the region was carried out during 2006-07 and the findings were compared with the observations recorded earlier.

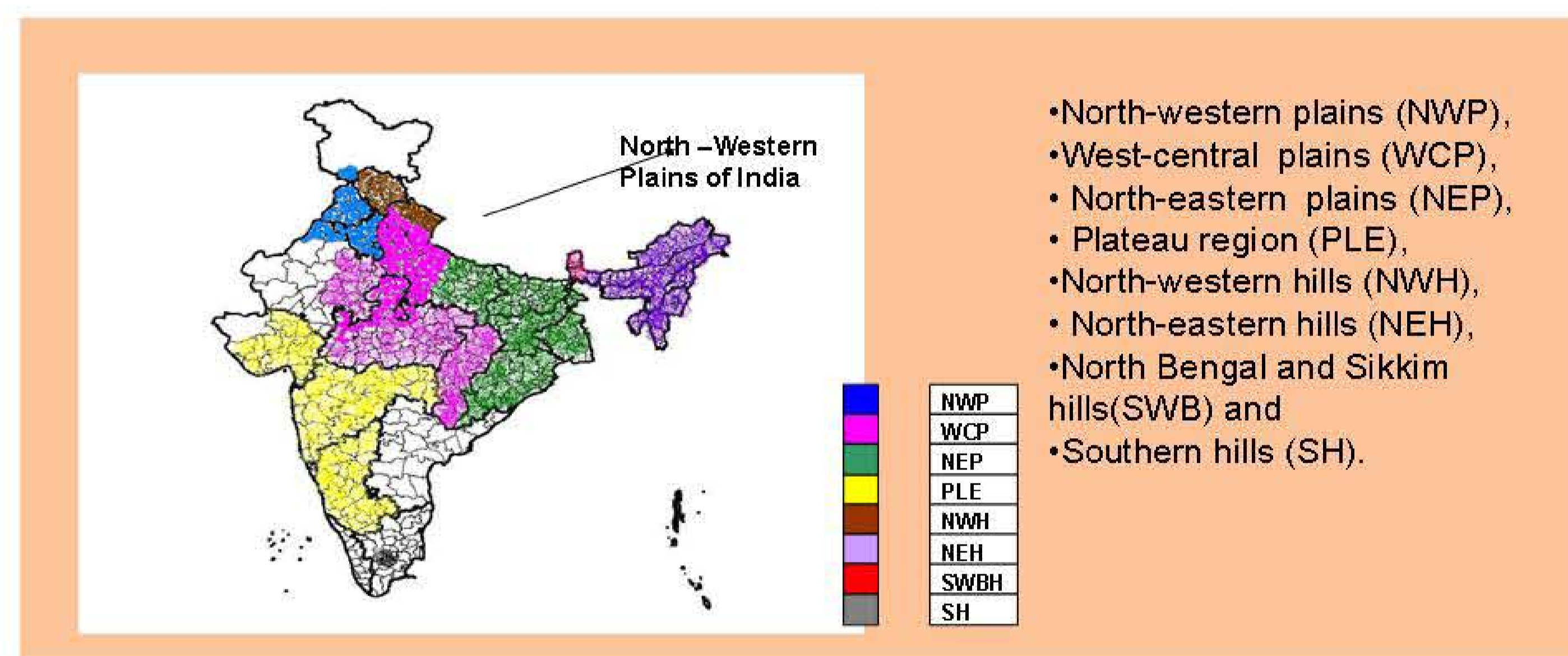


Figure No. 1: Agro-ecological zones of potato in India

Materials and Methods

•Appearance and build up of late blight in unsprayed and sprayed crop of blight susceptible potato varieties and the weather parameters are recorded each year at Central Potato Research Station, Jalandhar since 1980.

•Complexity in physiological races of *Phytophthora infestans* was recorded by method described by Black et al. 1953.

•A comprehensive survey to monitor loss due to late blight in Punjab state was recorded during 2006-07. 164 potato fields located in 71 villages in 7 districts representing more than 80% potato area were examined at 75 to 90 day of crop growth. Disease severity was recorded according to a standard 14 point scale. Actual yield was determined by harvesting 5 plants at 4 locations per field at random and the loss due to late blight determined from the yield expected in crop completely protected by fungicides.

•Resistance to metalaxyl in *P. infestans* isolates was determined following floating leaf disc method as described by Dowley and O'Sullivan, 1985 or by using tuber discs as per method followed by Kadish and Cohen, 1988.

District	Disease Severity (%)	Yield (t/ha)	Loss (%)
Jalandhar	50	15.2	24
Kapurthala	50	14.6	27
Hoshiarpur	75	12.8	36
Amritsar	40	18.0	10
Patiala	50	15.3	24
Ludhiana	10	19.4	3
Nawashehar	25	17.0	15
Mean	53	15.0	22.0

Figure 2. Loss in yield due to late blight in different districts of Punjab (2006-07)

Year	Severity	Year	Severity	Year	Severity
1980	Moderate	1989	Moderate	1998	Moderate
1981	Moderate	1990	Moderate	1999	Moderate
1982	High	1991	High	2000	Low
1983	Nil	1992	Moderate	2001	Nil
1984	Nil	1993	Low	2002	Moderate
1985	High	1994	Low	2003	High
1986	Low	1995	Moderate	2004	High
1987	Nil	1996	Low	2005	Moderate
1988	Low	1997	High	2006	High

Terminal severity in unsprayed crop <5%=Low; 5-50%=Moderate; 50-100% =Severe

Figure No.3. Occurrence and severity of late blight (1980-2006)

Results and Discussion

•During 2006-07 late blight appeared on November 8 which was the earliest recorded during the past 27 years. It appeared at a comparatively higher temperature range of 14.0 – 27.5°C as compared to the normal temperature range of 10 – 25°C.

•A comprehensive survey on loss in yield by late blight during 2006-07 revealed an average loss of 22% in potato productivity resulting in a loss of about 0.16 million tons of seed potato in the state of Punjab alone.

•An analysis of 91 isolates of *Phytophthora infestans* collected from different areas in the region during 2006 revealed presence of 11 gene complex races in 58.5% of the isolates and tolerance to metalaxyl beyond 200ppm in 22.0% of the isolates as compared to simpler races and zero tolerance to metalaxyl recorded in the earlier years.

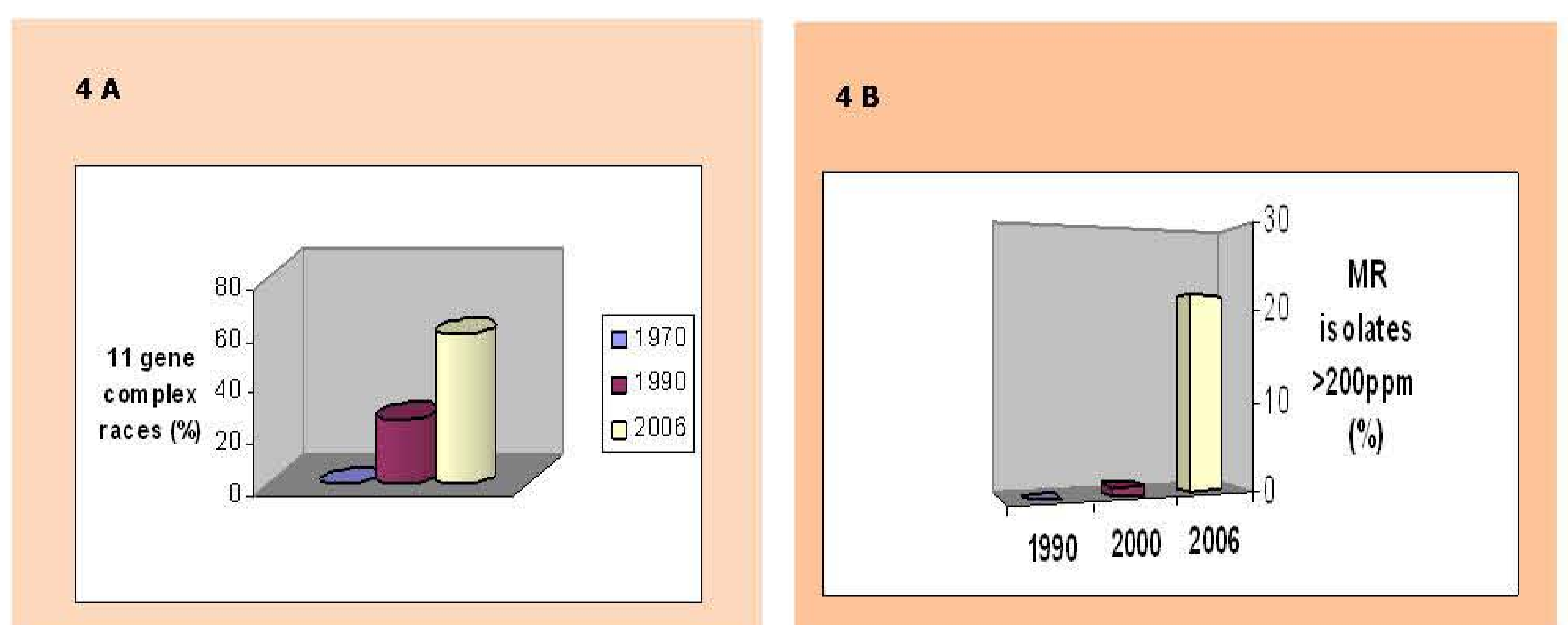


Figure No.4A. Frequency of 11gene complex races (1970-2006)

Figure No.4B. Frequency of metalaxyl resistant isolates (1990 -2006)

Year	Late blight appearance	Temperature Range (°C)
1985-86	Nov. 19	10-26
1991-92	Dec. 04	4-22
1997-98	Nov. 17	10-24
2003-04	Nov. 28	5-23
2004-05	Dec. 19	6-24
2006-07	Nov. 8	14-27.5

Figure No. 5 : Range of ambient temperature a week before disease onset.

Conclusions

• An increasing severity of late blight, a shift in pathogen population and an increasing tolerance to metalaxyl in North –Western plains of India suggests for an appropriate change in the disease management strategy.

Bibliography

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