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Impact of change in micro climatic factors for incidence and prevalence of powdery mildew disease in Indian Sandalwood (*Santalum album* L.)

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ABSTRACT

The summers are hot, while winters are getting cool at Bangalore, Karnataka, probably the possible effects of climate change. The changing climatic conditions have exaggerated the circumstances due to change in distribution pattern, epidemic development and new pathotypes of pest/disease (Yanez-Lopez 2012). The effect of local micro climatic conditions at IWST plays a major role in development of disease and rapid spread of inoculum. Some of the abiotic factors assessed during the study were temperature (t^0), relative humidity (RH) and cloud dynamics (CD) determines the incidence of disease. The inoculum tends to manifold in larger quantity under conducive abiotic factor (t^0, RH and CD) with a susceptible host (stress plants) and virulent pathogen. The prevailing management strategies for controlling of powdery mildew of *S. album* using either copper or sulphur fungicide were not found to be effective, which indicates the probability of resistance developed in pathogen. Therefore impact of climate change on plant disease is quiet an alarming situation, where the situation indirectly tells about the evolution of pathogen. It is high time to understand how climate change affects plant disease and host, therefore disease management against emerging and re-emerging pathogens through collaborative multi-facet discipline approaches may be better strategies under climate change.

Key words : *Climate change, Microclimatic factors, Powdery mildew disease*

Introduction

Climate change is a major environmental threat to the globe and had already observed impact on every natural ecosystems. Human activities are the primary reason tangled in increasing global climate change, straightly influencing the ecosystems (Ahanger *et al*., 2013). Global warming in India, was observed along the west coast, central India, the interior peninsula and Northeast India (Gautam *et al*., 2013). The global climate change is influenced by various factors directly effecting the 3 major elements of disease triangle, *viz*., host, pathogen and environment (Legreve and Duveiller, 2010). In general diseases are the result of interaction between susceptible host, virulent pathogen and favorable environmental conditions, therefore changes in environmental conditions can be strongly be correlated with the changes in disease severity and losses due to it (Elad and Pertot, 2014). Some of the cases of

plant-disease interaction due to weather phenomena are *viz.,* higher threat perception of late blight (*Phytophthorainfestans*) of potato and blast (*Magnaporthegrisea*) and sheath blight (*Rhizoctoniasolani*) of rice (Kobayashi *et al*., 2006). The present study was to decipher the influence of micro climate/environmental/abiotic factors for causing powdery mildew disease in Indian Sandalwood.

Findings

Re-emergence of powdery mildew disease

The incidence of powdery mildew disease on *S. album* was reported by Braun and Hosagoudar (1989), since then, there was no much literature reports were available. Two incidences of powdery mildew disease were reported from Maharashtra and Madhya Pradesh, India during the year 2015 and 2018.

Field observation

The disease is more prevalent during the onset of monsoon and post monsoon period. The saplings showed white powdery blotch symptoms on upper and lower side of the leaf in initial stage. Later similar symptoms develop under the leaf and start spreading all over the surface and finally leaves drop off (Fig. 1 & 2a & b). The surveillance report form 2014 to 2018 revealed the disease was also found in all other sandalwood growing regions of Karnataka, Tamil Nadu and Telangana, while the incidence was more prevalent in Karnataka. The young plants of these regions of one to two years old introduced into plantation were also prone to powdery mildew infection.

Interpretation/Conclusion

The summers are hot, while winters are getting cool at Bangalore, Karnataka, probably the possible effects of climate change. The changing climatic conditions have exaggerated the circumstances due to change in distribution pattern, epidemic development and new pathotypes of pest/disease (Yanez-Lopez 2012). The effect of local micro climatic conditions at IWST plays a major role in development of

Fig. 1. Devastating effect of powdery mildew disease at IWST nursery

Fig. 2a. Infected seedlings in nurseries

Fig. 2b. Infected seedlings in plantation

disease and rapid spread of inoculum. Some of the abiotic factors assessed during the study were temperature (t^0), relative humidity (RH) and cloud dynamics (CD) determines the incidence of disease. The inoculum tends to manifold in larger quantity under conducive abiotic factor (t^0, RH and CD) with a susceptible host (stress plants) and virulent pathogen. The prevailing management strategies for controlling of powdery mildew of *S. album* using either copper or sulphur fungicide were not found to be effective, which indicates the probability of resistance developed in pathogen. Therefore impact of climate change on plant disease is quiet an alarming situation, where the situation indirectly tells about the evolution of pathogen. It is high time to understand how climate change affects plant disease and host, therefore disease management against emerging and re-emerging pathogens through collaborative multi-facet discipline approaches may be better strategies under climate change.

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