

ROLE OF THE ASCIGEROUS STATE IN THE EPIDEMIOLOGY
OF EYESPOT IN WHEAT

By

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To the Faculty of Washington State University:

The members of the Committee appointed to examine the
dissertation of DANILO ISAAC VERA COELLO find it satisfactory and recommend
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Abstract

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Eyespot is a chronic disease of winter wheat, caused by *Oculimacula yallundae* (OY) and *O. aciformis* (OA) that results in premature ripening of grain, lodging, and reduced grain yield. Discovery of the *Oculimacula* spp. teleomorph in the Pacific Northwest region of the United States (PNW) is relatively recent and the role of apothecia or ascospores in the epidemiology of eyespot is unclear. Our goals were to determine the occurrence of OY and OA apothecia in commercial and inoculated field plots, to investigate when apothecia are produced and ascospores released, to determine persistence of apothecia to over summer and over winter, and to investigate factors influencing production of OY apothecia in vitro. Apothecia of OY and OA were found in spring and fall in commercial wheat fields, demonstrating that sexual reproduction occurs regularly in the PNW and may play a role as primary inoculum in the eyespot disease cycle. Apothecia survived over summer but not over winter in inoculated field plots.

Occurrence of ascospores was monitored with Burkard spore traps in inoculated field plots. Ascospores of OY and OA were trapped during spring and fall, and there were no

differences in the number of ascospores trapped from fields with a wheat crop or stubble.

Number of ascospores $\text{m}^{-3} \text{wk}^{-1}$ was positively correlated with relative humidity and weekly accumulated precipitation. Regression models based on environmental variables accounted for 27 to 36% of the variation in number of ascospores trapped. The effect of media, host substrate, inoculation method, temperature, light and stress-shock preconditions on development of primordial and mature apothecia of OY were studied. Inoculation of winter wheat and spring barley straw segments with a suspension of conidia or mycelial plugs favored apothecia development; however, mature apothecia did not developed in treatments without host substrate.

This research provides a base-line offering new insights into the role of the sexual stage of *Oculimacula* spp. in the epidemiology of eyespot. Understanding the incidence, seasonality and occurrence of apothecia and ascospores provides a better understanding of the role of ascospores as an inoculum source.