

Annual Epidemic Model of Coffee Leaf Rust (*Hemileia vastatrix*) Severity in Hainan Island, PRC

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SUMMARY

An annual epidemic model of Coffee Leaf Rust Severity (CLRS) in Hainan Island, PR China, was investigated from September 1993 to April 1994, the months of the year where the rust is of high field incidence. For this purpose a 4-year coffee plantation was chosen at Danzhou county and 24 trees were used. Leaves of eight branches, 4 from upper and 4 from lower layers of the canopy, were assessed for leaf rust severity. Results showed that temperature, rainfall and dew duration (in days) were three key correlation factors affecting the disease epidemics. Temperature was a limiting factor for the epidemics with an optimum between 20°C and 25°C. At this range of temperature, the monocyclic process of the disease only needed 23-28 days. The infected leaves after removing the urediospores could produce spores again within 1-3 days. When the field average temperature was higher than 26°C or lower than 19°C, the monocyclic process took more than 30 days or could not complete at all. During the rust epidemic early periods, heavy rains and dews of long duration provided enough free water for spores germination and penetration and also helped spores dispersal. These three factors worked together to build up the rust epidemics. No significant differences were noted for the CLRS between the upper and lower assessed branches and the orientation of the branches. However the CLRS at the South oriented branches was lower than in the other directions in the first three months of the disease epidemics, a fact that was correlated with the prevailing winds blown from the Southeast, East and Northeast directions during the early period of the epidemics. By statistic analysis all possible climate factors correlated to CLRS. The following regression equation was developed to predict CLRS: $Y = 215 - 3.98X_1 - 0.138X_4 - 3.46X_6$ ($S = 13.4$, $R^2 = 86.01$, $F = 36.9 > F_{0.01} = 5.09^{**}$), where Y is CLRS, X_1 is the average temperature of 30 days before prediction, X_4 the amount of rainfall in millimeters and X_6 the number of dew days during the same period.

Key words: Coffee leaf rust, *Hemileia vastatrix* Berk & Br, Severity, Epidemic model, Hainan, China.