**Comparison of the Impact of Pedotransfer Functions on Simulated Crop Yield: A Case Study with Agricultural Production Systems Simulator**

U.G.N.U.Wimalasiri1\*, Eranga M.Wimalasiri1

*1 Department of Export Agriculture, Faculty of Agricultural Sciences, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka*

\* [*nadeeshaudari97@gmail.com*](mailto:nadeeshaudari97@gmail.com)

The determination of soil hydraulic properties is a difficult, time-consuming and laborious process. The pedotransfer functions are developed as an alternative method for estimating the hydraulic parameters based on existing soil measurements. Hydraulic properties that can be estimated from pedotransfer functions can be used for environment and crop models. However, the impact of hydraulic property values derived from different pedotransfer functions on the growth and development of crops in crop models was not assessed in detail. In this study, the weight of rough rice (WRR) was simulated and measured and pedotranfer function-derived soil hydraulic parameters that include permanent wilting point (LL15) and field capacity (DUL) from15 pedotransfer functions were used. The Oryza model in Agricultural Production Systems sIMulator (APSIM) was used as the test model and simulations were conducted for thirty years (1980-2010) in 43 locations in Sri Lanka. Furthermore, the global sensitivity analysis was performed using the gaussian emulation machine for sensitivity analysis to identify the most sensitive soil parameter to yield, which was estimated by each pedotransfer function. The results showed a significant (p<0.05) difference in the yield prediction maps generated using PTFs-based hydraulic properties than the yield prediction map generated using the observed hydraulic parameters. In the correlation analysis PTF 8 is not significant. The statistical analysis confirmed yield generated using hydraulic parameters estimated by PTF 8 had a poor agreement and PTF 12 had good agreement with the observed yield. The DUL and LL15 are the most sensitive parameters on WRR value estimated from different PTFs. The PTF 12 (Oliveira et al. 2002) is most preferred and PTF 8 (Dijkerman 1988) least accurate PTF to predict the crop growth in process-based crop models for tropical Sri Lankan soils.

**Keywords*:*** *APSIM, ArcGIS, sensitivity analysis,* *soil hydraulic properties*