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Development of mathematical models for predicting vapour pressure deficit inside a greenhouse from internal and external climate

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ABSTRACT

Vapour pressure deficit (*VPD*) inside protective structures under cropped conditions significantly affects the plant growth and productivity through its direct relationship with crop transpiration or irrigation management. Thus, monitoring *VPD* inside greenhouse during crop growth period becomes essential to limit it to a desired range. The present study was undertaken to develop mathematical models for predicting *SVP*, *AVP* and *VPD* inside a greenhouse independently using internal and external climatic parameters as inputs. The root mean square error (*RMSE*) was obtained in the range of 0.03-0.10 kPa and 0.27-1.03 kPa respectively for the models developed from internal and external climatic parameters as model inputs. The average model efficiency (n_{eff}) was computed to be 98.7 per cent, 92.2 per cent and 100.0 per cent respectively for *SVP*, *AVP* and *VPD* when predictions were made using internal climate as input. Similarly, for the models developed from external climate as model input, n_{eff} was worked out to be 96.7, 86.1 and 93.0 per cent for *SVP*, *AVP* and *VPD* respectively. The developed models presented a high degree of precision in predicting *SVP*, *AVP* and *VPD* with both internal and external climatic conditions as model inputs inside a naturally ventilated greenhouse under cucumber crop in soilless media.

Keywords: *Greenhouse, MATLAB, modeling, simulink,* VPD