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Agroclimatic models as a tool to predict biophysical variables and productivity in oilseed Brassica (*Brassica juncea*) under semiarid subtropical environment

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ABSTRACT

Quantification of plants biophysical variable, economic yield and oil content of oilseed Brassica is important to know the potential impact of in-season weather variability. Agroclimatic models may be used to predict the plants' response and adaptability in the soil-plants-atmospheric systems and thereby screening various mitigation options to combat impinging climate change. In this study, some important biophysical indicators *viz.*, leaf area index (LAI), dry biomass, economic seed yield and oil content of Indian mustard have been predicted using thermal unit based regression models following field experimentations carried out in two consecutive winter seasons of 2005-06 and 2006-07 on a sandy clay loam soil of IARI research farm, New Delhi. Linear and non-linear regression models were developed in which thermal indices *viz.*, Growing Degree Days (GDD), Heliothermal Unit (HTU) and Photothermal Unit (PTU) have been used as independent variables. These thermal units were cumulated up to maximum leaf area index and dry biomass and 50% physiological maturity. Models developed from pooled data showed statistically significant and positive correlations existed between biophysical variables with thermal units. GDD and PTU based regression models may be recommended for predicting leaf area index (LAI = 0.008 × GDD - 3.54; R^2 = 0.78** and LAI = 0.0007 × PTU - 3.31; R^2 = 0.75**) and dry biomass production (Dry biomass = 1.89 × GDD - 1060.3; R^2 = 0.87** and Dry biomass = 0.15 × PTU - 794.02; R^2 = 0.85**). HTU based regression models were found to be better predictor only when accumulated values of the index exceeded 1000^{0}Cd hours (LAI = 0.0005 × HTU + 0.69; R^2 = 0.31 and Dry biomass = 0.11 × HTU + 202.81; R^2 = 0.51). The generated agroclimatic models may be complementary to decision support systems for predicting biophysical parameters under semi-arid subtropical environment using daily information on critical weather parameters.