

Onset of the rainy season and crop yield in sub-Saharan Africa – tools and perspectives for Cameroon

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Abstract In dry sub-humid and semi-arid regions, where rainfall is limited to only a few months per year, rainfall is the most important factor affecting crop growth and yield. Every year, farmers are faced with the crucial question of when to start planting. Do the first rainfalls after the dry season resemble the onset of the rainy season (ORS) or not? A fuzzy logic-based algorithm for estimating the ORS and the optimal planting date was developed. It is based on rainfall data and accounts for agriculturally meaningful aspects. The ORS algorithm, which calculates the planting date for each year, was coupled to the physically-based crop model CropSyst. A Monte Carlo approach was applied to generate annual planting dates from 1979 to 2003. Therefore, the definition constraints, which are allowed to vary within reasonable parameter ranges, are generated randomly. The averaged crop yield served as a performance measure for each realization. The parameter range of the best realizations is retained. Various iterations are necessary to obtain a robust set of “optimal” definition parameters. The coupled ORS definition-crop modelling system was applied for two different crop species and five different observation stations across Cameroon for the period 1979–2003. It is shown that the derived “optimal” planting dates would allow for significantly increased crop yields compared to the existing planting rules in Cameroon.

Key words crop modelling; CropSyst; Monte Carlo approach; onset of the rainy season; planting date