A Process Model of Photosynthetic Production and Dry Matter Accumulation in Cotton

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Abstract: A process based model for cotton photosynthesis and dry matter dynamic accumulation was developed by integrating certain advantages in current simulation models. The model introduced Gaussian integration method for computation of daily total canopy PAR interception and assimilation, considered not only PAR daily course but also the influence of direct PAR extinction coefficient by daily solar height course. The model calculated photosynthesis based on both direct radiation and diffusion radiation from sky, canopy and soil. The effectiveness of temperature, physiological age, nitrogen and water status on photosynthesis and respiration are fully quantified. The validation of model for dry matter accumulation with field experiments of different genotype and management indicated good fit between the simulated and observed data. Therefore, this model is strong on both mechanism and practicability.

Key words: cotton; radiation interception; photosynthesis; dry matter accumulation; ecophsiology; simulation model