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Biomass-based rapeseed (*Brassica napus* L.) leaf geometric parameter model

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Highlights: A biomass-based model of leaf geometric parameters of rapeseed was developed, and the effects of cultivars and environmental conditions on rapeseed leaf morphogenesis were considered through the connection to rapeseed growth model via biomass.

Keywords: biomass, leaf geometric parameter, model, rapeseed (*Brassica napus* L.).

To quantify the relationships between rapeseed leaf geometric parameters and the corresponding leaf biomass, this paper presents a biomass-based model of leaf geometric parameters of rapeseed (Brassica napus L.) in the seedling stage, including Biomass-base leaf blade length model $LLj(i) = CPLBj(i) \cdot DWSP(i) \cdot RLWj(i)$, blade length-based leaf blade width model $LW_j(i) = e^{b_0 + b_1 LL_j(i)}$, leaf sheath length model $LS_j(i) = b_0 LL_j^{b_1}$, leaf blade bowstring length model $LBBL_j(i) = B_0 + B_1 LL_j(i)$, and leaf blade angle models $TA_j(i) = CPLB_j(i) \cdot DW_{SP}(i) \cdot RTW_j(i)$, $BA_j(i) = CPLB_j(i) \cdot DW_{SP}(i) \cdot RBW_j(i)$, designed to explain effects of genotypes and environmental conditions on rapeseed leaf morphogenesis at the individual leaf level. Various model variables, including biomass of blade, and blade length, were parameterized for rapeseed based on data derived from an outdoor experiment with rapeseed cv. Ningyou18, Ningyou16, and Ningza19. The leaf dimensions of rapeseed are modelled taking corresponding leaf biomass as an independent variable. Various variables in rapeseed showed marked consistency in observation and simulation, suggesting possibilities for a general rapeseed leaf geometric parameter model in the seedling stage. Our descriptive model is suitable for our objective. However, they can set the stage for connection to physiological model via biomass and development of Functional Structural Rapeseed Models (FSRM), and start with the localized production and partitioning of assimilates as affected by abiotic growth factors. The finding of biomass-based rapeseed leaf geometric parameter models also can be used in morphological models of internode, ramification, anthotaxy, and root of the other stages in rapeseed life.