Rose bush leaf and internode expansion dynamics: analysis and development of a model capturing interplant variability

Titre	Rose bush leaf and internode expansion dynamics: analysis and development of a model capturing interplant variability
Type de publication	Article de revue
Auteur	Demote-Mainard, Sabine [1], Bertheloot, Jessica [2], Boumaza, Rachid [3], Huché-Thélier, Lydie [4], Guéritaine, Gaëlle [5], Guérin, Vincent [6], Andrieu, Bruno [7]
Editeur	Frontiers
Type	Article scientifique dans une revue à comité de lecture
Année	2013
Langue	Anglais
Date	2013/10/24
Volume	4
Titre de la revue	Frontiers in Plant Science
ISSN	1664-462X
Résumé en anglais	Rose bush architecture, among other factors, such as plant health, determines plant visual quality. The commercial product is the individual plant and interplant variability may be high within a crop. Thus, both mean plant architecture and interplant variability should be studied. Expansion is an important feature of architecture, but it has been little studied at the level of individual organs in rose bushes. We investigated the expansion kinetics of primary shoot organs, to develop a model reproducing the organ expansion of real crops from non-destructive input variables. We took interplant variability in expansion kinetics and the model's ability to simulate this variability into account. Changes in leaflet and internode dimensions over thermal time were recorded for primary shoot expansion, on 83 plants from three crops grown in different climatic conditions and densities. An empirical model was developed, to reproduce organ expansion kinetics for individual plants of a real crop of rose bush primary shoots. Leaflet or internode length was simulated as a logistic function of thermal time. The model was evaluated by cross-validation. We found that differences in leaflet or internode expansion kinetics between phytomer positions and between plants at a given phytomer position were due mostly to large differences in time of organ expansion and expansion rate, rather than differences in expansion duration. Thus, in the model, the parameters linked to expansion duration were predicted by values common to all plants, whereas variability in final size and organ expansion time was captured by input data. The model accurately simulated leaflet and internode expansion for individual plants (RMSEP = 7.3 and 10.2% of final length, respectively). Thus, this study defines the measurements required to simulate expansion and provides the first model simulating organ expansion in rosebush to capture interplant variability.
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DOI	10.3389/fpls.2013.00418 [9]

Lien vers le document	http://dx.doi.org/10.3389/fpls.2013.00418 [9]

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