Paper by Van Rooij *et al*. presents a revised biomechanical model simulating the growth stress distribution in a branch cross-section. The originality of the paper is application of the biomechanical model on outputs of a growth model generating the tree architecture and the growth history *i.e*. history of mechanical loading. Authors then play with two main parameters controlling the branch postural control: maturation stresses and eccentric growth. The rationale of the paper is very interesting however, some clarifications in the used terminology and discussion of outputs should be done. Results and conclusion section lacks comparison with literature and sometimes the link with possible biological interpretation. Language revision would be appreciated.

Title: growth strategies -> biomechanical strategies?

Abstract

L12 Ensure > control

L12 gravity -> its self-weight

L12 I am not sure we can talk about different strategies while talking about maturation stress and eccentricity, I would rather talk about different parameters

L13 I am a bit bothered by the term straightening. As you say later in your paper, the most straightforward assumption for the branch is to maintain its spatial position, not to search for a vertical position at it is the case of the main stem axis. By the way, straightening might by also confused with proprioception, which is not of concern here.

L16 …biomechanical impact of each strategy, what do you mean?

L20 Eccentricity process - I would rather talk about eccentric growth.

L23 Biomechanical process? The term building does not seem appropriate to me for plants.

Introduction

L28 construction of architecture, postural maintenance and resistance to external elements is not very clear, please reword

L80 I think the first biomechanical difference between the stem and the branch is that the tree stem is looking for verticality, which is not the case of the branch as mentioned above. I think you should introduce it here, explicit more clearly hypothesis you want to test with your model and also the final aim – why study the capacity of branches to control their posture is interesting.

L149 balances –> compensates

L167 realistic data -> data generated by growth model

L169 Tree architecture modelling

L171 Could you explain reasons for the selection of these two species? AMAPSim is simulating open-grown trees or forest trees? Birch trees are in general smaller and live shorter compared to Pinus pinaster, does the age of 50 years correspond roughly to the same stage of architectural development? What is the height and diameter of simulated trees? What are dimensions (and its variability) of generated branches?

L202 Is the different growth kinetics and other parameters you analyse (lightly vs heavily loaded branches) related to the height of the branch in the crown? Or their age? This might give new perspectives to the paper going more into biological implications.

L205 How do you interpret this variability in the loading history? How the change in branch angle is handled in the model if it is handled.

L206 It would be better to presents both variations in relative or absolute values, not a mix.

L213 Stem orientation?

L222 It might be interesting to have an idea about the branch angle at insertion; can you extract them from the model of loading and look at its variability?

L231 both strategies alone – reword

L235 Eccentricity of 0.6 is already very high

L239 The more space eccentricity leaves to TW – please reword, it is not very clear

L247 Please introduce results you are describing. Less intense TW reword lower σ_{TW}

L245 Which trade-off is on your mind?

L255 ability -> capacity

L263 inclination reword microfibril angle

L269 eccentricity of 0.8 is very high, you previously mentioned that posture control drivers are less triggered but eccentricity modelled here is higher in softwood than in hardwood

L267 I am wondering why do you let your model go for epitrophic eccentricity in conifer branches as this is not observed in nature. We do not need a complicated model to understand that allocation of the biomass to the lower side of the branch is not efficient mechanically.

L274 What do you mean by coordination problem?

L277 In case of combined effects – specify the scenario, same for L286, by the way you start to discuss Fig. 8b before Fig. 8a

L278 I can not see any red dotted line in Fig. 8b

L284 It is a bit surprising conclusion because in general in temperate softwood branches exhibit more eccentric growth compared to temperate hardwood species.

L295 This section is not very clear to me: Generating some tension at the pith allows the branch to create more CW…you mean that softwood branch could produce tension wood at the beginning of its growth under assumption of epitrophic growth? This seems to me rather unrealistic scenario for a softwood branch, I am not sure we should go for a deeper analysis you suggest for that but maybe I misunderstood?

Fig. 9 – I do not think this figure gives additional information compared to Fig. 8

L307 Replace straightening by uprighting here

L313 Expression building of branches should be revised

L314 Ok for bending due to self-weight however any little wind sway will change everything.

L323 I am wondering if the shape change could not be an issue as well for perspectives, to test behaviour of ovalized cross-section of branches for example.