Date:	08 Aug 2019
To:	"Haruka Tomobe" tomobe.haruka.58m@st.kyoto-u.ac.jp
cc:	"Kazunori Fujisawa" fujik@kais.kyoto-u.ac.jp, "Akira Murakami" akiram@kais.kyoto-u.ac.jp
From:	"Plant and Soil Office" Archie.Miras@springernature.com
Subject:	Your Submission PLSO-D-19-01158

Dear Mr. Tomobe,

I have received the reports from our advisors on your manuscript PLSO-D-19-01158 "Development of new experimental and numerical method to evaluate suction-induced cohesion of root-soil interfaces".

Due completely unforeseen circumstances, I have only managed to obtain one review of your paper. However, the review we have is comprehensive and allows me to make a decision. In the interests of time, I will do that now. I have also read your paper and I think the review accurately highlights problems with your paper.

In summary:
Main problems - confusing presentation of experiments and simulations, lack of method details, data measured for different experiments/species (e.g. soybean strength properties used in simulations of barley pullout), no replication or stats.

In my view, more experimental work will be needed before this paper can be accepted from Plant and Soil. It is quite possible that the paper will be acceptable with some revision for a civil-engineering journal where the interest is soil mechanics with less emphasis on the plant science.

I hope the comments will help you to take this forward.

With regret, I must inform you that, based on the advice received, I have decided that your manuscript cannot be accepted for publication in Plant and Soil.
Below, please find the comments for your perusal.

I would like to thank you very much for forwarding your manuscript to us for consideration.

With kind regards,
W Richard Whalley, PhD
Section Editor

Comments for the Author:

Please check online for possible reviewer attachments.

Reviewer #2: General: This is an interesting topic, research question, and study. However, the paper needs substantial reorganisation and improvement so that the reader can properly understand what has been done, and whether it has significant implications or not. I also think that the authors should really repeat the experiments to characterise the mechanical properties of the plants they used in the pullout experiments (rather than using plants of a completely different species), and include multiple repetitions of the pullout experiments, together with complete description of the experimental method.
Some details of the experiments and the data plotted in Fig 12 appear to be contained in a Japanese language journal by the same author, which does not make it accessible to many Plant and Soil readers. Although infinitely better than my Japanese, the English in the paper does need improvement in many places.
Main points:
1. The series of experiments and simulations need to be very clearly specified at the start, to avoid confusing the reader.
2. Full experimental details need to be added, to allow replication of the work. At present much of the detail appears to be lacking.
3. Assumptions need to be clearly and succinctly stated for both experiment and theory.
4. Mechanical root properties in Table 2 appear to be those measured on soybean (stated in the text, line 320), rather than the barley used in the pullout experiments. I don't think this is satisfactory scientifically. Why not measure the properties of the barley, or else do the pullout experiments on the soybean?
5. The pullout experiments appear to consist of only a single root pulled from the soil at each suction. This is not enough to give an indication of variability between roots and packing or growth conditions.
6. Figures need to have proper scales and detailed captions. Currently these are inadequate.
7. Need to place the study better in the context of the literature on root pullout (e.g. Ennos, 1990, Annals of Botany 65, 409-416; Mickovski et al., 2010, Canadian Geotechnical Journal 47, 78-95; Mickovski et al, 2007, European Journal of Soil Science 58, 1471-1481).
8. The conclusion that the suction-induced cohesion can be ignored (line 22, and results, discussion and conclusions section) in relation to 2-D shear box, needs to be considered in more detail. For example, the effect in Fig 14 becomes more important as displacement increases - 10 mm of displacement, although a long way past peak in fallow soil, is often considerably before the peak in resistance in rooted soil (so large displacements need to be considered more seriously for rooted soil).
Detailed points:
Pullout experiments with barley
9. What are the assumptions behind the experimental approach and its interpretation? (e.g. uniform suction throughout the root-soil interface and surrounding soil). How might this differ from the situation around a real functioning root grown into the soil and attached to a transpiring shoot, or where rainwater has just fallen and is percolating into the ground along preferential flow paths. How do lateral branches affect the anchorage of the roots in the soil.
10. Need to specify details of the plant material (barley cultivar, age of plants, growth and excavation) etc… For example, root strength and stiffness depends strongly on root age.
11. I presume the roots were not grown into the soil box, but rather placed after being excavated from the field, but this is not at all clear and has big implications? This is important as roots placed in repacked soil may have quite different interface properties from roots that have grown into that soil and formed a natural interface.
12. Make it clearer how the root was placed into the soil, with (presumably) the root tip end protruding from the end of the box etc…
13. Failures noted in Fig 8 - were these exclusively failure of the root-soil bond, or were there any root tensile failures?
14. Need a statistical analysis of variability and statistical significance of the results.
15. Line 162: No root hairs - why? (or is it that you can't easily see them with the naked eye after washing the root material from the soil?).
2-D shear box with soybean?
16. I don't understand why we suddenly move to soybean growing in a thin box, with lateral branch roots. Shouldn't this have been done

with barley?
17. The full data on this root system is not given, nor the replication or whether this box shown in Fig A was actually sheared (it doesn't look like a shear box, was it just to get root distribution?).
18. How many roots were grown in this system? What were the growth details, how was the soil prepared etc..?
Numerical simulations of pullout (barley)
19. Line 294: The logic behind measuring pullout of thin (0.7mm diameter) barley roots, but then simulating pullout of roots three times thicker (0.2mm) - for "convenience", seems missing. Why not simulate the thing that you measured exactly, even if it is less "convenient"?
Numerical simulations of shear (soybean?)
20. Lines 423-439. The simulation of 2-D shear appears to be for a vey young soybean root system (is this the root system shown in Fig 7A - it is not at all clear). The mesh shown in Fig 7C is largely black, obscuring the root architecture being simulated.
21. What would the implications be of simulating a root system which had a much more realistic root length density (e.g. >1 cm cm-3) be, rather than a single root in a soil box measuring 26 cm x 0.2cm?

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The Editorial Manager is at: https://www.editorialmanager.com/plso/

Reviewer's Responses to Questions

1. Does this paper significantly enhance our mechanistic understanding of plant-soil interactions?

Reviewer #2: No: see report

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2. Are the interpretations/conclusions sound and justified by the data?

Reviewer #2: No: see report

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3. Is this a new and original contribution?

Reviewer #2: No: see report

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4. Does the title clearly and sufficiently reflect its content?

Reviewer #2: Yes

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5. Are the presentation, organization and length satisfactory?

Reviewer #2: No: see report

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6. Can you suggest brief additions or amendments (words, phrases) or anintroductory statement that will increase the value of this paper for an international audience?

Reviewer #2: No

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7. Can you suggest any reductions in the paper, or deletions of parts?

Reviewer #2: No

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8. Is the quality of the English satisfactory?

Reviewer #2: No: see report

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9. Are the illustrations and tables necessary and acceptable?

Reviewer #2: No: see report

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10. Are the references adequate and are they all necessary?

Reviewer #2: No: see report

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11. Are the keywords and abstract or summary informative?

Reviewer #2: No: see report

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