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Response to De Jong Van Lier's comments on "Quantitative assessment of soil physical quality in northern China based on S-theory" [Rev Bras Cienc Solo. 2015;39:1311-21]

We are grateful to De Jong van Lier for raising queries about our study (Yang et al., 2015) which merits some clarification, and we would like to reply to his comments.

The principal purpose of our study (Yang et al., 2015) was to determine soil physical quality in the Haihe River Basin in northern China using the S-index proposed by Dexter (2004). The S-theory, developed with a basis on European soils, has been applied worldwide and produced plausible results. We noted the argument from De Jong van Lier (2014) that the S-index could have a negative mathematical relationship to soil bulk density and therefore had no additional value over soil bulk density. We regret that we did not discuss this further in our study.

The reason we adopted the S-theory was the ease it offered in calculating and providing critical values for classification of soil physical quality; no such values were available for other methods using different indicators, such as bulk density or total porosity. We agree with De Jong van Lier, though, that the absolute value of the S-index for classification of soil physical quality is debatable. However, the values suggested by Dexter (2004) and Dexter and Czyż (2007) were based on fairly extensive studies on various soils, and formed a reasonable basis for adoption. Obviously, more analysis is required in future studies. We should have made this clear in the discussion in our study (Yang et al., 2015).

The negative relationship between the S-index and soil bulk density in our study was obtained by a fitting procedure, which could be mathematically derived, as shown in De Jong van Lier (2014).

As discussed in De Jong van Lier (2014) that the S-index is a static parameter which is unable to describe dynamic processes, efforts should be made towards mechanistic soil physics. Such a suggestion is currently feasible since sophisticated physics-based hydrological models are widely available.

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