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Closing the yield gap of soybean (*Glycine max* (L.) Merril) in Southern Africa: a case of Malawi, Zambia, and Mozambique

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Introduction: Smallholder farmers in Sub-Saharan Africa (SSA) are increasingly producing soybean for food, feed, cash, and soil fertility improvement. Yet, the difference between the smallholder farmers' yield and either the attainable in research fields or the potential from crop models is wide. Reasons for the yield gap include low to nonapplication of appropriate fertilizers and inoculants, late planting, low plant populations, recycling seeds, etc.

Methods: Here, we reviewed the literature on the yield gap and the technologies for narrowing it and modelled yields through the right sowing dates and suitable high-yielding varieties in APSIM.

Results and Discussion: Results highlighted that between 2010 and 2020 in SSA, soybean production increased; however, it was through an expansion in the cropped area rather than a yield increase per hectare. Also, the actual smallholder farmers' yield was 3.8, 2.2, and 2.3 times lower than the attainable yield in Malawi, Zambia, and Mozambique, respectively. Through inoculants, soybean yield increased by 23.8%. Coupling this with either 40 kg ha–1 of P or 60 kg ha–1 of K boosted the yields by 89.1% and 26.0%, respectively. Overall, application of 21–30 kg ha-1 of P to soybean in SSA could increase yields by about 48.2%. Furthermore, sowing at the right time increased soybean yield by