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THE ROOT SYSTEMS IN SUSTAINABLE AGRICULTURAL INTENSIFICATION

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Preface

Major challenges lay ahead in providing food, feed, and fibre for increasing population on the planet using diminishing water and nutrient resources and being faced with pronounced climate change and variability. There are increasingly severe shortages of good-quality water to be used for irrigation as well as exacerbated frequency and severity of droughts in the areas reliant on rain-fed food production. Moreover, raw materials used in producing some fertilizers (e.g. P and K) are becoming scarce and expensive, and the high price of energy (production of N fertilizers has a high energy demand) combine to push fertilizer prices up. Food security is also threatened by declining average yield increases of staple crops in recent years, emphasizing the need for a shift in thinking about food production.

Sustainable agricultural intensification has been increasingly popular and important in expanding food production and enhancing efficiency of water and nutrient use in a range of agricultural systems, particularly in Africa and Asia. Increasing efficiency of water and nutrient use (i.e. increasing food production per unit of water and nutrient input) is crucial in (i) maintaining food security and food quality for increased global population and (ii) decreasing potentially negative environmental impacts of growing food, feed, and fibre.

Improved root systems capable of efficient acquisition of water and nutrients from soils underpin increased efficiency of utilization of soil resources that is essential for sustainable agricultural intensification of food production. The importance of roots has been recognized by scientists worldwide, with the number of published research papers