Cellulose Nanofibrils as Functional Additives in Foliar Fertilization Formulation

Xuan Li, Lu Wang

Foliar fertilizers can be absorbed directly through the leaves and can be transported more quickly and efficiently to the other plant organs. Integrating foliar fertilization can play a crucial role in supplementing micronutrient deficiencies and fostering more resilient crops. Despite the higher absorption efficiency of foliar fertilizers compared to soil fertilizers, the risk of fertilizer loss remains. Additionally, traditional foliar fertilizers tend to form large and irregular particles on leaves, which also hinders the absorption efficiency of plants. Additive-based fertilizers will likely remain the most economical and practical option for foliar fertilization. Cellulose is the most abundant natural biopolymer, and its nanoscale derivative, nanocellulose, holds promise as an additive for foliar fertilization. Cellulose nanofibril (CNF) is one such derivative, possessing a large specific surface area and a high aspect ratio, typically ranging from 3–50 nm in width and 1–3 μm in length, as well as excellent renewability, biodegradability and capacity for extensive chemical modification. Therefore, this study investigates the effects of three types of cellulose nanofibrils (negatively charged, neutral, and positively charged) as functional additives on foliar fertilizer formulation. It is believed that adding cellulose nanofibrils into foliar fertilization formula is a simple yet effective strategy to reduce foliar fertilizers loss and enhance the competitiveness of additive-based fertilizers.

Xuan Li

Graduate Research assistant

Center for Renewable Carbon

Department of Biosystems Engineering and Soil Science

University of Tennessee, Knoxville

Email address: xli152@vols.utk.edu