Public Abstract
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Boron is a very important nutrient element in plants, and thus it plays a key role in the world's food supply. Both boron deficiency and boron toxicity will cause plants to decrease their crop yield or even cause plants to die. To understand boron's role in plants, it is indispensable to investigate boron quantitatively and to study boron distribution so that we can know the amount of boron in each area of plants and the extent boron is transported in plants under various conditions. Some analytical methods have already been used to quantify boron in plants, such as UV-vis spectroscopy with the Azomethine-H method and Inductively Coupled Plasma Mass Spectrometry (ICP-MS). Also recently, some techniques are being developed by investigators to investigate boron distribution in plants such as Laser Ablation ICP-MS (LA-ICP-MS) and Quantitative Neutron Capture Radiography (QNCR). The hypothesis of this dissertation is whether LA-ICP-MS and QNCR can provide accurate and precise information on boron distribution analysis in plants. This information can be used to play a central role in analyzing boron distribution and to provide a better understanding of boron's role in plants.

This dissertation has confirmed UV-vis spectroscopy with the Azomethine-H method and ICP-MS can analyze [B] in plants accurately and precisely as the destructive techniques. Their advantages and disadvantages are also discussed based on the experimental procedures and results. The dissertation also demonstrates that QNCR can be used to study boron imaging analysis in plants.