Uptake, Translocation and accumulation:

CQDs' stable and unique fluorescence signal offers a promising method for tracking them in plants. Several studies have used fluorescence imaging (Chen et al., 2016), confocal laser scanning microscopy, transmission electron microscopy (TEM) (Li et al., 2020), or Raman spectroscopic measurements (Tripathi & Sarkar, 2015) to show CQD uptake in plants.

For example, (Li et al., 2020) used mung bean as a model plant to show the uptake, translocation and accumulation of CQDs. Hydroponics ensured the availability and uptake of CQDs by the plant. Germination of the seed and growth of the seedling was observed after 5 days of cultivation at 25°C. The mung bean plant's increased absorption of CQDs was demonstrated by its clear concentration-dependent reddish-orange fluorescence under 365 nm UV light. A confocal laser scanning microscope was employed to image the root, stem, cotyledon and leaves to locate the CQDs in the mung bean seedlings after 5 days of incubation. The fluorescence signals of the CQDs were found to be mainly located in the vascular system in the parts of the root, stem and leaves. TEM imaging of the cross sections of the seedlings showed the agglomeration in the form of large clusters in the intercellular spaces. It can be concluded that CQDs enter the seed coating through the intercellular space and accumulate in the cotyledons to speed up seed germination. The CQDs were adsorbed on the root surface and penetrated the root vascular bundles after the root emerged. The CQDs were then found in the veins of the leaves after being transferred from the roots to the stems and leaves via the vascular system.