



Remote control of chemicals accumulation within vegetation

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Rationale: Chemicals within growing canopy are diluted with time. Techniques to measure the chemicals status in vegetation can assist in its management. In this study a nondestructive (remote) method to determine the dilution rate with time was developed and described.

Objectives: a) Demonstrate applicability of image analysis and digital color imaging to monitor chemicals accumulation in vegetation's canopy . b) Formulate a general dilution equation of chemicals within the canopy of vegetation; c) Monitoring the dilution function of a case study;

Methods: Carrot (*Daucus carota*) was grown on loess soil at five nitrogen (N_{tot}) application rates. N_{tot} weight (kg/ha) was obtained by standard laboratory analysis and by image processing.

Results: A new logistic decay curve $N_c = a / [1 + (W/W_0)^b]$ agreed with experimental data. N_c (g/kg) is the critical nitrogen level, a and b are coefficients and W/W_0 is the relative dry matter biomass. Values of Nitrogen Nutrition Index (NNI) ≥ 1.0 indicated that there was no nitrogen deficiency in treatment larger than 100% application of N_{tot} .

Conclusions: The weight of Nitrogen in form of multiplication of the dry leaves weight (W) and N percent is suitable for the determination of nitrogen status. The availability of image-based data for N content within the vegetation is faster, timely and less expensive than that of laboratory test. Applicability of digital color camera to monitor total N uptake by vegetation instead of laboratory test was successfully demonstrated.