UPTAKE POTENTIAL OF NON-REGULARLY DISTRIBUTED ROOTS

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ABSTRACT

Traditionally, models on transport of nutrients through the soil and uptake by the root assume regular distribution of roots. In this paper some consequences of non-regular root distribution are discussed. Three aspects of non-regular distributions are evaluated: The distribution of the size of the region of influence around the roots; the eccentricity of the root's position in the region; and the form of the region.

INTRODUCTION

Existing models on uptake of nutrients by root systems implicitly or explicitly assume a regular root distribution (2, 8). Then an equal volume of soil can be attributed to each root and the uptake by a crop can be studied by considering one root, as representative of the root system.

Barley (3) proposed to construct around each root polygon, the locus of points in the soil nearer to that root than to any other. This construction - called the Dirichlet tesselation (7) - seems as a first approximation an acceptable way to define the region of influence of each root. The polygons obtained are usually called Thiessen polygons. Barley substituted for each polygon a circle with the same area, and calculated the uptake of the collection of cylinders obtained in this way. He found that depletion rate differed only slightly between his most regular and his most irregular distribution. Thus in this approach only the