

Significance of Root Development to Fertilizer Use and Research

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Field investigations over a period of years suggest that cultural practices and weather both are major factors in root development of crops. Deep seeding, drought conditions, loose soil and even excessively shallow seeding of cereals contribute to weak development of roots but the influence has been noted particularly on the crown or adventitious roots.

Boatwright and Ferguson(1) have recently conducted a study on the relative contribution of primary and adventitious roots to the growth, yield and phosphorus uptake of wheat. An excerpt from their table shows that adventitious roots gave a grain yield of 70 and 76% of the combined system, whereas primary roots gave a yield of only 43 and 56% of the combined root system. Phosphate uptake was similar with the adventitious roots absorbing 75% of that for the combined system and the primary roots absorbing only 49 and 50% of that for the combined root system.

One would probably have to accept some reservations on the technique used by these workers but the difference in the ability of the two root systems to exploit soil phosphorus as well as applied phosphorus appear to be quite significant. If this is the case, future research on fertilizer placement for cereals will require careful analysis of the root development of the crop for proper assessment of results. Results could be quite variable depending on the vigour of the adventitious root system.

The implications under field conditions could be of greater significance than these laboratory results. The adventitious root system will exploit the soil region which is generally most fertile and also the only region which benefits from low intensity rainfall.

TABLE I

	<u>Grain Yield g/plant</u>		
	<u>A+Pr</u>	<u>Pr</u>	<u>A</u>
wet + P	1.23	0.69 (56)*	0.94 (76)*
wet - P	0.63	0.27 (43)*	0.43 (70)*

	<u>P Uptake mg/plant</u>		
	<u>A+Pr</u>	<u>Pr</u>	<u>A</u>
wet + P	6.17	3.07 (50)*	4.60 (75)*
wet - P	3.14	1.54 (49)*	2.36 (75)*

A - Adventitious

Pr - Primary

* - Per cent of A+Pr

Reference:

(1) Boatwright, G.O. and Ferguson, H. - Agron. Journ. 59, 299-302.

Influence of Primary and/or Adventitious Root Systems on Wheat Production and Nutrient Uptake.