AGRY 515 2012

- Nutrient Bioavailability
- Nutrient Movement in Soils
- Nutrient Concentrations in the Rhizosphere

Figure 1

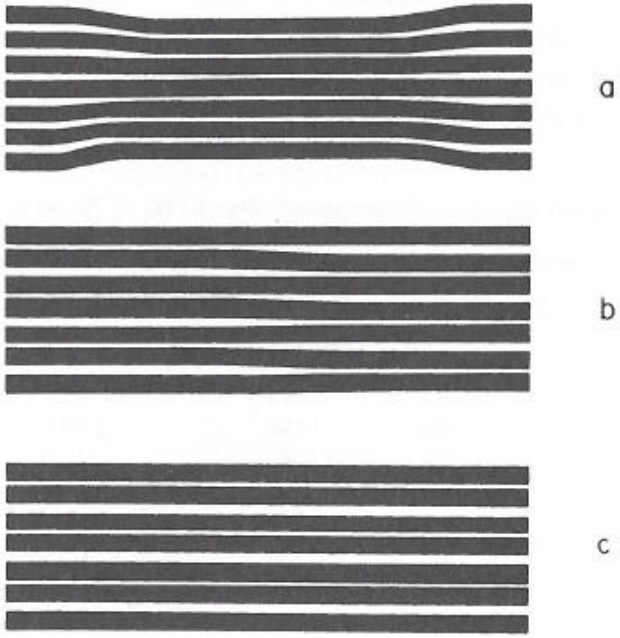


Fig. 4–6. Diagram of a weathered mica particle containing about 50% expanded (vermiculite) layer. (a) "Frayed edge" and mica core; (b) alternate layers open half-way through interlayer; and (c) regularly interstratified mica–vermiculite (no wedge zones) (Rich, 1972).

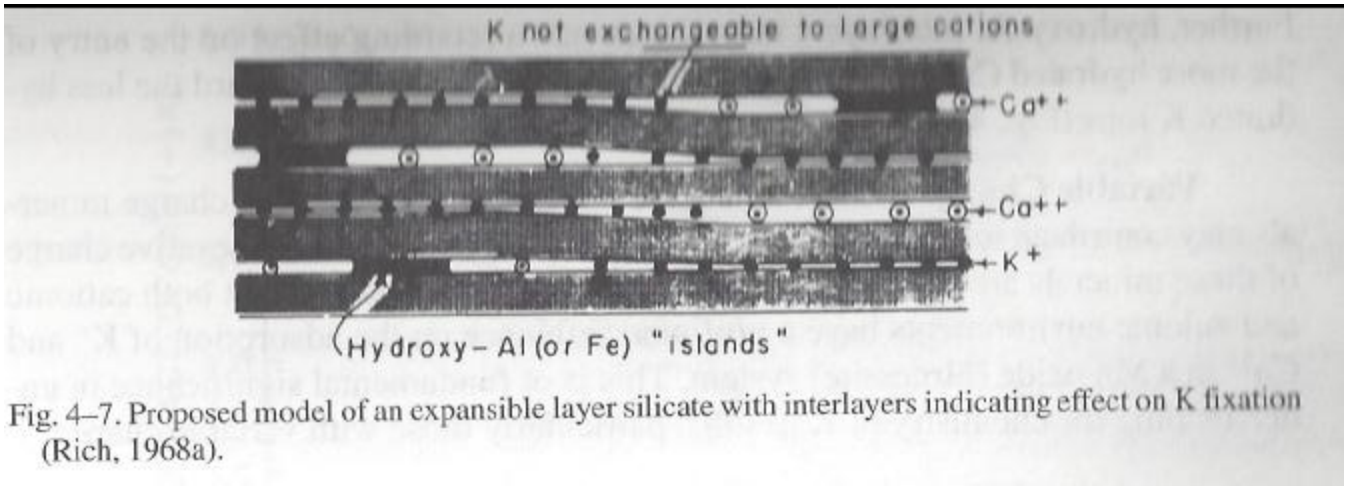
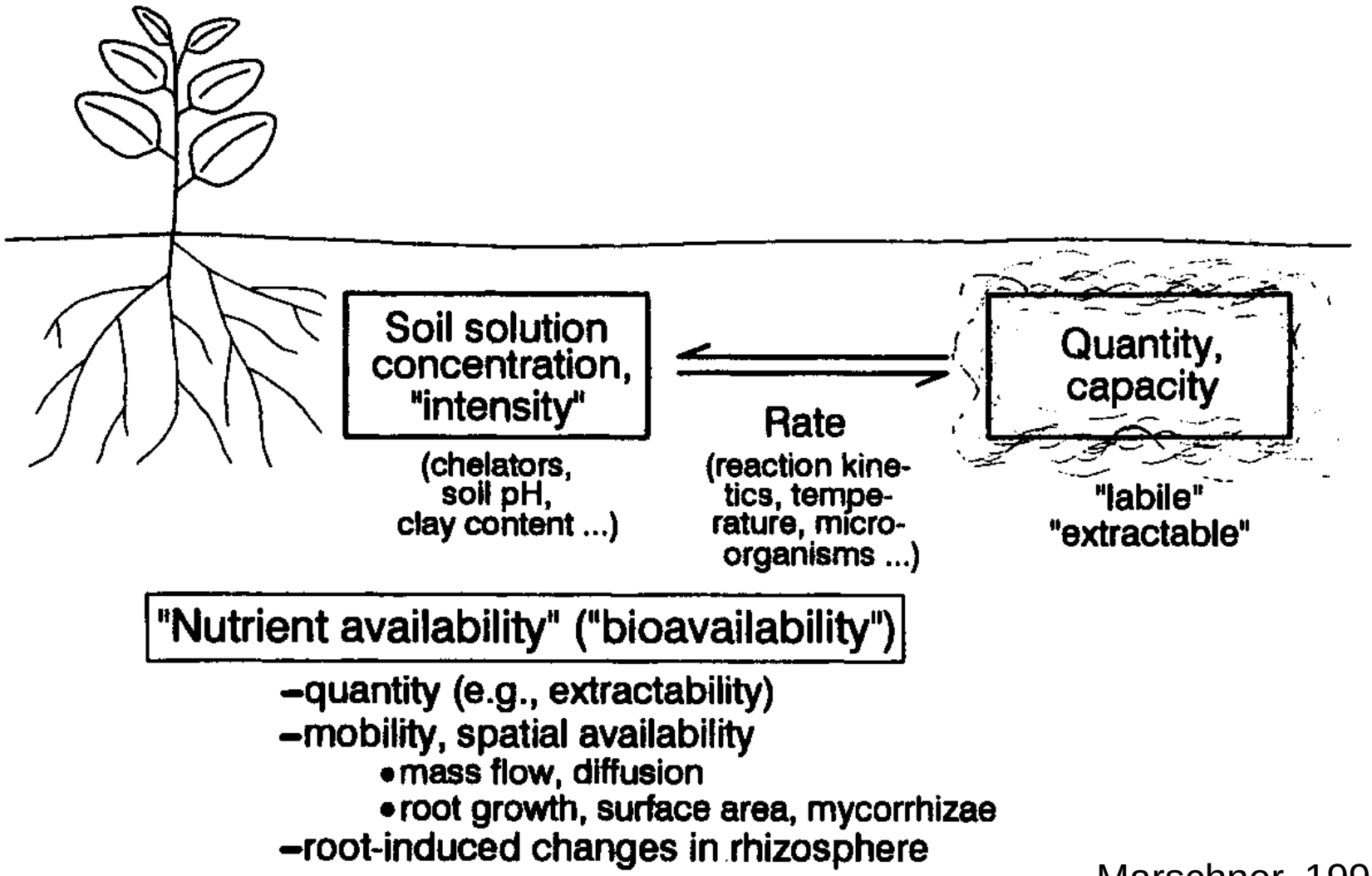


Fig. 4–7. Proposed model of an expansible layer silicate with interlayers indicating effect on K fixation (Rich, 1968a).

Huang, 2005, Chemistry of Potassium in Soils

Figure 2 (Fig. 12.12)



Marschner, 1995

Figure 3

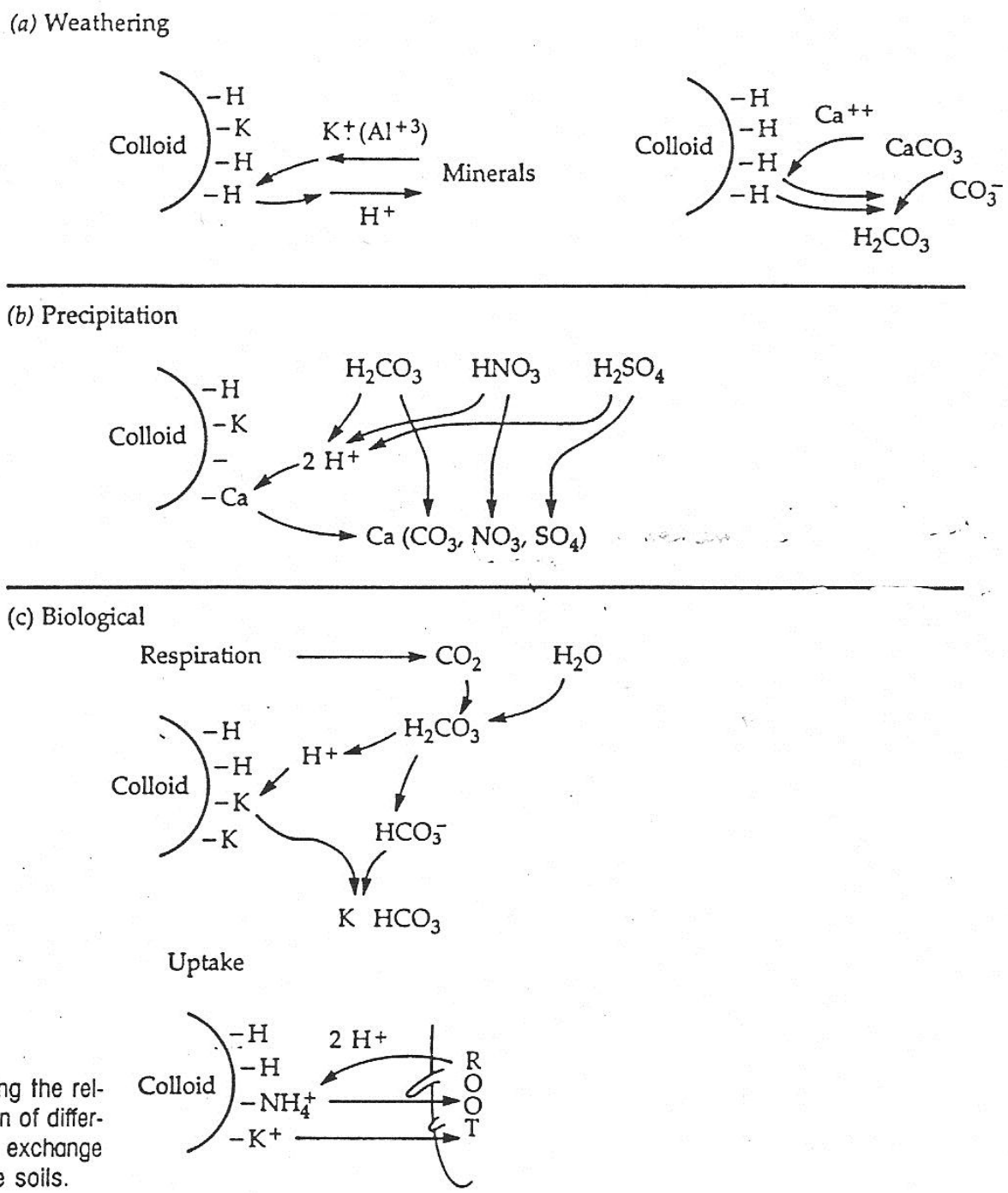


Figure 9.8
Processes affecting the relative concentration of different cations on exchange sites in temperate soils.

Figure 4

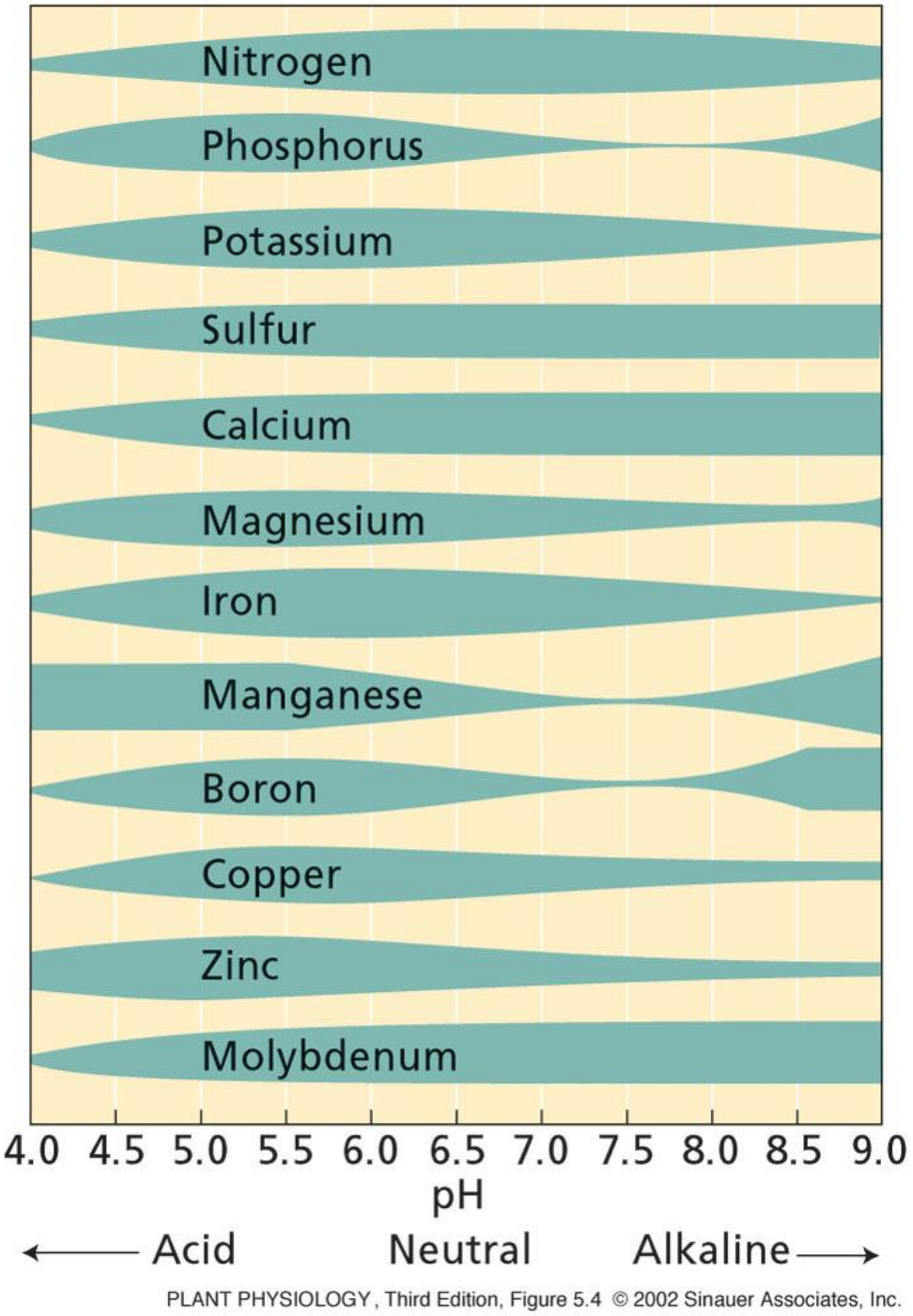


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Figure 5

What is soil buffer power?

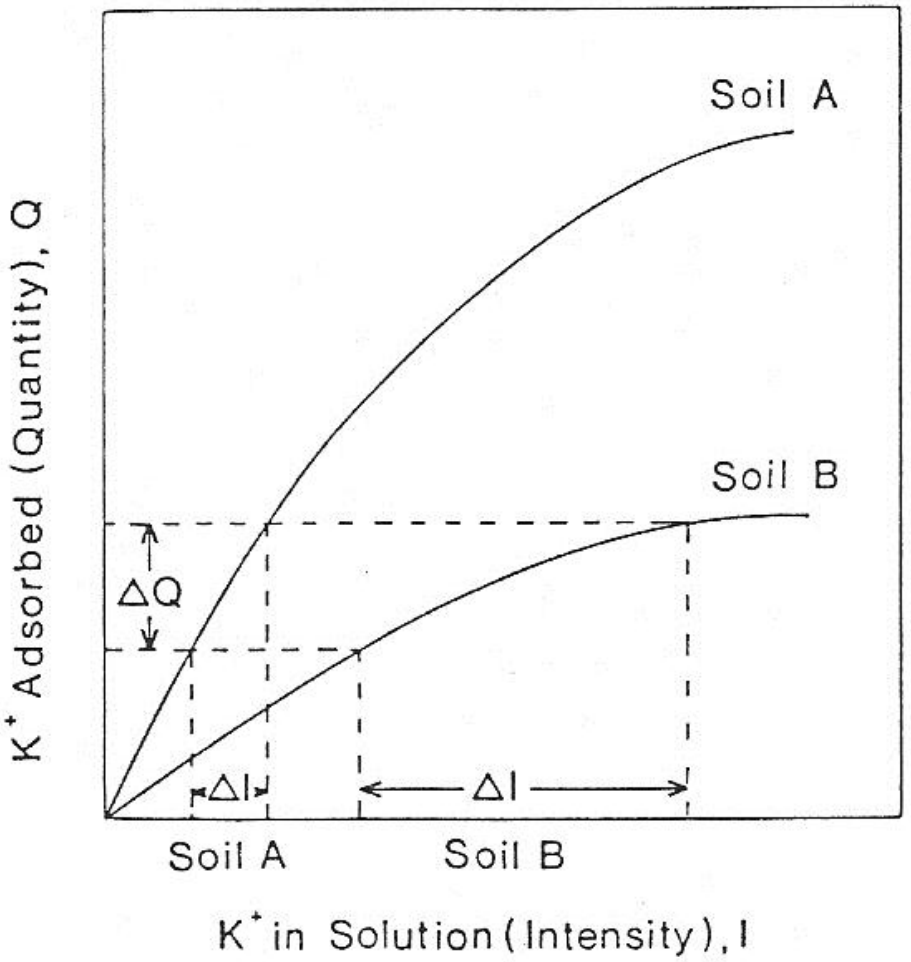

Fig. 2.18 Relationship between K^+ intensity and K^+ quantity for two soils with different adsorbing capacities (Soil A high and Soil B low).

MENGEL & KIRKBY 1987

Figure 6

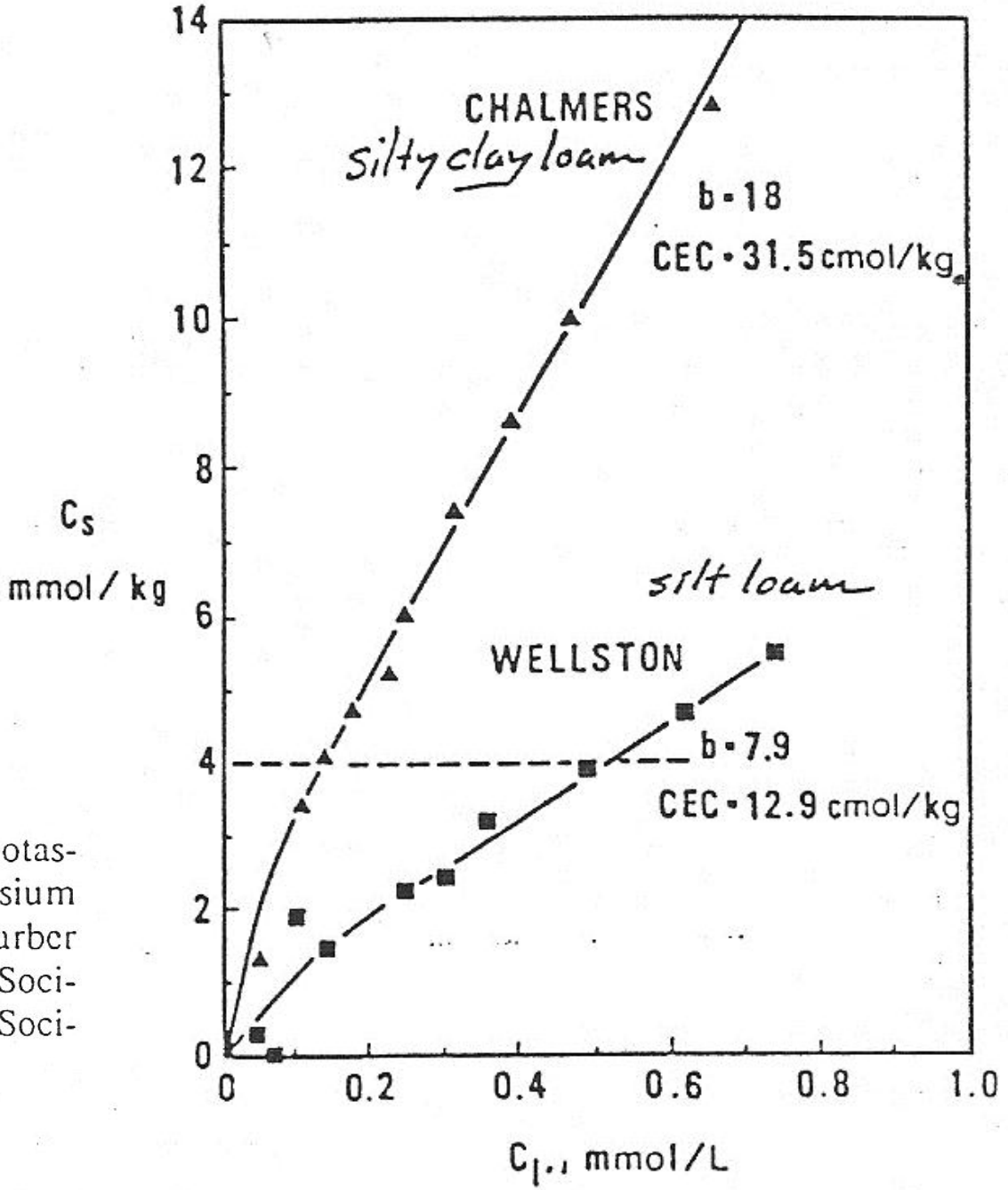

FIGURE 2.7 Plot of solution potassium versus exchangeable potassium for two soils. Reproduced from Barber (1981) by permission of American Society of Agronomy and Soil Science Society of America.

BARBER, 1995

Figure 7 (Fig. 12.1)

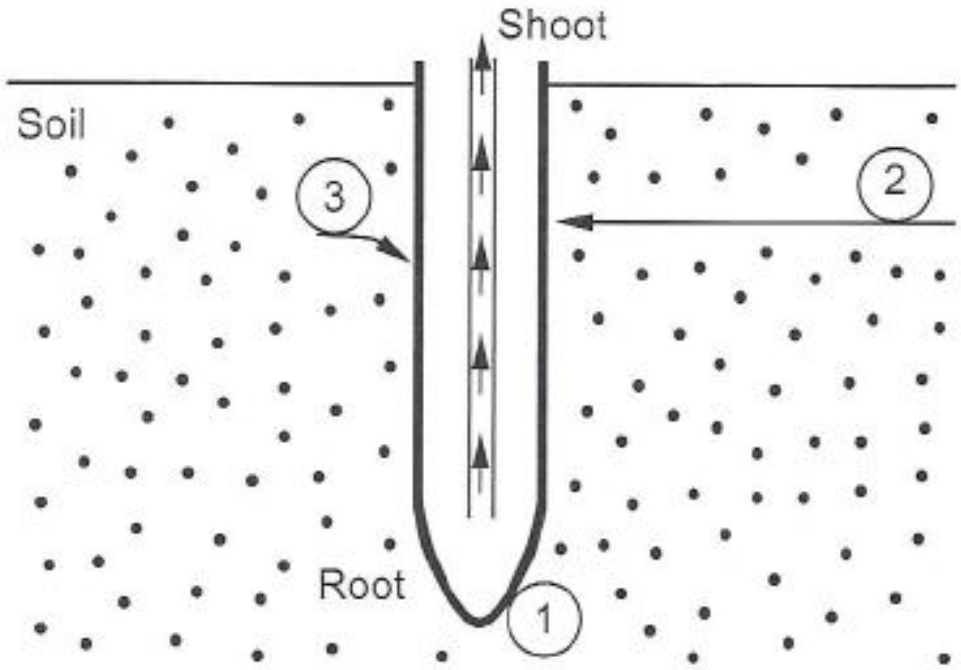

FIGURE 12.1 Schematic presentation of the movement of elements to the root surface of soil-grown plants. (1) Root interception: soil volume displaced by roots. (2) Mass flow: transport of soil solution along the water potential gradient (driven by transpiration). (3) Diffusion: element transport along a concentration gradient. • = available nutrients (as determined, e.g. by soil testing).

Table 1 (Similar to Table 12.2)

Table 13.6

Plant Uptake and Estimates on Supply to the Roots by Mass Flow of Potassium, Magnesium, and Calcium in Spring Wheat and Sugar Beet Grown in a Silty Loam Soil (Luvisol Derived from Loess)[a]

	Amount ($kg\ ha^{-1}$)					
	Spring wheat			Sugar beet		
	K	Mg	Ca	K	Mg	Ca
Plant uptake	215	13	35	326	44	104
Mass flow	5	17	272	3	10	236
(% of total uptake)	(2)	(131)	(777)	(1)	(23)	(227)

[a]From Strebel and Duynisveld (1989).

MARSCHNER, 1995

Table 2 (Table 12.7)

Table 13.7
Estimates of Diffusion Coefficients ($m^2\ s^{-1}$) of Ions in Water (D_l) and in Soils (D_e), and of Movement per Day at Average Values of D_e[a]

Ion	Diffusion coefficient		Average D_e in soils	Movement in soils (mm per day)
	Water (D_l)	soil (D_e)		
NO_3^-	1.9×10^{-9}	10^{-10}–10^{-11}	5×10^{-11}	3.0
K^+	2.0×10^{-9}	10^{-11}–10^{-12}	5×10^{-12}	0.9
$H_2PO_4^-$	0.9×10^{-9}	10^{-12}–10^{-15}	1×10^{-13}	0.13

[a]From Jungk (1991). Reprinted by courtesy of Marcel Dekker Inc.

MARSCHNER, 1995

Figure 8

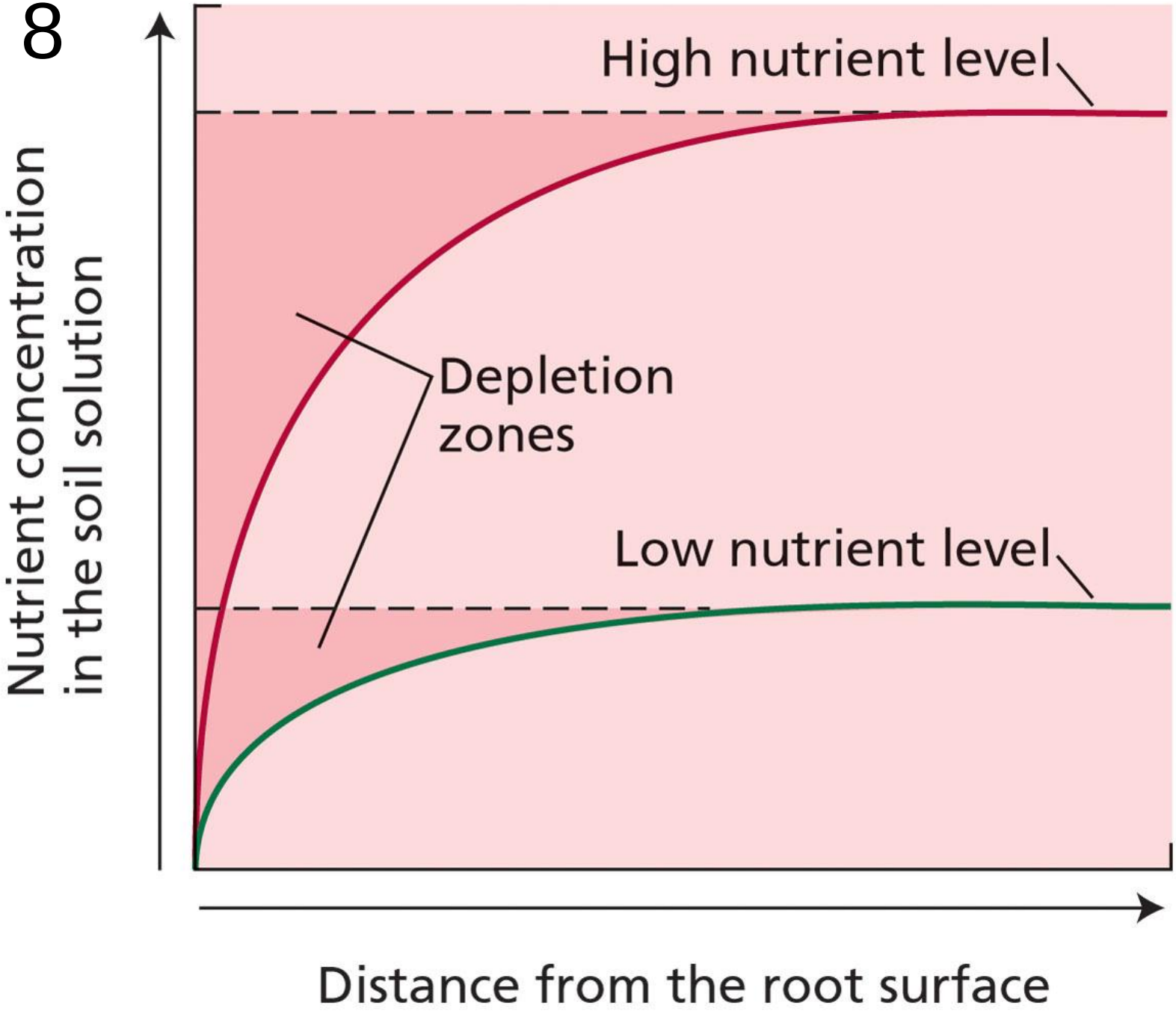

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Figure 9 (Fig. 12.2)

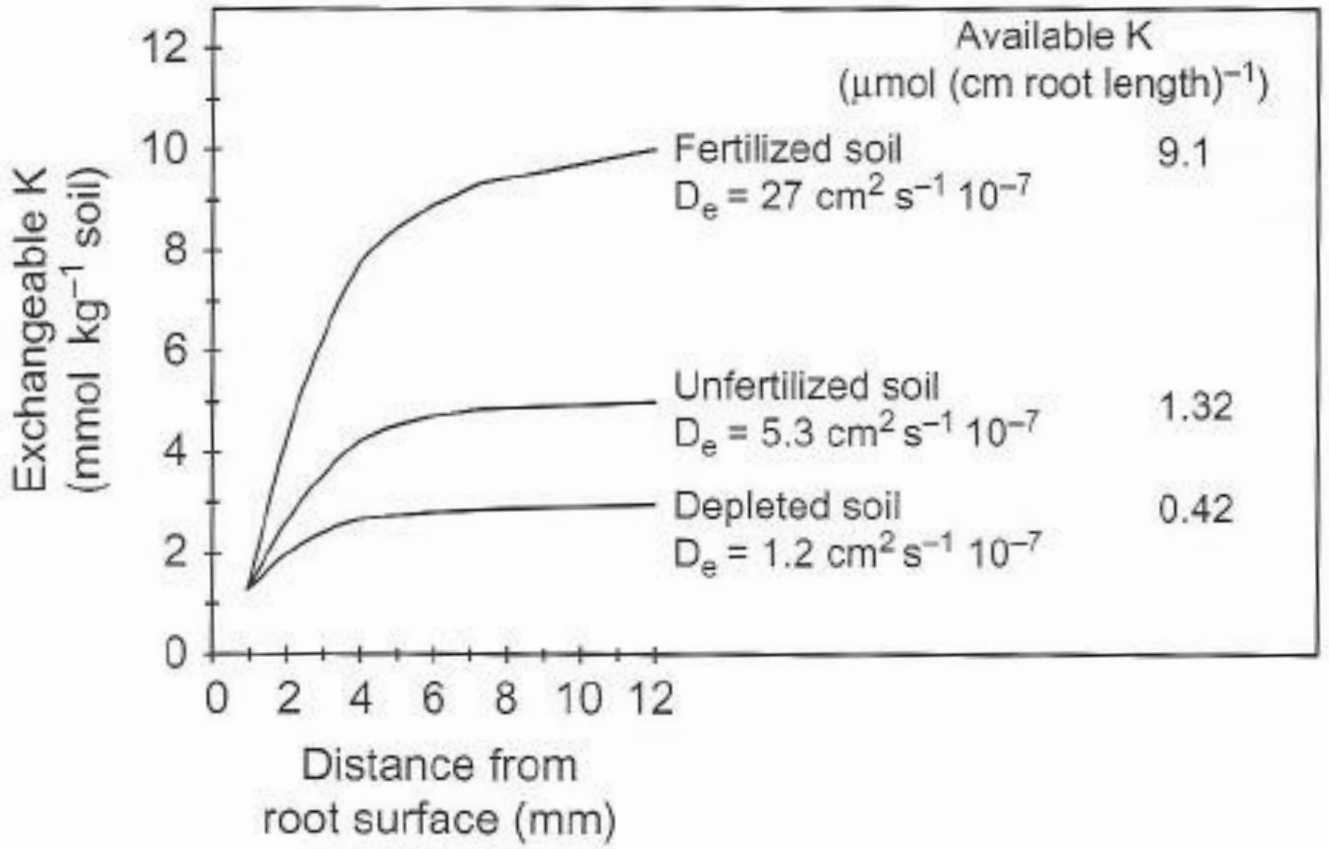

FIGURE 12.2 Concentration gradient around roots of 7-day-old oilseed rape (*Brassica napus*) seedlings grown in a soil with different concentrations of exchangeable K. *Modified from Kuchenbuch and Jungk (1984).*

Figure 10 (Fig. 12.3)

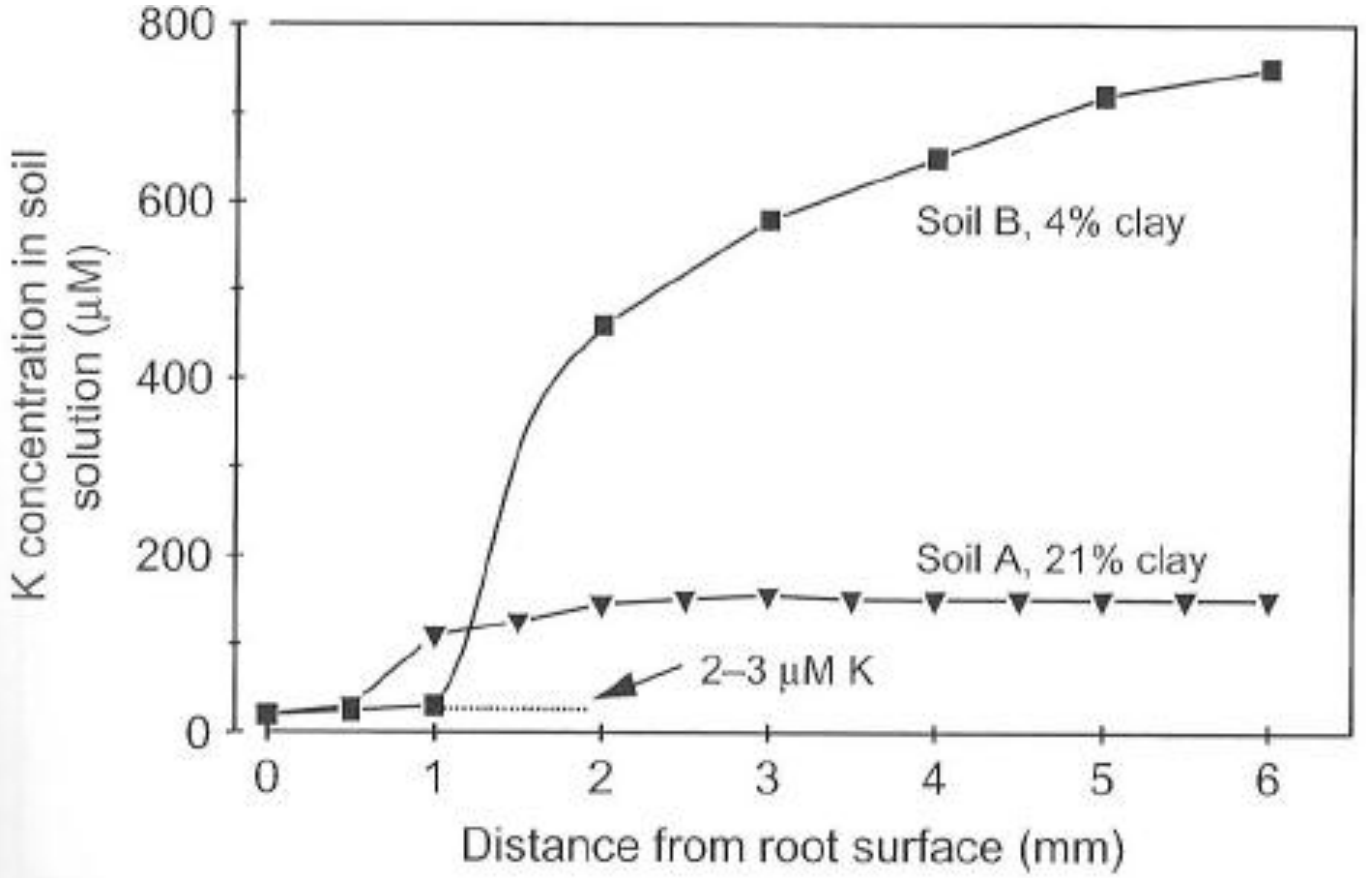

FIGURE 12.3 Concentration gradient of K in the soil solution around maize roots growing in soils with different clay contents. *Modified from Claassen and Jungk (1982).*

Figure 11 (Fig. 12.4)

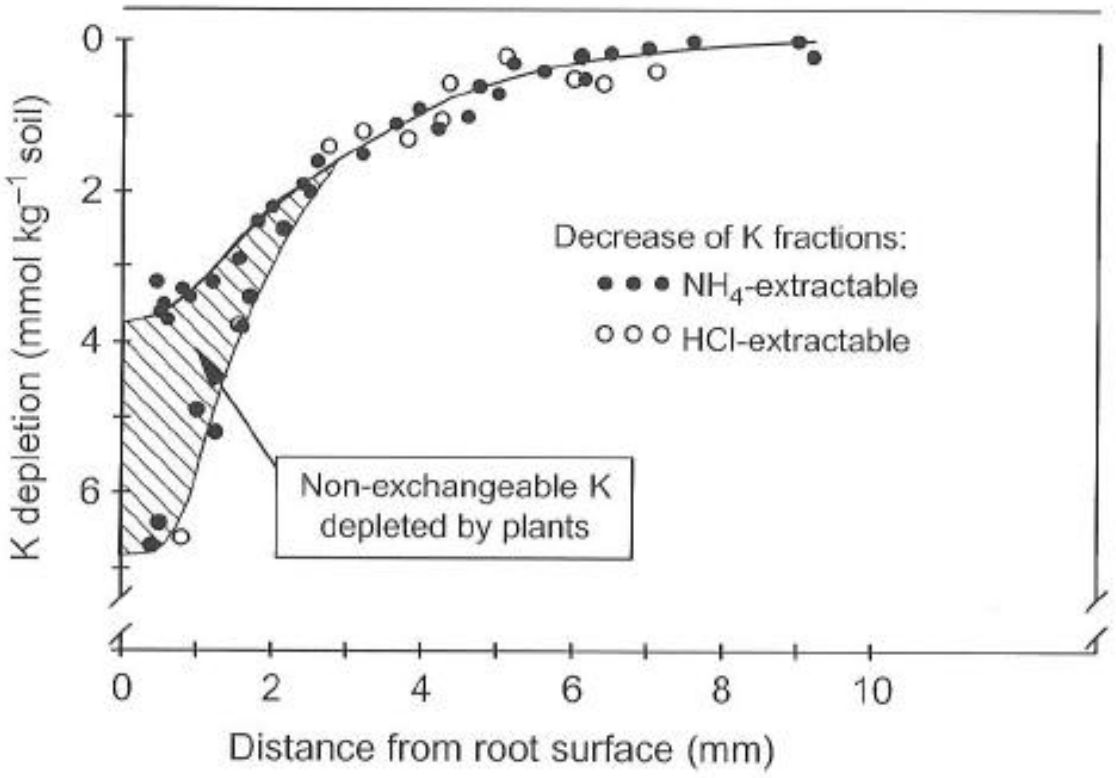

FIGURE 12.4 Concentration of different K fractions in the rhizosphere of 7-day-old oilseed rape (*Brassica napus*) seedlings. *From Jungk and Claassen (1986). Copyright Wiley-VCH Verlag GmbH & Co. KGaA. Reproduced with permission.*