ROOT HABIT

During an average period of growth, the root system of a single maize plant may exploit over 200 cubic feet of soil and may absorb 35–50 gallons of water. Depending on soil texture, the lateral spread of a mature root system may be 3–4 feet on all sides of the plant and typically penetrates to depths of 5–6 feet (Figure 4.1), although depths of 8 feet are not unusual (Weaver 1926). The depth of planting appears to bear no relationship to depth of rooting.

As in other herbaceous monocotyledons, the root system of maize is derived from several distinctive types of roots:

1. The primary or tap root and associated lateral roots.
2. Seminal roots (that is, roots other than the primary root preformed and present in the ungerminated seed).
3. Shoot-borne (“adventitious’’)¹ roots that originate at nodes on portions of the germinated seedling axis below the soil level.
4. Shoot-borne (“adventitious”—see footnote 1) roots that form at nodes on portions of the stem above the soil, usually at the lowermost 2–3 nodes; these are usually referred to as “prop” or “brace” roots.

The primary root originates early during embryogenesis and becomes defined as a distinctive region 10–15 days after pollination. Vascular development is evident 12–15 days after pollination (Avery 1930). The primary root is enclosed by a protective en-sheathing structure, the coleorhiza (Figure 4.2). At germination the coleorhiza grows or

¹Technically, adventitious roots are roots formed at a cut surface or on portions of the plant as a result of injury. Because “adventitious” roots in maize are part of the normal development of the plant, they are therefore not truly adventitious. However, because these roots are usually described as adventitious, I will continue to use this terminology.
is pushed through the seed coat and is itself then pierced by the primary root (the radicle). Although the radicle is reportedly capable of extending at rates of up to 11 cm per day, rates of 1–4 cm/day are most common.

At about the time the coleoptile reaches the soil surface, the adventitious seminal roots emerge between the scutellum and the first internode. Mature maize kernels typically contain from 3 to 7 seminal root primordia (Figure 4.2); these originate 30–40 days postanthesis. At germination these roots initially grow upward or horizontally, depending on the original orientation of the seminal root primordia, but soon bend downward.