beginning anywhere on the ear (figure 13.47). Often the decay begins with insect-damaged kernels. Usually, *Fusarium* does not rot the entire ear, but affected kernels may be scattered or clustered throughout the ear. Infected kernels are often tan or brown colored, or have white streaks.

Gibberella Ear Rot: Gibberella ear rot can be identified most readily by the red or pink color of the mold. It almost always begins at the tip of the ear (figure 13.48). The silks and husks may adhere to the ear due to excessive mold. In severe cases, the pink mold is visible on the outside of the husks at the ear tip.

Diplodia Ear Rot: This fungus initially appears as a white mold beginning at the base of the ear. The mold and the kernels eventually turn a grayish brown color and rot the entire ear (figure 13.49). The mold may be apparent on the outside of the husk or on the shank. A distinctive characteristic of Diplodia ear rot is the appearance of raised black bumps on the moldy husk or kernels.

Figure 13.47. Fusarium ear rot.

Figure 13.48. Gibbetrella ear rot.

Aspergillus Ear and Kernel Rot: Asperg
green, powdery mold (figure 13.50). Infec
brownish, light weight, and shrunken. The rot may begin at the tip of the ear or follow along tracks made by insect injury. Aspergillus ear rot is more common in hot, dry years. It can grow at temperatures higher than 90° F, and grain moisture content as low as 16 percent. These fungi produce aflatoxin, the best known mycotoxin in corn. The fungus can be detected in corn by its fluorescence under black light, but the presence of the fungus does not necessarily indicate the presence of aflatoxins.

Figure 13.49. Diplodia ear rot.

Figure 13.50. Aspergillus ear rot.

Nutrient Deficiency and Toxicity Symptoms

While the symptoms of nutrient deficiency and toxicity are generally definitive for the particular nutrient, the presence of symptoms does not always indicate a lack of the nutrient in the soil. In some cases, it is a lack of the ability of the plant to absorb the nutrient rather than a lack of the nutrient.

Nitrogen deficiency: Nitrogen deficiency symptoms may appear at any time during the growing season, but they are more likely to occur during grain fill. Early season nitrogen deficiency appears as an overall yellowing of the plant (figure 13.51). Nitrogen deficiency early in the season may be due to leaching of the available nitrogen to below the rooting zone. In that case, it is possible that the roots will elongate down into the zone where the nitrogen is present and outgrow the problem.

As the season progresses, the deficiency symptoms will appear as a "firing" that starts at the leaf tip and proceeds down the midrib of the lower leaves (figure 13.52).

Figure 13.51. Nitrogen deficiency on small plants.

Figure 13.52. Nitrogen deficiency — midseason.

Phosphorus deficiency: Phosphorus deficiency occurs early in the growing season, often during the seedling stage of growth. It is characterized by slow growth, and the plants are very dark green with reddish-purple tips and leaf margins (figure 13.53). Deficiency symptoms may be due to a shortage of phosphorus in the soil, but they are more commonly caused by other factors that limit root growth or function. Phosphorus deficiency caused by root growth problems early in the season will often correct itself once conditions improve and root growth resumes.

Potassium deficiency: Since potassium is mobile in plants, the deficiency appears first in the older (lower) leaves. Symptoms appear first as firing (necrosis) of the leaf tip which then proceeds along the leaf margin (figure 13.54). While deficiencies of nitrogen and potassium both

Figure 13.53. Phosphorus deficiency.

Figure 13.54. Potassium deficiency.