

thousands of spores may be produced per square centimeter of infected tissue. Even small specialized sporophores can produce millions of spores, and the number of spores produced per diseased plant is often in the billions or trillions (Fig. 2-14). The number of spores produced in an acre of heavily infected plants, therefore, is generally astronomical, and enough spores are released to land on every conceivable surface in the field and the surrounding areas, enough to easily inoculate with a heavy inoculum every plant in the area.

Bacteria reproduce rapidly within infected tissues (Fig. 2-13F). Under optimum nutritional and environmental conditions (in culture), bacteria divide (double their numbers) every 20 to 30 minutes, and, presumably, bacteria multiply just as fast in a susceptible plant as long as nutrients and space are available and the temperature is favorable. Millions of bacteria may be present in a single drop of infected plant sap so the number of bacteria per plant must be astronomical. Fastidious bacteria and mollicutes appear to reproduce more slowly than typical bacteria; although they spread systemically throughout the vascular system of the plant, they are present in relatively few xylem or phloem vessels, and the total number of these pathogens in infected plants is relatively small. This also seems to be true for protozoa.

Viruses and viroids reproduce within living host cells, with the first new virus particles being detectable several hours after infection. Soon after that, however, virus particles accumulate within the infected living cell until as many as 100,000 to 10,000,000 particles may be present in a single cell. Viruses and viroids infect and multiply in most or all living cells of their hosts, and it is apparent that each plant may contain innumerable individuals of these pathogens.

Nematode females lay about 300 to 500 eggs, about half of which produce females that again lay 300 to 600 eggs each. Depending on the climate, the availability of hosts, and the duration of each life cycle of the particular nematode, a nematode species may have from two to more than a dozen generations per year. If even just half of the females survived and reproduced, each generation time would increase the number of nematodes in the soil by more than a hundred fold. Thus, the buildup of nematode populations within a growing season and in successive seasons is often quite dramatic.