The morphology of spiroplasmas grown in pure culture may vary considerably with age of the culture, pH, osmolarity, decline in nutrients, and other factors. Commonly, the organisms no longer form helical cells; instead, they form round bodies that sometimes develop extruding nonhelical filaments. These morphological types are considered by some as aberrants resulting from suboptimal cultural conditions. M. Garnier, M. Clerc, and J. M. Bove of I.N.R.A. and Université de Bordeaux II, Port de la Maye, France, developed a technique whereby spiroplasmas are transferred from agar into a collodion membrane and examined directly under the electron microscope. This permitted studies of morphology during the normal growth cycle and in response to changes in pH, temperature, or other parameters. The smallest viable cell was a two-turn helix. During the log phase, the organisms increased most often to a four-turn helix, then divided by constriction into a pair of two-turn helices. Abnormal morphological forms appeared with decreased pH. No division occurred at 37 C, and the helices were therefore longer. (J. Bacteriol. 147:642-652)

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Turgor pressure is essential both for growth of root tips into soil and for expansion of the shoot. Even slight reductions in turgor are quickly translated into reduced expansion of the shoot and root apices. Many leaf diseases are well known to prevent root as well as shoot growth. P. G. Ayres of the University of Lancaster, England, has shown that powdery mildew (*Erysiphe pisi*) on leaves of peas leads to slower growth, shriveling, and even death of the lateral roots in dry soil. The disease interferes with the supply of photosynthates needed for normal osmoregulation and, hence, maintenance of adequate turgor pressure. Roots are therefore less able to extend through the drying soil; resistance to root penetration is usually highest in dry soil. (Physiol. Plant Pathol. 19:169-180)

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Osmoconditioning of seeds is a process whereby seeds are allowed to soak for several days in a solution of polyethylene glycol (or other osmotic solution) before sowing. The solution water potential is too "dry" to permit germination, but certain aspects of the process apparently get under way and such seeds subsequently sown in soil germinate faster and more uniformly. This treatment has been particularly effective for flower and vegetable seeds under laboratory and greenhouse conditions, but performance of osmoconditioned seeds in the field is not well established. A. Szafirowska, A. A. Khan, and N. H. Peck of Cornell University treated seeds of two carrot cultivars for 6 days in a solution of PEG 6000 at −8.6 bars; the seeds were then rinsed, dried, and sown in the field. The two cultivars yielded 32 and 93% more fresh weight, respectively, and the number of roots was increased by 37 and 100%, respectively. (Agron. J. 71:845-848)

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In orchards, the soil is managed by any of several methods, including clean cultivation, leaving the grass cover undisturbed, or leaving the soil undisturbed but killing the grass with an herbicide. R. J. Haynes of Lincoln College, Canterbury, New Zealand, studied the effects of these contrasting management techniques imposed for 3 yr on an apple orchard that was 11 yr old when the experiment started. After 3 yr, soil from the grass areas was well structured and had a higher density of earthworms than cultivated soil. Water retention and water-stable aggregation were decreased in cultivated soil, but total porosity and macroporosity and, consequently, water infiltration were increased. Cultivation was disastrous to root growth in the top 20 cm of soil. Herbicide treatment resulted in the most roots near the soil surface but increased compaction of surface soil and decreased water infiltration and retention properties. (Soil Till. Res. 1:269-280)

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The water potential of a plant—determined by soil water supply, atmospheric evaporative demand, and the plant control mechanism—affects virtually all physiological and metabolic processes, including susceptibility to disease. Working with alfalfa, S. B. Idso, R. J. Reginato, D. C. Reicosky, and J. L. Hatfield of the U.S. Water Conservation Laboratory in Phoenix have shown that plant surface temperature measurements by infrared thermometry can be used to rapidly assess large areas of cropped land for depressions in plant water potential arising from soil water shortages. The differential between foliage-air temperature and air vapor pressure deficit for well-watered alfalfa was determined at several locations in the United States. Detailed measurements on degrees of stressed alfalfa together with total plant water potentials were made at two sites, and a plant water stress index related to plant water potential was constructed from the temperature and vapor pressure data. A procedure was developed to remove various atmospheric effects. The remaining soil-induced plant water potential depressions were found to be described by a single function dependent on the plant water stress determined from foliage and air temperature and air relative humidity. Under high atmospheric-evaporative demand, the index detected plant water potential changes of 1 bar or less. The method gives rapid and accurate estimates without destructive sampling of plants. (Agron. J. 73:826-830)

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In 1879, W. J. Beal, then professor of botany and forestry at the Michigan Agricultural College in East Lansing, began a seed viability experiment. Fifty seeds from each of 23 different kinds of common plants were mixed thoroughly in moderately moist sand taken from 3 ft (1 m) below the surface of land that had never been plowed. The sets of seeds in sand were placed in pint (500-ml) bottles that were buried uncorked at a 30° angle with the mouth slanting downward in an east-west row on a sandy knoll. Germination tests were performed by Beal and others every 5 yr until 1940 and every 10 yr since then. A. Kivilaan and R. S. Bandurski of Michigan State University recovered the 14th bottle in 1980, 100 yr after burial. Under carefully controlled growing conditions, 21 seeds of *Verbascum blattaria,* one of *V. thapsus,* and one of *Malva rotundifolia* produced normal plants. Of the remaining seeds, six germinated but died before identification was possible, two did not produce roots, and two were albinos. (Am. J. Bot. 68:1290-1292)

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