water capacity seeds of species of *Centaurea, Galium, Sinapis,* and *Stellaria* germinate quite well. Studies of germination at various depths led to the recognition of three classes: (1) species that germinate well on the soil surface or at a shallow seeding depth, but not when covered more deeply than 2 cm (e.g. *Stellaria media*), (2) species that germinate better at a shallow seeding depth, but do germinate when covered more deeply than 2 cm (e.g. *Cirsium arvense*), and (3) species that germinate on the surface, at a shallow depth, and when covered more deeply than 2 cm (e.g. *Agrostemma Githago*).

A soil seed-population study of *Sinapis arvensis* by von Hofsten revealed an average of 267 living seeds for each 16.8 liters of soil (0–30 cm in depth), or 4,445 seeds/m^2 at that depth for 9 different samples, the largest number of seeds occurring in the depth range of 15–25 cm.

A remarkable example of the "equipment of plants in the struggle for space" is provided in the observations of Osvald on the poor germination and development of rape (*Brassica napus* and *B. rapa*) in patches of quack grass (*Agropyron repens*). Toxic root exudates were suspected. He cites the early work of Whitney (1904), and Livingston (1905, 1907), of the USDA, on the presence of toxins in unproductive soils and also notes that, with the discovery of the effects of penicillin, streptomycin, and phytohormones, the toxin theory has attracted revived interest. The substance extracted from finely ground dried stolons and roots is soluble in water and in alcohol. Tests indicate an acid, and the effects on germination resemble those of the growth substances. More than twice as high a concentration of the extract is required for the total inhibition of oat seeds (50%) than that of rape (20%). At moderate to high concentrations of the extract, mold fungi, *Mucor, Penicillium,* and others, were favored, but at still higher concentrations mold growth is retarded. Mold fungi grow at much higher concentrations than do oats. Seeds prevented from germinating by the toxin often succumbed to the molds. Osvald advances an hypothesis with far-reaching applications: Resistance of certain species to hormone derivatives may be due to the fact that "they . . . produce similar substances (or substances with similar effect) in fairly large quantities, and . . . are accustomed to these. Susceptible plants . . . probably produce growth substances in small quantities (or other types of growth substances)." By this hypothesis he notes that many phenomena of plant growth and grouping of natural vegetation may be explained, as "the ability of many grasses to supersede clover, the detrimental effect of grasses on fruit trees, and the inability of many wild species in open vegetation (for instance, in mountains and along shores) to compete with grasses, even if these do not form a close stand."

Three papers by Åberg, Schwanbom, and Wiklander are concerned with the effects of sodium chlorate on perennial weeds and on weed seeds in the soil. Osvald, von Hofsten, and Persson have an extensive study on preplanting soil treatments with calcium cyanamide in grain crops. Von Hofsten writes on control methods involving stubble cultivation and surface accumulation of weed seeds, on control of field thistle, and the use of herbicides on annual weeds. Åberg has a survey of weed-control work in the United States. Osvald, Denward, and Åberg have three articles on hormone derivatives in weed control. The editor, Hugo Osvald, closes the volume with a survey of present and future weed-control methods. Included here is an excellent tabulation (with a unique rating system) of the susceptibility of Swedish cultivated plants (64 spp.), weeds (90 spp.), and ligneous plants (20 spp.) to applications of sodium chlorate, calcium cyanamide, copper sulfate, sulfuric acid, dinitro-orthocresol, and hormone derivatives.

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The essentials of plant biology. Frank D. Kern. New York-London: Harper, 1947. Pp. vii + 440. (Illustrated.) $4.00.

This new textbook is designed for a one-semester course in elementary botany. The book employs a functional approach, yet presents basic botanical concepts in a progressive sequence which enables beginning students to obtain readily a clear understanding of the unity of plant life. The text comprises two major parts: the manifestation of life, stressing individual maintenance, and the perpetuation of life, covering various aspects of racial preservation. The overview of the plant kingdom is presented as a 50-page supplement on the great groups of plants. Attention throughout is centered upon plant activities and interpretation of life phenomena. The broad concepts of plant life bearing on human culture are expertly merged with the role of plants in contemporary affairs.

The book is profusely illustrated with 260 figures, most of which are new and especially well adapted to the full development of textual concepts. Several excellent full-page color plates contribute substantially to clarity of detail. The cuts are of uniformly high quality both in choice of material and excellence of reproduction. The format and headings are material aids to the organization of subject matter, and the author's style of presentation provides unusual clarity and interest for student readers. The author has achieved readability without sacrifice of scientific accuracy by minimizing the use of technical terminology and introducing it with care. Student interest has been attained by good organization, choice of interesting content, good illustrations, and diversity of references to practical applications of principles. The book is quite different from most of its kind, and for a one-semester text it gives the reader an exceptionally thorough grasp of plant science and its importance in modern life. The 16-page index is very complete and greatly facilitates reference use of the text.

The author has drawn ingeniously upon his rich first-hand acquaintance with the world flora and his long experience in presentation of the various disciplines of plant science. The excellence of content and style of the book will appeal to students and instructors.

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