

ever richly he may be endowed with research assistants. But some of it is due to a mistaken striving after clarity, in face of possibilities so varying that he is tempted to exclude most of them, and to choose just those which fit in best with his general plan. He is at his worst when he is discussing his second alternative—State-ownership; further, he makes all sorts of unwarrantable assumptions about the way in which industries would have to be nationalized, and the forms which compensation (or the absence of it) would necessarily take. His discussion of private enterprise is much better, because there he is dealing with something that exists, and has to begin by taking it as it is, and not by constructing an unrealistic model and then treating it as if it were the only possible variant. If this review is less favourable than the book deserves, it is because this state of unrealistic formalism in its author has annoyed me, and caused me to do less than justice to the particular things he has done well.

G. D. H. COLE.

## WEED CONTROL

### Weed Control

A Textbook and Manual. By Prof. Wilfred W. Robbins, Prof. Alden S. Crafts and Richard N. Raynor. (McGraw-Hill Publications in the Agricultural Sciences.) Pp. xi+543. (New York and London: McGraw-Hill Book Co., Inc., 1942.) 35s.

THE problem of weeds and their control or eradication is one which increases in importance with modern advances in agricultural practice. On land giving low returns, due to poor quality of the soil, poor cultivation or other factors, it may be uneconomic to adopt any intensive methods of weed control. On well-cultivated land, in good heart, and bearing heavy crops, it is justifiable and often profitable to expend considerable time and money in combating weeds in order to bring the reduction of crop due to competition to the lowest possible level. Much experimental work has been done and much written on the subject, and Messrs. Robbins, Crafts and Raynor have rendered a great service by gathering into one volume a comprehensive survey of this field of activity.

The rapidity with which weeds spread from one area to another emphasizes the need for a primary method of control, involving rigid inspection of imported seeds and prompt dealing with initial infestations of bad weeds. The worst pests in many countries, such as blackberry, Russian thistle, creeping thistle and morning glory owe their unenviable position to neglect of this elementary precaution. Furthermore, changes in methods of cultivation may cause native species to behave as weeds.

The harm caused by weeds is due not only to their demands upon the limited amounts of food and water available in the soil, the water requirements of bad weeds often being greater than that of the crops. Heavy expenses and monetary loss also are involved in control and eradication, in seed cleaning, clearing ditches and in the reduction of the market value of crops. The quality of milk, grain, hair and wool is often reduced, and certain weeds also act as alternative hosts for various crop pests.

Control and eradication need to be distinguished,

as the latter is seldom economically possible, except in such cases as dodder. The life-history of weeds is closely related to effective methods of control, and for large-scale work very special methods have been evolved, as flooding by water, heat treatment by flame throwers and steam boxes, and paper mulch in areas of very rapid growth. There is, however, no universal panacea for killing weeds, and, to quote the authors, "general recommendations must be interpreted in the light of the specific situation, amended to meet the requirements imposed and tempered with judgment based on local experience".

On arable land the time-honoured method of weed control by careful cultivation is still often the most economical procedure, but great strides have recently been made with chemical agents. These may act in various ways: as herbicides killing by contact with the leaves or by being translocated through the plant tissues, or as soil sterilizers preventing the growth of plants over varying periods of time. Some chemicals, as sodium arsenite, are non-selective and kill all vegetation by contact; others are selective, killing weeds but sparing crops of certain types, as occurs with charlock among cereals. This group of weed killers includes highly soluble fertilizers and toxic compounds which are reduced in toxicity by contact with soil.

Translocated sprays, the physiological action of which is discussed, pass downwards through the tissues, killing as they go. Arsenical sprays and sodium chlorate fall into this group. The same weed killer can be used in various ways, according to the rate of application and the environmental and soil conditions.

Detailed accounts are given of the more important weed killers with full reference to the work of many investigators, a bibliography being appended to each chapter. For convenience of reference these authors are gathered into a general index, though this does not appear to be complete, as such an important investigator as Korsmo fails to appear therein, although adequate reference is made to his work in the text.

Weed control on special areas as railroads, paths, etc., is effected by soil sterilants, among which sodium arsenite stands almost alone as regards permanence. All others are more or less temporary in nature, the type of soil and environmental conditions affecting their action considerably.

Weed control by chemical means entails of necessity special machinery, much of which is effectively illustrated. Consideration is also given to various special problems, as the weeds on grassland and on uncropped areas, control of dodder, and stump- and tree-killing, the latter sometimes being dealt with by injection of poison. Certain weeds receive special attention; for hoary cress, morning glory, sheep sorrel, Russian thistle, and puncture vine, among others, are so dominant where they occur that they constitute major problems. In the appendix various useful tables and lists are given, including an estimate of the number of seeds produced by various weeds, and examples of native species in various areas which have now usurped the role of weeds.

The authors are to be congratulated on producing a book which will be of great value to all who deal with the land, and which should stimulate experimental research on practical and economic methods of weed control.

WINIFRED E. BRENCHLEY.