

Certain weeds like Silver Weed grow best in a soil that is fairly damp. Others such as Orange Hawkweed are more partial to dry situations. Others again are more or less indifferent. There is still considerable room for inquiry as to the moisture requirements of a good many species of weeds.

In the Prairie Provinces the rainfall after harvest is frequently so slight that the weed seeds cannot be induced to germinate when plowed under. This considerably increases the difficulty of eradicating them.

#### 12. Relation to temperature.

While seeds when buried in the soil can undergo very rigorous temperatures in winter, the young plants produced by them after germination are much more sensitive to frost. As regards the exact temperature, however, at which weeds and their seeds are killed by frost we have very little information at present.

In this connection it might be of some use to have several years' observations in various districts of the average date of occurrence of the first frost in autumn.

#### Susceptibility to chemical sprays.

The effect of various chemical substances such as copper sulphate, iron sulphate, sodium arsenite, etc., on various weeds has furnished useful results in some cases. While the method is not, under ordinary circumstances, one to be adopted as a substitute for the older well-established methods of controlling weeds, still it is as well to know what can be done in this way. The effect on various species of weeds at various stages of their development up to the flower period would be worth trying. Even if it did not kill the weed, if it injured it sufficiently to prevent the formation of seeds it would be something gained. Recently tests were made at Purdue University Agricultural Experiment Station, Indiana, to determine the effect of spraying Wild Garlic with orchard heating oil, and the results, it is claimed were very satisfactory.

The spraying method appears to be specially suited to cereal crops where ordinary methods of cultivation are not applicable.

#### 14. Relation to the live stock of the farm, birds, etc.

Various plants which are usually considered weeds may yet be very useful when growing on a pasture field, for example, Ribgrass. Clark & Fletcher in "Farm Weeds" enumerate quite a number of weeds which are frequently eaten by sheep. Pigs and poultry also eat a considerable number of weeds, and doubtless there are some which are relished by horses and cattle. But it would be poor policy to spare a weed because it is eaten by some of the domestic animals if a more useful plant can be grown in its place. Nevertheless, experiments to determine what wild plants are eaten by live stock by preference rather than by accident would be worth trying and could be easily carried out. There are large areas of marshy, stony or scrubby land which cannot be cultivated and are only adapted for grazing, and the term "weed" is much harder to define in relation to land of this nature. But in such places many plants of poisonous nature must certainly be considered as weeds and should therefore claim attention.

There still remains the question of birds in their relation to weeds. Some fruits, especially those which are juicy when ripe, are dispersed by birds, but these form only a small percentage of weeds. On the other hand it has been proved beyond a doubt that certain birds eat and destroy every season a large number of weed seeds. They are thus indirectly of service to agriculture. A prudent farmer will naturally take every means to prevent weeds from seeding rather than depend on birds to help him out of his difficulties. Nevertheless, in spite of constant vigilance weed seeds will be ripened in varying quantities and the services of birds are not by any means to be dispensed. The important question is—What seeds are eaten by what birds?

Investigations along these lines would pave the way to a better understanding of the life and growth and spread of weeds, and the best methods of eradicating them would suggest themselves as a natural consequence.

Work of this nature might be undertaken by the Experimental Farms, the various agricultural colleges, and the Departments of Agriculture of the several provinces.

#### II. Educational Methods.

Some very useful works on weeds have already appeared in different countries. Foremost among these is Pammel's "Weed Flora of Iowa" published last year with more than 900 pages and 570 illustrations. Other useful bulletins published in the United States are Bollev's "North Dakota Weeds," Blatchley's "Indiana Weed Book" and Beal's "Weeds of Michigan." In England, the best-known is Long's "Common Weeds of the Farm and Garden," and more recently Praeger's "Weeds, Simple Lessons for Children," while in Canada we have Clark & Fletcher's "Farm Weeds of Canada," and Howitt's "Weeds of Ontario." An educational campaign on weeds accompanied

by the dissemination of suitable literature would doubtless be productive of good results.

A small handbook on weeds for teachers (along somewhat similar lines to that of Praeger in Ireland) in which only general principles, the methods of spreading, types of fruits, classification, etc., of weeds are dealt with would fill a useful place.

A short bulletin on methods of eradicating weeds specially intended for farmers would probably be largely availed of. Specimens of weeds and queries as to their names, method of propagation and mode of destroying them are constantly being received at the Central Experimental Farm from all parts of the Dominion, showing that farmers are on the alert and take a widespread interest in the problems confronting them.



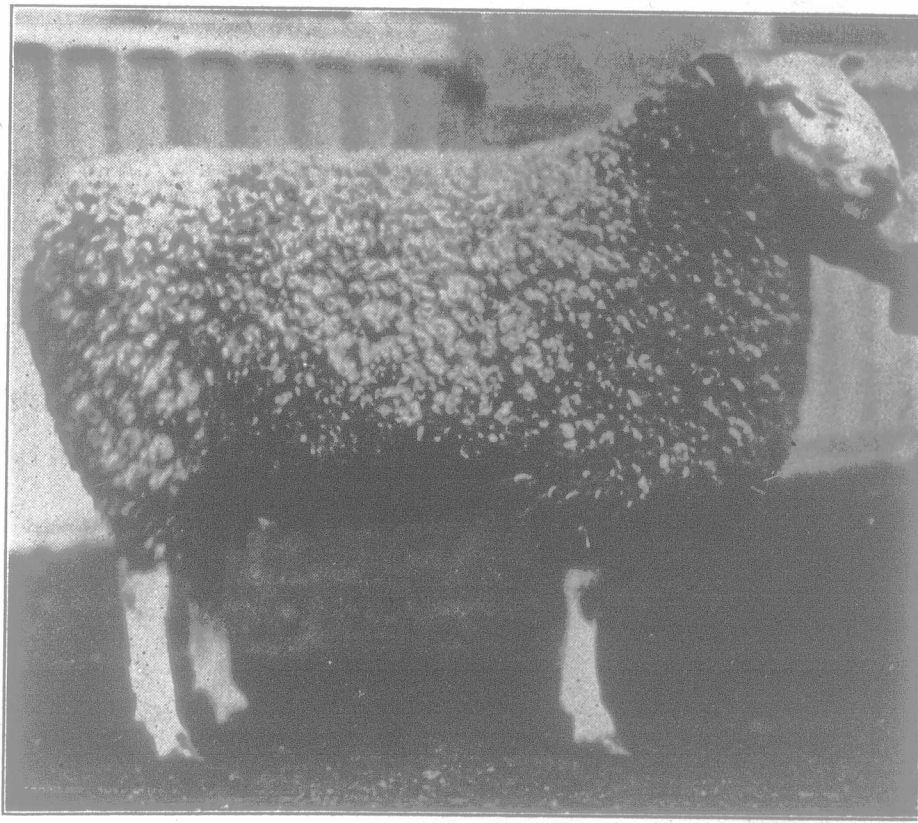
Southdown Ram.

Champion at Toronto and London. Exhibited by R. McEwen, Byron, Ont.

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Howitt's "Weeds of Ontario" might well serve as a model for the other provinces to copy. Each has some particular species of weeds that are rare in or absent from the other provinces, and the publication of a bulletin of moderate size dealing with the Weed Flora might well be undertaken by the provincial governments concerned.

Then something might be done in the schools to familiarize children in rural districts with the



Jas. Snell & Sons' Champion Leicester.

correct names, habits, etc., of about 50 of the most troublesome weeds of their own province. Such knowledge would be extremely useful to them in after years. They might even be induced to make a collection of the weeds of their district, prizes being offered to those who make the largest and best-named collection.

Dried and carefully mounted specimens of weeds and poisonous plants might with advantage be exhibited at the various provincial and local shows. If at the same time a brief explanation of the most important feature of the weeds concerned were given by the officer in charge and suitable literature distributed, there is every reason to believe that farmers would

readily avail themselves of all the information obtainable. In cases where a special touring railroad car is employed for demonstration a small section might well be devoted to mounted weeds.

In addition a plot of ground might be set apart at each of the branch farms on which about 100 of the commonest weeds and poisonous plants of the province concerned could be grown and properly labelled. Visitors to the farms could thus familiarize themselves with the names and general appearance of the plants. An acre of ground or less should be quite ample for the purpose, and the person in charge of the plot would require to see that creeping specimens were kept within bounds, and that none of the weeds were allowed to develop seeds.

#### III. Legislative Action.

The keeping of weeds under control is a matter that calls for constant vigilance on the part of the farmer. Even if he is content simply to hold his own in the battle against weeds there are two things which he must do—he must prevent the weeds on his farm from seeding, and he must at all costs prevent the introduction of weed seeds from outside sources. In the latter case legislation has been of undoubted benefit to the farmer already, and may be even more beneficial in the future. There are at least four ways in which a farm may become contaminated by weed seeds from outside sources: 1, impurities in the seeds sown; 2, weed seeds in feeding stuffs; 3, threshing machines; 4, wind-borne seeds from waste ground or neighboring farms.

1. The stringent application of the Seed Control Act has undoubtedly made the weed question much easier for farmers to deal with. But even under its operation a certain percentage of weed seeds are still sown with every crop. The improvements in seed-cleaning machinery have done much to separate a large number of weed impurities, but in every species of farm seeds there will often occur a few weed seeds about the same size and diameter as the seeds of the crop to be sown which no device yet invented will remove. It would not be difficult to make a list of these. The next step in securing clean seed would be to make a rigorous inspection of the growing crop, and carefully remove all these species by hand-pulling or other means. In this way the ideal might be reached, namely, where a sample of seed consists only of the species mentioned on the label and no others. As Dr. Pammel says: "The only way to enforce any seed law is to have fields in which commercial seed is grown inspected by some competent botanist. The seed should not be sold unless the weed seeds can be removed."

Two questions arise in this connection, namely, "Is the establishment of an 'Extra No. 1' grade for all kinds of seed sown desirable?" and should the definition of this grade be taken as "a sample of seed which consists of one species only, and is absolutely free from all weed impurities?" This idea should be possible of attainment in the case of cereals, and has already been attained in samples of alfalfa and timothy tested at Guelph. The second question is, Should seed inspectors be empowered to visit the crops intended for seed, and if these are not considered sufficiently free from weeds should the grower be allowed to sell the crop for seed purposes? For example, if Purple

Cockle is found growing in a wheat field should the produce of that field be allowed to be sold for seed? Even if the standing crop were not inspected, it would probably pay the grower to produce a perfectly clean sample and charge a higher price for it.

2. It appears from an article by Prof. Howitt that owing to the evasion of the law weed seeds are being spread in the form of feeding stuffs. Probably further legislation will be required to make this matter right. There is a temptation to use the cleanings of threshing machines as feed, provided that grinding was thoroughly done there would be little objection to the practice. But the smaller seeds are liable to escape being