

which taint milk. The horny or barbed seeds of some grasses as Porecupine Grass and Skunk-tail Grass in the Northwest, cause irritation or painful wounds by penetrating the flesh, particularly the mouth parts.

7. Weeds attract injurious insects and harbour fungus diseases.



Sweet Grass

Weedy stubbles or summer-fallows are breeding grounds for cut-worms, and the rust of small grains may pass the winter on several kinds of grasses.

HOW WEEDS SPREAD.

In the present age of easy communication with all parts of the country, and indeed with the whole world, there are frequent opportunities for the introduction of weed seeds into previously uninfested districts.

1. By natural agencies. The wind carries seeds long distances, not only in summer, but with drifting soil and over the surface of the snow in winter. Streams distribute them along their courses. They are also distributed by seed-eating birds and herbivorous animals, through the stomachs of which the seeds pass undigested; or they attach themselves by special contrivances, such as hooked and barbed hairs, spines, gummy excretions, etc., to passing animals.

2. By human agencies. New weeds are introduced on farms with grass, clover or other commercial seeds, and commercial feeding stuffs usually contain some vital weed seeds. They are spread from district to district through various transportation facilities, such as railways, and become disseminated within a locality in stable manure from towns and cities, and through threshing machines and farm implements. The illustrations of weed seeds on the last five plates of this volume will aid in the identification of impurities

common in commercial seeds and feeding stuffs.

WEED SEEDS IN THE SOIL.

The ability of the seeds of many species of plants to retain their vitality when embedded in the soil for a period of years is one of the principal factors which brings them within the category of noxious weeds.

It is commonly asserted by farmers that seeds of several species of the Mustard and other families will retain their vitality for an indefinite period. The apparent absence of mustard in old pastures, roadways or lands left waste during many years and the re-appearance of the plant when the land is brought under cultivation, forms the usual evidence to bear out such assertions. An examination of permanent pasture or waste lands that are known to have been polluted with mustard will, however, show occasional inconspicuous plants that give promise of ripening a few seeds.

Duval, of Washington, D C., in December, 1902, buried 112 different kinds of seeds in clay soil in earthen pots, to depths of six, eighteen and thirty-six inches, and compared their vitality with control samples kept in proper storage. When dug up in November 1903, practically all the seeds of cultivated plants were decayed, many of them having first germinated, even at a depth of thirty-six inches. The buried weed seeds showed a decided loss of vitality when compared with the control samples that were kept in storage. The latter germinated fifty-three per cent. on the average; those buried to a depth of six inches germinated twenty per cent.; eighteen inches, twenty-six per cent.; and thirty-six inches, thirty-one per cent.

Ewart, of the University of Melbourne, Australia, made exhaustive vitality tests of six hundred different species of seeds taken from a collection that had been compiled and stored in a dry, airy and dark cupboard by Prof. McCoy in 1856, and a large number of specimens of seeds, of varying ages, from the national herbarium and other reliable sources. In his deductions from the results of over 3,000 tests, Ewart gives a list of those relatively few species that may be expected under favorable conditions, to retain their vitality beyond fifteen years, nearly all of which species are included in the following botanical families: Leguminosae, Malvaceae, Myrtaceae, Nymphaeaceae, Labiatae and Iridae. Forty-eight specimens of seeds of the genus *Brassica* (the Mustard family) were tested. The fresh seeds gave a germination as high as eighty-six per cent. and one lot twelve years old gave a germination of thirty per cent. None of the *Brassica* samples

fifteen years old or more germinated, although six of them were less than twenty years old.

CONTROL AND EXTERMINATION OF WEEDS.

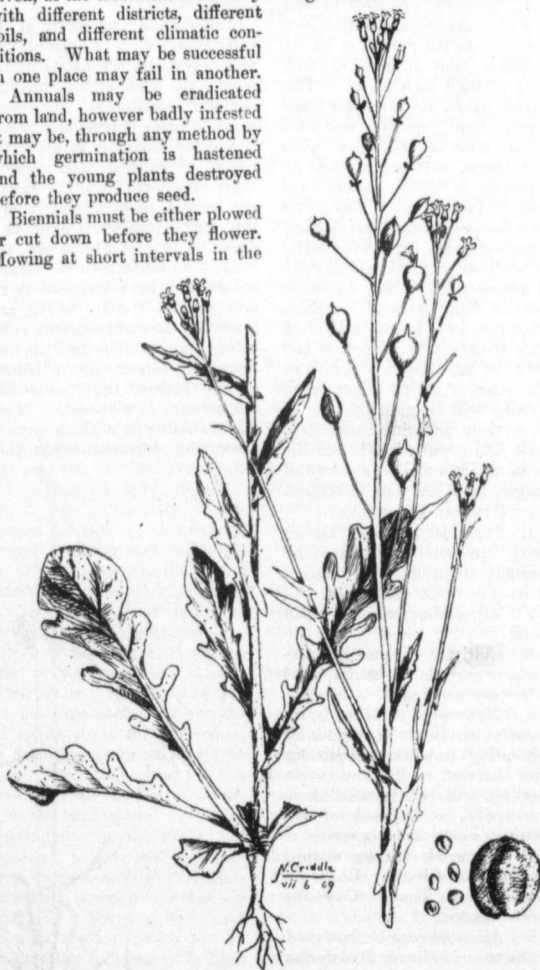
In adopting a method of extermination, the nature of the plant and its habits of growth must first of all be considered. Some experience is necessary to know the best time to work certain soils or to deal with special weeds, as well as to recognize them in all their stages. Some weeds, Russian Thistle and Stinkweed, for instance, have a very different appearance when young and when mature. No general rule can be given, as the treatment must vary with different districts, different soils, and different climatic conditions. What may be successful in one place may fail in another.

Annuals may be eradicated from land, however badly infested it may be, through any method by which germination is hastened and the young plants destroyed before they produce seed.

Biennials must be either plowed or cut down before they flower. Mowing at short intervals in the

instances the cultivation of special crops, to insure their eradication. Imperfect treatment, such as a single plowing, often does more harm than good, by breaking up the rootstocks and stimulating growth.

For shallow-rooted perennials, infested land should be plowed so lightly that the roots are exposed to the sun to dry up. For deep-rooted perennials, on the other hand, plowing should be as deep as conveniently possible. The nature of the land must determine the depth of plowing. In light or gravelly soils shallow plowing may be preferable as deep plowing might interfere with the mechan-



CAMELINA DENTATA.—The plant is natural size. Large seed magnified 8 times; small seeds twice natural size.

second year, so as to prevent the development of new seeds, will clear the land of this class of plants; but a single mowing will only induce them to send out later branches, which, if not cut, will mature many seeds. Where plowing is impracticable such plants should be cut below the crown of the root.

Perennials are by far the most troublesome of all weeds and require thorough treatment, in some

ical texture of the soil, which is so important in the storing of moisture.

The rootstocks of some perennial weeds are very persistent. Small sections or cuttings from them will quickly take root when they are distributed by plowing or cultivation. Where such persistent perennials have become well established, it is usually advisable to adopt the most convenient method of cultivation that