

As a food for cows there are other feeds more conducive to milk production than frozen wheat. It contains a rather smaller percentage of digestible nutrients than timothy, or oats cut green for the same purpose. If fed to dairy cows the addition of something fairly strong in protein should be added to the ration, to get the best results. Bran would be good to feed along with wheat hay.

#### Wild Mustard.

Perhaps the commonest weed met with in this country is the wild mustard, (*Brassica Sinapistrum*), a weed that in some districts seems to have established itself so strongly as to baffle all attempts at eradication. It is a plant that seems specially adapted to flourish in our soils and in some ways is peculiarly fitted for perpetuating itself and resisting destruction. It came to this continent originally from Europe. It was brought here from Ontario where it ranks among the worst weeds, first being found in these provinces around railway stations and places where settlers' effects were unloaded. It is altogether too familiar to everybody to require any description here. Every farmer in the West knows it to his sorrow. What he wants to know is how to get rid of it, not prosy rehearsals of its botanical peculiarities.

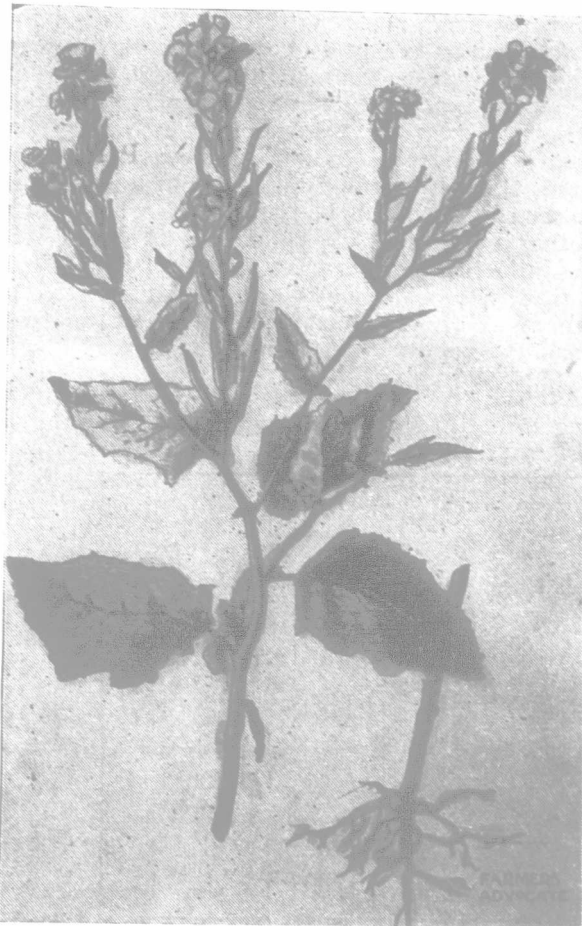
Mustard belongs to that class of annual plants the seeds of which will live in the soil for a number of years. Wild oats and French weed are in the same class with it. The North Dakota Experiment Station some years ago conducted an experiment to determine the length of time weed seeds would retain their vitality in the soil. Wild oats germinated after being buried twenty months, but were dead after fifty six. Some of the mustard and French weed seeds grew after being in the soil five years. These facts, however, need not be discouraging, for a season of careful cultivation will bring most weed seeds into condition which will cause their germination. After that the few remaining can be removed cheaply by pulling or subsequent cultivation.

It cannot be denied though that mustard is among the most difficult weeds to eradicate. It is difficult enough to deal with where the area infested covers only a few acres, it becomes much more than proportionately difficult to destroy when the infested area amounts to several hundred acres and the labor available for fighting the weed is the same or less. In England and in Ontario, spraying with a weak solution of copper sulphate has been found efficacious in destroying the growing plants, but the next plowing of the soil turned up new seeds and next season the weed seemed flourishing in the crop as luxuriantly as before. This system of eradication followed consistently year by year will ultimately rid a field of the pest, but for some reason in Ontario the spraying method has not come into use. In England it is more generally followed. Out here we only know of it being tried in a few cases, but where tried it was a success. The areas to be treated here, however, seem altogether too large to make spraying practical.

Summer fallowing is about the only way we have of checking mustard. The land should be plowed shallow in the fall, as soon after the crop is harvested as possible. Stir it up with a harrow once or twice in the spring to induce all the seed in the upper three or four inches to grow. About July turn the soil over again plowing to the usual depth. Cultivate the fallow right into the fall destroying the weeds as much as possible by surface cultivation. This won't rid a field entirely of mustard as there is always some seeds left to germinate the following spring, but if it is carefully done such plants as grow can be removed by pulling. If this is followed for a year or two the upper, cultivated soil strata will be freed from the pest. Hand pulling is a laborious method of eradicating weeds to be sure, but it is impossible to germinate all the seeds no matter how thoroughly our summer fallowing has been done, and when one goes to the expense of fallowing a field for a season he cannot afford to allow such few weeds as do persist in growing the following season to reseed his field and render the previous labor useless.

Mustard seed has a good many ways of distributing itself, it may be carried from place to place by birds, animals and by machinery. The last two are the most common methods of infection, and also the most easily controlled by the farmer. Quite a percentage of mustard seed will pass through the digestive tract of

some farm animals without injury to its germination. Wild oats is another weed that is easily distributed in this way. It pays to grind feed grain to ensure of no weed seeds being distributed by this means. Threshing machines, too, are a common means of conveying weed seeds from one farm to another. Farmers should insist that threshing machines be thoroughly cleaned before moving from a weedy farm onto theirs. Too seldom is this precaution taken. Machines are moved directly from one farm to



WILD MUSTARD.  
(*Brassica Sinapistrum*.)

another with scarcely any thought being given of cleaning them out. Caution also should be observed in importing new varieties of grain. Practically every troublesome weed at present flourishing in this country is an imported species, and we cannot exercise too much care in guarding against infection from this source. Had this precaution been taken in the first place, we would now have few really pernicious varieties of weeds to contend with. If it is carefully observed now, and all seed grain well cleaned before sowing, a long step would be taken in controlling such species as are at present troublesome, while a good many kinds that have not yet got a foothold would be effectually prevented from establishing themselves.

#### How Potato Bugs Spread.

A few days ago mature potato beetles could be seen hurrying in every direction as if pursued by an implacable enemy or haunted by a horrible dream. In every case there seemed to be a definite object in view though no one has ever been able to tell just what it was. Eventually these beetles, if not caught by birds or crushed by large animals, found a secluded place and delved into the earth for their long sleep.

The spread of these beetles from their original home in Colorado is interestingly told by F. H. Chittenden, entomologist in charge of the United States breeding experiments, which we repeat below:

It has always been believed—and, the writer maintains, with reason, until the contrary can be proved beyond doubt—that the Colorado potato beetle, having become dispersed from Colorado as a starting point, originated as a species in that region. Dr. W. L. Tower, however, in a publication issued in 1906, has assumed that this insect had the same origin as its principle wild food plant, *Solanum rostratum*, which he states is essentially tropical, and that the insect has followed the distribution of the plant from Mexico into Texas, New Mexico, and parts of Arizona. He also gives reasons for the belief that *Leptinotarsa decemlineata* has developed from *L. "intermedia" Tower*, after changing its habitat, the latter occurring in both Mexico and Texas, and the former not being found in Mexico at all, according to his experience.

The eastward dispersal of this potato beetle from what is generally considered its original home in the West is of peculiar interest. The beetle appear to have been first associated with injury to potato in 1865. Forty-five years prior to that time it had been recognized as feeding on the sand bur, or beaked nightshade (*Solanum rostratum* Dunal.), a related solanaceous plant peculiar to the Rocky Mountain region. The beetle was described in 1824 by Thomas Say. With the advance of civilization westward and the cultivation of potato in the vicinity of its native home, the insect acquired the habit of feeding upon this more succulent plant, and about 1859 it had spread to the east as far as Nebraska. Two years afterwards it reached Kansas, and later Iowa, which it traversed in three or four years; so that by 1864 or 1865 it had crossed the Mississippi River and invaded the western borders of Illinois. In its spread through Illinois it was described by Walsh as marching through that State "in many separate columns, just as Sherman marched to the sea; the southern columns of the grand army lagged far behind the northern columns." By 1860 it had found its way to Ohio, appearing almost simultaneously in the northern and western portions. During all this time, beginning with the year 1861, the insect had done considerable injury, and by 1870 it had become exceedingly destructive in the North and Middle West, and was continuing its eastward march at an increasing rate. It had now reached the Province of Ontario. By 1872 its depredations in the West had noticeably abated, owing to the effectiveness of natural enemies and to the increasing use of Paris Green. Its progress eastward, however, continued, the northern columns becoming established in Pennsylvania and New York, the southern ones reaching Kentucky. The next year it made its first appearance in the District of Columbia and West Virginia, and in 1874 it had reached the Atlantic seaboard and was reported from Connecticut to Maryland and Virginia.

By the centennial year (1876) the Colorado potato beetle had spread over an area composing more than a third of the United States, so that it occupied at that time more or less completely the States of Colorado, Nebraska, Kansas, Minnesota, Iowa, Missouri, Wisconsin, Illinois, Michigan, Indiana, Ohio, Kentucky, the New England States, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and West Virginia, and the District of Columbia, in none of which was it native except in the State first mentioned. At that time it occupied also portions of Wyoming and southern Dakota—where it was perhaps also native—and a considerable part of the more arable portions of eastern Canada.

The farther spread of this insect, particularly southward, is of less interest and has, in many instances at least, been dependent more or less on the increased cultivation of the potato. The following additional statements as to the insect's progress are taken from data collated mainly from the records of this office, some of which are published more in detail by Tower. In 1877 the beetle appeared in North Carolina and Tennessee. The following year it was reported to be completely overrunning portions of Canada, being found eastward in New Brunswick. In 1879 it was recorded from Manitoba. In 1880 its presence was observed in Texas. Since about 1882 complaints of injuries have been made in Nova Scotia; in 1885, at Savannah, Ga.; in 1888, at Jackson, Miss.; and in Smith County, Tex. In 1892 the species had become abundant in Alabama, and was noticed also in South Carolina. The following year its occurrence was observed by H. G. Hubbard at Fort Assiniboine, Mont., which is evidently the most northern limit of its original habitat, as it was not found there on potato. In succeeding years other localities were added in some of the States which have been mentioned, but little of positive interest adding to its known distribution has been learned since 1893. It should be stated, however, that the species has been found at Jacksonville, Fla.; in southern Louisiana, and at San Antonio, Tex. but these extreme localities do not indicate permanent location.

It has been calculated that it increased its range from its original home to the Atlantic coast at an average annual rate of about eighty-eight miles. Its spread eastward was accomplished largely by flight, as the writer had occasion to