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United States Department of Agriculture,

DIVISION OF BOTANY.

THREE NEW WEEDS OF THE MUSTARD FAMILY.

Three plants belonging to the mustard family have been reported from several new localities in the northern United States and Canada during the past four years. In some of these places they have already become aggressive weeds. Although they are as yet confined to comparatively small areas and have thus far caused little damage in this country, the fact that they are spreading in grain fields, meadows, and cultivated land, and also that they are weeds in the fields of western Europe, are reasons why farmers should be warned to be on the look-out for them. There is little danger of injury from noxious weeds of this class if they can be recognized and destroyed upon their first appearance. These species are not described in any American manuals of plants except in the larger ones issued within the last two years.



FIG. 1.—Gray berteroa: *a*, upper part of plant, one-third natural size; *b*, flower, twice natural size; *c*, seed pods, natural size, one with the valves fallen away, showing the transparent partition; *d*, seed, enlarged 4 diameters.

GRAY BERTEROA.

Berteroa incana (L.) DC.

Gray berteroa is an erect or spreading annual, one to two feet in height, with numerous slender branches, few branchlets, and rather narrow sessile leaves (fig. 1). The leaves of the base, forming a small rosette, are broader toward the apex (spatulate) and three to four inches long, while those of the stem are broadest near the middle (lanceolate) and two inches or less long. The numerous flowers, with white petals cleft at the apex, are produced from June to September in flat clusters at the ends of the branches, and are followed by racemes of seed pods as the branches elongate (fig. 1, *a*). The seed pods are

about a quarter of an inch long and a third as wide, and are borne on slender pedicels a little longer than themselves. The pods are divided into two cells by a transparent membranaceous partition, which usually remains, like an eye-glass in its frame, after the outer walls and seeds fall away (fig. 1, *c*). Each cell usually contains six seeds. A well developed plant bears from 200 to 600 pods, or an average of about 5,000 seeds. The seeds are brown, circular in outline, irregularly flattened from crowding in the cells, narrowly wing-margined, and about one-sixteenth of an inch in diameter (fig. 1, *d*). The plant is pale-green or grayish throughout, and is similar to shepherd's purse in its habit of growth.

DISTRIBUTION IN THE UNITED STATES.

The present distribution of gray berteroa in this country, as well as its increasing disposition to spread, can best be indicated by a list of the localities in which it is known to exist, in the order of its reported appearance:

1876. Philadelphia, Pa.	1894. Springfield, Mass.
1883. Boston, Mass.	Somers, Conn.
1884. Providence, R. I.	East Windsor, Conn.
1893. North Bridgton, Me.	Weehawken, N. J.
1894. East Livermore, Me.	St. Paul, Minn.
Farmington, Me.	1895. New York, N. Y.
Hartford, Me.	1896. Dedham, Mass.
North Berwick, Me.	Plainville, Conn.
York Harbor, Me.	

There are doubtless localities where this plant appeared in 1895 and 1896 that have not yet been reported to this Department.

AVENUES OF INTRODUCTION TO BE GUARDED.

The fact that gray berteroa thrives and spreads in each of the eight States in which it has been introduced indicates that it is adapted to grow throughout the Northern States. At Philadelphia, Boston, and New York it was first found on ballast ground. At Providence, Weehawken, St. Paul, and Dedham it occurred in waste ground about railroad yards or along roadsides, while at most of the other places it appears to have been introduced in clover seed.

The seeds of gray berteroa are so nearly the same size and weight as those of red clover that they can be separated completely only by the best modern cleaning machines. The seed-producing capacity of gray berteroa is many times greater than that of red clover. An average plant of red clover, the product of a single seed, produces in two years about 1,000 seeds. An average plant from a single seed of gray berteroa may, as already stated, produce 5,000 seeds in one year, and if only 10 per cent of these germinate and grow the product during the second year will be 250 times as great as the product of a clover seed in the two years.

REMEDIES.

Where there are few plants, hand pulling is recommended. Where they are abundant they should be mowed as often as the flowers appear. If the plants are found in a meadow they should be pulled or cut by themselves and burned, since curing them with the hay would insure a wide dissemination of the seeds. Clover seed or grass seed should not be saved from fields infested with this weed, and all imported clover seed should be carefully examined before sowing.

HARE'S-EAR MUSTARD.

Conringia orientalis (L.) Andrz.

Hare's-ear mustard is a rather slender branching annual, smooth and grayish throughout (fig. 2). The comparatively large, oval, succulent leaves suggest the popular name. The leaves at the base are broadly spatulate; those of the stem elliptical or oval, clasping at the base, and 2 to 5 inches long. The flowers are of a creamy white, about three-eighths of an inch in diameter, and produced in clusters at the extremities of the branches as in the common mustards. Flowers are produced continuously throughout the season, and are followed by racemes of seed pods on rather stout, spreading pedicels about half an inch long, which become separated at intervals of half an inch to 1 inch as the branches elongate. The seed pods are nearly straight, about 4 inches long, diamond-shaped or nearly square in transverse section, and about one-eighth of an inch in diameter (fig. 2, *b*, *c*). The average number of seeds borne by each pod is about fifty, and an average plant bears from 40 to 100 pods,



FIG. 2.—Hare's-ear mustard: *a*, young plant, one-third natural size; *b*, mature seed pod with valves breaking away at base, natural size; *c*, transverse section, showing seed crowding the septum to one side and nearly filling the cavity, natural size; *d*, seeds, back and side views, natural size; *e*, seed, enlarged 3 diameters.

maturing from the first of July until the plant is killed by frost. The seeds are reddish-brown, oblong, nearly flat on one side and rounded on the other, about a tenth of an inch long by one-sixteenth of an inch wide (fig. 2, *d, e*). They are large and heavy enough to pass with the grains of wheat and oats through the thrashing machine, and in fact they can be completely separated from these grains only by careful manipulation with the best fanning mills or modern cleaning machines. It is practically impossible to separate them completely from flax seed.

PRESENT DISTRIBUTION IN AMERICA.

The following table of localities, given in the chronological order of the introduction of the species so far as known at this Department, will indicate its distribution and also the region where it is most rapidly spreading.

1876. Philadelphia, Pa.	1894. Brookings, S. Dak.
1877. Richibucto, New Brunswick.	1895. Clearwater, Manitoba.
1885. Staten Island, N. Y.	Wawanesa, Manitoba.
1890. Fargo, N. Dak.	1896. Keweenaw County, Mich.
1891. Thomson, Minn.	Minot, N. Dak.
1894. Beulah, Manitoba.	Lisbon, N. Dak.
Indian Head, Assiniboia.	Hillsboro, N. Dak.

HINTS FOR GUARDING DANGEROUS POINTS.

A knowledge of the presence of hare's-ear mustard in the grain fields of Manitoba should be sufficient warning to farmers to use special care in cleaning seed wheat or oats from that region. Flax seed from fields infested with this weed should not be saved for sowing. The plant is likely to be introduced along railroad tracks and around warehouses and elevators where grain from the Northwest is handled, and it may be introduced in hay, although it will grow in meadows only where the sod has been broken.

REMEDIES.

All plants found should be pulled or mowed, and if seed pods are formed they should be burned. If the plants appear in flax or grain crops they should be pulled by hand when the flowers appear. As the plant is rather conspicuous, easily recognized, and easily killed, it should be an easy matter to prevent it from establishing itself in new localities.

USEFUL PROPERTIES.

The peculiar foliage of the plant and its clusters of creamy white flowers entitle it to a place in the flower garden, while the crisp, tender leaves with a mild mustard flavor make very good salad. But if planted for these purposes in the garden none of its seed should be allowed to fall.

BALL MUSTARD.

Neslia paniculata (L.) Desf.

Ball mustard is a rather slender, erect annual, 1 to 3 feet high, with a simple leafy stem up to the few short flower-bearing branches (fig. 3). The stem and leaves are clothed with a short, rough pubescence. The leaves are oblong, 1 to 4 inches long by less than three-fourths of an inch wide, erect, sessile, and with two pointed lobes at the base (sagittate). The full-grown plants have from 2 to 10 flower bearing branches, 2 to 8 inches long. The flowers are bright yellow, about one-eighth of an inch in diameter, and borne in clusters at the ends of the branches like those of most other mustards. They are produced in succession from the last of June until the plants are killed by frost, and are followed, as the branches elongate, by racemes of small, rough, greenish pods, borne on slender spreading pedicels about one-fourth of an inch long. The seed pods are about one-twelfth of an inch in diameter and nearly spherical, hence the name *ball mustard* (fig. 3, *b*). They are normally two-celled, with one small yellow seed in each cell; but frequently only one seed is developed. A single plant produces from 25 to 250 pods, and, as they do not average more than one seed to the pod, the seed-bearing capacity of this species is much smaller than that of most of the common mustards.

WHERE TO LOOK FOR ITS INTRODUCTION.

The seeds remain inclosed in the hard-shelled pods, therefore the entire pods rather than the seeds are to be looked for as impurities in commercial seeds. The pods are of about the same size as seeds of the corn-cockle and almost as heavy. They are likely to appear in poorly cleaned wheat, oats, barley, or flax, and special pains should be taken to clean these seeds when grown in infested regions. Like other migratory weeds, ball mustard may be looked for around grain elevators and along railroads. The fact that, though it has been known in America since 1848, it has during this long period spread over a comparatively small area indicates that it may not prove as troublesome as many other species of the mustard family. The slowness of its progress is accounted for by the comparatively small num-

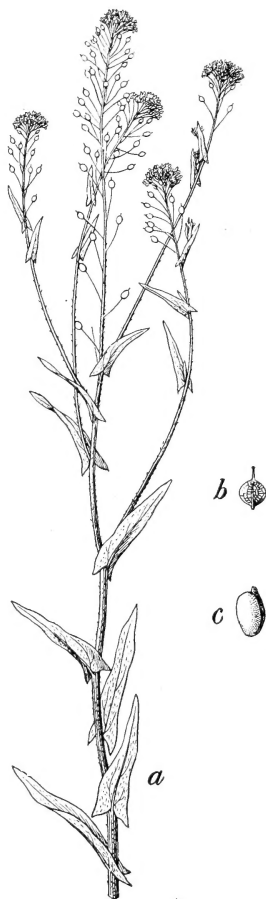


FIG. 3.—Ball mustard: *a*, upper part of plant, third natural size; *b*, seed pod, natural size; *c*, seed, enlarged four diameters.

ber of seeds produced, but under cultivation it seems to increase in size and in seed-bearing capacity. It has become abundant and troublesome in grain fields in southern Manitoba, and is developing an increasing ability to spread. It has appeared in but few places in this country so far as known, and it will cause but little injury if watched for and destroyed as soon as recognized.

REPORTS OF NEW LOCALITIES DESIRED.

In order that a full record of the distribution of these weeds may be kept, reports of localities, not mentioned above, where any of them have appeared are requested by the Department.

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Approved:

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