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ON
SWEET VERNAL GRASS
AND
GOLDEN OAT GRASS,
AND THEIR ADULTERATION.

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LONDON:
PRINTED BY WILLIAM CLOWES AND SONS, LIMITED,
STAMFORD STREET AND CHARING CROSS.
1883.

FROM THE
JOURNAL OF THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND.
VOL. XIX.—S. S. PART II.

ON
SWEET VERNAL GRASS AND GOLDEN
OAT GRASS,
AND THEIR ADULTERATION.

SWEET Vernal Grass (*Anthoxanthum odoratum*, Linn.) Fig 1 a, is one of the most widely distributed of our indigenous grasses. It is found flourishing in all kinds of soils—in rich meadows and dry pastures, in bogs and woods, and on barren hill-sides. It is one of the earliest grasses, showing its flowering heads even at the end of April, and it sends up flowering stems all through the season. Whatever benefit may be derived from its presence in pastures is due to its early foliage, which at the best is but scanty, and is never a favourite food of any kind of stock, though in this early state it is eaten with the other palatable grasses of the pasture. Whether it is better liked by cattle as a food when dry is doubtful, but it is certain that its extremely fragrant odour enhances the money-value of hay in the eyes of both seller and buyer. It is a perennial grass, and deserves a place, though not an important one, in permanent pastures.

But the benefits sweet vernal grass may give to a pasture are entirely wanting from the allied species, the seeds of which are very largely sold in its stead. This plant, called *Anthoxanthum Puelii*, Lec. and Lam., Fig. 1 b, is an annual grass, found throughout Central and Southern Europe, and extending as far north as Holland and Belgium; but whether in these two countries it is an introduced or an indigenous plant I have not the means of determining. It is a smaller and more delicate grass, branching very freely from the root, and producing a large number of flowering stems. The plant has scarcely any odour, either when green or dried. The foliage is small, and not abundant. The substitution, therefore, of its seeds for the perennial sweet vernal grass is a serious injury, and the increasing proportion of samples that have during the year come under my notice prove that this adulteration is on the increase.

The introduction of *Anthoxanthum Puelii* by seedsmen, and

Fig. 1.—a, Sweet-scented Vernal Grass, *Anthoxanthum odoratum*, Linn. b, Annual Vernal Grass, *Anthoxanthum Puelii*, Lec. and Lam. Both one-third natural size.

its extensive presence in mixtures for laying down new pastures and improving old ones, has led to its appearance over the country in such a way as to puzzle botanists, and to lead to the notion that it is an indigenous grass, which had been overlooked until a few years ago. It was first noticed by Mr. Britten in 1872, at Mobberly in Cheshire, in a field which had been broken up and re-sown with grass some years before. It was next observed by Mr. Townsend, in 1874, in a gravelly field near Netley, in Hampshire; and since then it has been

Fig. 2.—Sweet Scented Vernal Grass, *Anthoxanthum odoratum*, Linn. Ten times the natural size.
a, The seed with its shining striated scales; b, one of the hairy palea, with the jointed hygrometric awn, covered with hairs, and with curved edges, and an even apex; c, the "seed" as offered for sale, consisting of the two palea surrounding the small shining seed, which is seen between the open edges of the palea.

recorded from Staffordshire, Worcestershire, Devonshire, and other places. But in none of the localities is its appearance free from the strong suspicion that it has been introduced with agricultural seeds. Mr. Townsend gave a figure and description of the plant in the 'Journal of Botany' for 1875, page 1, plate 157.

The seeds of the two grasses very closely resemble each other, yet they possess differences which may be detected when they are carefully examined.

As offered for sale, the seeds are not naked like those of

wheat, but are still covered by two sets of leafy envelopes. They are oblong and more or less hairy bodies, with two hygrometric awns, one being kneed, and the other shorter and straight. The small seed is easily freed from the outer coverings, and it is found to be an oval brownish body, with a shining coat. The coat consists of two thin striated scales, which are so closely wrapped round the seed that it is very difficult to remove them. When the grass is in flower, the scales are more open, and the stamens spring from within

Fig. 3.—Annual Vernal Grass, *Anthoxanthum sili*, Lec. and Lam. Ten times the natural size. a, The seed with its shining striated scales; b, one of the pales, with the jointed hygrometric awn, the hairs along the nerves and margins, and with straight edges and toothed apex; c, the "seed" as offered for sale, consisting of the two pales, completely enclosing the seed.

them. The hairy awned pales are believed to be aborted florets, one on either side of the central fertile floret, which produces the seed; and the three florets are enclosed in two unequal-sized white chaffy glumes, which remain attached to the flowering stalk when the seeds are ripe. This description applies equally to the seeds of all species of *Anthoxanthum*.

The differences between the seeds of the sweet vernal grass and the annual species employed to adulterate it are not very

obvious, yet, when accurately apprehended, they can easily be detected. In the bulk, the seeds of the true vernal grass are darker in colour than those of the other species. The most important characters for distinguishing them are to be seen in the hairy pales or barren florets. In the sweet vernal grass the pales are narrowed or hollowed out in the middle, so that while they overlap at top and bottom, they leave a narrow oval space in the middle, through which the glistening surface of the seed may be seen. In *Anthoxanthum Puelii* the pales are quite straight-sided, and entirely cover the seed. This difference may be seen in the aspect of the complete seed as offered for sale—Figs. 2 *c* and 3 *c*, but perhaps better in the drawings of the separate glumes of each species, Figs. 2 *b* and 3 *b*. In the sweet vernal grass the enlarged apex of the pale is evenly rounded, and the edge is uniformly and finely serrate; while in the allied species the apex has two or three irregular teeth. And further, the hairs on the pales of the sweet vernal grass are scattered irregularly over the surface, while in the other species they are in lines along the midrib and veins, and along the edges. Finally, the seeds free from the hairy pales of the sweet vernal grass are longer and narrower, and darker in colour than those of *Anthoxanthum Puelii*. In both the outer scale is very large, completely covering the seed and the smaller inner scale. The white seed is of the same form, when denuded of the scales.

The Yellow Oat-grass (*Avena flavescens*, Linn.) Fig. 4 *a*, occurs frequently in dry meadows and pastures, and may be grown in almost any kind of soil or situation. It produces a considerable quantity of foliage, and is a favourite food of sheep. It is important as a late grass in pastures, and is therefore a desirable ingredient in mixtures of seeds used for laying down fields. It has fibrous roots, and sends out creeping underground stems by which it increases. The stems of the oat-grass rise to a height of 1 to 3 feet; the leaves are flat and somewhat hairy, especially on the upper surface. The flowers, which are very small for an oat-grass, are borne on a branched lax panicle. The seeds are enclosed in two pales; the outer one has the apex bifid and drawn out into two short roughish awns, and it gives off from its outer surface towards the apex a long rough-jointed awn. The inner pale is white and membranous, with a bifid apex; it is very obvious in the seed being free in its upper portion from the outer pale. There is a small crown of short white hairs at the base of the pales, and the longish stalk or pedicel of the next flower has a continuous series of silvery hairs along its sides.

The seed which is extensively supplied instead of the yellow oat-grass is the Wavy Mountain Hair-grass (*Aira flexuosa*, Linn.), Fig. 4, *b*, a grass very common on sandy heaths, moors,

Fig. 4.—a, Yellow Oat Grass, *Avena flavescens*, Linn.; b, Wavy Mountain Hair Grass, *Aira flexuosa*, Linn. Both one-third the natural size.

and hilly pastures, where it often forms a considerable portion of the herbage, and is no doubt of value as an ingredient in such exposed native pastures. It belongs to the same genus as the Hassock grass (*Aira cæspitosa*, Linn.), so common in moist rich soils, especially where there is some shade. As the wiry foliage of the Hassock grass is rejected by cattle, it grows in tussocks, which are as objectionable to the sight as they are worthless in the pasture. The seeds of this common grass could not be

Fig. 5.—Yellow Oat Grass, *Avena flavescens*, Linn. Ten times the natural size. a, Inner surface of the seed, showing the pedicel of the next seed, with a continuous line of hairs on each side; b, side view, showing the inner chaffy scale; c, back view, showing the place of attachment of the hygroscopic awn, and the smaller awns terminating the outer pale.

employed to adulterate the yellow oat-grass without easy detection, for they are much smaller than those of the latter grass. It is obvious that intelligence is somewhere exercised in selecting suitable seeds for the purposes of adulteration. It would seem difficult to understand why in this case seed-collectors should gather the seeds of a totally different-looking and worthless grass, when the same labour would secure the seeds of the valu-

able yellow oat-grass. The two grasses do not naturally grow together. The seeds are collected separately, and are sold, each pure of its kind, and both as the seeds of *Avena flavescens*. When one examines a little more closely into the relations of the two seeds, it is however easy to discover the reasons that induce unprincipled merchants to substitute the one for the other. *Aira flexuosa* seeds abundantly, and its seeds are three times heavier than the seeds of *Avena flavescens*, so that, other

Fig. 6.—Wavy Mountain Hair Grass, *Aira flexuosa*, Linn. Ten times the natural size. a, Inner surface of the seed, showing the pedicel of the next seed, with a pencil of hairs on either side; b, side view, in which the inner pale cannot be seen; c, back view, showing the place of attachment of the hygrometric awn, and the entire apex of the outer pale.

things being equal, the labour of collecting 3 cwt. of the one grass would secure only 1 cwt. of the other. But other things are not equal, for the *Aira*, where its seeds are gathered, grows in large breadths unmixed with other grasses; while the seeds of the *Avena* are collected from individual plants growing amongst other grasses, so that their collection necessarily involves greater labour. Then the price of the seed of *Aira flexuosa* is from 20s. to 30s. per cwt., while the same quantity of *Avena flavescens* costs from 150s. to 220s. I have reason to believe that less

than a hundredth part of the seed sold last year in this country as *Avena flavescens* belonged to this species, and that ninety-nine parts out of a hundred were the seeds of this worthless *Aira*! One firm, having a deservedly large seed-trade, had the misfortune this year to acquire *Aira flexuosa* as *Avena flavescens*, without a single seed of the *Avena* being mixed with it. It is not easy to realise the injury to pastures and the loss to farmers which the distribution of this worthless grass must have unwittingly caused. But the distribution of wavy hair-grass, under the name of yellow oat-grass, has not been confined to one house. The main purpose I have in drawing special attention to these adulterations and substitutions, and giving the accompanying figures by which they may be detected, is to draw the attention of the trade to their parcels, in the hope that they may avoid being imposed upon, and so be prevented from unwittingly purchasing and distributing a worthless weed instead of a valuable grass.

The wavy hair-grass has long fibrous roots, a stem from 1 to 2 feet high, and a large number of very narrow bristle-shaped, roughish leaves, the lower and outer ones being longer and more numerous than the upper. The flowers are in a spreading panicle, the branches being hair-like and wavy.

The seeds of this grass can be readily distinguished from those of the yellow oat-grass by the twisted awn which springs from near the base of the outer pale. The inner pale is smaller and firmer in texture, and its edges are covered by those of the outer pale. The base of the outer pale is surrounded by a crown of spreading silvery hairs, and two pencils of similar hairs spring from either side of the otherwise smooth persistent stalk, lying on the face of the grain.

The figures of the whole grasses described in this paper should enable the farmer to recognise any of them present in his fields. If he accepts the seed on the testimony of the merchant from whom he buys it, without careful examination to discover whether it be the seed he has ordered or not, he ought at least to be able to discover what are the plants that appear in his pasture, from the admirable drawings by Mr. R. Morgan which accompany this paper, even though they are reduced one-third, to suit the pages of the 'Journal.'

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