Grasses and Forage Plants.

Cabbages as a Field Crop.

We took occasion in a recent article on filling up the gaps in turnip fields, to refer incidentally to the value of the cabbage as a forage plant, and to recommend it as useful to supply vacancies here and there. We are glad to find so able and influential a contemporary as the *American Agriculturist* speaking in high terms of the cabbage as a field crop, in the following extract, the excellence of which fully atones for its length.—

The value of the cabbage as food for stock is rarely considered. Yet as a fodder crop to be consumed in summer when the freshness of the pastures is past or as green winter fodder for young stock, fattening stock milch cows or sheep, we know of none better. The value of the cabbage as compared with other fodder, known to be of the greatest excellence, may be seen by the following statement of the composition of the various substances here mentioned: for instance, there is in 1,000 parts of

	Water.	Ash.	Potash.	Lime.	Phosphoric acid.	Soda.	Magnesia.
Green clover..	800	13.4	4 6	4.6	1.3	0.2	1
Green peas	815	13.7	6.6	3 9	1.8	—	1
Sugar beet roots........	810	8.0	4.0	0.5	1.1	0 8	0
do leaves........	8 0	0.5	1.9	0.6	0 3	1.6	0 7
Cabbage	855	12 1	6 0	1 9	2.0	0 5	0

Considering the excess of phosphoric acid, which is the most valuable of all the constituents of the ash, the cabbage is seen to be quite equal to sugar beet as a fodder, while this excess gives to it a special value for young and growing or milking animals.

Again, if we compare the amount of valuable organic matter contained in clover and cabbage, we find the following, viz., in 100 parts of

	Water	Album noids or flesh-formers.	Carbo hydrates or fat formers.	Fat.	Crud fibr.
Clover ..	80	3.8	7 7	0.7	4.5
Cabbage .	89	1.5	6 3	0 4	2.0
Turnips...	92	1.1	6.1	0.1	1.0

Thus, although cabbage is not so nutritious as clover, yet the large amount of water it contains makes it a valuable fodder for winter, when given with dry food, and it contains a very small portion of [illegible] matter. It is, however, considerably more nutritious than turnips. The carbo-hydrates consist mainly of starch and gum. These substances are largely consumed in the respiratory process, and help greatly to maintain the natural heat of the animal. As a winter food, therefore, the cabbage is seen to possess a high value, being superior to turnips and only slightly inferior to clover. From our own experience with it, we consider it the very best food for ewes previous to and after lambing, as it causes a large flow of milk; and also far better than turnips, because no cutting is necessary and there is no danger of choking. The same advantages apply to it as food for milch cows. For its culture considerable previous preparation is necessary, and for a crop for next season it is not too early now to begin to prepare the seed-bed. One great advantage of this crop is that succession may be grown and an early crop may be ready for use in August, at which time it will be found of the greatest value for cows that are in milk. For this early crop the plants must be grown in the fall and wintered over in cold frames. The bed for the plants should be chosen in a dry, warm, sheltered place, and the soil should be carefully dug over with the spade or the fork, and made fine and mellow and rich with well-rotted manure. For each acre of crop a bed of two square rods will be sufficient, upon which space one pound of seed should be sown. Drill sowing will be found more convenient than broadcast, as it will be necessary to keep the bed clear from weeds, and the hoe can be used between the drills. The seed should not be sown until the end of August or early in September. We have found the large Drumhead the best for this early crop, as it is very hardy, and upon rich ground comes forward quickly in the spring and grows to a large size. Heads weighing twenty pounds and over are not uncommon in a field of this variety. When the plants are about four weeks old, it is best to transplant them to the spaces between the drills, by which they are checked in their upward growth, and make more stocky plants with more spreading roots. The frames may be made by placing boards upon their edges between the rows, about four feet apart, and nailing strips to hold each pair of boards together. The strips may be nailed about three or four feet apart, and loose boards laid between the strips to complete the covering. The loose boards may be removed during the days when the weather is not too severe, to give light and air to the plants. Upon very cold nights, straw or coarse hay may be heaped upon the frames for protection. The ground for this crop may be a corn or oat stubble ploughed in the fall and manured well with ten to twelve two-horse loads of [illegible] manure directly upon the ploughed ground. The soil and manure should be mixed by a thorough harrowing or working with the cultivator, and then lightly cross ploughed and left rough until spring. In spring, as early as possible, the ground should be harrowed level and marked out into rows three feet apart. A dressing of 200 lbs. of fine bone dust, superphosphate of lime or guano, spread in the rows, will be found of great benefit. The plants should be set out two feet apart in the rows, and if troubled with the flea they should be dusted over with fine dry-slacked lime or soot. Clean cultivation is needed. A later crop may be made from plants sown in a hot-bed in March and planted out in May and June. For this crop we have found the Early Winningstadt an excellent variety, and growing to a good size. The late crop will be raised from seed sown in an open bed in May and planted in July, and the Marblehead Mammoth or the Drumhead are probably the best varieties. If a piece of clover sod can be ploughed and well manured early in this month (July), it will pay to purchase plants from the seedsmen if they have not been prepared at home. A good clover sod turned under has yielded us an excellent crop, and we have also raised a good crop by planting cabbages between the hills of corn and working them with the hoe. For these late crops and such a catch crop as that raised with corn we have found Peruvian guano or fish guano the best fertilizers. With a small hand[illegible] to each plant we have raised some good cabbages in a [illegible], but where a piece of ground can be [illegible] devoted to them, it will be found the best [illegible] where it cannot be had we would by all means [illegible] in every available space either with the corn or in vacant spaces among the [illegible]. Over 8,000 plants may be raised upon an acre, and if by careful cultivation and liberal manuring heads of an average weight of six pounds only are grown, there will be twenty tons of most excellent and healthful fodder. Such a crop is by no means beyond the range of probability where the proper attention is given. We know of few crops which return a greater value for the labor expended, and it is one which stands heat and drouth better than turnips, and equally as well as mangolds.

Fertilization of Wheat and other Grasses.

This subject, in its reference not only to wheat but to other grasses, appears to have received some attention in Germany, particularly by Professor Hildebrand, of Freiburg, and is made the subject of a paper read by him before the Berlin Academy of Sciences, Oct 31, 1872.

A [illegible] synopsis of this paper, from a translation published in the *London Gardener's Chronicle and Agricultural Gazette*, is as follows.—

With respect to their floral structure, grasses may be classified under the following heads:

1. *Diœcious Grasses.*—Here, the two kinds of floral organs, viz., stamens and pistils, grow on distinct plants, one portion producing only staminate flowers and the other portion producing only pistillate flowers. There is but a small number of species of this class; the buffalo-grass of the plains (*Buchloe dactyloides*) is one of them.

2. *Monœcious Grasses.*—In this class, the staminate and pistillate flowers occupy different parts of the same plant. In Indian corn (*Zea mays*) the staminate flowers occupy the summit of the plant, while the pistillate are arranged upon an axis proceeding from a lower portion of the plant. In wild rice (*Zizania palustris*) the female flowers occupy the upper part of the panicle, and the staminate flowers the lower part.

3. *Polygamous Grasses.*—Here, a portion of the flowers may be perfect; that is, combining both sexes, and a portion will be either wholly staminate or wholly pistillate. Some species of *Panicum* and of *Andropogon* are of this description.

4. *Perfectly flowered Grasses.*—This includes the larger portion of grasses, especially of temperate climates. In this division fall also most of our cultivated grains, as wheat, oats, and barley.

In grasses of the first class, i.e., diœcious grasses, the pistillate flowers must necessarily be fertilized by the pollen from entirely distinct plants, just as among higher plants the pistillate willow is fertilized by the pollen from the male willow of the same kind but on a different tree. On the western plains, where the buffalo grass prevails, large patches may be found having only male flowers, and other patches occur having only female flowers. The seed of course is only produced upon these female or fertile plants. Until this fact was discovered, the two sexes were supposed to be different species, and were known by different names.

In the monœcious grasses also, as in the common Indian corn, (*Zea mays*) the pistillate flowers must be fertilized from without, the pistils are thrust out from the husky covering and exposed to the influence of any pollen which may fall upon them, hence the readiness with which different varieties, if planted in proximity, hybridize or mix with each other. The same is true to a large extent with polygamous grasses.

In the case of the perfectly flowered grasses we find several provisions existing, which affect the mode of fertilization.

1. In some species, as in the sweet-vernal grass, (*Anthoxanthum*) the stigmas are thrust out of the flower some time in advance of its own stamens, and are fertilized by pollen from earlier developed flowers. A similar arrangement exists in the meadow fox-tail (*Alopecurus*) and many other grasses. In these cases, there is usually only a short period during which the pistil remains fresh and capable of fertilization; in *Phalaris arundinacea*, however, Professor Hildebrand found the stigmas fresh and receptive for a longer time.

2. In by far the larger number of grasses, the male and female organs mature at the same time in the same flower; but even here, there are circumstances which in some species seem favorable to self-fertilization, and in others, to cross fertilization. Thus, in rye, the anthers are partly extended beyond the points of the enclosing chaff, before the full expansion of the flower, so that the pollen first shed goes to the fertilization of other flowers which are already open.—When the flower fully expands, and the rest of the pollen is shed, only a portion is likely to fall upon the stigmas of the same flower owing to the relative position of the parts, the greater portion being conveyed to other flowers. In the common oat (*Avena sativa*) the flowers in *dry weather* open in the afternoon and toward evening. The anthers hang out of the flower, and the pollen is, to by far the greater extent, dispersed to other flowers; but in damp and cold weather the flowers remain closed, the pollen is held within the flower, and self fertilization is inevitable. The flowers of rice (*Oryza sativa*) open in the morning, and the arrangement is nearly the same as in the oat, favorable to cross-fertilization.

In all the observations made by Professor Hildebrand on different species of barley, *no* flowers were found to be open, but all were self-fertilized, even before the spike or head was protruded from its sheath. However, another observer, Delphino, asserts that he recognizes at least the possibility of cross-fertilization in barley.

With respect to wheat, Delphino asserts that the idea that *wheat is necessarily self-fertilized* has arisen erroneously, from the fact that the flowers remain open only for a very brief time. In a wheat field only a very small proportion, perhaps one in four [illegible] of the flowers are open at one and the same time. The opening of the flower of wheat is a very interesting phenomenon, and happens with wonderful rapidity. While the flowers are still closed, a motion of the glumes is observable; these separate suddenly in a moment; at the same time, the anthers protrude laterally from the opening, they open and about one-third of the pollen falls inside the flower upon its own stigma, while the remaining two-thirds are dispersed into the air; the anthers are emptied in a moment, and the whole process does not occupy more than half a minute. The stigmas remain receptive for a considerably longer period, and can hence receive the pollen of other flowers.

The conditions of fertilization must be observed in each single species, since closely allied species of the same genus show strikingly different phenomena in this respect, and moreover, each separate species may exhibit very different behavior when exposed to different conditions of climate.—*Dr. George Vasey, in Monthly Report of Department of Agriculture.*

Clover and Gypsum.—George Geddes writes the *New York Tribune* that he has on his farm, in Central New York, a field which from 1799 to 1873 has had no manure except clover grown on it and ploughed under, and that wheat, corn, oats, barley, meadow and pasture have been regularly taken from the land in five years rotation—the closing crop being winter wheat, when timothy and clover is sowed. The clover has been regularly treated with gypsum for 50 years. He has particularly noticed it of late years, and says the land is more fertile now than it was 23 years ago.