roots of the cereals and grasses, as well as esculent roots of every kind in the field or garden. They are injurious to all plants of the *brassica*, or cabbage family, and also to garden flowers.

It is said that whatever grass will grow, wire-worms will live on. The eggs of the parent beetle are supposed to be deposited on the roots of grass and weeds, but this point has not been clearly determined. The eggs must be very small, for when first hatched the larvæ can scarcely be detected by the naked eye. They live five years in the larval state, casting their skins several times, and committing great ravages on nearly all kinds of plants. When fully grown, the wire-worm forms a shell in the earth, in which it becomes a pupa or chrysalis, generally in July or August. This pupa remains stationary, quiescent and harmless for about three weeks, and then changes to an *elater* or beetle, which is at first white and tender, but in a short time gains its proper color and hardness. These beetles run with the heads down, and drop when apprehended. They fly well and are perfectly harmless, feeding only on flowers. The extent of the damage done by the wire-worm during its five years of larval life may be estimated from the fact that a single worm has been observed to bite from fift· · to twenty plants in a short time.

When fields lie fallow the wire-worms feed on the grass and weeds, which are too frequently allowed to over-run them; whereas, if the soil was kept clean, they would either die for want of food or be compelled to move to some other place. As these larvæ invariably lie beneath the surface of the soil, every plan suggested for their destruction must be founded on this consideration. Superficial applications have been frequently tried without effect. The most obvious remedy is to saturate the soil with some fluid that will destroy them, or top-dress the surface with some substance that, when dissolved by rain and carried into the soil, will be destructive to them without damaging the plants. In a fallow field no precaution need be used, as the destruction of weeds and insects are indispensable. A farmer of the island of Guernsey, whose crops were entirely destroyed by wire-worms, used a top-dressing of salt, lime, and soot, but it did not check their ravages He was then advised to try guano; he did so, and found that it checked their progress as soon as applied, and banished them from his fiel˘ .

Sir Joseph Banks suggested · plan for alluring wire-wor· s from plants, and collect ·g them that they might be destroyed. This consisted in placing slices of raw potato on skewers and burying them in the ground near the seed sown. This appears better adapted for the garden than the field. A farmer in England affirms that he has frequently freed fields entirely from wire-worms by sowing a crop of white mustard seed. The experiment he tried so frequently and in circumstances so well calculated to demonstrate its effects, that he is perfectly satisfied the remedy is efficient. "Encouraged," he says, "by the results of my former trials, I sowed a whole field of 42 acres, which had never repaid me for nineteen years, in consequence of every crop being destroyed by the wire-worm, and I am warranted in saying that not a single wire-worm could be found the following year; and the succeeding crop of wheat was the best I had reaped for twenty-one years." It has been found by repeated experiments that soda-ash will destroy them when applied as a top-dressing at the rate of two hundred pounds per acre. Refuse gas-lime from gas works, will also banish the wire-worm from all places to which it is applied.

Analysis of Millet and Hungarian.

Dr Sturtevant gives the *Scientific Farmer* a valuable article about Hungarian and its effects in the soil, in the way of exhaustion. He compares it with millet as follows:—Wolff gives the composition of Hungarian millet, green, which we will compare with his tables of analysis of Timothy or Herds grass, as below:—

Composition of the Ash.

	Ash.	Potash.	Soda.	Magnesia.	Lime.	Phos. acid.	Sulph acid.	Silica.	Chlorine.
Millet,	7 23	3" 4	–	8.0	10 8	5 4	3.6	29 1	6 4
Herds grass,	7 01	·3.8	2.7	3.7	9.4	10 8	3 9	35 6	5.0

Or, calculating the results of the analyses in another form, we have:—

Composition of the Fresh Product.

	Water	Ash.	Potash.	Soda.	Magnesia.	Lime.	Phos. acid.	Sulph. acid.	Silica.	Chlorine.
Millet,	68 0	2 31	.86	–	.10	25	.13	.08	.07	.15
Herds grass,	70 0	2 10	.61	06	.08	.20	.23	08	75	.11

From these figures we deduce that a ton of the two grasses removes the mineral constituents of value as below:

	Potash.	Phos. acid.
1 ton Hungarian grass,............	17.2 lbs.	2.60 lbs.
1 ton Timothy Grass,...............	12.2 lbs.	4.00 lbs.

As the millet contains in the analysis given but 68 per cent. of water, to the Herds grass 70 per cent., we have for a new showing:

6,376 lbs. (2,688 tons) Hungarian grass=1 ton Hungarian hay (14 per cent. water.)

6,732 lbs. (2,866 tons) Timothy grass=1 ton Timothy hay (14 per cent. water.)

Or:

	Potash.	Phos acid.
1 ton Millet, dried, removes.......	46.23 lbs.	6.98 lbs.
1 ton Timoths hay removes........	34.96 lbs.	13,18 lbs.

If we estimate the value of potash at 7 cts., and phos. acid at 14 cts. a lb., we have the cost of replacement of these ash elements: For 1 ton Hungarian hay $4.21. For 1 ton Timothy hay, $4.29.

We have thus far considered the ash elements alone; but it must be remembered that Hungarian hay removes about 47 lbs. of nitrogen per ton, while the Timothy hay removes per ton about 31 lbs. only; calling nitrogen 28 cts. a lb., we have for the values $13.16 for the ton of millet and $8.60 for the ton of hay.

If these analyses represent the correct composition of our crop, we have as a measure of their exhaustive property, the following sums:

	Nitrogen. lbs.	Potash. lbs.	Phos. acid. lbs.	Value.
Millet, dried, per ton,	47	46.23	6.98	=$17 37
Timothy hay, per ton,	.31	34.96	13.18	= 12.97

It would seem from these results that Hungarian is an exhaustive crop; but yet one thing must be considered: It is not very exhaustive of the ash elements, which are fixed in the soil; and of the nitrogenous elements, it is quite sure that, if not removed from the field by the crop, they would escape into the sub soil. Hungarian grass then may be esteemed in some cases as a *conservative* crop—a crop applied to preserve elements which otherwise would go to loss. We are justified by these facts which we have presented, in warning against millet as a regular crop, to be grown by purchased manures. There is nothing, however, shown here to countervail against any experience which would tend to show that this crop may not be readily raised from manures deficient in that expensive element, nitrogen, as we do not know as yet the power of the plant to assimilate soil nitrogen which is usually to a large extent unavailable as plant food. We are in need of further data regarding the growth history of millet.

As to the feeding value of millet, cut when in blossom, we are at a loss what to say. Some parties regard it as equal to hay, others as inferior. Of one thing only are we certain, cattle like it, and do well under it, but this leaves the question of comparative economy untouched. The analysis of green millet (*panicum germanicum*) in blossom is as below:—

	Water.	Organic matter.	Ash.	Albuminoids.	Carbo Hydrate.	Crude fibre.	Fat.
Millet in blossom, ..	65 6	22 0	2.4	5.9	15 0	11 5	1 5
Grass, before " ...	75 0	22 9	2 1	3.0	12.9	7.0	0.8
Grass, after "	69.0	29.0	2.0	2.5	15.0	11.5	0.7

As the feeding values of articles are usually calculated on the percentage of albuminoids, these analyses would indicate a higher feeding value than we usually see ascribed to millet. It is hard to believe but that it must be at least equal, and probably better than grass; but if to such an extent as is here shown, whence the discrepancy of opinion in the practical estimates?

It is well for the farmer who has this crop, to harvest while in bloom, so as to obtain the fodder at the period of the greatest nutriment in the whole plant; and when successfully stored, then it would be well to compare its feeding value, in the ordinary rough way of the farm, and come to an understanding with one's self whether it be a profitable crop to cultivate. Despite all we have written we believe it is, under our system of farming; and forming opinion from our own observation, we cannot believe that the amount of nitrogen indicated as necessary by the analyses, is needed to be applied.

One word of caution: There is a suspicion (more than suspicion—certainty—Ed. C. F.) that over-ripe Hungarian—that is cut for fodder, after the seed is formed—is injurious when fed to animals. We have heard instances of injury which have been ascribed to feeding millet in seed, and it is best, therefore, as a rule, to keep on the safe side, by cutting in the bloom; a course otherwise to be recommended.

Lime on the Fallow.

The fallow should be dunged or limed between the fourth and last ploughing, but it is questionable policy to apply both of these fertilizers simultaneously. Lime sets free ammonia in the very essence of dung, so that a want of compatibility is apparent in dressing both on the land at the same time. If it is determined to apply lime, the more caustic its condition when incorporated with the soil the better. For this reason many farmers of clay land plough in the shells at once fresh from the kiln, a course which we scarcely feel justified in recommending, on account of the partial distribution of the lime so applied through the soil. Small heaps drawn out from the carts, and protected from heavy rain by a shovelful of earth thrown over the op, is a very good plan; and these are easily spread, when the shells are reduced to powdery condition.

On no soils are the benefits of lime more apparent than upon those under consideration; and if mixed with the soil before it becomes effete from exposure, it will be found to greatly assist in decomposing the vegetable matter in the soil, neutralizing acid substances (which are invariably formed during the imperfect decomposition of such matter), and also to cause the land to work more easily. The amount which ought to be applied per acre must depend upon the peculiarities of each field, but clay lands which have not received a dressing for many years will be all the better of 300 bushels per acre, a quantity which, we are assured on scientific authority, adds just about one per cent. of lime to the staple of a soil ten inches deep.

It has been contended that lime impoverishes the land, but such is true, in a certain sense, of every application, excepting those which like dung contain all the constituents required by plants. If lime increases a crop that removes potash, phosphoric acid and nitrogen from a field, it is evident that these constituents, not existing in quantity in the lime, must be appropriated from the soil. In this sense, lime, nitrate of soda, and even superphosphate of lime must be regarded as exhausting. But, as is well known, a good farmer is constantly adding to the general stock of plant food in the soil, by various measures, such as the feeding of cake, and the importation of various fertilizers. So that, on well managed farms, the cry of exhaustion is utterly vain and unfounded.—*Agricultural Gazette.*

Test with Fertilizers.—It is well known that different plants require, to some extent, different fertilizers; and recently it has been found by Lehmann that the same plant demands a change of plant food in the course of its growth. Thus Indian corn did best with ammonia salts the first forty-one days; after that nitrates had the greater effect. So with tobacco. Buckwheat fed best upon nitrates throughout. Lupine it was found gets its nitrogen from the atmosphere. In some experiments made last summer I got a great growth of clover from a dressing of the contents of the earth closet, the growth being made the latter half of the season, while the grass mixed with the clover showed much less effect throughout. The thing was reversed where sour milk was used, which grew the grasses almost unprecedentedly, leaving the clover far behind. So we know plaster to be favorable to the *leguminosæ*, but having generally little effect upon the *gramineæ*. Milk, which combines many properties, like barnyard manure, is a general fertilizer. Applied upon an old sod, never ploughed, growing the various grasses and numerous weeds, it pushed them all, though with a difference. Applied upon clover alone, it did well, but was most remarkable upon the grasses, whether grown alone or otherwise. I also found it a powerful stimulant upon strawberries which I transplanted in the fall somewhat late, the plants showing through the winter a rich healthy green. This, with the other experiments, was made upon the poorest soil—drift, composed almost wholly of sand, gravel and clay. The soil had in addition some accumulation of vegetable material.—*Country Gentleman.*

The Great Value of Humus.—Humus consists of fine muck or vegetable mold. Few farmers whose soils are deficient in humus know the great value of this element of fertility. The humus of compost and the organic part of the manure, with which the gardeners literally fill their soil, has ten or twenty times the absorptive power for water of the sandy portions of soil it is mixed with. The porous nature of the subsoil drains away all excess of moisture, so that what is left does not obstruct the ingress of heat. But when heat penetrates two or three inches into the ground there is, in the organic matter, sufficient moisture to absorb and retain the heat; so that by reason of the presence of sufficient humus and organic matter, moisture is retained, and the moisture, by reason of the great power of water to contain heat, insures the retention of heat in such proportion chemically to moisture and in such large proportion to the substance of soil as to insure the chemical disintegration of the manure, and therein the feeding of the growing crops with equally surprising and profitable rapidity. * * * Now, if humus and other organic matters thus insure the retention and combination of the proper proportions of heat and moisture, to promote, in part, their own reduction to the atomic state in which plants absorb them as food, organic matter being present and within the reach of heat in large quantity, is it not equally apparent that the largest proportion of the organic matter of soils should be left to compose the surface mold? I mark the word mold, because in many instances after ground is planted, there is little if any mold, properly so called, left at the surface, especially on lands with a sandy or gravelly subsoil and thin surface mold. In clay, which is itself a great absorbent of heat and moisture, vegetable matter is necessary to keep it loose and to admit heat. In sandy loams, into which heat penetrates without water, vegetable matter is necessary to insure the retention of both heat and water for a sufficient length of time to promote the solution of plant food.