

The Farm.

The Turnip Fly.

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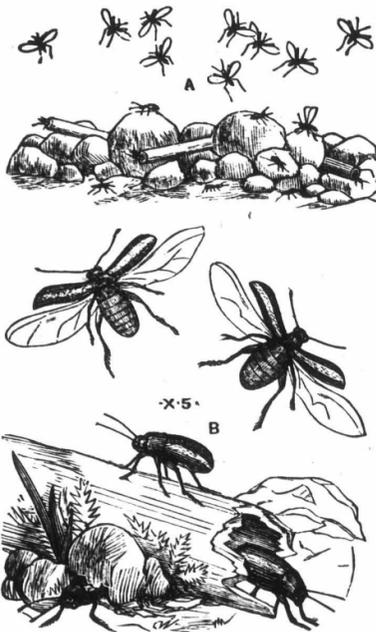
There are very few insects which attack our farm crops with effects more disastrous than the turnip fly. The insect is not a fly in the true sense of the term; it belongs to the beetle family, and is really a minute beetle with comparatively large transparent wings. As it is seen flitting about over young turnip plants, it appears with its large wings and small body to the naked eye very much like a small fly. From its size and general appearance when its wings are closed, it is in some places termed the Turnip Flea, or Flea Beetle. It is known to men of science as *Phylloreta nemorum*, or at times *Haltica nemorum*. There is more than one sort of turnip fly, just as there are different sorts of turnips; but in regard to the flies, they appear all the same to the naked eye, and alike in their general habits. In its manner of flying it resembles the cockchafer, and other members of the beetle family familiar to every agriculturist.

The flies live through the winter generally in a semi-torpid state slightly beneath the surface soil of fields, under stones, within the hollow stems of old straw and partly decayed herbaceous plants, in heaps of dry field rubbish, and in any place that is likely to afford some protection against the cold and wet of winter.

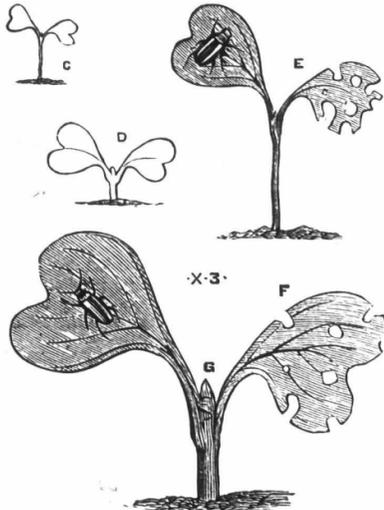
With the first sunshine of early spring these little flies emerge from their hiding-places, and run over the surface of the ground as illustrated natural size at A. Being so small, they are virtually invisible to the naked eye, but when they spread their transparent wings and flutter in the light, especially when they are present in large numbers, they become as visible as the ordinary green fly, but not so clearly seen as gnats.

If some of the specimens are secured and magnified with a lens about five diameters, they will be

seedlings three diameters to better show the damaging work of the fly. The right-hand leaf of each seedling turnip is shown with an equal amount of damage done by the turnip fly, and it is at once



TURNIP FLY.—Natural size at top, magnified 5 diameters below.



TURNIP FLIES attacking seedling Turnips—natural size at C, D; enlarged 3 diameters at E, a weak seedling from bad seed, and F, a strong seedling from good seed.

more clearly seen, like our illustration at B, where one fly is emerging from a broken straw (of course magnified five times), another example is walking on the top of the fragment of straw, a third is creeping from under a little particle of earth, whilst two others have spread their gauzy wings, and are flying in the air. The colour of the fly's body is black, with two stripes of yellow from snout to tail.

The beetle commonly attacks the turnip plants as soon as the two first smooth green seed-leaves show themselves above the ground. As the function of these two leaves is to assimilate food for the plant, it follows as a consequence that if they are eaten off, or get seriously damaged, the young turnip plant must perish. That they do very often get eaten off, and the entire first sowing of seed is entirely lost, is clear; we have illustrated two turnip seedlings at C and D, natural size, to show the difference in the size of the seed-leaves; C is from common and inferior seed, D is from good seed; now if an equally bad attack is made upon these two seedlings by the fly, C will perish, whilst D will survive. At E and F we have enlarged both

manifest to the eye that whilst the weak and drawn-up seedling at E, raised from poor seed, is very seriously, and perhaps fatally, damaged, the much more sturdy seedling raised from the best selected seed is not likely to be materially affected by the attack.

It must be remembered that the chief injury is done to the turnip plant in its infant seed-leaf state, therefore every effort should be made by the best cultivation to hurry the seedlings on to produce a few of the ordinary rough leaves, such as are seen just emerging from between the seed-leaves at G. When a few of these rough ordinary leaves are produced, the young turnip plants are almost proof against attacks of the fly; at any rate, they can withstand or throw off attacks with ease.

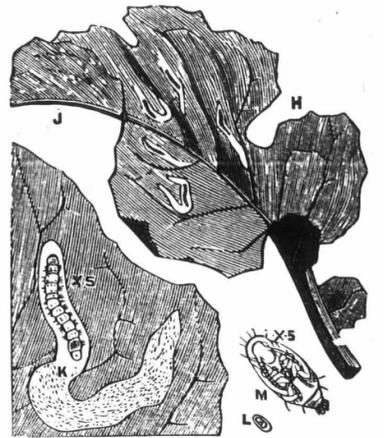
We must now describe another phase in the attack of turnip flies upon turnips. In April the flies begin to lay eggs, and when a turnip field is selected for this act, the eggs are laid on the undersides of the rough turnip leaves, the seed-leaves having by this time all decayed. The eggs are not much larger than an ordinary pin's head, and being laid on the under side of the leaves, they are virtually invisible. Being underneath, they are protected from the heat of the sun and from storms of rain; the eggs are soon hatched, and do not give rise to a fly but to a very small grub; as soon as hatched the grub eats its way into the substance of the leaf, and lives between the upper and lower skin, feeding on the green vital material within the leaf. The grubs continue eating the inner substance of the leaf for about six days, when they drop out of the leaf on to the ground close to the turnip plant, and bury themselves an inch or two beneath the surface. In this position each grub changes to a chrysalis, and in about a fortnight a perfect turnip fly emerges from each chrysalis. The first new brood of flies generally appears in May or June, and as less than a month is sufficient for eggs to be laid, the grubs to be hatched and fed, the chrysalis condition reached, and another brood of flies hatched, it follows that there are generally five or six broods of turnip flies produced every season, and always of course with their attendant grubs. From the above remarks it will be seen what enormous power of increase the turnip fly possesses in being capable of producing five or six generations in one season.

At H, we have illustrated a small ordinary rough turnip leaf the size of nature; at J is shown the end of the leaf turned up to exhibit the fly's eggs deposited on the under side: on the upper side may be seen five grubs within the two skins of the leaf, and eating away the inner substance.

Wherever the grubs have eaten away this material a small white wavy streak is left quite visible to the naked eye. To make the appearance of the grub more distinct we have enlarged it five diameters at K (to the same size as the flies at B): it is again shown within the material of the leaf living in the tunnel it has made between the skins. The chrysalis is seen natural size and enlarged five diameters at L and M. We need hardly say that all our illustrations have been taken from nature, and our notes made from practical experience. The seedling turnips at D and F are actual examples of Webbs' Purple Top Mammoth.

In considering the nature of the means to be taken to avoid attacks of the turnip fly, it must be remembered that wet weather is very distasteful to the insect, as it can neither leap nor open out its fine gauzy wings in rainy weather; this wet weather, on the other hand, is the very condition young turnips most require. Hot, dry, sunshiny weather, is most suitable to the fly, and on the other hand it is equally unsuitable to the turnip. It follows, therefore, if the turnips can be hurried on in wet weather well through the seed-leaf stage, they will grow at their best whilst the fly is at its worst. It is in the highest degree desirable that the surface of the ground on which turnips are to be sown should be fine and even, without, if possible, even moderate-sized clods; for if the surface is not finely prepared the young seedlings cannot effectually pierce it with their roots, and if the seedlings are in any difficulty (however slight) it invariably proves advantageous to the turnip fly. As the turnip fly can only live on the turnip or some of its allies (chiefly charlock), it is manifestly advisable to remove as far as possible all weeds of the turnip and cabbage class seen on ill-kept farms and in hedge sides.

We confess that we cannot advise the steeping of seeds in turpentine, kerosene, paraffin, carbolic acid, petroleum, &c. These materials, if properly diluted with water, are no doubt distasteful to the fly and do not injure the seeds, as the outer skin of every seed is already a dead substance, the vital



TURNIP FLY.—The grub of the fly, natural size and magnified, feeding between the upper and lower skins of the turnip leaf. Chrysalis at bottom, natural size and magnified.

material being within. Now the turnip fly does not want the dead outer husk of the turnip seed, but the living juicy green seed leaves from within as they are spread out in the sun; these leaves are not likely to be largely tainted by paraffin, and upon these leaves the flies rest or leap from one to the other.

The summary of our advice is—1st, keep the fields as clear from weeds and rubbish as possible; 2nd, prepare the ground with a fine, even surface; 3rd, sow the best selected seeds; 4th, sow thickly; 5th, sow during weather which is likely to continue wet for a short time; 6th, manure discreetly, for too much manure is as bad as too little; 7th, when convenient, prefer artificial to farmyard manure.

Professor E. M. Shelton's experiment at the Kansas Agricultural College Farm to test the value of comfort to fattening stock, reports that during one week recently the five pigs exposed to the weather made, getting all the corn they would eat, a total increase of only 16 lb.; while the same number, originally of equal size, kept in warm pens, consumed a little more feed, and gained 41 lb.