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C. P. Gillette  
Iowa State College

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FOOD HABITS OF THE
STRIPED PRAIRIE-SQUIRREL.

(Spermophilus redheadicus).

C. P. GILLETTE.

Shall we kill the striped squirrels? Nearly everyone in Iowa who raises corn in field or garden will say, without hesitation, yes. I am not prepared to flatly contradict this reply but beg to call the attention of those who are indiscriminately taking the life of this little animal to the following short study of its food habits.

I am fully aware that one serious charge is brought against this squirrel and that is that it destroys a large amount of corn early in the season by digging for the kernels. With this much of its food habits every Iowa farmer is familiar, but beyond this, little, to my knowledge, has ever been learned. In the Entomological Report of the Department of Agriculture for 1887, page 160, Prof. Osborn of the Iowa Agricultural College, speaks of having seen the squirrels eating the pupae of the sod web-worm, Crambus exsiccatus, and suggests that the squirrels may be very beneficial upon lawns and meadows by feeding upon the larvae (worms) also.

Early in the spring of the present year a wholesale slaughter of the squirrels was begun upon the college campus and vicinity, boys and men being hired to do the work and, as a result, the little benefactors were nearly exterminated from the college grounds. I say benefactors, because I am aware of no appreciable harm that they do to lawns and they certainly do much that is good besides being a very attractive little creature.

From April 19th to August 2d squirrels have been taken and the contents of their stomachs examined for the purpose of determining their value in exterminating injurious insects. The result of these examinations is given below.

Squirrels 1 to 11 were shot in the afternoon of April 19th.

Squirrel 1.—Cut-worms and web-worms 4, Coccinellid, (lady-beetle) 1, other Coleoptera (beetles) 1 or 2; remainder of contents green food and seeds. (*) Five per cent insects. (†)

(*) Under seeds is included all finely masticated starchy material.
(†) All insect matter was carefully separated from the rest of the stomach contents and the proportion that this bore to the whole was estimated as nearly as possible without actual measurement.
Squirrel 2.—Cut-worms and web-worms 11, Coccinellid 1, other Coleoptera 2, angle-worm 1; remainder green food and seeds. Fifteen per cent insects.

Squirrel 3.—Cut-worms and web-worms 4, wire-worms 3, angle-worm 1, saw-fly 1, other Hymenoptera 1; remainder green food. Ten per cent insects.

Squirrel 4.—Cut-worms and web-worms 10, wire-worms 2, angle-worm 1, Coccinellid 1, saw-fly 1; remainder mostly seeds. Eight per cent insects.

Squirrel 5.—Stomach nearly empty, containing a small amount of green food only.

Squirrel 6.—Web-worms 2, angle-worm 1, Hymenoptera 1; remainder green food. Five per cent insects.

Squirrel 7.—Stomach nearly empty; Lepidopterous larva 3, angle-worm 1; remainder mostly green food; a little ground seed. Fifteen per cent insects.

Squirrel 8.—Stomach full; cut-worms and web-worms 26, spider 1, Hemiptera (bug) 1, unrecognizable larva 1; remainder green food. Sixty per cent insects.

Squirrel 9.—A few chitinous parts of insects which could not be identified; remainder green food and seeds. One per cent insects.

Squirrel 10.—Cut-worms and web-worms 32, Coccinellid 1; remainder green food and seeds. Ninety per cent insects.

Squirrel 11.—Cut-worms and web-worms 8; remainder green food. Twenty per cent insects.

Numbers 12 and 13 were taken in the afternoon of April 28th.

Squirrel 12.—Cut-worms and web-worms 50, angle-worms 2, Hymenoptera 1; remainder seed and green food. Ninety per cent insects.

Squirrel 13.—Stomach but partially filled; cut-worms and web-worms 5, remainder seeds. Five per cent insects.

Squirrel 14.—Taken in the afternoon of May 4th. Cut-worms and web-worms 10, Coleoptera (Carabid) 1, remainder seeds. Ninety-five per cent insects.

Squirrel 15.—Taken July 18th. Stomach nearly empty; the leg of a spider and a few chitinous pieces of insects were found. Contents mostly green food. One per cent insects.

Numbers 16-19 inclusive were taken between 10 and 12 o'clock August 2d.

Squirrel 16.—Stomach moderately filled; contents almost entirely composed of finely masticated insects most of which are grasshoppers, their wings and legs being plainly recog-
pizable; web-worms 4; a very little seed. Ninety-five per cent insects.

Squirrel 17.—Stomach only partially filled; contents almost entirely finely masticated insects, apparently grasshoppers; a small amount of seeds. Ninety per cent insects.

Squirrel 18.—Stomach moderately full; web-worms 9; remainder of contents grasshoppers. One hundred per cent insects.

Squirrel 19.—Stomach well filled; web-worms 40, remainder of contents entirely insects, apparently grasshoppers. One hundred percent insects.

The squirrels 20-22 were taken by a student, Mr. E. Thurli-man, who kindly loaned them to me for examination.

Squirrel 20.—Stomach very full. The contents is almost entirely cut-worms which are so thoroughly masticated as to make it impossible to count them. Should think fifty to be a low estimate as to numbers. One ant and a very little seed also found. Ninety-five per cent insects.

Squirrel 21.—Like 20 except that the contents is entirely worms and the quantity about half as much. One hundred per cent insects.

Squirrel 22.—Stomach nearly empty. At least one large cut-worm; no other insects distinguishable; remainder green food and seeds. Twenty per cent insects.

The web-worms in these stomachs were, in the great majority of cases, the larvae of *Crambus exsiccatus*, which is very injurious to corn and grass in Iowa, its work in corn being very often mistaken for that of cut-worms. Although it would have been desirable to examine a larger number of stomachs it seems fair from the above data to draw the following conclusions.

1. Insects certainly constitute a large proportion of the food of the “striped squirrel.”

2. The insects upon which the squirrels feed are almost exclusively injurious species, chief among which seem to be cut-worms, web-worms and grasshoppers.

3. As grass, clover and other green stuff has been abundant wherever the squirrels were taken, and as their stomachs were often gorged with insects, that must have given them much trouble to catch, it would seem that they prefer the latter food.

4. From the above facts it seems certain that the squirrels must be a decided benefit to lawns, meadows and pastures.

5. If ground containing cut-worms, web-worms and wire-worms is to be turned over to corn, the more squirrels that
can be harbored upon it up to planting time, the less will the crop be damaged by these insects.

6. The squirrels would be a most valuable adjunct to any corn field after planting if some method could be devised to prevent them from taking the corn.

I have noticed that it is very often the case that the squirrels do not dig deep enough about the hills of corn to reach the kernels, in which cases it is probable that the cut-worm or web-worm was the coveted morsel and not the corn.

Whether or not there can be found a practical plan for preventing the damage to corn by squirrels is a question to be settled by future experiment. Director Speer tells me that he has prevented their ravages by planting corn freely on the borders of the field a few days before the regular planting, and also by freely scattering soaked corn late in the evening or very early in the morning in the vicinity of their burrows, repeating the application every day until the corn is past being damaged by them. It has also been found to pay well to harrow the ground frequently while the corn is small. This disturbs the squirrels by continually stopping their holes and obliterating the planter marks along which they travel from hill to hill and helps to drive them from the field.

Smoking the corn in the smoke-house with the meat is claimed by some to be a remedy, while another says that he always plants so deep that the squirrels never trouble him. It is the purpose of the writer to test as many of these remedies as seem practical another year and, if anyone who reads this can suggest a remedy for trial, that has been used with good results, we shall be glad to hear of it.

In considering the number of insects eaten by the squirrels as indicated by the above figures it should be borne in mind that the stomachs were in all degrees of fullness; some almost empty and others gorged, and also that it was only possible to get at the amount in the stomach at one time. So it is probable that these figures indicate less than half of the actual amount that these squirrels would eat in twenty-four hours.

It may seem impossible to some that one small stomach should hold so much. The stomach of squirrel 13, for example, contained five worms which were only five per cent of its contents, and the stomach was only partially filled. The worms being crushed before entering the stomach, their soft parts soon pass on leaving for a time the tough skins which are harder to digest. A large number of these can be stowed in a very small place. If the worms retained their viscera so
as to occupy as much space after being taken into the stomach as before, the proportion of insects to entire stomach contents would be very much higher.

By combining the percentages above given and dividing by twenty-two we find that forty-six per cent of the contents of these stomachs was insects. If we add together all of the cut-worms and web-worms found and divide by twenty-two, we get thirteen as the average number. If we suppose that the amounts found in the stomachs represent, on an average, one-half of the daily food, this would give twenty-six as the average number of these worms consumed by a single squirrel each day from April 19th to August 2d, and 2730 as the total number. These figures multiplied by the number of squirrels living upon a given piece of ground will give some idea of the amount of benefit derived from them.

This without saying anything of the large number of grasshoppers, wire-worms and other noxious insects eaten, makes a very large credit account to be placed over against the debits chargeable to these squirrels.

When grass land inhabited by these little rodents has long been free from insect ravages it is, without doubt, very often the case that this freedom is due directly to their presence; and the writer questions very much whether, all things considered, they really do more harm than good. Most of the harm is strikingly noticeable and is of short duration while the good is perpetual from spring to fall but is in no way noticeable and can not well be estimated.

Erratum.—Page 234, ninth line from top, nitrogenious should read nitrogenous.