

The Changa or West Indian Mole Cricket As a Pest on Golf Courses

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Many reports of injuries to golf courses by the "West Indian mole cricket" or "changa," have been received from the Gulf and extreme southeastern states.

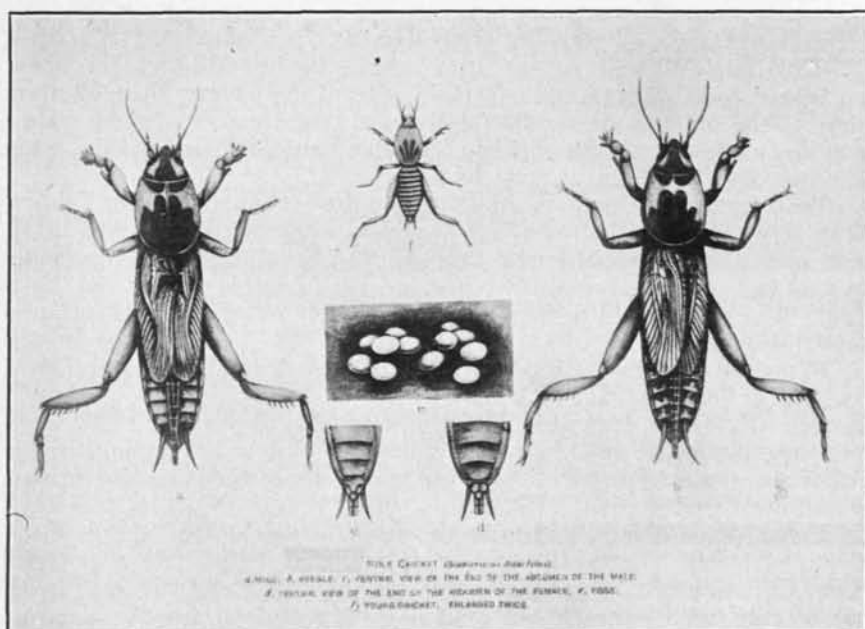
This insect, a native of the West Indies and South America, has become well established in the southeastern United States.*

Because of the fact that the West Indian name is both euphonious and brief, we shall refer to it hereafter in this article as the *changa*. Another common name having considerable vogue in this country is that of "ground puppy," a name which is rather misleading, because there is nothing dog-like about this insect, which resembles a mole rather than any member of the canine tribe. A native species, the northern mole cricket, has been known to entomologists for many years, and is of comparatively little economic importance, although widely distributed throughout the country east of the Rocky Mountains. Another introduced species, the European mole cricket, recently has become quite a pest in the nurseries of northern New Jersey, where it is said to injure the roots of young trees as well as root crops, such as beets, etc.; the native species has been known to injure potato tubers quite severely at times. The *changa* is reported as being the "most serious insect pest of general agriculture in Porto Rico," where it damages crops to the extent of \$100,000 or more annually. The *changa* is rather closely related to our common field crickets, although in appearance it is quite different. It is known to be present in Georgia, Florida, and Alabama, and is believed to be spreading to other states nearby. As its name and form imply, it is essentially a subterranean creature, spending the greater portion of its existence burrowing through the soil underground. The *changa* avoids the light, and for this reason, whenever it becomes necessary for it to emerge above ground, the dark hours of the night are selected. The insect requires a soil containing considerable moisture for its operations and in cases of prolonged drought is known to travel under cover of the night for considerable distances. Although the mole-like fore-legs of the *changa* (see illustration) render it a rather clumsy creature, it is capable of running rapidly, and the adults fly with considerable facility. The insect is particularly partial to the lighter, more compressible soils which permit of tunnelling without the removal of the material displaced by its movements.

The *changa* feeds almost entirely upon vegetable matter, remaining underground and feeding from below. It is especially fond of the tender roots of grasses and hence arises its motive for injury to golf courses and especially to the greens.

In Porto Rico it feeds upon many kinds of vegetables as well as grasses, sugar-cane, and rice. The adult *changa* is brownish in color and about one and one-quarter inches in length. It is provided with two pairs of wings, the upper pair of which are small and horny or leathery in texture. The lower pair are large and soft in character, and it is this pair

*A full discussion of this pest in Porto Rico has been published as Bulletin No. 23 of the Porto Rico Experiment Station, by Mr. R. H. Van Zwaluwenburg, from which most of the accompanying text has been compiled.



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of wings which sustain the insect while in flight. Like ordinary crickets, the changa possesses a chirping or stridulating apparatus which is operated by rubbing together the upper wings or tegmina. The adult insects are capable of living for several months, and may survive for as long as six months under favorable conditions. The eggs of this pest are laid in underground, oval chambers from 3 to 8 inches or more below the surface of the ground. The egg is about one-eighth of an inch long, half as broad, and grayish or greenish in color. The eggs hatch in about 19 days, and in warm climates, such as that of our extreme southeastern states, may continue hatching during the warmer 7 or 8 months of the year.

The young changas are active immediately upon hatching and are born with ready-made appetites. They feed voraciously almost from the beginning of their lives and consume food in proportion to their size as they develop. The young insects resemble the adults very closely, except that they do not possess wings. When held captive in the hand, mole-crickets develop an astonishing amount of energy in their fore-legs. Instances are on record from the West Indies of fowls being killed by the changa. In the Windward Islands fowls are said often to be killed by swallowing live changas which, finding themselves in uncongenial quarters, promptly burrow through the bird's crop or gullet, resulting in the death of the bird and the escape of the insect.

The insects are inclined to be exceedingly impolite among themselves, as they do not hesitate to commit cannibalism and devour one another upon slight provocation. If a strain of such individuals could be successfully propagated and turned loose on the putting green, the troubles of the greenkeepers in Florida and Georgia with this pest would be mitigated, to say the least. However, as such a scheme obviously is preposterous, the following suggestions for the control of the changa on golf courses may be found useful.

Suggestions for Control.

PLOWING.—Where it is possible to plow up the infested area, this operation is said to be of great value, as exposure of the insects, their eggs and young to the sun and air results fatally to a great number of them. However, this method doubtless will be applicable but seldom on golf links, and some less drastic treatment must be used.

TRAPPING.—Although the adult insects are often attracted to lights at night, it was found that trap-lights proved altogether inadequate in the experiments carried on in Porto Rico. Burlap bags laid flat on the ground are said to have been successfully used as traps for this pest in the Isle of Pines. The bags should be inspected each morning and any crickets found under them killed.

FLOODING.—In case infested greens are in such locations as to make it practicable, flooding them with water for a few hours might be tried. The changas will not be drowned, as they are capable of surviving submerged for hours, if not for days. But many of them will be brought to the surface of the ground by contact with the water, where they may be gathered up and destroyed.

POISONING.—This is said to be the most practicable and simple means of control for the changa, at least in agricultural lands. Whether it will be equally successful on golf grounds remains to be ascertained. In the case of cultivated crops, but a limited supply of food for the insects is present at any time, while on the golf courses and particularly on the greens, an abundant supply of tender grass roots is available, unless the greens have already been very thoroughly devoured by the insects. The most satisfactory bait used in the Porto Rico work was ordinary low-grade wheat-flour with which was mixed three per cent of Paris green. This was distributed broadcast at the rate of 300 pounds per acre and resulted in a fairly satisfactory control. The distribution of this bait in small heaps near the entrances to the burrows of the insects may be tried on greens, but in this case it will be very necessary to guard against the liability of poisoning any domestic animals which could gain access to the poison. White arsenic may be used in the place of the Paris green where desirable, as it usually may be obtained much more cheaply. There is a bare possibility that the tender grasses of greens may be burned by the application of the arsenicals as recommended and in this case hydrated lime may be added to the bait in sufficient quantities to overcome the trouble.

FUMIGATION.—Little, if any, work of this character seems to have been attempted against the changa but it seems quite possible that, under some conditions, such soil fumigants as carbon disulfid or even para-dichlorobenzine might be found useful. Since the burrows of the insect are often but a short distance beneath the surface of the soil, it may be found possible to reach them successfully with soil fumigants. The use of carbon disulfid may be attempted in cases where the infestation is of limited extent and injury is severe, in the following manner: Inject about one teaspoonful of the liquid into the soil at intervals of a foot or two over the surface, by means of a long-spouted oil can, and cover the same for an hour or two with large pieces of heavy canvas or burlap which have been previously wetted with water. This precaution will prevent the heavy gases from diffusing into the air and allow them to penetrate the soil. This method should be applied with caution as injury may result to the turf from this gas. Doubtless the best time to use this method would be the evening hours, just before dusk.