

The Southern Buffalo Gnat (*Eusimulium pecuarum*) In Mississippi 1937

By

G. H. Bradley, Associate Entomologist

Division of Insects Affecting Man and Animals

Bureau of Entomology and Plant Quarantine

United States Department of Agriculture

General

The period February 26 to March 20 was spent in the Delta Section of Mississippi, where considerable trouble and annoyance are caused each spring by the Southern Buffalo Gnat, (*Eusimulium pecuarum*). This gnat is a serious pest of livestock every year and in some years causes the deaths of large numbers of animals, chiefly mules. Each spring, even though no deaths can be directly attributed to gnat attacks, serious losses occur because work mules must be kept well coated with repellent mixtures which are injurious, causing overheating and loss of condition, and it is often necessary to keep them out of the fields in the early morning and late afternoon at which times the gnats are most abundant. The cost of repellent greases and time lost applying them also amount to considerable sums.

Time of appearance:

This year (1937) the gnats are reported to have been present in annoying numbers during the early part of February, particularly along the Coldwater River and Opossum Bayou, in the vicinity of Marks and Lambert, Mississippi,. During the period spent in this region the weather was generally cold and unfavorable for gnat activity and for farm work, but on several days during early March they were quite troublesome, especially near Webb, Mississippi, and in the Tallahatchie River bottoms between Webb and Charleston.

Breeding Conditions

Around the first of March examinations of the rivers in which the gnats are known to breed (Yalobusha, Tallahatchie, and Coldwater) showed relatively few cast pupal skins, indicating that only a small

proportion of the brood of gnats had emerged. Larvae were found in abundance, some being mature, others smaller. These examinations seemed to indicate that a serious gnat outbreak might occur at some time later in the spring if weather conditions become favorable. This year an early flood occurred which subsided to a considerable extent before many gnats were mature and myriads of them were undoubtedly stranded in quiet backwaters. This condition should bring about the absence of any excessive numbers of gnats this year even though later floods occur. Our knowledge of gnat breeding localities and conditions however is too limited to enable any worthwhile predictions to be made.

During the middle of March examinations of these rivers were made and the larvae were found to be maturing rapidly. A considerable pupation and emergence were occurring. Due to the rapid falling of the water, opportunity was afforded for examining several shallow canals and high water drains which do not have running water all year. In a part of these there was no current when examined, and being shallow, probably are dry during a part of the year. Cast pupal skins both above and below the water indicates that a heavy emergence of gnats had already occurred from some of these places. It seems probable that in these waters which had been quiet for some time prior to these examinations, only those larvae which were mature before the flood subsided were able to survive and produce adults. So far as we know, larvae of the buffalo gnat require running water for development.

Animal Deaths

Dr. Gates, Veterinarian of Clarksdale, informed the writer that he had seen one mule near Vance about March 10th which he believed had been killed by gnats. This is the only death from this cause known to have occurred up until March 20th.

Repellants

During a previous visit to the Delta at a time when gnat trouble was being experienced, experiments were made with various gnat repellants. None of those tried gave any better or more lasting protection from gnat attacks than heavy coatings of tar and grease. This generally used repellant however, seriously injures mules by clogging the pores of the skin, causes overheating, loss of flesh, and sometimes blistering. Among the repellants tested at the time was a 5% pine tar oil emulsion which, while very good as a repellant for a short period did not have the lasting qualities so much desired by the farmers of the

region. This material is cheap, easily made and can be used successfully by those who give close attention to their animals. Recently the Arkansas Experiment Station has issued a circular by Mr. H.H. Schwardt describing a fish oil soap-cylinder oil emulsion, made by emulsifying 3 quarts of cylinder oil in 1% fish oil soap. This makes a stock emulsion which is diluted with 1 gallon of water for use. It was stated that this material gives at least as good protection from gnat attacks as the commonly used repellents. Tests made by the writer with this emulsion seem to bear out the claims made and it appears to be much less injurious to the animal than oil and tar mixtures.

Due to the successful experiments made by New Jersey workers in repelling mosquitoes by the use of pyrethrum extract oil emulsion it occurred to the writer that the addition of this material to the Arkansas emulsion might improve its repellent effect on Buffalo gnats. This seemed to be the case, although a sufficient number of experiments have not been made to determine whether or not the added effect of the pyrethrum is worth the additional cost. The following are summaries of some experiments made to observe the effects of oil emulsion in repelling buffalo gnats.

Repellent Tests

1. March 3, Lambert Mississippi. Gnats were but moderately troublesome at 1 P.M. when the repellents were applied and they increased only slightly in abundance during the afternoon. Repellents were applied at 1.P.M. as follows: All animals were plowing.
 - Arkansas emulsion to 4 mules
 - Arkansas emulsion with pyrethrum extract added at rate of 1% per gallon to 2 mules.
 - Tar and waste cylinder oil to 4 mules.

During the afternoon the mules sprayed with the Arkansas emulsion needed no further general spraying. A few gnats were observed biting on 3 of them at 3P.M. At 4:30 P.M. many gnats were sticking to the faces of all mules at which time the heads were mopped over. The mules sprayed with the Arkansas emulsion with pyrethrum added were well protected from attack all afternoon and no further repellent was applied. The mules treated with tar and grease needed no further treatment until 4P.M. at which time the annoyance from biting gnats was sufficient to make a reapplication advisable. A further mopping was

given at 5P.M. At 5:30 P.M when work was stopped, none of the animals in any group were being troubled by gnats.

Discussion: The Arkansas emulsion with pyrethrum added seemed to be a superior repellent. The same material without pyrethrum being added gave better protection than the ordinary tar and cylinder oil. It must be stated however that the tar and cylinder oil mixture was applied by mopping it on the animals. This was done by the drivers in the manner to which they are accustomed. If the mixture had been uniformly sprayed over the animals as were the other two repellents it is probable that at least the 5:00 mopping would have been unnecessary. The gnats were not considered to be sufficiently troublesome on this day to draw very definite conclusions.

2. Mar. 4. Lambert, Mississippi. Gnats fewer than on Mar. 3rd, being only slightly troublesome. Teams mopped with repellents 6.am. as follows:

- Arkansas emulsion on 4 mules
- Arkansas emulsion with pyrethrum extract at rate of 1% per gal. to 2 mules.
- Tar and grease on 10 mules

Remarks: No more repellent needed on any mules all morning. Gnats not abundant enough for comparative tests. Rain in afternoon prevented work.

3. Mar. 11 Webb, Mississippi. Gnats few at 1 P.M. when animals were sprayed, then gradually increased in numbers throughout the afternoon. From 4:30 to 6:00 P.M. they were very abundant.

- 12 mules were sprayed at 1 P.M. with Arkansas emulsion
- 2 mules were sprayed at 1 P.M. with Commercial "Extra grade" gnat oil.

At 3 P.M. all mules were in good condition and no repellent application was needed.

At 3:30 P.M. the gnats were becoming troublesome. Three of the 12 mules sprayed with emulsion required spraying on face and belly, and the 2 mules sprayed with gnat oil required a general spraying.

At 4:30P.M. the faces of the emulsion sprayed mules had to be mopped over with repellent to remove biting gnats, other parts of body were free of gnats: the two mules sprayed with gnat oil had gnats on body and face and required general respraying.

At 5:00 P.M. a few gnats were biting generally on all mules and a general application was given to all emulsion sprayed mules. The mules sprayed with gnat oil required another general application.

At 5:30 P.M. gnats were extremely bad but very few were sticking to the emulsion sprayed mules. On mules sprayed with gnat oil the biting gnats appeared to be more numerous and a general respray was necessary.

At 6:00P.M. work was stopped and the mules were brought in. Some few gnats were biting, particularly on the faces of all mules. Remarks: Although difficult to gauge accurately it was believed that somewhat better protection was given to the mules by the emulsion than by the gnat oil. The gnats were so abundant between 4:30 and 6:00P.M. that they followed and alighted on the mules in swarms. Relatively however would stay on them long enough to bite. This was true of both the mules sprayed with the emulsion and those sprayed with gnat oil. The gnat oil was a product which is much used by those able to afford it and is considered one of the best on the market.

4. Mar. 12 Webb, Mississippi. Gnats very abundant 6 A.M. to 9 A.M. after which they rapidly decreased in numbers until noon. There was very little gnat activity in the afternoon until about 4:30 P.M. when they increased slightly but not sufficiently to be very annoying.

- 7 mules were sprayed with Arkansas emulsion with pyrethrum added at rate of 1% per gallon at 6:30 A.M.
- 8 mules were sprayed with commercial gnat oil at 6:30 A.M.

Of the seven mules sprayed with the Arkansas emulsion with pyrethrum added 1 was resprayed at 8:30 A.M. and the face of one was mopped again at 9:30 A.M. No more application was necessary until 2:30 P.M. when two mules plowing in a low field were resprayed. A further spraying was given at 5:00 P.M. Four of the mules were not resprayed all day. The eight mules sprayed with gnat oil were being badly bitten at 8 A.M. and all were resprayed. No further treatment was necessary until afternoon. One team

which was plowing near the emulsion treated team in the low field mentioned above was resprayed at 1:00, 2:30, 4:30, and 5:00 P.M. The other 6 mules were not re-sprayed until 5 P.M. and at that time they were not being attacked very severely, but they were being annoyed more than the emulsion sprayed mules. Remarks: The Arkansas emulsion with pyrethrum added appeared to have better lasting repellent qualities than the gnat oil. The gnats were sufficiently abundant early in the day to provide satisfactory conditions for a test, but thereafter, except in one field, their abundance diminished rapidly and they did no again become particularly annoying all day. In the field where the gnats persisted in more or less annoying numbers all day, 4 mules were working, 2 of which were treated with the emulsion and two with gnat oil. Observation indicated that those on which the emulsion was used had better and more lasting protection than did those on which the commercial repellent was used.

5. Mar. 13. Webb, Mississippi. Gnats only fairly abundant. Annoying, but not particularly so all day. At 6:00 A.M. mules were sprayed as follows:

- 6 mules with fish oil-cylinder oil emulsion containing pyrethrum extract at the rate of ½% per gal.
- 5 mules with liquid pine tar soap-cylinder oil emulsion containing ½% per gal. of pyrethrum extract.
- 6 mules with gnat oil (commercial)

Of the 6 mules sprayed with fish oil soap-pyrethrum-emulsion 4 had to be re-sprayed at 3 P.M. and the other two at 5 P.M. These latter ones could have gone all day without injury as the gnats did not increase in abundance late in the day.

Of the 5 mules sprayed with pine tar-soap-pyrethrum emulsion 3 had to be re-sprayed at 1:30 P.M. and one of these again at 4 P.M. The other two got by all day without a respraying although it was necessary to mop the face of one of these at 4 P.M. Of the 6 mules sprayed with commercial gnat oil, all were resprayed at 7:30 A.M. They were again resprayed before going to work at 1 P.M. but this application was not needed. It was necessary to respray them at 2:30 P.M. and 4 P.M.

Remarks: In these tests pyrethrum extract was added at the rate of only ½% per gallon of spray. The emulsion made with tar soap seemed to be about as efficient as that made with fish oil, and both were

superior to the commercial gnat oil. On the day these tests were made the gnats were troublesome but not particularly abundant. They also varied considerably in their distribution over the fields.

Cost of making the emulsion used in these tests

The cost of making the emulsion used in these tests is as follows:

- 1 2/3 Fish oil soap \$1.75
- 3 quarts cylinder oil at \$.50 per gal (waste oil may be used if available)
- 1 gal of water \$0.375 (Paraffin oil which costs 25 cents per gal. also makes a good emulsion.

Cost for approx. 2 gal of spray: \$ 0.55

With pyrethrum extract at \$7.50 per gallon for a 30 to 1 extract (30% of flowers in 1 gal. of extract) the additional cost for making a gallon of emulsion having 1% per gallon pyrethrum content is approximately \$0.25 and one having ½% per gallon pyrethrum content \$ 0.12 ½ per gallon.

The emulsions used were made just prior to use. The effects of soap on the pyrethrum in stock emulsion if stored for any length of time are not known.