

The Effect of Winter Temperatures of 1935-1936 on Some of the Common Illinois Insects

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The winter of 1935-36 established a record in the state for long periods of low temperatures. According to statements given in the Climatological Data sheet put out by the U. S. Department of Agriculture Weather Bureau, Illinois section, January 1936 was one of the coldest January's on record, with a minimum temperature at Freeport in Stephenson county of -27 degrees F. on January 23rd.

February was equally cold and quoting from this publication: "This was not only the coldest February since 1905, but disregarding calendar month divisions and taking the 31 day period from January 22d to February 21st a mean temperature of approximately 8.3 degrees is obtained, which is 4.3 degrees lower than the extremely cold calendar month record of January, 1917. Considering the entire winter, December to February, inclusive, State averages dating back to 1878 show only the winters of 1880-81, 1884-85, and 1917-18, to have been colder. While more severe extreme temperatures have previously prevailed over the State, frequency of zero-weather this winter exceeds that of any winter since 1884-85. Presenting the cold picture in another way, extreme north-western Illinois from January 19th to February 22d, had only four days free of zero readings, Chicago had 273 hours of zero weather, Peoria 312 hours, Springfield 168 hours, and zero readings were quite general in the southern division on 10 days."

Throughout the northern two-thirds of the state there were many days of sub-zero temperature recorded at all stations. In the northern division minimums of -66 to -21 occurred at many stations in January and about the same temperatures were recorded during two different periods in February.

In the southern division minimums were as usual higher, the January minimums for the section from Carbondale south being from -1 to -7, and the February minimum from -7 to -10. In this part of the state the cold periods were of much shorter duration. Such unusually cold weather, extending as it did over practically a 31-day period, could not help but have a marked effect on some of the hibernating insects that normally occur in this state.

During the past two months attempts to check the effect of these low temperatures on some of the more important economic species have been made. In southern Illinois Mr. S. C. Chandler, Southern Illinois

Field Entomologist, Illinois State Natural History Survey, made numerous examinations of codling moth and Oriental fruit moth larvae. For points north of Carbondale his examinations showed approximately 52 per cent of the codling moth dead. In Greene County, however, which was the most northern point covered by his examinations, 64.5 per cent of the codling moth were dead.

Of the Oriental fruit moth, 100 per cent of the larvae hibernating in cocoons on the trunks of the trees or at other points above the snow line were killed at all points where examinations were made north of Jackson, Union and Johnson counties. In Jackson County from 20 to 33 per cent of the larvae were dead and about 20 per cent were dead in Johnson County.

Our examinations in the vicinity of Urbana failed to show any living codling moth above the snow line.

San Jose scale was unusually abundant in the Fall of 1935, the warm October permitting a late development of this insect. Two weeks after the first period of sub-zero temperatures, attempts were made to determine the per cent of mortality of this scale. At this time, however, the scale was found still in a plump condition and the usual examinations made by removing the waxy scale covering from the insect did not show conclusively whether the scale was alive or dead. Three weeks later another examination was started and by this time, due to a period of warm weather, it was very easy to distinguish the dead from the living scale. A large number of samples of scale from different orchards in the southern and central parts of the state were examined during March. These examinations showed from Centralia north better than 99 per cent of the scale had been killed, the actual figures showing only 0.3 of 1 per cent of the scale alive as the average for this area of the state.

From Centralia to Carbondale between 2 to 3 per cent of the scale remained alive. In Jackson County, approximately 4 per cent of the scale was alive. In Saline County about 7 per cent survived. In Galatin County 19 per cent were alive.

In the extreme southern part of the state in Union, Massac and Johnson counties, the per cent of scale alive was 12, 10 and 16 per cent respectively.

There was, as was expected, a considerable variation in samples in this southern area, some samples showing only 1 or 2 per cent of the scale alive while others showed as high as 22 per cent of the scale alive. In cases where the San Jose scale was protected by a covering of snow around the base of the trunks of young trees, a much higher per cent of scale survived. In Pike County, for instance, we examined one sample of scale taken from under the snow cover about the base of young trees. This sample showed 35 per cent of the scale alive. Three samples taken from the same general area but not below the snow line showed 99 + per cent dead, the actual figures being 1 scale alive out of 1,300 examined.

The Oyster Shell Scale, which passes the winter in the egg stage instead of in the partly grown nymphal stage, showed only a very slight mortality from cold weather. Samples of this scale taken from central Illinois which have been hatched in the laboratory have given no more than the normal per cent of winter kill.

Tussock moth eggs and aphid eggs were not injured by the cold weather. Aphid eggs in general have shown a normal hatch in the early Spring of 1936.

In Northern Illinois, where the European elm scale has become abundant, it was hoped that the temperatures of -25 to -27 might have destroyed at least a part of the overwintering, immature scale of this species. Our examinations, however, show this was not the case. Of the samples so far examined less than 10 per cent had died during the winter. This is little if any higher than the normal winter mortality. It seems unusual that this scale should survive so well when the San Jose scale in the same area was almost completely killed out.

There was no great kill of insects that hibernate on the surface of the ground and which are protected more or less by snow during the periods of lowest temperatures.

Mr. J. H. Bigger, Western Illinois Field Entomologist, Illinois Natural History Survey, has made a number of examinations of chinch bugs and finds the winter mortality running about 15 to 20 per cent. Figures from our examinations in the eastern part of the state showed about the same mortality. Where the bugs were hibernating in clumps of grass that were exposed to the full force of the wind and were clean of snow, the mortality would run very high, in some cases over 90 per cent. As a rule, the chinch bug does not choose hibernating quarters of this type and in many of the protected areas the mortality was less than 5 per cent.

Of the other field crop insects of particular importance, Hessian fly suffered a mortality of possibly 30 to 40 per cent although where protected by snow not more than 10 per cent of the overwintering flies were killed.

Cutworms and flea beetles survived the low temperatures without any particular harm. So far as we have been able to tell the continued low temperatures and deep freezing of the ground, did not have any effect on larvae that normally hibernate beneath the surface soil, such as the white grub.

Summing up the results of our examinations to date, the abnormally cold weather had the effect of greatly reducing San Jose scale and brought about a considerable reduction of codling moth and a marked reduction of Oriental fruit moth. They had little or no effect in reducing the numbers of any of the other injurious insects on which it has been possible to make any definite check.