were removed, and soon recovered. Others continued to move, although with less vigor, for three hours, and were then allowed to remain over night in the water. The next morning practically all of them were still alive, although they had been under water for 18 hours. This indicated that flooding fields infested by these beetles would be useless as a control measure.

Dr. F. H. Chittenden, Bureau of Entomology, informs the writer that on two occasions other species of Blapstinus have been destroyed by poisoned baits used by employees engaged in Truck Crop Insect Investigations. The first of these experiments was performed by Mr. H. M. Russell in the spring of 1911 in combating an outbreak of cutworms on sugar beet in southern California. Bran, shorts and Paris green were used in the preparation of this bait. It was applied May 1 and when the infested fields were examined later, in addition to an abundance of dead cutworms, many Blapstinus beetles were found lying dead beside the poisoned bait.

UTILIZATION OF SYSTEMATIC OBSERVATIONS ON BEET LEAFHOPPER (*EUTETTIX TENELLA* BAKER) AND CURLY LEAF OF SUGAR BEETS

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Sugar companies demand information as to the number of beet leafhoppers (*Eutettix tenella* Baker) present during the spring invasion of the pest into the beet fields, and also at very frequent intervals, the extent and progress of curly leaf (curly top or blight) which this insect transmits. Reliable information must be at hand for economic reasons. The desultory manner of gathering and recording this information in the past, resulted in data of very little value to the sugar companies as a reference to the average number of leafhoppers for a certain number of beets and the possibility of securing a marketable crop. During 1920, the recording of information was put on a sound workable basis with all of the essential facts and related data. The following headings were found to be most satisfactory in tabulating the data:

Location	Date	Weather conditions	Size of beet	Curly leaf	Number hoppers per 100 ft. of beet row
Ranch 3 Doud Tract	May 4-21	8:30 a. m. sunshine, quite	6 leaves unthinned	20%	15 adults

In checking up the percentage of blight in a field, two rows of 50 beets were counted. and the average percentage of curly leaf was computed. Curly leaf was determined by examining the youngest or innermost leaf of a beet for the earliest visible symptom; namely, the transparent network of minute veins.

The determination of the number of beet leafhoppers to 100 feet of beet row is a difficult and tedious task. Trial after trial by sweeping with an insect-net proved that this method of ascertaining the number of insects in a beet field was inaccurate. The method which we employed was to disturb the foliage with the hand and carefully examine each beet and surrounding soil for leafhoppers, while the observer crawled along the row of beets on his hands and knees. Months of this experience makes one very adept and the possible error is reduced to a minimum. Time after time observers have checked the results of each other and the counts of the number of hoppers were so nearly the same, that it is felt that the data thus obtained is reliable.

In the Salinas Valley, where this work has been carried on systematically weather conditions are an important factor in ascertaining the number of insects. Early in the morning, when it is cool and still quiet, the adults in the beet fields are sluggish and easy to count. In the Salinas Valley a daily wind blows from about 10 A.M. until evening. When this wind prevails, the hoppers are difficult to find and the work for the day must cease if accurate results are to be recorded. During cloudy, cool mornings the determinations are very accurate; on warm, sunshiny mornings, the activity of the leafhopppers makes observation more difficult and less accurate.

During 1920, the number of adults in the beet fields of the Salinas Valley remained almost constant from the time that the invasion of the pest occurred in early May until the second brood adults made their appearance during the last week in June. Nymphs began to appear in early June and increased as the month progressed. The same condition with slight modifications was found to be true in the present season of 1921.

The size of the beet at the time that the leafhoppers appear in considerable numbers in the fields and the relative number of hoppers present have a direct bearing on the tonnage harvested. At King City three beet fields on which data was kept during 1920, showed the effect of the time of planting. One tract planted about April 1, was being thinned about the time that the spring brood adults flew into the beet fields during the early part of May. By June 26, these beets were all blighted,

and at the end of the season a crop of less than one ton per acre was harvested. Beets planted in January, 1921 in the same field averaged eight tons per acre. On a second tract planted about the last of March, 1920 the beets were still unthinned when the spring brood made its appearance. Blight made quick inroads on this area also, amounting to 100% by July 24. The yield from this field was 3.1 tons per acre which hardly paid for harvesting the crop. A third tract was planted in February. When the bugs appeared, these beets were making a thrifty growth and continued to grow but did not show the effect of curly leaf until much later in the season. These beets did not show 100% blight until August 20, and before that time they were ready to harvest. Even though a delay of the last irrigation due to power shortage reduced the crop, a yield of over seven tons per acre was secured from this field.

In the fog belt districts more leafhoppers were present and a higher percentage of curly leaf occurred in early planted beet fields than in fields planted after the invasion of the pest had occurred in the Salinas Valley. March plantings showed 80% curly leaf on July 23, near Chualar, while beet seeds which germinated after May 1, showed only 3% blight on August 5. At Santa Rita 60% of the early planted beets were blighted compared with 3% in an area replanted on account of the disease in the same field. The same condition occurred in the San Juan Valley; where, on one side of the river, March and April plantings were destroyed by curly leaf, while on the opposite side of the river late plantings produced a good crop.

The two following questions are frequently asked by growers: (1) Can a profitable crop of sugar beets be grown where the beet leafhopper is present? (2) Will it pay to allow beet fields that are attacked by leafhoppers to complete their growth, or is it advisable to plow up the beets and plant some other crop? Systematic observations show that under semi-arid conditions near King City, Salinas Valley, beets planted before March 1, with proper cultural methods and soil moisture, will produce a fair yield in blight years. If beets have not been thinned or have just been thinned, when the adults invade the fields, the possibility of a crop is very problematical; in fact, a failure is almost a certainty when one leafhopper to 20 beets are present. If the beets have been thinned and possess not over 16 leaves, with the same number of insects, the crop is still doubtful and the beets may or may not pay for harvesting. In the case like the latter, beets had best be left to complete their growth if there is doubt as to the success of a crop planted at this time. In the fog belt districts of the Salinas Valley where climatic conditions

are favorable, replanting may be resorted to when the first planting becomes badly blighted in the early part of the season.

Systematic records of this nature should be continued in years when the beet leafhoppers are at their maximum in number, and through the interval between outbreaks so that all conditions can be recorded. Better decisions on crop prospects with reference to curly leaf and the number of beet leafhoppers can be rendered early in the season with more data available.

THE EFFECT OF ACTIVITY ON THE LENGTH OF LIFE OF HONEYBEES

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That honeybees live longer when they are least active has been known for many years. This is especially evident from the fact that during the heavy honey-flow the worker bees live about six weeks while during the winter they may live four times as long. It may be that this difference is in some degree associated with certain physiological conditions which need not be discussed at this time, but it seems clear that the chief difference is in the amount of work which they are called upon to do. It has for a number of years been believed that the greater the activity of the bees, the shorter their term of life.

In connection with some experiments to determine the availability of various carbohydrates as food for worker bees, it was noted that the bees used as checks on the experiments, and which were given no food whatever, lived for different periods, taking an average of the daily death rate. In the first series of experiments (August 1914) the bees without food averaged 1.74 ± 0.0377 days. In the second series (September 1914) the average for unfed bees was 4.34 ± 0.0662 days. For the third series (September 1919) the average was 1.375 days. For the fourth series (May 1922) three lots of bees without food were put under different conditions, and it is the purpose of this note to discuss these results in detail. In a fifth series (May 1922) the average for the bees without food was 2.4164 ± 0.0216 days.

In the fourth series three lots of worker bees were placed in wire-cloth and wood cages and each cage was provided with a water bottle but the bees were given no food after the beginning of the experiment. The small number of drones in each cage is omitted from the following figures:—Lot No. 1 (274 bees) was placed in a dark room in the basement of the laboratory, light being introduced into the room once daily when the