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Contributions from the Entomological Branch, Department of Agriculture, Ottawa.

Locust Control Work With Poisoned Baits in Eastern Canada in 1915

BY

ARTHUR GIBSON,

Chief Assistant Entomologist.

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LOCUST CONTROL WORK WITH POISONED BAITS IN EASTERN CANADA IN 1915.

ARTHUR GIBSON

Chief Assistant Entomologist, in Charge of Field Crop Insect Investigations,
Department of Agriculture, Ottawa.

At the meeting of the Society held in Toronto in November, 1914, I gave an account of our experiments at Bowesville, Ont., with poisoned bran baits to control locusts.* Such work we considered very encouraging. During the present year, 1915, the Lesser Migratory Locust, *Melanoplus atlanis* Riley, was again enormously abundant in Ontario and Quebec Provinces and to a lesser extent the Pellucid Locust, *Camnula pellucida* Scudd. We were, therefore, able to conduct further experiments and to demonstrate the value of new poisoned baits which had not previously, under field conditions, been used in Canada.

Poisoned Baits Used in 1915.

In June last (1915) arrangements were made to conduct twenty-three experiments with various poisoned baits near Bowesville, Ont. Each experiment was on five acres and the land chosen was from adjacent farms upon which the Lesser Migratory Locust was exceedingly numerous. No poisoned bait had previously been used on any of this land. In addition to bran, shorts and sawdust were also used as carriers for the poison. Formulæ containing bran were easily mixed; shorts did not mix satisfactorily owing to the fact that it becomes sticky and lumpy which, of course, makes it more difficult to spread properly. Sawdust, if fairly well free of small pieces of wood, spreads easily, but in mixing the formulæ containing it care had to be taken to add the water slowly, as the sawdust does not absorb liquid as quickly as bran, otherwise the Paris green is liable to be washed off. In many districts where it is difficult to obtain bran sawdust may often be had for practically nothing.

The following table gives concisely the results of some of our experiments conducted at Bowesville:

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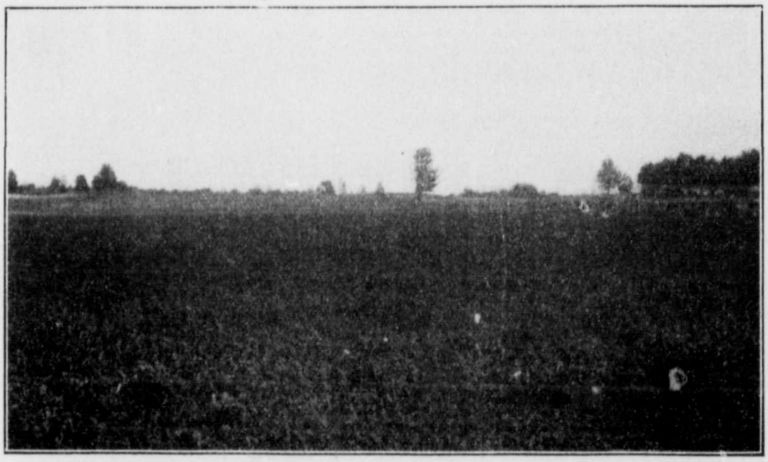
*See Rep. Ent. Soc. Ont., 1914 (1915), pp. 97-100.

	Mixture	Crop (5 acres)	Weather	Infestation	Death counts per square yard, 10 made in each field, 4 days after application, beginning at one corner of the field and walking diagonally across to the opposite corner.				Cost of single application per acre including labour	Date of application
						Highest	Lowest	Average		
1	Bran, 20 lbs. Paris Green, ½ lb. Molasses, 2 qrts. Lemons, 3 Water, 2½ gals.	Millet, 6 in. high	warm and dry	Very heavy. Locusts in all stages. Some winged	75, 10, 7, 575, 10, 40, 100, 241, 70, 90	575	7	121.8	18½ cents	June 24
2	Bran, 20 lbs. Paris Green, ½ lb. Molasses, 2 qrts. Oranges, 3 Water, 2½ gals.	Pasture	warm and dry	Heavy. Locusts very active. Some beginning to migrate	155, 250, 163, 241, 54, 50, 65, 140, 200, 710	710	50	202.8	19 cents	June 29
3	Bran, 20 lbs. Paris Green, 1 lb. Molasses, 2 qrts. Lemons, 3 Water, 2¾ gals.	Oats, 9 in. high	warm and dry	Very heavy. Locusts active. Medium number of winged individuals	26, 726, 38, 300, 26, 50, 230, 100, 300, 25	736	25	184.1	21 cents	June 25
4	Bran, 20 lbs. Paris Green, 1 lb. Molasses, 2 qrts. Oranges, 3 Water, 2½ gals.	Oats, 9 in. high	warm and dry	Very heavy. Locusts active	819, 691, 84, 630, 121, 918, 63, 80, 540, 120	918	63	406.6	21⅓ cents	June 28
5	Bran, 10 lbs. Sawdust, 10 lbs. Paris Green, ½ lb. Molasses, 2 qrts. Oranges, 3 Water, 2½ gals.	Pasture	warm and dry	Heavy. Locusts from very small to winged state	127, 100, 15, 40, 260, 35, 30, 25, 100, 200	269	15	103.2	16½ cents	June 24

	Mixture	Crop (5 acres)	Weather	Infestation	Death counts per square yard, 10 made in each field, 4 days after application, beginning at one corner of the field and walking diagonally across to the opposite corner.				Cost of single application per acre including labour	Date of application
						Highest	Lowest	Average		
6	Bran, 10 lbs. Sawdust, 10 lbs. Paris Green, 1 lb. Molasses, 2 qrts. Lemons, 3 Water, 3 gals.	Oats, 6 in. to 9 in. high	warm and dry	Heavy. Locusts in various stages. Some winged	25, 400, 530, 44, 80, 60, 125, 90, 23, 15	530	15	139.2	18½ cents	June 25
7	Bran, 10 lbs. Sawdust, 10 lbs. Paris Green, 1 lb. Molasses, 2 qrts. Oranges, 3 Water, 2½ gals.	Oats, 6 in. to 9 in. high	warm and dry	Heavy infestation. Locusts active.	118, 116, 197, 33, 70, 258, 204, 200, 190, 104	258	33	149	19 cents	June 25
8	Sawdust, 20 lbs. Paris Green, ½ lb. Salt. ¼ lb. Water, 3 gals.	Oats, 9 in. to 12 in. high	warm and dry	Heavy. Locusts active. Many winged from adjacent uncultivated land	30, 121, 404, 46, 720, 650, 100, 35, 80, 100	720	30	228.6	7 cents	June 25
9	Bran, 20 lbs. Paris Green, 1⅙ lbs. Molasses, 4½ qrts. Water, 2 gals.	Oats, 9 in. to 12 in. high	warm and dry	Heavy. Locusts active.	246, 840, 509, 473, 210, 368, 230, 1,200, 616, 450	1,200	210	514.2	27 cents	June 30

From the above table it will be seen that in fields where mixtures Nos. 2 and 4 containing oranges were used, higher death counts per square yard were obtained. The mixtures in which sawdust was used are, indeed, very promising and further work with these mixtures will be conducted. The results obtained with mixture No. 8 are certainly remarkable and indicate the value of this new and very cheap poisoned bait. In the report of the Society for 1914,* Mr. Norman Criddle stated that he had experimented with sawdust and salt in Manitoba and claimed that with the salt and sawdust he obtained about the same results as with salt and bran. In the experiments tabulated above the highest death rate was obtained, as will be seen, in the use of mixture No. 9, which killed, on an average, 514 locusts per square yard of field.

As above mentioned each mixture treated an area of five acres. In the sawdust mixtures the amount of water necessary, of course, will vary with the dryness or otherwise of the material at hand. Two gallons may be sufficient, or more may be required. The carrier, whether this be sawdust or bran, should be noticeably moistened, not made into a mash, or moistened too much to prevent its being crumbled through the fingers. The farmers in general on whose lands the experiments were conducted were much pleased with the success of the mixtures. Those on whose fields mixtures 3, 4 and 8 were used have specially reported that the crops were saved by the treatment. In all of these experiments only the one application was made. The work of spreading the mixtures and making the death counts was satisfactorily accomplished by Mr. T. Rankin, a student assistant.



Oat field at St. Etienne de Gres., Que., saved by one application of poisoned bait. (Original.)

At Lanoraie, in Quebec Province, a series of similar experiments were conducted under my direction by Messrs. Beaulieu and Beaulne, officers of the Entomological Branch. Unfortunately, the work here was seriously interfered with by exceptional heavy and continuous rain and wind storms. In heavily infested fields where mixtures similar to Nos. 1, 2, 3 and 4, but with shorts instead of bran, the locusts were much reduced in numbers by the application, but the

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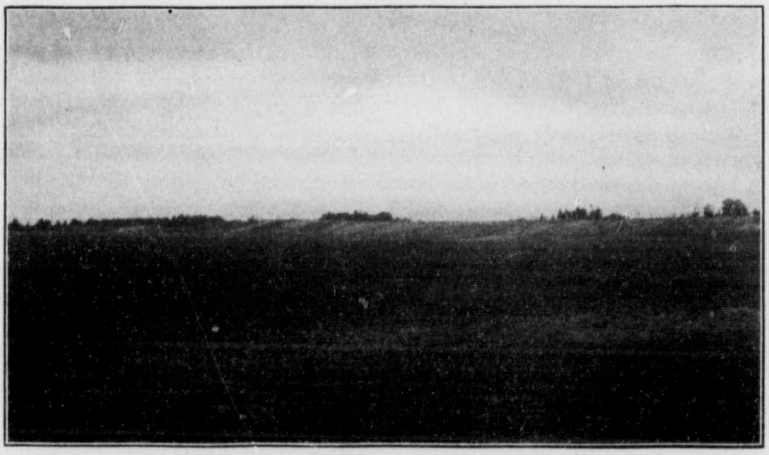
*Rep. Ent. Soc. Ont., 1914, p. 102.

heavy rains which followed soon after the mixtures were spread made it impossible to make important observations as to the death counts. On June 17, mixture No. 6, as above, was spread in a field of oats. Five days later three counts only were made owing to a misunderstanding and these gave 300, 305 and 328 dead to the square yard. A heavy rain and wind storm took place between 3 p.m. and 9 p.m. on June 17, and undoubtedly many locusts which had fed on the mixture in the early morning were poisoned and later washed away by the deluge. On June 28, mixture No. 1 distributed over a pasture field resulted in an average of 129 dead locusts to the square yard. Sixteen counts were made across the field and on the date mentioned many of the insects were in the winged condition. On June 25 I visited Lanoraie and in a field of rye in which mixture No. 3 with shorts used instead of bran large numbers of dead insects were observed. The following counts in different parts of the field were made, 220, 635, 408, 235, 195, 523, 609, 395, 259, an average of 386 dead to the square yard. Dead locusts were found in numbers as far as 249 feet from the treated field.



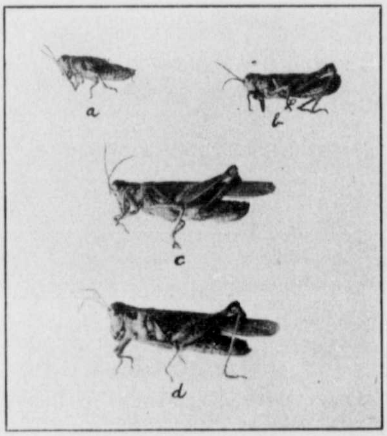
Part of abandoned farm, Valmont, Que., now a breeding ground for locusts. (Original.)

ORGANIZATION AND CO-OPERATION NECESSARY TO CONTROL LOCUSTS OVER WIDESPREAD AREAS.

In 1915 the value of early organization to control serious outbreaks of locusts was strikingly illustrated in the Province of Quebec. In the Parish of St. Etienne de Gres where our Entomological Circular No. 5 had been freely distributed, and where control work had been conducted in 1914, the farmers organized under the immediate direction of Father J. I. Trudel, the resident Parish Priest and Agricultural Missionary. In this parish, practically all farm land—estimated at over 21,000 acres—was treated with mixture No. 1, using Paris green, however, in the strength of 1½ pounds for each 20 pounds of bran. The bran, Paris green, molasses and lemons were purchased in large quantities at wholesale rates, and the mixture distributed over the land during the week beginning June 4, at which time the locusts were from one-quarter to one-half an inch in length. Counts made a few days after the application in various fields ranged from 80 to 120 dead locusts to the square foot. I visited St. Etienne de Gres on June 23 and examined many of the treated fields. Comparatively few living locusts could be seen and the farmers generally were much pleased with the effectiveness of the mixture. Father Trudel estimated that 90 per cent. of the locusts had been killed. Of the area treated about 7,000 acres were in oats. These crops, as well as fields of other grains and vegetables, were saved from destruction. According to the Parish Priest, not a single field was devastated and the pasture lands in addition were protected from injury. The cost of the application at St. Etienne de Gres was 15 cents an acre, exclusive of labor.

Following the advice given in our Entomological Circular No. 5, similar work was carried on in 1915 in the following additional parishes of the Province of Quebec: Mont Carmel, Pointe du Lac, St. Boniface de Shawinigan, and Almaville. The Quebec Department of Agriculture, I am informed by Mr. J. A. Grenier, Provincial Deputy Minister of Agriculture, made the following grants to assist the farmers in the purchase of bran, Paris green, etc.:

St. Etienne	$1,013 00
Mont Carmel	675 00
Pointe du lac	200 00
St. Boniface de Shawinigan	100 00
Almaville	100 00



Lesser Migratory Locust, *Melanoplus atlanis: a, b,* young hoppers; *c,* adult male; *d,* adult female.
(Author's illustration.)

I have already referred to the results obtained in the Parish of St. Etienne. In the Parish of Mont Carmel the farmers, under the guidance of Father E. Fusey, treated 7,400 acres, of which 2,000 acres consisted of farm land which had been abandoned owing to the continuous outbreaks of the locusts. In some fields, in 1915, crops of vegetables and grain were harvested for the first time in eleven years. The Parish priest reported complete success in the use of mixture No. 1, with Paris green used in the strength of 1½ pounds to the 20 pounds of bran, in his opinion 95 per cent. of the locusts having been killed. On June 22, I visited the parish and very few living locusts, indeed, were present in the fields examined. Mr. G. Beaulieu, Field Officer of the Branch, who was also present in the same district during the period June 20 to 29, could not find any fields sufficiently infested to enable him to undertake control experiments similar to those conducted at Bowesville, Ont. In some fields a second treatment was given owing to very heavy rains following the first spreading.

In the Parishes of Pointe du Lac, St. Boniface de Shawinigan and Almaville, similar satisfactory results were obtained and the farmers generally were well pleased with the poisoned bait, which certainly saved from destruction many fields of crops.

The question of the control of locusts is a very important one to many farmers in Eastern Canada, but we are extremely hopeful as a result of our experimental and field demonstration work, that the destruction of these insects in future outbreaks will be a comparatively simple matter—largely one of proper co-operation. Farmers living in districts where locusts are destructive should organize in early spring so that a sufficient quantity of poison, etc., will be readily available to distribute over the fields when the locusts are about the size shown at *a* and *b* of figure herewith of the Lesser Migratory Locust. The poisoned bait should be applied early in the morning (before or very soon after sunrise) on or about the same day. Twenty pounds of poisoned bait is sufficient to treat five acres. It is, of course, not necessary that the mixture be applied to all of the land, but by scattering it thinly here and there throughout the fields sufficient of the bait will be distributed to attract the locusts from considerable distances. In the preparation of the bait it is wise to guard against the breathing of the fine particles of the Paris green. This may be avoided by tying a handkerchief, loosely, over the mouth and nose.