From Hopperdozers to DDT:

Agricultural Insects In Butler County, Kansas

By Mark D. Weeks

"Judge Lamdin, who is just in from Butler county, states that the reports of damage by grasshoppers are not exaggerated. The insects have traversed a belt of country about six miles wide, devouring every green thing. Young fields of wheat have been completely destroyed."[1] This report from a Topeka observer in the *Leavenworth Conservative*, describing the grasshopper plague of 1861, showed that from the earliest settlement of Butler County, its farmers and stock raisers waged a never-ending war with insect pests. The insects which caused so much difficulty comprised two groups: insects that damaged or destroyed crops and parasites that harassed livestock, such as cattle. People involved in agriculture in Butler County fought insects with a large amount of manual labor, sometimes in conjunction with mechanical devices or simple chemicals. Some methods, often remarkably successful, persisted until the advent of contact insecticides.

The insect most destructive to crops was the locust, or grasshopper of which Kansas has an overabundance; there are more than 150 locust species in the state. The lesser migratory grasshopper caused most of the damage to crops in normal years, though other species that figured in locust outbreaks in Butler County were thistle, Packard's differential, two-striped, and red-legged grasshoppers.[2]

The life cycle of the grasshopper begins when females deposit their eggs about two inches into the soil in such areas as field margins and roadsides. Grasshoppers hatch out between April and June, depending on the species and spring weather conditions, and emerge to destroy such crops as wheat and corn. While feeding on wheat they damage the leaves and stems; on corn they eat the leaves and chew on the tassels, husks, and silk.[3]

Prior to the advent of contact pesticides, farmers and scientists developed several methods to combat grasshoppers. Some were aimed at the eggs. For example, some farmers plowed up the infested area in the fall and destroyed eggs laid in the soil. Others killed young and adult grasshoppers. The hopperdozer was a favorite device to catch and kill locusts. It consisted of a shallow pan mounted on a low sled or a hay buck with a vertical screen at the back to catch flying grasshoppers. The pan, divided into compartments, was filled with water to about one inch, then, crude oil or kerosene was poured over the water to form a film. Draft animals (and later automobiles) pushed or pulled the hopperdozer through the infested field; the frightened grasshoppers then leaped

Demonstrating a hopperdozer attached to the county agent's automobile, Butler County, 1936.
Photo courtesy Butler County Extension Office.

up in front of it, hit the advancing screen, and fell into one of the compartments and smothered in the oil-saturated pan. Another way of killing adult grasshoppers was to poison them with a bran mash that was first recommended by the Kansas Agricultural Experiment Station in 1920: the deadly bran contained twenty pounds of bran, one pound of white arsenic, a half-gallon of syrup, three gallons of lemons or oranges, and three and one-half gallons of water. Farmers applied the mixture in dry conditions; typically at edges of fields.[4]

Butler County suffered even worse locust outbreaks than the one in 1861. In 1874 a grasshopper plague descended on the entire plains region. T. B. Murdock, editor of El Dorado's *Walnut Valley Times*, wrote to Governor Thomas Osborn, "The grasshoppers are in here in untold millions and will leave many of our people in a destitute condition. We will need assistance."[5] The grasshoppers continued to reappear throughout the decade. A survey of locust infestation in 1876 by the Kansas State Board of Agriculture found that grasshoppers arrived in Butler County in August and damaged the wheat and rye by fifty percent. The next year, 1877, an article in the *Walnut Valley Times* reported that there were few grasshoppers and they were causing no damage, and another article the following year gave hope that the destruction caused by the locust might one day be controlled.[6]

The arrival of the twentieth century brought no end to the war between man and grasshopper. During the late 1920s grasshoppers were not a serious problem, and the Butler County agricultural extension agent recommended poison bran mash when problems did occur. On the night of June 17, 1936, thousands of grasshoppers descended on El Dorado, which called attention to the locust plague in the county. The event headlined the *El Dorado Times* the following day. Walter Zecksler, the Butler County agent, with help from Kansas State College, organized a county-wide campaign against grasshoppers. As part of a federal allocation to fight grasshoppers, Butler County received twenty barrels of sodium arsenate. The poison arrived on July 10, and by July 13 the campaign was underway. Meanwhile, as Zecksler noted in his 1936 report, he supervised the building of a hopperdozer at the farm of E. R. Boyer, but the poison proved more effective. The county agent distributed poison to farmers annually from 1936 until the 1940s to combat their grasshopper problems.[7]

The chinch bug was another agricultural pest which played havoc with Butler County farmers. The Kansas State Extension Service gave a description of the bug in 1920 as "one of the most destructive of all the native insects attacking grain and grass crops in Kansas."[8] Chinch bugs attack in large numbers and feed on a wide variety of plants. These difficulties--along with the problem that the insect feeds on plant sap, and so poisons applied to plant surfaces have no effect--make the chinch bug a difficult pest to control.

The life cycle of the chinch bug produces two generations each season. The insect survives each winter as an adult hiding in the bases of clump-forming native grasses and in the spring the female lays her eggs in blades of grass or in the ground surrounding the plants. The eggs hatch out after seven to forty-five days, depending on the air temperature; then wave after wave of insects spreads across the land.[9]

Early methods of controlling chinch bugs included fire and man-made barriers. Farmers burned areas of grass where the adult insects gathered for the winter, then in the spring they built chinch bug barriers to prevent the insects from getting into crops, because once infested, the crops were usually ruined. The earliest type of barrier was the dust barrier. A farmer plowed a furrow with a plow or lister between a non-infested field and an infested one. A horse then dragged a log along the furrow to stir up dust, with dust acting as a repellent to the bugs and keeping them from the crop. Dust barriers were used in Butler County in the early twentieth century, but one farmer from the region said that the ones he remembered were slightly different. The difference was that instead of a furrow, the

farmer disced a strip about four feet wide with a disc harrow; a horse then pulled a large tree branch along it to raise up dust.[10]

Building a creosote chinch-bug barrier on the C.C. Cunningham farm, in Butler County, 1933.
Photo courtesy Butler County Extension Office

By the 1920s the Kansas Agricultural Experiment Station advised farmers not to use dust barriers, because they were ineffective when it rained. Instead they recommended that they use creosote barriers. The experiment station provided information on how to construct this type of barrier. First, it recommended that a furrow be plowed between infested and non-infested fields. The dirt was thrown away from the infested field, and the farmer was to pour a line of creosote about one-half inch wide on the ridge formed on the side of the non-infested field. The most common way of killing the insects was to dig twelve-inch-deep postholes about sixteen feet apart along the creosote line and fill the holes with about a half-ounce of calcium cyanide daily. The farmer then poured creosote wings from the holes at angles of about thirty degrees from the creosote line. The bugs, repelled by the odor of the creosote line, followed along it and, guided by the wings, eventually tumbled into the postholes and died from the calcium cyanide.[11]

Butler County had more than its share of problems with the chinch bug. In his 1922 report the Butler County agent stated that there were chinch bug burning campaigns in several communities in the late fall. The pest reappeared in the spring of 1923, but rainy weather prevented much damage until the late summer and early fall, when a new generation arrived. More chinch bug burnings were scheduled for the late fall. By 1927 the county agent placed more emphasis on demonstrations of barriers and less on burnings. In one report, the county agent wrote "On the farm of Mr. Milburn, the bugs were trapped and killed with a blow torch, with tampers." This method was cost-effective, and "almost no bugs went into the adjoining corn fields." Milburn considered the method successful, the county agent said, and "will use it again during the season of 1928, if necessary."[12]

Butler County farmers continued fighting the chinch bug throughout the 1930s. During the fall of 1930 another burning campaign was started, but with little success. The county agent reported that chinch bugs were numerous in the summer of 1933 "and did severe damage to corn and sorghums." A few farmers used creosote barriers effectively, but most of them constructed no barriers, although creosote was being sold at a reasonable price. By 1934,as an emergency measure, the federal government decided to distribute a mixture of creosote and oil free to farmers as an incentive to build chinch bug barriers. Eighty barrels of creosote oil were distributed to thirty-two farmers in Butler County, with twenty-one of them using it. All farmers who received creosote oil had a questionnaire sent to them to check on results, and the majority, seventeen, had positive responses. However, one farmer missed the idea that the creosote oil was to be used to construct barriers; he thought the oil was to be sprayed on the insects, and he wrote that those he hit were destroyed.[13]

Cutworms were another menace to crops. The Kansas State Extension Service referred to them as "among the most troublesome insects with which farmers have to deal." The worms have no preference among the plants they feed on and attack crops such as alfalfa, oats, and corn, cutting off the plants just below the ground surface.[14]

The moths or millers begin the life cycle. The adult moths fly at night, looking for food and a place to lay their eggs. Each moth lays around 500 eggs in grassy places and alfalfa fields, and they care for them constantly from summer to fall, until they are hatched. The worms begin feeding at once and continue until fall, when they find cover and hibernate. They awaken and start feeding again in early spring, mature into pupae in late spring, and become moths a short time later.[15]

Cutworms severely damaged crops during the 1920s and 1930s in Butler County. In 1927, the county agent reported that the worms caused extensive damage "to the early planted corn and much replanting was done two or three times due to their ravages."[16] A poison bran mixture similar to that used against grasshoppers was the principal means of controlling cutworms. The farmer applied the bran in the evening (just before the worms started feeding) around the base of plants.[17] An agent in 1933 noted that the most serious outbreak of cutworms experienced in many years broke out in northwest Butler county during the past spring and summer, and that entire fields of wheat, oats and alfalfa had been destroyed. A poisoning campaign, however, was started in time to save most of the alfalfa and many of the wheat and oats fields as well. This poisoning campaign began at the farm of John Ep, Jr., near Whitewater.[18]

The campaign continued, despite problems. The Farm Bureau purchased white arsenic and molasses in bulk for farmers, and the poison and molasses were distributed at the Hinkson elevator in Brainerd, and at the Farmers' Union Store in Burns. In 1933, 2800 pounds of white arsenic was distributed in the county and 2950 acres were treated with poisoned bran mash.[19]

Insect pests not only damaged crops in Butler County, but they also harassed livestock. Early stock raisers and farmers knew that the heelfly bothered cattle, but only later did they discover that the fly was responsible for the grubs that formed ox warbles on the backs of cattle. The Kansas State Extension Service stated in the mid-1920s that the ox warble was "probably the most injurious insect of cattle." The insect was dangerous to cattle at various stages--first when the flies laid their eggs on the animal's heel, causing it to become excited and run wild, and second when they were in the larval stage, working up the throat of the host on the way to its back, robbing the animal of its energy.[20]

Ox-warble insects exist in four stages: adults or heelflies, eggs, larvae or grubs, and pupae. The adult heelfly lives only during the early spring and has the sole purpose of perpetuating the species. Heelflies lay their eggs on the feet of an animal in the stiff hairs above the hoof. The eggs hatch into larvae or grubs in about eight days, crawl down the hair, and bore into the flesh of the leg. The grubs then make their way to the back of the animal, and once there they cut holes and cause warbles to develop. When the larvae mature, they squeeze through the holes, drop to the ground, burrow into the soil, and become pupae. In about six weeks the pupae become adult heelflies.[21]

Early methods used to control this pest were somewhat crude. Farmers and ranchers gathered their cattle at the time when grubs cut holes in the backs of livestock, and they restrained and examined each animal. If an animal was found to be infected, the larvae were forcibly squeezed out of the holes and benzol was applied to the heads of the grubs.[22]

The Butler County agent was responsible for organizing ox-warble control demonstrations during the 1930s and 1940s. In 1932 E. G. Kelly, extension entomologist from the Kansas State Extension Service, gave two such demonstrations in Butler County, trying to get farmers to adopt control procedures. The Farm Bureau sent out a questionnaire the following year to see who was using ox-warble control. From the survey data the agent concluded, "While the list does not represent all the farmers adopting the practice, it is interesting to note the practice of ox-warble control is most common in the vicinity of meetings and that most men [who] replied that they were using the practice have been to one of the demonstrations." Ox-warble control demonstrations were held each year until 1945, but that year a new substance arrived that was called DDT.[23]

The *Thirty-fifth Biennial Report of the State Board of Agriculture*, covering 1945-1946, proudly proclaimed a break-through in the fight against agricultural insects: "Insect control has entered a new era with the introduction of DDT and the related series of organic insecticides which accomplish things beyond the wildest hopes of entomologists ten years ago. This new insecticide became available to the public in Kansas during 1945. It had received so much favorable publicity . . . that the public was thoroughly convinced of its merits before it could be purchased on the commercial market." DDT was a contact insecticide. This meant that if an insect came in contact with a minute amount of it, the chemical would work its way into the insect's nervous system and kill it.[24]

Stock raisers and farmers first used DDT against livestock insects in Butler County. "The most outstanding event in the past year has been the introduction of D.D.T. in the control of livestock insects," reported the county agent in 1945. "This will make revolutionary changes."[25] DDT was first used as a heelfly treatment that year at the F. R. and William Condell ranches. During this first treatment E. G. Kelly was there to observe, along with representatives of the National Livestock Loss Prevention Board, the United States Bureau of Entomology, and the State Livestock Sanitary Commissioner. The sprayings continued throughout that summer, and the fly population steadily declined. The next year the county weed sprayer used DDT for fly control, the areas where livestock were quartered were sprayed, and most of the stock raisers began a program of spraying their herds. A new era in insect control had begun.[26]

During the 19th and early 20th centuries farmer and county agent joined forces in the war against insect pests. At times county agents and the Kansas State agricultural at Manhattan provided ideas and technologies to aid in the struggle; sometimes folk technologies developed by the farmers proved effective. Combined these forces held back the enemy until contact pesticides were developed.

Notes

1. George Allen Root, "Grasshoppers," final draft manuscript, Manuscripts Division, Kansas State Historical Society.

2. Reginald H. Painter, Harry R. Bryson, and Donald A. Wilbur, *Insects That Attack Kansas Wheat*, Kansas Agricultural Experiment Station, Bulletin 367 (1954), p. 15.

3. *Insect Pest Management For Corn On The Western Great Plains*, Kansas Cooperative Extension Service, Bulletin 612 (1981), p. 20; Painter et al, *Insects That Attack Kansas Wheat*, p. 16.

4. F. B. Milliken, *Methods of Controlling Grasshoppers*, Kansas Agricultural Experiment Station, Bulletin 215 (1916), pp. 6-9.

5. T. B. Murdock to Governor Thomas Osborne, 19 August 1874, Governor's Office Correspondence Files, Box 7, Archives Division, Kansas State Historical Society.

6. T. B. Murdock to Governor Thomas Osborne, 24 March 1875, Governor's Office Correspondence Files, Box 9, Archives Division, Kansas State Historical Society; *Walnut Valley Times*, 28 May 1875; Kansas State Board of Agriculture, *Fifth Annual Report, 1876*, p. 269; *Walnut Valley Times*, 11 May 1877 and 21 June 1878.

7. Annual Report of the Butler County Agricultural Extension Agent, 1927, p. 38, Butler County Extension Office (repository of all county agent reports here cited), Butler County Courthouse, El Dorado; *El Dorado Times*, 18 June 1936, 22 June 1936, 1 July 1936, 2 July 1936, 7 July 1936, 9 July 1936, 10 July 1936, and 13 July 1936; Annual Report, Butler County Agent, 1936, p. 87, 1937, p. 116, 1938, p. 34, and 1939, p. 86.

8. E. G. Kelly, *Controlling Crop Insects*, Kansas Extension Service, Bulletin 62 (1929), p. 14.

9. Ibid.; *Insect Pest Management For Corn On The Western Great Plains*, pp. 11-12.

10. T. J. Headlee, *Burning Chinch Bugs*, Kansas Agricultural Experiment Station, Circular 76 (1910), pp. 1-7; J. W. McColloch, *Chinch Bug Barriers For Kansas Conditions*, Kansas Agricultural Experiment Station, Circular 113 (1925), p. 6; Glenn Lucas, interviewed by Tom Isern and Mark Weeks, El Dorado, 22 November 1985.

11. McColloch, *Chinch Bug Barriers For Kansas Conditions*, pp. 2-5.

12. Annual Report, Butler County Agent, 1922, n.p., 1923, n.p., and 1927, p. 39.

13. Annual Report, Butler County Agent, 1931, p. 59, 1933, p. 114, 1934, pp. 63-65, 1936, pp. 86-87, 1940, pp. 61-62, 1941, p. 72, and 1942, p. 106.

14. Kelly, *Controlling Crop Insects*, p. 25.

15. Ibid., p. 26.

16. Annual Report, Butler County Agent, 1927, p. 37.

17. Kelly, *Controlling Crop Insects*, p. 27.

18. Annual Report, Butler County Agent, 1933, pp. 113-114.

19. Ibid., p. 114.

20. Kelly, *Controlling Crop Insects*, pp. 29-31.

21. Ibid., pp. 31-32.

22. Ibid., p. 32.

23. Annual Report, Butler County Agent, 1932, p. 74, 1933, p. 115 (quote), 1940, p. 61, 1941, p. 72, 1944, p. 60, and 1945, p. 60.

24. "What We've Learned About DDT," Kansas State Board of Agriculture, *Thirty-Fifth Biennial Report*, 1945-46, pp. 59-60.

25. Annual Report. Butler County Agent, 1945, pp. 60-61.

26. Ibid.; Annual Report. Butler County Agent, 1946, p. 88.