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Alkali Bees vs. Drainage

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WHEREVER alkali bees (Nomia melanderi Ckll) are abundant, alfalfa seed yields are likely to be high. Experience in Washington, Wyoming, Idaho, and Utah proved that these bees, without help from other species, can pollinate large acreages. In most of the areas where alkali bees are important, alfalfa seed growers are interested in keeping them healthy.

Since alkali bees nest in the soil in dense aggregations (fig. 1), effective populations may occupy a limited acreage. Also, since they migrate readily to new nesting sites, effective populations may suddenly appear in favorable areas and build up rapidly from year to year. These characteristics make it feasible for growers having land favorable for nesting to attract aggregations and to maintain nesting sites without sacrificing much land. However, growers must understand the rather specific requirements of alkali-bee farming. Furthermore, they may find it necessary to compromise with what are generally recognized as efficient irrigation and drainage practices.

Nesting Sites

Districts favorable for alkali bees have certain characteristics in common: rainfall is low, midsummer temperatures are high, and the soil has a compact or “tight” structure. The land surface is characterized by alkaline, wet zones on low slopes or mounds. Such conditions occur principally in the lower land of the arid, treeless valleys of the West.

Before the development of irrigation in the West, alkali bees must have nested in naturally moist areas. However, populations were undoubtedly small since now nearly all of their forage consists of weeds along irrigation channels, alfalfa, and other introduced plants in irrigated fields.

Under modern conditions, extensive nesting sites may be found where the aquifers under broad valleys are subjected to artesian pressure. More restricted sites occur along certain natural watercourses where the river bottom is somewhat higher than adjacent land, or where a local high water table develops along the margins of cut-off ox-bow channels. Basic requirements for the occurrence of nesting in both of the above situations are (1) subsurface moisture (fig. 2), (2) alkalinity, and (3) freedom from flooding.

Today, by far the greatest numbers of nesting sites are found in seeped areas resulting from underground movement of excess irrigation water. The establishment of new irrigation districts, or the expansion of old ones, is often followed by a rapid increase in the number and size of alkali bee nesting sites. Such a development is now taking place in the Hosa area of Washington. Irrigation and the presence of new forage cause the bees to establish new holdings and expand their old ones. Increased seed yields resulting from increased pollination encourage the farmers to develop more seed acreage and more irrigation. Under such “snowballing” conditions alkali bees can easily keep pace with expanding seed acreage. The Wapato, Washington, and Riverton, Wyoming, seed districts bear witness to this.

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Two New Department Heads Named

Howard B. Peterson

Dr. Howard B. Peterson has been appointed to succeed Dr. D. W. Thorne as head of the Department of Agronomy. Dr. Peterson has been a member of the staff since 1940 when he was appointed research associate in agronomy. He is a native of Redmond, Utah, and a graduate of the Brigham Young University and the University of Nebraska where he received his doctor of philosophy degree in 1940.

Dr. Peterson’s research has been in the area of soil chemistry and fertility. From the spring of 1949 until the fall of 1950 he acted as project leader of phosphate fertilizer investigations for the U. S. Department of Agriculture. He is joint author of the book “Irrigated soils: their fertility and management,” in collaboration with Dr. Thorne. In addition he has written a number of bulletins and technical articles. He has been active in national agronomic organizations. During 1940 he was president of the Western Society of Soil Science.

Arthur J. Morris

Arthur J. Morris, professor of dairy industry and assistant dean of the school of Agriculture, has been appointed head of the Department of Dairy Industry on the retirement of Professor George B. Caine from administrative duties, July 1.

Professor Morris obtained both his B.S. and M.S. degrees from USAC in 1923 and 1930, respectively. He has done graduate work in dairy manufacturing at the University of Wisconsin.

From 1923 to 1930, Professor Morris was on the staff of the Branch Agricultural College at Cedar City. He came to USAC in 1931 as assistant professor of dairy industry in charge of the creamery. He was appointed associate professor in 1934 and professor in 1942. The students he has trained in dairy manufacturing now hold positions of responsibility in industry and in land grant colleges throughout the nation.

Professor Morris has won national recognition for his teaching and his efforts to improve dairy products. He has taken an active part in the activities of the Utah and the American Dairy Association. In 1941 he was appointed chairman of the western division of the American Dairy Science Association, in 1944 he became state manager of the American Dairy Association in Utah, a position he still holds. In 1952 he was elected secretary of the manufacturing section of the American Dairy Science Association, in 1953 he became vice chairman, and he is now national chairman of the manufacturing section.

ALKALI BEES

Decline of Populations and Destruction of Nesting Sites

Unfortunately, it seems that just when things are going at their best for the bees, trouble strikes, and populations of alkali bees decline. Nesting sites may dwindle gradually from year to year or virtually disappear in a single season. In Wyoming the opinion has developed among growers that alfalfa seed can be grown successfully in an area for only about five years. The fact that seed yields in the past have declined rapidly after a few years of high yield may have resulted partly from lack of lygus bug control, but the association in Wyoming of seed production and alkali bees makes one suspect that declining bee populations have been largely responsible. Such a decline seems to be taking place now in two of the newest and most successful “alkali bee seed areas”—South Pavilion and Hidden Valley, located on the Bureau of Reclamation project near Riverton, Wyoming.

Why do populations of alkali bees often decline so soon after a rapid increase? Expanding populations of insects are usually leveled off or reversed by one or more of four principal factors: (1) parasites and disease, (2) weather, (3) reduction of food sources, and (4) use of insecticides. The first and the last of these are important in the case of alkali bees. A parasitic fly, Heterostylus robustum O.S., has nearly eliminated alkali bees from Cache Valley, Utah. Pathology has done likewise for certain nesting sites near Delta, Utah. However, neither factor appears to have played much part in the declining population of nesting sites near Riverton, Wyoming, and Fort Hall, Idaho.

Nesting sites of alkali bees may be damaged or destroyed by (1) flooding, (2) ploughing, (3) encroachment of dense weed growth, (4) excessive seepage moisture, and (5) drying up. Flooding may

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centrate had a better feed conversion factor than those fed the combination of protein supplements. The high fat level in fish meals would be expected to improve feed conversion.

The heavier weights of the chicks fed the combination protein supplement was undoubtedly a result of greater feed consumption as the lots fed only fish meal had a better feed conversion factor.

Thus the results of this investigation establish the feeding value of carp meal to be equal to or better than fish meals sold on the open market.

Production of Carp Meal Still a Problem

The economic problems connected with mass production of this fish meal must be investigated further. Of considerable importance is the amount of fish oil that can be recovered in the processing operation and the problems of purifying and marketing.

The amount and vitamin content of the oil are of major importance in the economy of processing the carp into meal.

ALKALI BEES
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be caused by overirrigation, or abnormally high rainfall. Destruction by ploughing, ironically enough, may be caused by the high yields which the bees bring about. When yields and prices are favorable, the grower, in his anxiety to place more land under cultivation, "destroys the goose that lays the golden egg."

Damage to nesting sites by excessive seepage moisture rarely has been observed. However, in one site near Flowell, Utah, and in several near South Pavilion, Wyoming, areas within nesting sites have become so moist that free water can be squeezed out by hand. This condition results in extremely late emergence of the bees and a general avoidance of the spot by nesting adults. In the cases observed at Riverton plenty of suitable area remains around the wettest zones and it would probably be a mistake to attempt to reduce the moisture supply.

Drying of the soil in the nesting sites is the most common cause of nesting site abandonment. It is directly associated with drainage and irrigation practices and generally results from (1) construction of drainage ditches, (2) lining of irrigation ditches, or (3) drought. In the flat areas around Delta, Utah, a rising water table made necessary an extensive system of drainage ditches. However, as a result of these drains, the nesting sites were limited to a few remaining areas where deep confined water built up artesian pressure, upward ground water flow, and waterlogged overlying clays. The establishment and use of drainage pumping systems to eliminate the remaining seeped areas, would probably come close to eliminating the alkali bee as an important factor in the pollination of alfalfa.

Effect of Efficient Irrigation on Nesting Sites

Alkali bee areas around Wapato, Washington, Riverton, Wyoming, and the Uinta Basin in Utah are principally on low benches where waterlogging is caused by an underlying hard pan. Here, water in the seeped areas is derived principally from unlined irrigation ditches and canals a short distance away on higher ground. The seepage water is augmented periodically by deep percolation from fields under irrigation. In the Riverton area water loss through the sandy canal beds is unusually high and a ditch-lining program is under
way. In 1954 several formerly populous nesting sites were observed in which, as a result of ditch lining, the soil had become nearly dry and the alkali bees had declined or disappeared. If the trend continues, it may be only a question of time until alkali bees no longer exist in useful numbers and growers in the area give up production of alfalfa seed.

It is apparent that the making of proper recommendations for the preservation of alkali bees is a delicate matter. Where the water table under a large area rises to damaging heights, drainage is probably justified even if it means losing most of the alkali bees. However, within a large territory needing drainage, it might be feasible to set aside and preserve certain undrained areas known to harbor bees. In the case of seed-producing areas like those near Riverton, Wapato, and the Uinta Basin, complete ditch lining would almost certainly result in smaller rather than larger farm incomes.

Compromises Needed

There is an obvious conflict between efficient water management, and the preservation of optimum nesting condition for alkali bees. Compromises resulting in some sacrifice of water and tillable land will probably work to the advantage of seed growers. In planning such a program, farm advisors, reclamation engineers, and growers must keep in mind that in an alfalfa seed area the yearly return from an acre of ground supporting a dense population of alkali bees is many times that from an acre of the best farming land, and will more than offset the loss of many acre feet of irrigation water.

PROFITS IN POTATOES

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Total labor required in producing potatoes varies with size of enterprise; and labor required for harvesting operations varies with yields. Total labor decreased from about 86 man hours per acre to about 55 as average size increased from 2.6 to 19.2 acres. Hours of labor per acre for harvesting operations increased consistently as yields increased; however, time required in harvesting operations decreased from 2.2 man hours to .16 man hours per hundredweight as yields increased from 101 to 273 hundredweight per acre.

Hired labor accounted for 47.1 percent of the total used in producing potatoes during 1953. It accounted for 81.4 percent of the total harvesting labor.

Power cost includes cost of tractor, truck, and horsepower used in producing potatoes. These costs amounted to $34.68 per acre or 18.6 percent of total cost of producing potatoes.

Principal requirements for power for potato production in 1953 were supplied by tractors. Tractor use averaged 13.6 hours per acre for all farms studied. Trucks were used for an average of 3.0 hours per acre, of which 2.6 hours were for hauling potatoes at harvest time.

Overhead Costs Were 15 Percent of Total Costs

Overhead costs amounted to $27.77 per acre or 14.9 percent of the total cost of production. These included interest on fixed capital investments, interest on money invested in the crop, building and equipment repairs and depreciation, and taxes on land, water, and drainage. Interest on fixed capital was the largest item of overhead cost, accounting for 9.4 percent of the total cost of production. Taxes on land, water, and drainage together accounted for 4.0 percent of the total cost of production.

Cost of Materials Amounted to a Third of Total Costs

Material costs amounted to $58.32 per acre or 31.3 percent of the total cost of production. These included the cost of fertilizer, manure, seed potatoes, sacks, chemicals, fees, and miscellaneous materials. Cost of seed potatoes was the largest material cost, accounting for 22.3 percent of the total cost of producing potatoes. Manure and fertilizers together accounted for 7.1 percent of the total.

Bliss and Pontiac Grown Most Widely

Bliss and Pontiac potatoes were the most common varieties grown in Cache, Box Elder, Weber, Davis, and Utah Counties. Preference was shown for the Russet variety in Millard, Iron, Sevier, Piute, and Garfield Counties. Four other varieties; Mesabi, White Rose, Kennebec, and Cobbler, were also produced on a few enterprises.

Advantages of Combine Harvesting

Data collected were analyzed to see what advantage, if any, there may be in using combine potato harvesters instead of harvesting by the methods that have been in use for many years. The 13 enterprises on which combine potato harvesters were used were compared with enterprises similar in size and yields, and using conventional harvesting methods. That comparison indicated an average savings per acre of 6.0 man hours of labor, .5 tractor hours, and 1.7 truck hours on enterprises using the combine harvesters. Total harvesting costs were $45.17 per acre or $.24 per hundredweight for enterprises using the combines compared to $56.37 per acre or $.29 per hundredweight for enterprises using other harvesting methods.

Yields, Amount of Labor, and Size of Enterprise Most Important Factors in Financial Success

Of various factors associated with successful production of potatoes, yield per acre, efficient use of man labor, and size of enterprise as measured in acres of potatoes were the most important. Efficiency in these three factors is most conducive to economic production.

A consistent association between yields per acre and cost of production was indicated. Yields ranged...