Something Is Eating More Grass Than Our Livestock

B. Austin Haws

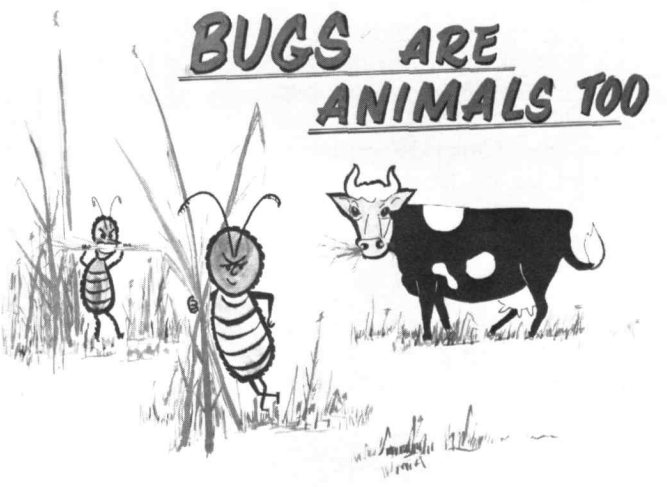
It is almost certain that in the future the term *Integrated Interdisciplinary Pest Management* or (IIPM) will become as familiar as the term *rest rotation* in the vocabulary of range grass users. In IIPM the goal is to identify all parts of the range system that are detrimental or beneficial to the range and to determine what the manipulation of any component of the system does to any other part of the system. For example, letting grass grow a year without grazing is fine for the grass, but it is also "fine" for the insects who use the time to "multiply and replenish the earth." One reason we're in big trouble in range at present is that many of our present policies and practices have not considered what would happen to the rest of the "pieces" in our ranges if we did something that affects another part. Economic management principles come from IIPM facts.

Since relatively little is known about the interrelationships of grazing and weeds, diseases, nematodes, etc., it is to be hoped we shall have more to report about these in the future, and can today discuss insects[1] that have had some intensive study the past 8 years in several places.

Recent studies suggest that there are more than 700 species of insects inhabiting the grasses. Systematic studies of insects in range grasses will undoubtedly reveal hundreds of other species present in various grasses in different areas of the United States and in other ranges of the world. At present perhaps no other single action has the potential of increasing the quantity, quality and longevity of grasses more than a thorough knowledge of the insect pests and their management or control in range grasses.

Here are a few major facts about insects that should be helpful to range grass users:

Insects are animals. They have hearts, breathing systems, blood circulating systems, digestive systems, reproductive systems, muscles, and the basic parts found in most animals. Livestock men know that their animals have preferences in the plants they eat. So do insects. Livestock men know their animals require feeding and care, if they suffer from injury and diseases, flies, predators, and parasites. So do insects. Livestock men know that some conditions favor the good health and development of their livestock. The same is true for insects. They have their diseases and their predators and their parasites and their favorite diets.



Bugs are animals too. *In our ranges these tiny animals have an enormous impact. Some of them hatch in or near melting snow water. They feed actively at 22° F. Some of them are feeding on above or below ground grass parts the entire season. Range management should consider the life cycles and seasonal cycles of insects and guide us in developing range management practices and principles.*

Of the large number of insects that are known in the world, approximately 1,000,000 or more, only a small number of this million (some say one-tenth of one percent) are considered detrimental to man in the sense that they carry agents of disease, or eat his crops, or compete with him for food or materials. Most insects in the world are beneficial. They help decay plant and animal organic material. They pollinate many plants. They produce wax and dyes and many other products. If we consider insects as just small wildlife then we can see how unthinkable it is that we should go into a range ecosystem and wantonly destroy every kind of insect present, any more than we should go into a beautiful forest and wantonly destroy every animal in the forest or in the grass ranges.

In considering solutions to problems with insects in range, how wise it would be to learn from the mistakes of the past that were made in studies of insects related to cotton, alfalfa, and other crops. We need to have the money and time necessary to study the insects in our range ecosystem and know what their interrelationships are to all the plants and grasses and animals and to plan our policies and our range management and practices in such a way that the beneficial insects would be preserved. Then

The author, professor of entomology in the Department of Biology, Utah State University, Logan, is specializing in injurious and beneficial insects on ranges. Recently he has been a member of a ten-man interdisciplinary range research group working in integrated interdisciplinary pest management for range grasses.

Editor's Note: The author and others are finding it difficult convincing funding agencies of the need for insect research on rangelands. That is too bad because insects are truly eating a lot of forage. Professor Haws has a five-minute synchronized slide presentation available for loan to state and federal agencies, range groups, and others to help sort out range problems and solutions. Ask to borrow it.

[1] In this article we will use the term "insects" to include mites, nematodes and other small insect-like animals that technically are not insects.

through proper management and, hopefully, through minimum use of chemicals those detrimental insects that reduce the yields and quantity and quality of our ranges could be reduced or eliminated. Someone said, "It seems that we seldom have enough money and human resources to do things right the first time, but we usually seem to get money and help to do things over again." The statement describes well the present status of Integrated Interdisciplinary Pest Management for our ranges.

Many ranchers, however, will not need to wait for statistics and scientific data to tell them what insects are doing to their ranching operations. A group of Utahns told their Governor in 1972 that when black grass bugs hit their ranges their cattle weight gains were reduced 66% and that the bugs were driving them out of business.

Individuals and agencies who have spent millions clearing land, renovating and improving their range grasses must be asking, "Where did these insects come from and how did so many of them develop?" As we examine the native grasses surrounding our introduced grasses, we find that many of the insects that are destroying the native grasses and introduced grasses appear to be native and to have come from surrounding areas.

Some insects migrate and are carried thousands of miles by wind from Mexico, and other states, and Canada. We are constantly finding new insect species in our states that previously were not there. They may be transported by human beings in their land and air vehicles as well as by forces of nature.

From long experience, specialists in ecology have found that in monocultures the systems of checks and balances that keep certain plants and animals within population limits may be destroyed. This is true in the case of some insects. Certain ones have adapted rapidly to the monocultures while their predators and parasites have been left back in the undisturbed areas. Many methods of planting grasses and systems of grazing and rest rotation also favor insect development.

A few range insects have been studied at Utah State University. These include the black grass bug *Labops hesperius* which lays its eggs mostly in the lower parts of the dead grass stems and sometimes parts of other plants. When grass is grazed high, these eggs are not disturbed and are able to develop to their full biotic potential. As a consequence, if large numbers of insects are present in range grasses, the principle of rest rotation does not "work." Since they are animals, these insects continue to "graze" day and night when plants are supposed to be "resting." Thus, under certain kinds of management we find insects develop to "outbreak" proportions.

Our present impression is that when we have an adequate knowledge of range insects, we can expect some major revolutions in range and livestock management. However, discovering how much individual insects eat, what damage they do to the plants, (vegetative growth, storage root reserves, longevity of plants, nutritional quality, seed and seed germination, etc.) is a long process that we have barely begun.

Insects are a part of the ecosystem. *There are hundreds of different kinds of beneficial and injurious insects in our ranges. We can ignore them, but they are not ignoring us. The beneficial ones help decay organic matter, pollinate the plants, and many of them are predators or parasites on injurious insects. The injurious ones damage all plant parts. We need to know what range management practices do to both the good and the bad insects.*

Rest rotation. *Are grasses* really *resting if insects are feeding on the roots and above-ground parts? An example of a range management improvement practice that may not really be improving ranges is rest rotation. If injurious insects are present in a range, the plants are not really resting or storing reserves if insects are destroying the leaves and roots of the plants.*

An interdisciplinary range research group has been working about a year at USU to get information needed for new principles upon which to base recommendations for range and livestock management. The disciplines involved to date include insect and range physiologists, animal nutritionists, climatologists, entomologists, economists, and soils specialists. We still need to include such vital links in the research chain as specialists in grass diseases, nematology, and wildlife.

It takes as long, or longer, to feed an insect in an experiment as it does to feed one calf, and it costs just about as much. The researcher has to get down on his knees and find out what an insect is eating and what it is not eating, where it is having the young and how long it takes for them to develop. It not only takes a long time, it is a disgraceful working position. In fact, my son went to the field and saw what I do, he told his mother I don't work at all! But someone is going to have to do away with personal pride and prejudice to get the needed information.

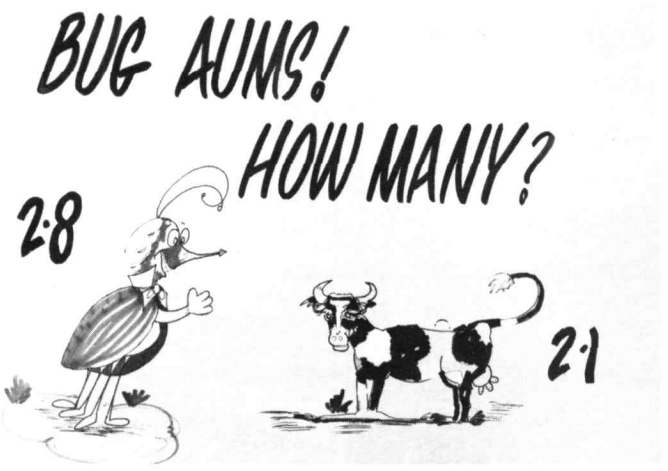
Those of us working in range need to "get on the ball" and get the money and the researchers we need to bring information about our valuable grass crops up to date. If we do, everyone–

government agencies, ranchers and the consumer—is going to benefit.

What Might be Some of the Benefits of IIPM?

1. *Facts about the real potential production, quality, and longevity of grasses.* Few people working with grass ranges have ever seen a bug-free range—without worms, nematodes, and insects chewing on the roots, inside and outside the stems, leaves, flowers, buds and seeds—and measured these potentials.

2. *Criteria to guide range conservationists and others who evaluate grazing potential.* They will not then do as one conservationist, a graduate student, did. Stationed on a range the entire year, he observed that insects attacked the grass early, as soon as the snow melted. The insects continued to feed on the grass by the thousands until late fall through a very dry season. Rains finally came in the fall and the grass utilized its last remaining root reserves to put up a stand of grass. At that point in the season the conservationist came in, observed the grass, and assigned a large number of cattle to the allotment. The season of grazing on that range was complete, "from spring to fall"! Information about insect populations and their damage will let conservationists know what the true grazing history has been and will enable them to assign AUM allotments correctly. We need to know the seasonal and life history of range insects and how these cycles mesh with the seasonal and life cycles and behaviours of grasses and wildlife so that whatever we do in management will not be detrimental to beneficial animals, but will be restrictive to the "pests." Again, this research is going to take a lot of time and money.



Black grass bug, Labops hesperius. *Utah data indicate these insects and their relatives, when present in relatively low numbers, consumed more grass than livestock. These insects are common pests of range grasses, in at least 12 states from Minnesota and the Dakotas to California.*

3. *New grasses with resistance to insects, nematodes, and disease.* This is a long way from reality. If the breeders began today, it would take 3–15 years to find, identify, and multiply some new grasses that are not only adaptable and palatable, but resistant to insects, nematodes, and disease. Genetic pools of grasses are available but they have not yet been studied for their physical or chemical qualities as related to "resistance." If a farmer plants a wheat and it turns out to be susceptible to smut, he can choose a resistant variety next year. This is not true with grasses. Once grass is planted it is expected plants will stay a long time. If we plant a variety susceptible to disease, insects, and nematodes, we've got trouble for a long time.

The problem of pest adaptation to resistant varieties also will need study because this problem on grasses is more serious than it is on grains. It will take years of hard work to screen the present gene pool of grasses against the major injurious "pests" found in range grasses and to develop varieties that are palatable, adaptable, and resistant, but the research must be done.

4. *Modification in uses of grasses.* We need to change our thinking about uses of grasses along highways and freeways, revegetation of mining sites, rights of way, water conservation plantings, watersheds, etc. There is no doubt that these grasses have beautified the highways and served some purposes well; but, many of these seedings are unmanaged, continuous incubators for injurious insects and weeds, besides being a tremendous waste of energy materials (also feeds). There are approximately 45 acres of grasses per mile along some of our big freeways. How many people could be fed if this grass could be harvested? Not all freeways are infested with insects, but many that are pass through native and introduced ranges and crops. There is evidence already that insects move from the freeways onto the crops. Losses resulting from these migrations have not been fully determined. We need to do what we can to get rid of "insect freeways."

We are looking to the future and at new problems as they develop and these are some that will need our attention. In the future those who are importing and testing new range plants and grasses for mining revegetation, water conservation and other uses, should make sure that their studies include screening of these plants for local insect pests and diseases and other possible problems.

5. *New guiding principles and facts about grazing.* No one grazing system is applicable to all ranges and all conditions. Grazing half the grass and leaving half, from the insect point of view, must bring great joy to the bug camp. It leaves most of their eggs in the stem of grass untouched so they can carry on their activities almost uninhibited and with plenty of food for young and old.

Periodic Drastic Grazing. *Some ranchers have used combinations of livestock for periodic drastic grazing to remove all grassable materials containing insect eggs when grasses were not growing, and have solved their problems with insects.*

It is well known that different animals have different grazing behaviors. It may be necessary to consider drastically different grazing methods to destroy bug eggs, where such a practice is in harmony with good grass management. Some ranchers who have flat ranges, have done away with the injurious insect problems through periodic, drastic grazing when grasses were

not growing. It may not be necessary to have continuous grazing programs designed to remove all insect eggs. Such a procedure may be necessary only periodically. Many insects recover slowly once their populations are reduced. New infestations may take many years to develop.

6. *Organization of interdisciplinary research teams working closely with users of range grasses.* (IIPM Interdisciplinary Integrated Pest Management). We should look forward to the development of teams who are specialized in their knowledge of grasses, wildlife, insects, etc., to assist those who at present have the tremendous responsibility of recommending grass uses and management so that we will not give one "treatment" to solve all the problems associated with needs for grasses. Such teams might work with road construction crews, mining establishments, and others to plant grasses or other range plants that would be adaptable and at the same time avoid some of the problems that might develop in the future.

If we are objectively looking at range problems and their solution, those of us who are teachers have to ask ourselves honest questions about our present course content. If we want to develop administrators and technicians who anticipate and solve some of our range problems, we have to do more interdisciplinary teaching. We need to see that our students at least have enough "thinking blocks" to enable them to beware of problems that their decisions or actions may bring about and to further their communication with other disciplines.

There is not enough time for everyone to be a specialist in everything. One alternative is teamwork (IIPM). There are few substitutes for the experience ranchers and other uses of range have. They need to be included as part of the team. They may not always know "*why*" things are happening, but they usually know "what's" happening and can contribute valuable ideas to the researcher.

Research people in our educational institutions and Federal agencies need to determine the impact insects, disease, nematodes, weeds, and wildlife have on our ranges and their interrelationships with other components and management and on their policies and recommendations. For example, policies that specify "No Grazing" may be disastrous in the long run.

There's an old Spanish saying that, "It's harder to change an idea than move the cemetery." We have a lot of ideas to be changed in range and changing may take a long time. There is enough to do to keep many of us busy so let's get the people and money needed to do our research in range right the first time instead of having to do it over later. ●

Book Review:

Economic Impacts of *Lapos hesperius* on the Production of High Quality Range Grasses

This final report by the Utah Agricultural Experiment Station was presented to the Four Corners Regional Commission in August, 1978. It points out that the primary range consumers are insects, livestock, and wildlife.

This 8½ by 11-inch paperback book tells recent research results about the common black grass bug, which is so detrimental to range grasses in many western states. It contains 269 pages, 122 photographs, and numerous tables, charts, and graphs. In addition, it makes specific references to 133 pieces of literature.

The report is written in easy to read and understand language and should prove very useful as an interesting dissertation as well as good to have in the library for range managers, ranchers, technicians, and scientists. It is very well done.

It presents, in an interesting manner, research results of an interdisciplinary research group formed to obtain basic information and explore management alternatives of integrated pest management for range grasses.

The facts and information was compiled by B. Austin Haws, Project Coordinator, from the original reports prepared by the principal investigators:

William A. Brindley, Entomologist/Toxicologist
William F. Campbell, Plant Scientist/Electron Microscopist
Terrence F. Glover, Economist
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Cyrus M. McKell, Range Physiologist
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Raymond W. Miller, Soil Scientist
E. Arlo Richardson, Climatologist
David J. Schimpf, Ecophysiologist
Herman H. Wiebe, Botanist

For further information about securing a copy of the book, or to borrow a 5-minute slide/tape on the subject of range insects contact *Professor Haws, Biology Department, UMC 53, Utah State University, Logan, Utah 84322.*