

Range Management in Israel, Yesterday, Today, and Tomorrow

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ISRAEL, land of the Bible, was one of the first countries to ask the Food and Agriculture Organization of the U.N. for assistance in a program of range improvement. It is fitting that this land with its long record as a land of shepherds should now begin a program of range improvement to repair the damage done through centuries of overuse. Long continued and extreme overuse have caused an advanced stage of range deterioration. Most of the soil has disappeared from many of the hills. Where even a shallow layer of soil remains, however, the prospects of improving the range are promising.

YESTERDAY

We find in the story of Abram and Lot an account of one of the first range wars. "And the land was not able to bear them, that they might dwell together; for their substance was great, so that they could not dwell together. And there was a strife between the herdmen of Abram's cattle and the herdmen of Lot's cattle". Genesis 13:6 and 7. This occurred about 4000 years ago in the area around Beer-sheba and the southern end of the Dead Sea. This is part of what is now known as the Negev desert.

There was plenty of space so Abraham and Lot agreed to divide the country between them and moved apart. Their herds made them both quite prosperous.

Later the spies sent by Moses to investigate the Promised Land of Israel reported it to be a land that "floweth with milk and honey". (Numbers 13:27). This was a rich and prosperous land.

The frequent references to shepherds in the New Testament indicate that grazing of livestock was a major part of the agriculture of the area in the time of Christ.

Lowdermilk (1944) says that the decline of Palestine's land began during the seventh century A.D. It is quite likely that ranges had been damaged long before this. We know that in recent times range deterioration has been so advanced as to give this area a reputation for desolation and barren hills. The damage was due not only to the grazing of too many stock. It was also due to joint use by a variety of kinds of livestock. There were cattle, donkeys, horses, sheep, goats, and camels. What one class of animals would not eat, another would, and these animals were usually hungry.

Most of the grazing lands were also public lands. A nearby village had nominal use of the adjoining range lands. There was no law, however, to prevent another village from using the same lands. Roving Bedouin, or tent dwelling Arabs, were also free to come in and use the same range (Fig. 1).

Under this system there was little reason for the individual livestock user to try to improve the range. His chief interest was to get the feed before it was used by someone else. Often his very life and that of his family depended on six or eight goats and one or two donkeys.

The only limitations on livestock numbers and on the amount of grazing for centuries have been the natural ones. Half starved animals have a lower rate of

reproduction. There was also the occasional dry year when the shortage of feed resulted in death by starvation for large numbers of range livestock. The cycle of a buildup of stock numbers in average to good years and widespread death losses in poor years seems to have been the accepted system of managing livestock. It is, of course, a system which destroys the range feed plants. Much of this land receives 4 to 40 inches of annual rainfall. Heavy grazing is responsible for giving the appearance of a desert to lands that could be quite productive range lands.

many of the Bedouin herdsmen are now refugees. The lands once used by these refugees for grazing have had little or no use for the past three years.

The change in three years of lighter grazing has been remarkable. Ecologists and botanists are now finding many specimens of palatable plants that in former times were rarely found. There is a wealth of good local perennial grass species well adapted to reseeding. A fine growth of annual legumes capable of restoring some of the fertility lost through centuries of overuse and erosion showed up as soon as grazing was reduced.

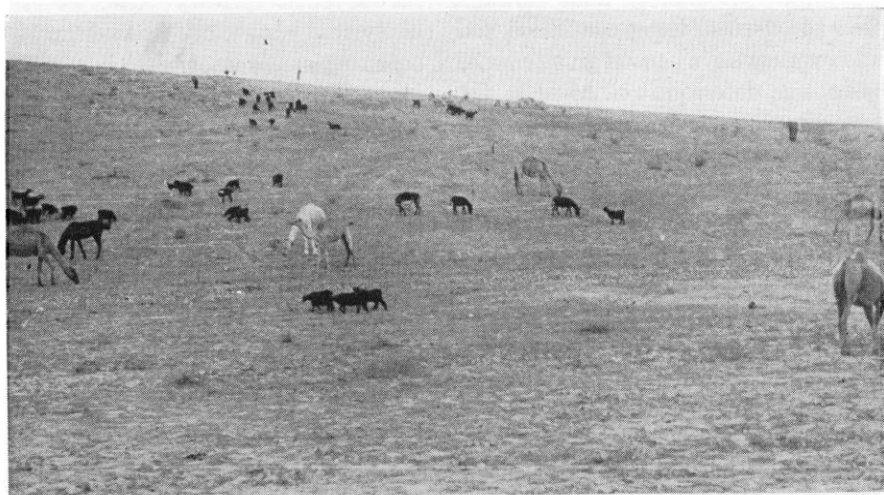


Figure 1. A mixed herd of Bedouin livestock grazing near Beersheba, Israel.

Reifenberg (1947) in "The Soils of Palestine" has estimated that there is a loss of 2 millimeters of soil per year from the hills of Palestine. Extended over the past 1,000 years this would indicate a loss of 6.5 feet of soil. Is it not logical to lay much of Israel's decline to this erosion? To a large extent this erosion is chargeable to overgrazing.

TODAY

As a result of recent disturbances in Israel, many of the Arab villagers and

Trees and shrubs are coming back in many areas to partially hide the rocks that were so prominent when the lands were closely grazed.

In spite of severe drouth in 1951, perennial grasses made a good seed crop. Two years of protection had allowed new grass plants to get started and to build up vigor.

Seed production was seen in northern Israel in 1951, for such good native perennial grasses as Harding grass (*Phalaris tuberosa*), bulbous barley (*Hor-*

deum bulbosum), smilo (*Oryzopsis miliacea*), *O. caerulea*, *Bromus erectus*, orchard grass (*Dactylis glomerata*) and *Stipa aristella*. Even in the drier climate, 4 to 9 inches annual rainfall, south and east of Beersheba there was seed production of such valuable grasses as *S. fontenasi*, *S. parviflora*, *Aristida cilliare*, *A. plumosa* and smilo.

Research work has already been started at the Government experiment station at Neve Yaar to find adapted species and improved strains of grasses and legumes for reseeding. This work is under the

Kibbutz Dalia, started row trials with native plants and with other seeds that he had brought back from a visit to research stations in the U. S. Mr. Avram also made two block plantings of native smilo (Fig. 2) and *O. caerulea* about five years ago. Clippings from these two plots by the author in May 1951 indicated yields of 3375 pounds per acre and 2935 pounds per acre respectively for these grasses after a rainfall of 16 inches during the previous winter. This area usually gets about 20 inches of annual rainfall.



Figure 2. Reseeded smilo grass on shallow soil near Kibbutz Dalia, Israel. Planted by Alfred Avram five years previously.

direction of Mr. Aronovitch, Director and Mr. A. Hammelburg, agronomist. Other trials on methods of brush control and seeding of rough lands are under Mr. Z. Nave at the same station. The station has also started research on rates and methods of stocking to determine how to use the crop of range feed. These studies are to find out what amount of grazing may be allowed without damage to the feed plants.

Mr. Alfred Avram, a member of

Mr. David Schley of the Soil Conservation Experiment Station near Natania in the Coastal Plain also had a number of row trials of various native and introduced species of grasses and legumes.

Mr. N. Gil, Chief, Soil Conservation Service, is an enthusiastic advocate of range improvement who has made hundreds of trial plantings over the past 10 years. Gil is a member of The American Society of Range Management.

Dr. Hugo Boyko, Chief Ecologist of the

Ministry of Agriculture, has made valuable studies (1949) of the various plant communities of Israel. Dr. M. Zohary and his son D. Zohary, Botanists, of the Hebrew University, have also done valuable work in this same field.

This local work has provided valuable information on which to begin a program of range improvement.

TOMORROW

To predict the future of range management in Israel is, of course, a matter of speculation. The following are, however, some indication of the trend that the future may take.

A land capability survey is already under way to map soil characteristics of each parcel of soil and to determine the best longtime use for each of the various soils in the country. The program of range improvement is to be part of a general program of soil conservation.

The establishment and management of a good grass cover should be the basis of the conservation program on lands that are to be grazed.

In most of the range lands north of Beersheba, this program of range improvement should be based on reseeding the author believes. This area gets from 8 to about 40 inches of rainfall. Proper species and methods of seeding must be found to fit local conditions.

Development work is already started on a grass seed nursery of 480 acres near Migdal Ascalon in the Southern Coastal Area. Seed of native grasses and of adapted introduced species is to be grown under irrigation. When completed this nursery should be able to furnish seed for planting 10,000 to 20,000 acres each year. Seed may also be collected from older reseeded fields once the program gets under way.

The range research work which has already been outlined, can and should be continued and increased. Along with

research at experiment stations, a program of field reseeding trials is planned. These trial plots are to be large enough to be grazed. The Soil Conservation Service in the 1951-52 season has planned and seeded about 375 acres of perennial grass in eight field trials. Each plot represents a different problem area needing to be reseeded. Trials range from a brush burn area at Matzuba with 32 inches annual rainfall to a water spreader area near Mashavim with less than 4 inches annual rainfall.

A close working relationship should continue between soil conservation operations people and range research workers so that each may be guided by newest developments in the others' program. As an example, most of the eight field trials on reseeding include only grass species. It is hoped that native annual legumes will grow between the grass clumps in good years. The legumes are considered to be necessary for soil building. If they do not occur naturally additional work must be done to find how legumes can be introduced in the mixtures.

When the good grasses and legumes are established on an area they should then be so used as to maintain themselves. The idea that a part of the forage crop should be left on the ground as litter is being encouraged.

A longer season of green forage on the range is needed and should be one of the aims of the seeding program. Bulbous barley and Harding grass make a more rapid early growth than the annual plants following the first winter rains. Smilo, *O. caerulescens* and *Stipa aristella* stay green for as much as a month after the annual plants are gone. The use of different species should, therefore extend the grazing season. This may be done either through mixtures or by seeding separate areas to various single species. The severe summer drouth which is characteristic of the Mediterranean cli-

mate sets limits on what can be accomplished, but two extra months of good green feed seems a reasonable goal.

The summer drouth and intensive farm development will probably lead stockmen to use most of the feed from their improved pastures during the growing season. Sudan grass, irrigated pasture and harvested roughage must be developed to carry through the dry season. Much of the pasture is needed for dairy cattle.

Several problems of a more general nature need to be solved in connection with the range program, some of these are: (1) The need for allotting definite areas for grazing with laws to prevent trespass. (2) A workable method of controlling stock numbers and time of grazing in the individual settlements to which a range allotment is made. (3) Security measures to prevent stealing, so cattle and other livestock can be left unattended in fenced pastures. (4) The consolidation and enlargement of many fragmented farm holdings to allow the economic production of hay, silage, grains, and pasture for supplemental livestock feed. (5) A large segment of the population accustomed to using primitive tools for producing crops and to herding small bands of 3 to 50 head of livestock must learn to use modern farm equipment, fences, and similar improved methods of production.

SUMMARY

Centuries of close grazing have bared the fields of Israel of grass. A cycle of

building up stock in good years and of a die-off in bad years has come to be accepted. In Biblical times Israel was a land of milk and honey. Erosion resulting from overgrazing is one reason for the decline.

Today in Israel there are fewer stock. Already the good plants are becoming more common. Perennial grasses made feed and seed in 1951 in spite of severe drouth. Local research has shown some of the adapted species for reseeding.

Israel is making plans to improve her range. A land capability survey will determine the best use of each parcel of land and will show which lands should be in range grass.

Reseeding of perennial grasses is needed for extensive areas of range lands. A grass seed nursery is being established. Eight reseeding trials totalling about 375 acres were made in the 1951-52 season. Proper use of these reseeded lands will be necessary. Selection of the proper species should extend the green grazing period and give higher yields. The need for supplemental feed production for livestock is discussed.

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