

botanical specimens become meaningful indicators of one of the most complex and least understood components of the autecology and synecology of our rangeland and forest resources.

## Viewpoint: Crop or Range?

E.J. Dyksterhuis

The noun "crop" is defined as "The cultivated produce of the ground." The transitive verb "crop" means "To cause to bear a crop or crops." In contrast "range" is uncultivated ground, and we do not cause it to produce forage as in the case of a tame pasture. Accordingly, planted tame pastures whether annual, in crop rotation, or long term, would seem to be a part of cropland acreage—as distinct from rangeland and forestland acreages.

Apart from dictionary reasons, there are compelling ecological reasons for distinguishing between range and crop. These are brought sharply into focus in the book, *Grain Yields and the American Food Supply*, Univ. Chicago Press. The introduction by Dr. Paul B. Sears, eminent ecologist of Yale University and past president of the American Association for the Advancement of Science, states:

"Environment is of course complex, but the limiting factors may be grouped into those which are climatic, edaphic, and biotic. In the instance of crop plants a fourth set of factors, the cultural, must be added. This last represents man's efforts to control the other three for his own purposes.

"Productivity is one of the central problems of the field of biological science known as ecology, and one of the most vital to mankind. The best indicator of natural productivity is the characteristic plant and animal life of the area, properly studied and measured over a long enough time to cancel out the effects of climatic and other fluctuations. It then becomes the role of land-use planning and management to preserve and enhance, so far as possible, the natural potential."

The No. 1 definition of "culture" is usually "action or practice of cultivating the soil; tillage." This clearly places crop scientists as fostering culture, which should be appreciated. Nonetheless, what is good under one set of conditions may be bad under another. Therefore, cultural elements must be listed among limiting factors of the environment for crops but not for range.

Many areas, of course, have been put into cultivated crops where experience now shows that natural forest or natural pasture would have been better land use. In the past, various Homestead Acts were the cause of such mistakes. Legislators through tax and subsidy laws still make such mistakes, sometimes abetted by real estate promoters and others. Much natural rangeland was environmentally well suited to

### References Cited

- Anderson, E. William. 1956. Some soil-plant relationships in Eastern Oregon. *Journal Range Manage.* 9:171-175 July.  
Anderson, E. William. 1962. Behavior of forage yields on some range sites in Oregon. *Journal Range Manage.* 15:245-252. September.

crops. We have only to think of the state of Iowa. In the *Yearbooks of Agriculture*, of a little over a century ago, there are references to Illinois, Iowa, and parts of Minnesota as the rangelands of the Northwest. There is still rangeland on many ranches being used as range that is suitable for cropland. Some could well be converted to feed crops (including tame hay) or tame pasture to supplement range, but then should be managed as such instead of as range. Nonetheless, in land use planning, our first concern should be use of land within capability. Use of land up to capability is nationally less urgent.

If rangeland is native pasture on natural grazing land, then cultivation and seeding of introduced or domesticated-native forage plants is in fact a *conversion in land use* from rangeland to cropland. This has too frequently been termed "range improvement."

Ecologically, this change is of the utmost significance and must therefore be recognized in our terminology. We must recognize the conversion to avoid misleading land owners and operators. Secondary succession tends to restore ranges but tends to destroy tame pastures. Natural tendencies in the development of vegetation on the planted tame pasture must be offset as surely as we still regularly have to control weeds in our cotton and corn fields, even after a century of clean cultivation. Nature will continue to show that the natural law of secondary succession hasn't been repealed, whether in cotton field or planted tame pasture.

Perhaps needing separate consideration is unplanted permanent "pastureland" of corn belt farms and of forestlands, but the latter are outside the scope of the title. An article in the July-August 1984 issue of the *Journal of Soil and Water Conservation* shows that all rangeland was included in pastureland acreage in the 1967 National Resources Inventory (NRI) on use of nonfederal rural land. However, it also shows that in the NRI's of 1977 and 1982, they were segregated. This is progress for range science. An adjacent table shows estimated average wind erosion in tons/per acre/per year as 1.5 for rangeland and 0.0 for pastureland. From this it seems safe to conclude that little pastureland is now tallied in rangeland climates, except possibly in the corn belt or where irrigated. On corn belt farms of the Dakotas and Nebraska, tracts of nonarable land used for pasture may be termed range, but in adjacent Minnesota and Iowa they are regularly termed pastureland as distinguished from cropland. They may be regarded by owners as either native or tame pasture but seldom as range. They may

receive some treatment such as an occasional mowing for control of unwanted forbs or woody plants, or barnyard manure may be spread there when not feasible on cropland. (Commercial fertilizers are regarded as more profitably applied to croplands.) Where invading exotics such as bluegrasses have replaced taller native prairie grasses and where land capability does not justify cultural treatments of planted tame pasture (crop), the principles of range management should apply. This presents a major task for the valiant "outpost" North Central Section of our Society.

The need for distinction between crop and range environments becomes especially important when crop and range scientists use the words "adapted," "adaptable," or "adaptation" with reference to plants that may be grown.

The crop scientist usually has assumed cultivation and renovation or reestablishment. The range scientists may assume some cultivation in seedbed preparation but should assume no need for reestablishment once the range seeding is established. In effect, the crop scientist assumes a degree of maladjustment between seeded plants and environment and expects that this will be shown by a need for renovation or reestablishment, sooner or later. When we are thinking of restoring an area of range by seeding, we should strive for so little maladjustment that it will be corrected in a few years by volunteer spreading of species normal in secondary succession. In some cases, only an interseeding of local strains of climax dominants may be needed. In effect, we attempt to hasten what would come naturally if disturbance were reduced or removed.

**Agronomically, sudangrass might be well adapted** because it would promptly produce a high yield, but ecologically it would fall into a low class of environmental adaptation because it would not survive into a second year.

A seeded mixture of local strains of native grasses may not attain maximum yield until its 4th to 7th year. Nonetheless, in its 10th to 15th year, it may be expected to produce more than earlier comparable stands of blue panic, dallisgrass, bermudagrass, smooth brome, crested wheatgrass and other exotics—if meanwhile no further cultural practices have been applied. It is instructive to wait ten years before visiting a new long-term tame pasture planting publicized in a farm journal. The reported initial productivity is rarely maintained. Many agronomists and rangemen believe that environmentally adapted forage plants should be classified somewhat as follows:

- Adapted for:
- 1) Range Reseeding
  - 2) Long-Term Tame Pasture
  - 3) Crop-Rotation Pasture
  - 4) Annual Pasture

Climate and soil limit the feasibility of 2, 3, & 4 to areas where cultivation is increasingly economical and does not entail possible loss of the soil itself when it must again be bared. At this time the evidence from seedings 15-40 years old indicates that only local strains of mixtures of native species including climax dominants are *adapted* for No. 1.

Range *environment*, though not limited to, does include that segment of the natural physical environment *between* barren desert and forest. In contrast, crop environment is whatever man chooses to make it. At the one extreme of crop

environments are hydroponic tanks in our best greenhouses—where virtually every element of environment of both roots and shoots is under cultural control, and response of the crop then is predictable within very narrow limits. At the other extreme are crops produced sporadically in unpredictable years in environments unsuited to cultivated crops. An example is the Dust Bowl environment for production of grain. Ecologically, the environment is not suitable for crops if cultivation must ultimately, substantially, and irreversibly reduce natural productivity, as periodic soil losses impair the root environment.

**In marginal farming areas abandoned fields** are evident on the aerial photos of many ranches. It is misleading to classify such fields as "retired cropland." Moreover, they are not "retired" to grass, they are put back into production with grass. Some government programs have permitted the seeding of tame pasture and hay grasses (crop) on *all* such "retired" acres when range seeding should have been required on some. Consequences were observed in the western halves of the Dakotas. After ten years, many land users awaited a chance to plow up the remnants of no longer productive stands of smooth brome, and to again try wheat production. Meanwhile, range seedings had developed into excellent dependable native range that few were tempted to plow up for hazardous wheat production. If the field to be retired from cultivation is such that it never again should be bared, range seeding is indicated.

When we plow new ground, our cultural manipulations start from a climate, a soil, and a community of organisms developed by unthinking nature. There was sufficient harmony in this triumvirate as we found it to be at least self sustaining. Soils were built, communities of adapted organisms were evolved, and climate near the ground was modified.

The plants (producers) and microbes (decomposers) as evolved in natural communities seem to have achieved symbiosis. Range vegetation protected from grazing, given an occasional fire, seems capable of surviving independently of other populations (consumers)—even without benefit of range and crop scientists. Not so with crops, including tame pastures. Here cultural controls are necessary to maintain a type of vegetation not favored by secondary succession toward climax for the type of site.

**When cultural controls are imposed**, it probably is impossible to alter only micro-climate, soil, or biota without ramifications in the other two areas. When the natural vegetation is removed, the soil begins to change. The aerial environment becomes windier and drier, populations of microbial decomposers change, etc.

When range users substituted domestic livestock for big game populations on our ranges that, too, was an environmental change (biotic). But, perhaps not a very important one because after a century, where grazing by domestic livestock and use of fire were exceptionally well managed, we continue to produce—or are again producing—about the same amount of forage. This kind of forage production can be without costs of cultivation, fertilizers, seeding, or control of weeds, insects and diseases.

We also largely practiced fire prevention—though fire was a part of climax environment. Stated more specifically, we eliminated this natural climatic environmental influence in

our natural rangelands. It is now becoming apparent that prescribed use of fire is a needed part of management in much of the range country.

Finally, consider sustainable production with limiting factors as named by Sears; four for crop and three for range. Land capability and land user aptitude are bases for produc-

tion from either crop or range. Nevertheless, sustained production from cropland, including tame pasture, is more complex, uncertain, and hazardous for the environment than is maintenance of natural productivity under sustained native forage production from rangeland.

# Legislative Log

(As of February 27, 1986)

## **Animal Damage Control Responsibility to USDA**

The Animal and Plant Health Inspection Service (APHIS) of USDA is moving to assume responsibility for both operations and research in animal damage control previously handled by Interior's Fish and Wildlife Service. Target date for the shift, which Congress directed in the Continuing Resolution providing funds for ADC, is April 1.

Budget problems already loom large. Interior's appropriation (which will be transferred to APHIS) was over \$20 million in 1986, but the budget request which went forward for APHIS for 1987 cuts that amount in half. Negotiations continue about transfer of personnel, which could amount to 500 full-time equivalents. Seven hundred cooperative agreements and memoranda of understanding will be involved as administrative tidying up goes ahead.

A key feature of APHIS approach to managing the program will be an ADC Advisory committee. Twenty members representing as many organizations will be selected from about 200 interested groups and agencies.

A policy group of representatives of USDA agencies (Extension Service, Forest Service, Cooperative State Research Service, Agricultural Research Service, Economics Research Service and APHIS) will help guide management of the program, along with a working group representing the same agencies.

## **Grazing Fees Settled—for Now...**

On February 14, Executive Order 12548 directed Interior and Agriculture Secretaries to continue using the PRIA (Public Rangelands Improvement Act) formula to set BLM and Forest Service grazing fees. However, the President's directive provided that fees will not be less than \$1.35 per AUM (the 1985 fee level) and changes are limited to 25% in any one year.

This action puts the next move in the hands of Congress. With grazing fees fixed by administrative action, incentive for Congress to act on an omnibus range bill may be weakened.

## **Budget Hearings Under Way**

George Lea presented statements on behalf of SRM February 27 at hearings on the 1987 budget for the Bureau of Land Management and the Forest Service before the Appropriations Subcommittee on Interior and Related Agencies in the House. Hearings for public witnesses on Agriculture agency appropriations are scheduled for early to mid-April.

Reflecting the tight fiscal climate and the backdrop of Gramm-Rudman-Hollings, budget proposals for virtually every program affecting range management and related activities are austere and conservative.

## **BLM—FS Interchange Moves to Capitol Hill**

Months after the first proposal surfaced, Interior and Agriculture sent a revised version of the BLM—Forest Service land interchange proposal to Congress February 18, and a Draft Legislative Environment Impact Statement followed.

The proposal has changed. While some potentially controversial features remain, gone are the ideas that the O&C lands would shift to the Forest Service, that National Forests in Nevada would go to BLM or that substantial parts of the Bighorn NF (WY), Prescott NF (AZ), and Modoc NF (CA) would be under BLM management. All told, 14.8 million acres would shift to FS in return for 9.4 million BLM acres, a net change of 5.4 million acres. The modified proposal involves about 10 million acres less than the original. The concept of minerals authority for the Forest Service on 204 million acres is retained in the draft legislation.

Agencies estimate savings under the proposal at \$13 to \$15 million per year after \$21-24 million implementation costs. After interchange, total employment in the two agencies would shrink by 350, substantially without reduction-in-force actions. Estimates were not available as to how many of the number would be on-the-ground managers and resource professionals and scientists.

Citing budget constraints, the need for efficient management and 'the unsettling effect of the proposal' BLM Director Bob Burford urged quick action on the revised proposal.

Detailed descriptions of state-by-state proposals are available at field offices of both agencies, and copies of the EIS will be available for review as well.

**The second session of the 99th U.S. Congress** is busily working on several major issues. Among them are tax reform, environment, immigration, trade, foreign policy, political action committee limits and federal spending. Because of the new Gramm-Rudman-Hollings balanced budget law spending must be cut \$11.7 billion, by March 1 and next year's budget (F.Y. 1987) must be trimmed by an estimated \$50 billion or more to a \$144 billion deficit limit. Some predict a tax increase.

Following are highlights on a few of the more important