"Forbs" Need Proper Ecological Recognition

C. Wayne Cook

Editor's Note: This article gives a new and fresh look, to some, of the ecological importance of forbs on rangelands.

Many experienced ecologists have recognized forbs as attaining a position of dominance, subdominance, or major species in some ecosystems. However, most range managers still treat them as "weeds" or as "least desirable" plants in most managed plant communities. Their presence is therefore distasteful and demeaning to good range management. This concept should somehow be changed through better knowledge of the true status of forbs in both structure and function of ecosystems. Why treat this life form as an undesirable group of plants in many of our plant associations, particularly with respect to some grassland types? Forbs, not unlike other life forms, have both desirable and undesirable characteristics that should lead to management for their presence or absence. They should not be thought of as weeds but as a true life form or forage class that has an important place in ecosystem structure and function as primary producers.

Cattle usually prefer to utilize grasses while sheep prefer forbs and shrubs. This, however, should not imply that forbs and shrubs are not desirable plants on cattle range any more than grasses are not desirable on sheep range. It is not a matter of rating the importance of any life forms from the standpoint of preference by certain species of herbivore but rather one of identifying the status of each species within each life form and its contribution to the biological system in question.

The diversity presented by more than one life form, and the species within each life form, is desirable from the standpoint of potential soil protection and indeed from the point of view that the nutritional level for most herbivores is enhanced over longer time periods. It is well known that warm-season and cool-season grasses complement each other from the standpoint of extending a higher nutritional level over a longer period. This concept is likewise true of broadleaf plants of forbs and shrubs. Shrubs have been given considerable attention with respect to their rather distinct nutritional attributes as compared with grass. Forbs, however, have continued to assume the role of unwanted plants (weeds) on most American rangelands. This categorization for forbs began with Sampson (1923) in his studies from about 1910 to 1917 in the Wasatch Mountains of Utah. However, Ellison (1954), Stoddard (1940) and Oosting (1956) all recognized that most grass and shrubland communities have many forbs that are important constituents. In some cases, they believed that forbs should share the occupational space in the climax community as dominants, co-dominants or sub-dominants along with grasses and shrubs. Certainly, at least seasonally, their abundance and conspicuous flowering give the community a very definite aspect of being a true forb community.

In many grass-forb communities there may be a combination of both life forms resembling a 50-50 mixture. But with cattle grazing, forbs may increase in abundance and with sheep grazing grasses may increase in abundance. The point, however, is that there are truly grass-forb mixtures in climax expressions. A change toward one or the other life forms does not necessarily bring about a downward trend or an immediate change in range condition. Some forbs decrease with cattle grazing along with grasses—the extent depends upon the period and degree of use. Likewise, some grasses decrease with sheep grazing on grass-forb range types. The actual indication of a downward trend toward a poorer range condition is an increase in size of bare openings among perennial plant and the occupation of these areas with ephemeral (annual grasses and forbs) plants.

This deteriorated state of plant expression is frequently referred to as a weed stage, which means a dominance of unpalatable perennial plants (mostly forbs) and weedy annuals (both grass and forbs). In most cases this poor range condition is attained only after the interspacial areas among plants have been increased, thus allowing annuals or non-preferred perennials to express themselves rather prominantly. It is true that favorable years may allow annuals to appear even in rather small interspaces among perennial plants, but their appearance during average and unfavorable years indicates that the stand is not a closed community and will eventually allow perennial species (good or bad) to occupy the space if they are present in the locality and are allowed to regenerate themselves.

There are three primary reasons why forbs should be recognized as important constituents of many grassland types. First, they may be present as either dominants or subdominants in the ultimate expression (climax) of most of the grassland range types; second, some forbs, like grasses, are readily eaten even by cattle; and third, forbs contribute substantially to a higher animal nutritional level when found in a mixture of grasses than in grass stands alone.

Recognition of Forbs as Climax Species: If forbs are considered undesirable from the standpoint of species composition on many western ranges, then many, if not most, of our grassland types that have forbs as major species would be considered in a lower condition class then they actually are. Ellison (1954) and Dix and Beidleman (1969), respectively, found that while mountain parks and grassland ecosystems of the Great Plains had a higher density of grasses than forbs, the diversity of number of species of forbs present outnumbered grass more than 2 to 1. Many times the position of individual forb species in ecological succession in differ-

The author is with the Range Science Department, Colorado State University, Fort Collins.

ent topographic and edaphic environments is not understood.

Ellison (1954) found more than 50 forb species mixed in with about a dozen grass species in the open mountain parks that were intermingled with aspen and conifer stands. It was indicated that only 13 of the more than 50 forbs increased with heavy cattle grazing. Several forb species, like some grass species, decreased with heavy grazing.

Since grasses are fewer in number of species and have received more attention, there is considerably more known about their status in the structure and function of ecosystems. It seems that we should be equally informed about forbs if we are to use their degree of presence or absence as a criterion for managing rangelands in a satisfactory and productive state. Thus, range condition score cards that characterize all forbs as weeds (least desirable) on grass-forb communities may seriously underestimate the condition of the range in relation to climax.

Recognition that Forbs are Palatable to Cattle: Both cattle and sheep used many forbs in mountain range of Utah and utilized them heavier as the summer season advanced (Cook et al. 1967). This is because many grasses tend to mature earlier and become less palatable, whereas forbs tend to mature less rapidly and as a result remain more palatable than grasses. In the present study covering 6 years (1960 to 1966) it was determined that cattle consumed almost as many forbs as sheep but they did not consume them as intensively as sheep (Table 1). The study included observa-

Table 1. Average percent use for forage species for cattle and sheep on mountain summer ranges in Utah.

Scientific name	Common name	% Use[1]	
		Cattle	Sheep
Grasses			
Agropyron inerme	Beardless wheatgrass	51	27
Agropyron smithii	Western wheatgrass	26	8
Agropyron subsecundum	Bearded wheatgrass	24	18
Agropyron trachycaulum	Slender wheatgrass	35	27
Bromus carinatus	Mountain brome	29	16
Bromus tectorum	Downy chess (Cheatgrass)	3	10
Carex species	Sedge	26	54
Danthonia californica	Oatgrass	2	4
Elymus cinereus	Giant wildrye	52	21
Elymus glaucus	Blue wild rye	36	4
Festuca idahoensis	Bluebunch fescue	6	44
Festuca ovina	Sheep fescue	38	14
Hesperochloa kingii	Spike fescue	72	55
Glyceria pauciflorus	Mannagrass	71	44
Koeleria cristata	Junegrass	61	50
Melica bulbosa	Oniongrass	51	52
Poa ampla	Big bluegrass	45	30
Poa bulbosa	Bulbous bluegrass	2	3
Poa fendleriana	Muttongrass	60	58
Poa pratensis	Kentucky bluegrass	70	60
Poa secunda	Sandberg bluegrass	10	30
Sitanion hystrix	Squirreltail	8	5
Stipa columbiana	Columbia needlegrass	42	3
Stipa lettermani	Letterman needlegrass	43	20
Forbs			
Achillea lanulosa	Western yarrow	3	5
Actaea arguta	Baneberry	0	0
Agastache urticifolia	Horse mint	16	26
Agoseris glauca	False dandelion	2	52
Allium accuminatum	Wild onion	5	31
Antennaria dimorpha	Everlasting	0	1
Aquilegia caerulea	Columbine	10	25
Arabis holboellii	Rockcress	0	0
Arenaria congesta	Sandwort	15	30
Arnica cordifolia	Arnica	5	20
Aster adscendens	Aster	37	47
Aster engelmanii	Aster	56	47
Astragalus agrophyllus	Locoweed	15	26
Astragalus miser	Milkvetch	13	22
Balsamorhiza sagittata	Balsamroot	24	40
Capsella bursa-pastoris	Shepard's purse	30	35
Castilleja species	Indian paint brush	5	14
Circium species	Thistle	10	0
Collinsia parviflora	Blue-eyed mary	0	0
Collomia tenellia	Collomia	0	0
Comandra umbellata	Toad flax	0	10
Cordylanthus ramosus	Cordylanthus	5	0
Cynoglossum officinale	Hound's tongue	0	9
Delphinium nelsonii	Larkspur	5	20
Descurainia pinnala	Tansy mustard	0	14
Disporum trachycarpum	Fairybells	0	0
Epilobium angustifolium	Fireweed	0	0

Table 1. (Continued).

Scientific name	Common name	% Use[1]	
		Cattle	Sheep
Epilobium paniculatum	Willowweed	0	0
Erigeron macranthus	Wild daisy	6	14
Eriogonum heracleoides	Buckwheat	23	18
Fraseria speciosa	Elkplant	0	0
Galium boreale	Bedstraw	0	0
Geranium fremontii	Cranesbill	26	18
Hackelia floribunda	Stickseed	2	9
Helianthella uniflora	Single-flowered sunflower	60	34
Heracleum lanatum	Cow parsnip	65	78
Hieracium scouleri	Hawk weed	2	11
Hydrophyllum capitatum	Waterleaf	0	0
Lactuca pulchella	Blue lettuce	5	15
Lathyrus leucanthus	Wild pea	20	45
Linum lewisii	Prairie flax	0	4
Lithophragma parviflora	Woodland star	0	0
Lithospermum ruderale	Gromwell	30	16
Lomatium grayii	Wild carrot	0	0
Lupinus caudatus	Lupine	36	33
Mertensia oblongifolia	Bluebell	28	78
Microseris nutan	Microseris	4	10
Nemophila breviflora	Nemophila	0	0
Osmorhiza occidentalis	Sweetroot	15	34
Ozmorhiza chilensis	Sweet cicely	17	40
Pedicularis groenlandica	Elephant head	0	5
Penstemon rydbergii	Penstemon	5	15
Perideridia gairdneri	False caraway	0	0
Phlox gracilis	Phlox	7	10
Physaria species	Bladder pod	4	12
Polemonium albiflorum	Polemonium	10	35
Polypodium species	Polypody	3	2
Potentilla glandulosa	Cinquefoil	6	13
Potentilla pectinisecta	Cinquefoil	41	42
Rudbeckia occidentalis	Coneflower	0	10
Rumex crispus	Curlyhead dock	0	0
Scrophularia lanceolata	Figwort	0	2
Senecio serra	Groundsel	20	34
Senecio integerrimus	Butterweed	2	3
Sidalcea neomexicana	Prairie mallow	10	10
Smilacina racemosa	False solomon's seal	10	50
Solidago missouriensis	Goldenrod	10	15
Stellaria jamesii	Starwort	0	4
Taraxacum officinale	Dandelion	20	45
Thalictrum fendleri	Meadow rue	5	60
Tragapogon porrifolius	Oyster plant	60	42
Trifolium repens	White clover	15	25
Urtica gracilis	Stinging nettle	0	0
Vaccinium occidentale	Blueberry	0	9
Valeriana occidentalis	Western valerian	15	5
Veratrum californicum	Skunk cabbage	0	0
Viccia americana	American vetch	45	25
Viguiera multiflora	Goldeneye	10	5
Viola purpurea	Pine violet	23	14
Viola vallicola	Yellow violet	10	11
Weythia amplexicaulis	Mule ears	0	5
Shrubs			
Acer grandidentatum	Maple	0	5
Alnus tenuifolia	Alder	0	0
Amelanchier alnifolia	Serviceberry	27	42
Artemisia cana	Silver sage	0	2
Artemisia tridentata	Big sagebrush	5	5
Chrysothamnus viscidiflorus	Rabbitbrush	7	3
Mahonia repens	Hollygrape	0	0
Pachystima myrsinites	Myrtle pachystima	0	0
Populus tremuloides	Aspen	2	32
Prunus virginianus	Chokecherry	9	21
Purshia tridentata	Antelope bitterbrush	34	40
Rosa species	Wild rose	2	17
Sambucus caerulea	Elderberry	50	53
Symphoricarpos vaccinoides	Snowberry	24	21

[1]Percent use was determined by estimation of percent herbage removed at the end of the grazing period.

tions made from both adjacent cattle and sheep allotments on comparable range and from adjacent fenced pastures where cattle and sheep grazed separately. The range area included open aspen with many intermingled parks that ranged in area from a few acres to as large as several hundred acres. All studies were made on accessible range that was judged to be about 60% parks and 40% open aspen groves. Both species of animal made rather uniform use of both vegetation types. Table 1 is presented in some detail with respect to species utilization because few publications have presented the comparative use of grasses and forbs on grass-forb ranges.

The average production of dry matter was 1,274 pounds per acre on ranges grazed by sheep and 1,078 pounds per acre on ranges grazed by cattle. There were a total of 24 grasses, 84 forbs, and 14 shrubs on these ranges. Forbs made up twice the herbage production compared to grasses and produced about the same amount of herbage as shrubs. The weighted utilization on grasses, forbs and shrubs for sheep was 18, 42, and 8%, respectively. For cattle utilization of grasses, forbs and shrubs was 37, 17 and 9% respectively. The rather light use made of shrubs was a result of the rather light use of substantial amounts of big sagebrush that was present in some of the open parks. Of the total quantity consumed by sheep, only about 14% was grass but 70% was forbs. Of the total quantity consumed by cattle, about equal amounts were composed of grasses and forbs 45 and 37%, respectively. It was thus observed that even though cattle did not utilize many individual forb species heavily, this forage class made up substantial quantities of their daily intake especially in mid and late summer.

Recognition of Forbs for Higher Nutrition Levels: The level of nutrient intake of grazing animals is, to a large degree, dependent upon the life forms that are available as forage. Digestible protein available in the forage classes shows that grasses are decidedly deficient after the heading stage, but forbs had adequate or borderline digestible protein throughout most of the summer grazing season. Generally the same trends are evident for phosphorus during the summer grazing season. Grasses when forming the head become rather dramatically deficient in phosphorus which is a very important nutrient for herbivores. Forbs, however, throughout most of the west remain high in phosphorus and meet the grazing animals's nutrient requirement until heavy frost in the fall. Thus, for no other reason than to meet protein and phosphorus requirements of grazing animals, grassland ranges should be managed for a mixture of forbs and grasses in the stand.

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