

# New Mexico Geological Society

Downloaded from: <http://nmgs.nmt.edu/publications/guidebooks/22>



## *Flora of the San Luis Valley*

Hobart N. Dixon, 1971, pp. 133-136

in:

*San Luis Basin (Colorado)*, James, H. L.; [ed.], New Mexico Geological Society 22<sup>nd</sup> Annual Fall Field Conference Guidebook, 340 p.

---

*This is one of many related papers that were included in the 1971 NMGS Fall Field Conference Guidebook.*

---

## **Annual NMGS Fall Field Conference Guidebooks**

Every fall since 1950, the New Mexico Geological Society (NMGS) has held an annual [Fall Field Conference](#) that explores some region of New Mexico (or surrounding states). Always well attended, these conferences provide a guidebook to participants. Besides detailed road logs, the guidebooks contain many well written, edited, and peer-reviewed geoscience papers. These books have set the national standard for geologic guidebooks and are an essential geologic reference for anyone working in or around New Mexico.

### **Free Downloads**

NMGS has decided to make peer-reviewed papers from our Fall Field Conference guidebooks available for free download. Non-members will have access to guidebook papers two years after publication. Members have access to all papers. This is in keeping with our mission of promoting interest, research, and cooperation regarding geology in New Mexico. However, guidebook sales represent a significant proportion of our operating budget. Therefore, only *research papers* are available for download. *Road logs, mini-papers, maps, stratigraphic charts*, and other selected content are available only in the printed guidebooks.

### **Copyright Information**

Publications of the New Mexico Geological Society, printed and electronic, are protected by the copyright laws of the United States. No material from the NMGS website, or printed and electronic publications, may be reprinted or redistributed without NMGS permission. Contact us for permission to reprint portions of any of our publications.

One printed copy of any materials from the NMGS website or our print and electronic publications may be made for individual use without our permission. Teachers and students may make unlimited copies for educational use. Any other use of these materials requires explicit permission.

*This page is intentionally left blank to maintain order of facing pages.*

# FLORA OF THE SAN LUIS VALLEY

by

HOBART N. DIXON

Biology Department  
Adams State College  
Alamosa, Colorado

The Rocky Mountains in southern Colorado present a broad spectrum of vegetation types ranging from dry grasslands to moist spruce-fir forests. Where the different types of vegetation are found depends upon the environment and how it effects the plants by satisfying requirements or by exceeding the tolerances of the plants.

All species of plants have distinctive ranges of distribution which coincide with and which are controlled by patterns of the environment. The ranges of plants overlap in various combinations, usually in fairly constant associations which are called plant communities. These plant communities, composed of reasonably constant plant associations, are named for the dominant species in each community. Dominant species are the most obvious and abundant plants in the community. For example, ponderosa pine forests are dominated by ponderosa pines, but in this community type there are dozens of other plants which are overlooked due to small size or lack of abundance. In this paper we will consider the distribution of plant communities in the San Luis Valley as they relate to environment and as they can be identified by the dominant species. (Appendix 1 is a taxonomic key for the identification of the specific plants listed below.)

The distribution, or zonation, of plant communities is most obviously related to altitude, especially where the gradient is steep as in the Sangre de Cristo Mountains. (NOTE: There have been other, perhaps more familiar, schemes proposed for the naming of vegetation. Some of these different schemes are compared in Table 1). Of

many environmental factors which change with altitude, two might be singled out as more important than others: (1) Temperatures decrease with altitude. (2) At higher altitudes there is more water available because of increased precipitation (annual precipitation at Alamosa is seven inches, while that at Wolf Creek Pass is over forty inches), and a decrease in the evaporative power of the air because of increasing relative humidities.

**GREASEWOOD:** Commonly called "chico" in the San Luis Valley, greasewood (*Sarcobatus vermiculatus*) is a low shrub which is adapted to areas where drainage is poor and where high concentrations of salt in the soil are common.

**RABBITBRUSH:** Several varieties of *Chrysothamnus nauseosus* are found on the valley floor. The distribution of the varieties is related to elevation and depth to water-table. Toward the lower parts of the valley, this small, greenish shrub is found intermingled with the greasewood in communities where the two plants are dominant, but away from the center of the valley the rabbitbrush becomes dominant.

**GRASSLAND-SHRUB STEPPE:** The grassland which originally occupied the region between the rabbitbrush type and the piñon-juniper woodland has been severely overgrazed. As a consequence, the original grasses have been replaced by several types of low-growing woody plants which include several types of rabbitbrush and other shrubs.

**SAGEBRUSH:** Probably because of slightly greater amounts of snow in the eastern parts of the valley, sage-

TABLE 1.

A comparison of some different classifications of vegetation zones in the Rocky Mountains.

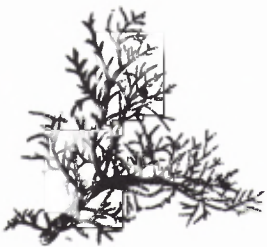
COMMUNITY TYPE USED IN THIS PAPER	ALTITUDIAL DISTRIBUTION (ft. above sea level X 1000)	CLASSIFICATION OF VEGETATION ZONE ACCORDING TO:		
		BAILEY (1913)	RAMALEY (1942)	MARR (1964)
Tundra	11.5-14	Arctic-alpine	Not mentioned	Alpine tundra
Spruce-fir	10.5-12.5	Hudsonian	Coniferous forest	Subalpine
Lodgepole pine	9.5-11	Transition	Coniferous forest	Subalpine
Mixed Conifer	8-11	Transition	Coniferous forest	Upper montane
Douglas fir	8-10.5	Transition	Coniferous forest	Upper montane
Ponderosa pine	8.5-10	Transition	Coniferous forest	Lower montane
Piñon-juniper	8-9.5	Upper Sonoran	Piñon-cedar	Lower montane
Sagebrush	8-9	Transition	Oak-scrubland	Plains grassland
Scrub-oak	8-9	Upper Sonoran	Oak-chaparral	Plains grassland
Grassland-shrub-steppe	7.7-8.5	Upper Sonoran	Grassland	Plains grassland
Rabbitbrush	7.5-9	Upper Sonoran	Greasewood scrub	Plains grassland
Greasewood	7.5-8	Lower Sonoran	Greasewood scrub	Plains grassland
Aspen	8-11.5	Canadian	Aspen groves	Subalpine
Limber-Bristle-cone pine	8-12.5	Canadian	Coniferous forest	Upper montane
Willow-cottonwood	7.5-11	Upper Sonoran	Stream-valley	Lower montane



Piñon Needles

brush (*Artemisia tridentata*) replaces the dried shrub-steppe vegetation. South of Mount Blanca, sagebrush forms extensive stands below the piñon-juniper woodland. Soils in the sagebrush type are deep and fine textured and are very productive when cultivated.

**SCRUB OAK:** In the northern end of the valley, *Quercus gambellii*, a shrub 6 to 12 feet high, is found just below the piñon-juniper woodland. Dense stands of scrub oak are associated with rich soils and are frequently mixed with sagebrush.



Juniper



Piñon

**PIÑON-JUNIPER:** The woodland vegetation type is dominated by the piñon (*Pinus edulis*) and by either Rocky Mountain Juniper (*Juniperus scopulorum*) or one-seed juniper (*Juniperus monosperma*). All are small shrub-like trees seldom exceeding 20 feet in height. Soils in this vegetation type are rocky and well drained and support little except the piñon and juniper. Along water courses and on north-facing hillsides occasional stands of ponderosa pine and Douglas fir occur.

**PONDEROSA PINE:** Lying above and intermingled with the piñon-juniper type is the ponderosa pine vegetation type (*Pinus ponderosa*). These tall (up to 100 feet), open-spaced pines are found throughout the Southwest and are often logged. In topographic situations which allow for greater amounts of soil moisture, the Douglas fir or mixed-conifer type of vegetation will replace the ponderosa pine.

**DOUGLAS FIR:** When compared with the same species in the Pacific Northwest, Douglas firs (*Pseudotsuga*



Shooting Star

*menziesii*) in the southern Rocky Mountains are small (rarely over 2 feet in diameter or 70 feet in height). In the San Luis Valley these trees are found in pure stands above the ponderosa pine type and on north-facing slopes from 8,000 to 11,000 feet altitude.

**MIXED-CONIFER:** The mixed-conifer vegetation type is frequently found in a narrow, ill-defined band just above ponderosa pine, and in the ponderosa pine type along water courses on cool, shaded hillsides along the canyons. This type is composed of several trees which include aspen (*Populus tremuloides*), white fir (*Abies concolor*), Douglas fir, and Colorado Blue Spruce (*Picea pungens*).

**SUBALPINE SPRUCE-FIR:** The subalpine spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) form the highest forest type in the Rockies. These trees, reaching heights of 100 feet, are shaped like tall pyramids and gradually become more and more stunted toward timberline. The spruce makes good lumber and most of the logging in the San Luis Valley is in this high altitude forest type.

**TUNDRA:** The alpine tundra is found above timberline where all vegetation is characteristically long-growing. Dwarf willows and other shrubs dominate parts of the tundra while grasses, sedges, and other herbaceous plants dominate others. Soils in the tundra are unstable because they contain abundant water and because of frequent freeze-thaw cycles. Consequently only those plants adapted to moving soil are successful in many areas. Also, constant strong winds in the tundra dry and kill the foliage of exposed plants, they carry snow and other materials which abrade the plants, and they move the snow about so that plants on windswept ridges receive little moisture



Bluebells

from snow while plants on leeward slopes receive a great deal.

**ASPEN:** Aspen groves, found throughout the Rocky Mountains, are the first trees to become established following forest fires and logging. When aspen trees are shaded by invading conifers they are unable to compete and tend to be replaced by the conifers; however, stands of aspen are frequently permanent on sites where there is sufficient moisture. Aspens range altitudinally from below 8,000 feet to timberline. These trees are generally not large and trunks with a diameter of 1 foot or heights of over 50 feet are considered large.

**LODGEPOLE PINE:** Lodgepole pine (*Pinus contorta*) is another tree which is successional following fires. Found on La Veta Pass and in the northwest part of the basin, these trees are characterized by having trunks with little taper. (Plains Indians used saplings of this species for their lodgepoles, hence the name). Cones, which remain closed on the trees for many years, release millions of seeds when the heat of fires softens the resins which stick the cone scales together. At lower elevations the lodgepole pine is replaced by ponderosa pine, Douglas fir, or mixed-conifer and at higher altitudes it is replaced by spruce-fir.

**LIMBER PINE, BRISTLECONE PINE:** Scattered throughout the mountains on rocky, wind-swept ridges are many local stands of limber pine (*Pinus flexilis*) at low altitudes and bristlecone pine (*Pinus aristata*) at high altitudes. These trees are small (seldom over 30 feet high), and much-branched. They are not successful except on ridgetops.

**COTTONWOOD-WILLOW:** At elevations below 11,000 feet, the banks of streams are characteristically occupied by cottonwood (*Populus* spp.) and willows (*Salix* spp.). These plants require much water and are restricted to situations where there is ample, shallow water.

**COMMON JUNIPER:** Although not a dominant in any vegetation type, *Juniperus communis* is frequently encountered in all types above piñon-juniper and deserves some mention. This dense, low shrub is common to all mountainous regions and is a distinctive part of many communities.



## APPENDIX 1.

## Key to some dominant native trees and shrubs of the San Luis Valley

1. Plants evergreen, leaves needle-like, scale-like, or awl-like	2 (conifers)
1. Plants not evergreen, leaves otherwise	14 (flowering plants)
2. Leaves needle-like, more than ½ inch long	3
2. Leaves awl or scale-like, less than ½ inch long	12 (junipers)
3. Needles fascicled (in groups surrounded by papery sheaths)	4 (pines)
3. Needles not fascicled, single	8
4. Needles in groups of 5 (sometimes 4)	5 (white pines)
4. Needles in groups of 3 (sometimes 2)	6 (yellow pines)
5. Mature cones long, without bristles	<i>Pinus flexilis</i> (limber pine)
5. Mature cones short, with bristles	<i>Pinus aristata</i> (bristlecone pine)
6. Mature cones closed, top-shaped, less than 2 inches long, remain on tree many years	<i>Pinus contorta</i> (lodgepole pine)
6. Mature cones open, ovoid, more than 2 inches long, fall soon after maturity	7
7. Needles more than 3 inches long	<i>Pinus ponderosa</i> (ponderosa pine)
7. Needles less than 3 inches long	<i>Pinus edulis</i> (piñon pine)
8. Needles square or diamond-shaped in cross section, sharp-pointed	9 (spruce)
8. Needles flat in cross section, not sharp-pointed	10
9. Tree growing at high altitude, cone less than 2 inches long	<i>Picea engelmannii</i> (Engelmann spruce)
9. Tree growing at low altitude, cones more than 2 inches long	<i>Picea pungens</i> (Colo. Blue Spruce)
10. Buds pointed; cones dry, pendant, with 3-lobed bracts, falling entire	<i>Pseudotsuga menziesii</i> (Douglas fir)
10. Buds round; cones fleshy, upright, falling apart on tree	11 (true firs)
11. Needles more than 1½ inches long; usually found below 11,000 feet	<i>Abies concolor</i> (white fir)
11. Needles less than 1 inch long; found above 11,000 feet	<i>Abies lasiocarpa</i> (subalpine fir)
12. Leaves awl-like; plant low growing, shrubby	<i>Juniperus communis</i> (common juniper)
12. Leaves scale-like; plant tree-like	13
13. Fruits usually with more than 1 seed; branches in flat sprays	<i>Juniperus scopulorum</i> (Rky. Mt. juniper)
13. Fruits with 1 seed; branches not in flat sprays	<i>Juniperus monosperma</i> (one-seed juniper)
14. Trees, with single trunks generally over 6 inches in diameter	15
14. Shrubs, with many small, woody stems	19
15. Leaves 4 to 6 times longer than wide	16
15. Leaves about as long as wide	17
16. Buds sticky with resin	<i>Populus angustifolia</i> (narrowleaf cottonwood)
16. Buds without resin	<i>Salix</i> spp. (willows)
17. Bark white, powdery to base of tree	<i>Populus tremuloides</i> (aspen)
17. Bark not white at base	18
18. Leaves deeply lobed; plants of dry hillsides	<i>Quercus gambellii</i> (scrub oak)
18. Leaves shallowly toothed; streamside plants	<i>Populus</i> spp. (cottonwoods)
19. Leaves cylindrical, succulent; brittle thorns present	<i>Sarcobatus vermiculatus</i> (greasewood)
19. Leaves flat, not succulent; thorns absent	20
20. Leaves grey, small, 3-lobed, aromatic	<i>Artemisia tridentata</i> (sagebrush)
20. Leaves green, large, not aromatic	21
21. Leaves deeply lobed, about twice as long as broad	<i>Quercus gambellii</i> (scrub oak)
21. Leaves not deeply lobed, more than 3 times as long as broad	22
22. Shrubs of streamsides	<i>Salix</i> spp. (willows)
22. Shrubs of dry areas	<i>Chrysothamnus nauseosus</i> (rabbitbrush)