USDA Natural Resources Conservation Service

Ecological site R034AY334WY
Rocky Hills High Plains Southeast (RH)

Accessed: 05/12/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Associated sites

R034AY322WY	**Loamy High Plains Southeast (Ly)**
R034AY358WY	**Shallow Clayey High Plains Southeast (SwCy)**
R034AY362WY	**Shallow Loamy High Plains Southeast (SwLy)**

Similar sites

R034AY376WY	**Very Shallow High Plains Southeast (VS)** Very Shallow (VS) 10-14SE has lower production and does not have mountain mahogany as a major woody component.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site usually occurs on upland positions but may occur on all slopes and positions.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Escarpment
Flooding frequency	None
Ponding frequency	None
Elevation	5,500–7,500 ft
Slope	1–70%
Ponding depth	0 in
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation ranges from 10-14 inches per year. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation. Temperatures show a wide range between summer and winter and between daily maximums and minimums. This is predominantly due to the high elevation

and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring.

Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 mph.

Growth of native cool season plants begins about April 15 and continues to about June 15. Some green up of cool season plants usually occurs in September.

The following information is from the “Laramie” climate station:
Minimum Maximum 5 yrs. out of 10 between
Frost-free period (days): 57 149 June 1 – September 16
Freeze-free period (days): 94 183 May 15 – September 28
Annual Precipitation (inches): 5.8 17.34

Mean annual precipitation: 11.53 inches
Mean annual air temperature: 42.2 F (30.4 F Avg. Min. to 53.9 F Avg. Max.)
For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at http://www.wcc.nrcs.usda.gov/ website. Other climate station(s) representative of this precipitation zone include ”Dixon ” and “Medicine Bow”.

Table 3. Representative climatic features

Frost-free period (average)	149 days
Freeze-free period (average)	183 days
Precipitation total (average)	14 in

Influencing water features

Stream type: None

Soil features

The soils of this site are shallow to very deep and well drained. They formed on alluvium, colluvium and residuum and have moderate permeability.

Table 4. Representative soil features

Surface texture	(1) Loam (2) Clay loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	20–60 in
Surface fragment cover <=3"	10–40%
Surface fragment cover >3"	10–40%
Available water capacity (0-40in)	0.7–1 in
Calcium carbonate equivalent (0-40in)	0–35%
Electrical conductivity (0-40in)	0–2 mmhos/cm

Sodium adsorption ratio (0-40in)	0–3
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	10–60%
Subsurface fragment volume >3" (Depth not specified)	10–60%

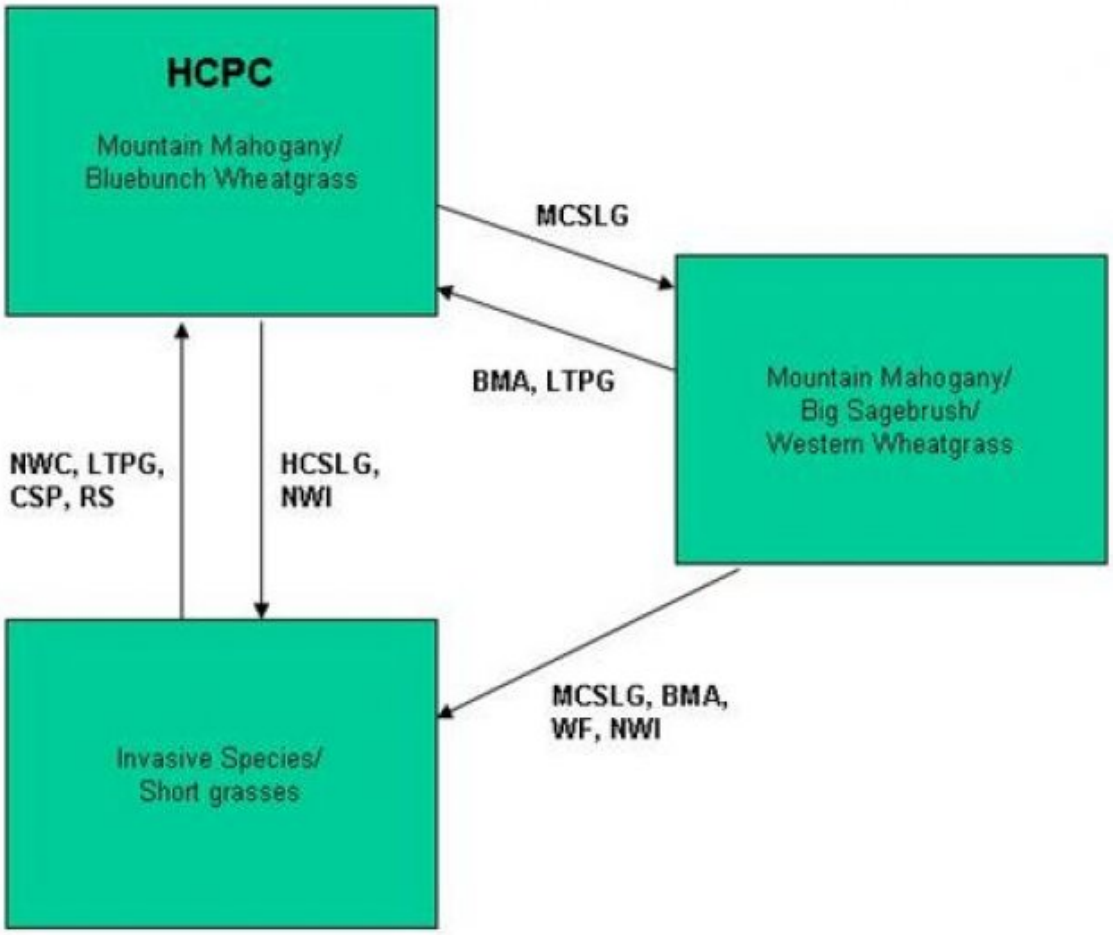
Ecological dynamics

As this site deteriorates, species such as big sagebrush and rabbitbrush will increase. Cheatgrass may invade. Bluebunch wheatgrass, needleandthread, and mountain mahogany will decrease in frequency and production.

The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

State and transition model



BMA – Brush Management (all methods)
BMC – Brush Management (chemical)
BMF – Brush Management (fire)
BMM – Brush Management (mechanical)
CSP – Chemical Seedbed Preparation
CSLG – Continuous Season-long Grazing
DR – Drainage
CSG – Continuous Spring Grazing
HB – Heavy Browse
HCSLG – Heavy Continuous Season-long Grazing
HI – Heavy Inundation
LPG – Long-term Prescribed Grazing
MT – Mechanical Treatment (chiseling, ripping, pitting)
MCSLG – Moderate Continuous Season Long Grazing

NF – No Fire
NS – Natural Succession
NWC – Noxious Weed Control
NWI – Noxious Weed Invasion
NU – Nonuse
P&C – Plow & Crop (including hay)
PG – Prescribed Grazing
RPT – Re-plant Trees
RS – Re-seed
SGD – Severe Ground Disturbance
SHC – Severe Hoof Compaction
WD – Wildlife Damage (Beaver)
WF – Wildfire

State 1
Mountain Mahogany/Bluebunch Wheatgrass Plant Community (HCPC)

Community 1.1
Mountain Mahogany/Bluebunch Wheatgrass Plant Community (HCPC)

The interpretive plant community for this site is the Historic Climax Plant Community. Potential vegetation is estimated at 45% grasses or grass-like plants, 10% forbs, and 45% woody plants. The major grasses include bluebunch wheatgrass, rhizomatous wheatgrass, and needleandthread. Other grasses may include Canby and Sandberg bluegrass, upland sedges, prairie junegrass, and Indian ricegrass. Mountain mahogany is the dominant woody plant. Other woody plants may include big sagebrush, juniper, snowberry, green rabbitbrush, winterfat, and black sagebrush. A typical plant composition for this state consists of bluebunch wheatgrass 20-30%, rhizomatous wheatgrass 10-20%, needleandthread 10-20%, other grasses and grass-like plants 15-25%, perennial forbs 5-10%, mountain mahogany 40-50%, and 5-15% other woody species. Ground cover, by ocular estimate, varies from 15-25%. The total annual production (air-dry weight) of this state is about 600 pounds per acre, but it can range from about 350 lbs./acre in unfavorable years to about 800 lbs./acre in above average years The state is stable and well adapted to the Cool Central Desertic Basins and Plateaus climatic conditions. The diversity in plant species allows for high drought resistance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity Transitions or pathways leading to other plant communities are as follows: • Moderate Continuous Season Long Grazing will convert this plant community to the Mountain Mahogany/Big Sagebrush/Western Wheatgrass Plant Community. • Heavy Continuous Season-Long Grazing and Noxious Weed Invasion will convert this plant community to the Invasive Species/Short Grass Plant Community. • Wildfire will convert this plant community to the Invasive Species/Short Grass Plant Community.

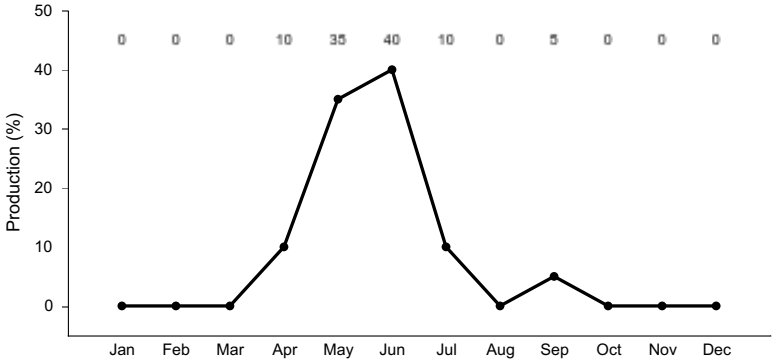


Figure 2. Plant community growth curve (percent production by month). WY0901, 34AI, Upland Sites. All Upland Sites.

State 2
Mountain Mahogany/Big Sagebrush/Western Wheatgrass Plant Community

Community 2.1
Mountain Mahogany/Big Sagebrush/Western Wheatgrass Plant Community

This plant community is a result of moderate continuous season long grazing. Mountain mahogany and big sagebrush dominate the site. The understory is composed of western wheatgrass with remnants of bluebunch wheatgrass, needleandthread, and Indian ricegrass. The total annual production (air-dry weight) of this state is about 400 pounds per acre, but it can range from about 200 lbs./acre in unfavorable years to about 600 lbs./acre in above average years. The state is stable but susceptible to excessive erosion. The biotic integrity of this plant community is affected by loss of mid bunchgrasses. The watershed is functioning at risk. Transitional pathways leading to other plant communities are as follows: • Brush Management followed by deferment for 1 to 2 years as part of a Prescribed Grazing plan will return this state to near Historic Climax Plant Community (Mountain Mahogany/Bluebunch Wheatgrass State). Care should be taken when planning brush management to consider wildlife habitat and critical winter ranges. • Moderate Continuous Season Long Grazing following Brush Management or Wildfire and Noxious Weed Invasion will convert this plant community to the Invasive Species/Short grass Plant Community.

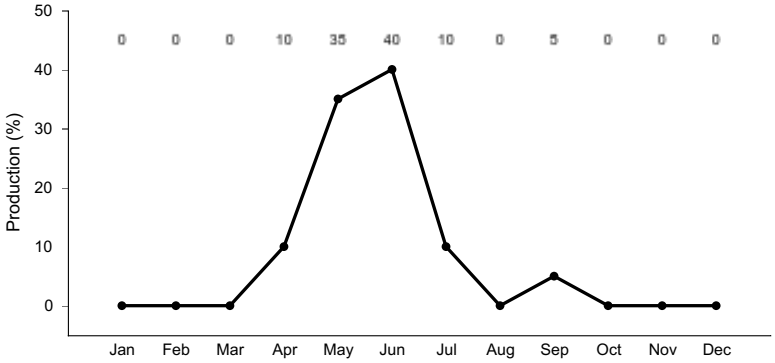


Figure 3. Plant community growth curve (percent production by month). WY0901, 34AI, Upland Sites. All Upland Sites.

State 3
Invasive Species/ Short Grass Plant Community

Community 3.1
Invasive Species/ Short Grass Plant Community

This plant community is found under frequent and severe grazing following fires (wild or planned). Although still a part of the plant community, mountain mahogany is no longer the dominant woody plant. Remaining plants are suppressed by browsing and have a hedged appearance. Big sagebrush, juniper, and green rabbitbrush are components of this plant community. Rhizomatous wheatgrass, annuals such as cheatgrass and bluegrasses dominate the understory. The total annual production (air-dry weight) of this state is about 300 pounds per acre, but it can range from about 100 lbs./acre in unfavorable years to about 500 lbs./acre in above average years. The state is vulnerable to excessive erosion. The biotic integrity of this plant community is at risk depending on how far a shift has occurred in plant composition toward green rabbitbrush, cheatgrass, and annual forbs. The watershed is at risk as bare ground increases. Transitional pathways leading to other plant communities are as follows: • Noxious weed control, Chemical Seedbed Preparation and Re-seeding followed by deferment for 1 to 2 years as part of a Prescribed Grazing plan will return this plant community to near Historic Climax Plant Community (Mountain Mahogany/Bluebunch Wheatgrass State) although cheatgrass will remain a part of the plant community. Additional deferment may be necessary and should be prescribed on an individual site basis.

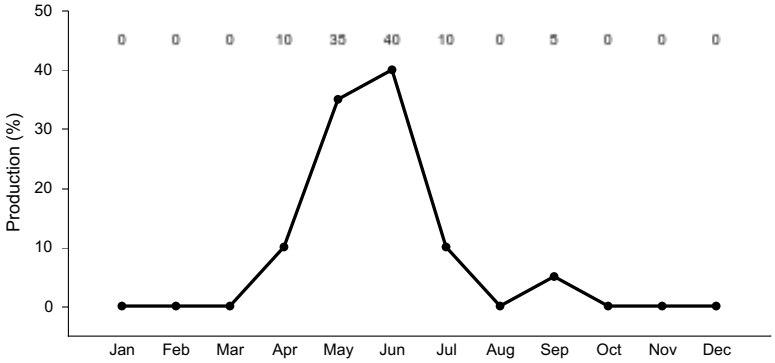


Figure 4. Plant community growth curve (percent production by month). WY0901, 34AI, Upland Sites. All Upland Sites.

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				60–120	
	needle and thread	HECO26	*Hesperostipa comata*	60–120	–
2				120–180	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	120–180	–
3				60–120	
	western wheatgrass	PASM	*Pascopyrum smithii*	60–120	–
4				90–150	
	Grass, perennial	2GP	*Grass, perennial*	0–30	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–30	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–30	–
	threadleaf sedge	CAFI	*Carex filifolia*	0–30	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–30	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–30	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–30	–
5				30–60	
	Forb, perennial	2FP	*Forb, perennial*	0–30	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–30	–
	milkvetch	ASTRA	*Astragalus*	0–30	–
	buckwheat	ERIOG	*Eriogonum*	0–30	–
	beardtongue	PENST	*Penstemon*	0–30	–
	phlox	PHLOX	*Phlox*	0–30	–
Shrub/Vine					
6				240–300	
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	240–300	–
7				30–90	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–30	–
	black sagebrush	ARNO4	*Artemisia nova*	0–30	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0–30	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–30	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	0–30	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–30	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0–30	–

Animal community

Animal Community – Wildlife Interpretations
Mountain Mahogany/Bluebunch Wheatgrass Plant Community (HCPC): This plant community provides excellent thermal and escape cover for wintering mule deer and elk. Year-round habitat is provided for mule deer, bobcat, cottontail rabbits, jackrabbits, sage grouse and many other birds such as the black-throated sparrow, lark sparrow, green-tailed towhee, and neotropical migrants. Mountain mahogany provides good thermal cover and nesting habitat for many bird species.

Mountain Mahogany/Big Sagebrush/Western Wheatgrass Plant Community: This plant community may be useful for the same wildlife that would use the Historic Climax Plant Community.

Invasive Species/Short Grass Plant Community: This plant community exhibits a low level of plant species diversity. In most cases it is not a desirable plant community to select as a wildlife habitat management objective.

Animal Community – Grazing Interpretations
The following table lists suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor.

Plant Community Production Carrying Capacity*
(lb./ac) (AUM/ac)
Mountain Mahogany/Bluebunch (HCPC) 350-800 .2
Mountain Mahogany/Big Sagebrush/Western 200-600 .1
Invasive Species/Short Grasses 100-500 .09

* - Continuous, season-long grazing by cattle under average growing conditions.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use needs to be supplemented with protein because the quality does not meet minimum livestock requirements.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is highly variable and is dominated by soils in hydrologic group B and C, with localized areas in hydrologic group D. Infiltration ranges from slow to very rapid. Runoff potential for this site varies from moderate to high depending on soil hydrologic group, depth to and permeability of bedrock, slope, and ground cover (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information).

Rills and gullies may be present, but should be small. Water flow patterns should be barely distinguishable. Pedestals are only slightly present in association with bunchgrasses such as bluebunch wheatgrass. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogrammic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game species. Variable topography, rock outcrop, and mountain mahogany appeal to hikers and wildlife viewers

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Inventory data references

Inventory Data References (narrative)
Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used. Other sources used as references include: USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various

counties.

Inventory Data References
Data Source Number of Records Sample Period State County
SCS-RANGE-417 69 1967-1988 WY Carbon
& others

Contributors

B. Brazee

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/01/2005
Approved by	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills should not be present

2. **Presence of water flow patterns:** Barely observable

3. **Number and height of erosional pedestals or terracettes:** Essentially non-existent

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 20-30% occurring in small areas throughout site

5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present

6. **Extent of wind scoured, blowouts and/or depositional areas:** None

7. **Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Plant cover and litter is at 70% or greater of soil surface and maintains soil surface integrity. Soil Stability class is anticipated to be 5 or greater.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Use Soil Series description for depth and color of A-horizon

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Grass canopy, Shrub Canopy and basal cover should reduce raindrop impact and slow overland flow providing increased time for infiltration to occur. Healthy deep rooted vegetation enhances infiltration and reduces runoff. Infiltration is moderately slow to moderate.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer or soil surface crusting should be present.

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional: Shrubs > Mid stature Bunchgrasses > Mid rhizomatous Grasses > Short Grasses/grasslikes > Forbs > Trees

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very Low

14. **Average percent litter cover (%) and depth (in):** Average litter cover is 25-35% with depths of 0.25 to 1.0 inches

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 600 lbs/ac

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Broom snakeweed, pricklypear, cheatgrass and other annuals, threadleaf sedge, bluegrasses,

rabbitbrushes big sagebrush, and Species found on Noxious Weed List

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17. **Perennial plant reproductive capability:** All species are capable of reproducing

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