

## **Ecological site R042BB027NM Hills, Desert Shrub**

Accessed: 06/30/2024

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### 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.

**Figure 1. Mapped extent**

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

**Table 1. Dominant plant species**

|            |               |
|------------|---------------|
| Tree       | Not specified |
| Shrub      | Not specified |
| Herbaceous | Not specified |

### Physiographic features

This site occurs as a complex of different soils, exposures, and degrees of slopes, and in close association with igneous or sedimentary rock formations other than limestone. It is characterized by rolling to steep hills and mountain footslopes. Slopes average more than 15 percent and range frequently to 50 percent, while direction of slopes is variable. Elevations range from 4,000 feet to 5,000 feet.

\*Note: Lozier and Courthouse soil series may be outside of the slope range for this ESD

**Table 2. Representative physiographic features**

|                    |                                    |
|--------------------|------------------------------------|
| Landforms          | (1) Hill<br>(2) Mountain slope     |
| Flooding frequency | None                               |
| Ponding frequency  | None                               |
| Elevation          | 4,000–5,000 ft                     |
| Slope              | 5–50%                              |
| Aspect             | Aspect is not a significant factor |

### Climatic features

Annual average precipitation ranges from 7.35 to 11.90 inches. Wide fluctuations from year to year are common, ranging from a low of about 2 inches to a high of over 20 inches. At least one-half of the annual precipitation comes in the form of rainfall during July, August, and September. Precipitation in the form of snow or sleet averages less than 4 inches annually. The average annual air temperature is about 61 degrees F. Summer maximums usually exceed 100 degrees F., and winter minimums can go below zero. The average frost-free season exceeds 200 days and extends from April 1 to November 1. Both the temperature regime and rainfall distribution favor warm-season perennial plants on this site. Spring moisture conditions are only occasionally adequate to cause significant growth during this period of the year. High winds from the west and southwest are common from March to June, which further tends to create poor soil moisture conditions in the springtime.

**Table 3. Representative climatic features**

|                               |          |
|-------------------------------|----------|
| Frost-free period (average)   | 205 days |
| Freeze-free period (average)  | 227 days |
| Precipitation total (average) | 12 in    |

## Influencing water features

This site is not influenced by water from wetlands or streams.

## Soil features

Soils are generally shallow. Surface textures range from stony loam, gravelly clay loam, cobbly loam, extremely stony sandy loam, very gravelly fine sandy loam, or cobbly loam. The subsoil is a very gravelly sandy loam, cobbly silt loam, very cobbly sandy clay loam, stony clay loam, cobbly clay or gravelly sandy loam. The soils are calcareous throughout the profile ranging from 2 to 40 percent. Runoff is moderately rapid to rapid. Slopes average more than 15 percent.

Minimum and maximum values listed below represent the characteristic soils for this site.

Characteristic Soils:

Lehmans

Ledru

Luxor

Lozier\*

Courthouse\*

Lemitar

Motoque

Pilabo

Laborcita

\*Note: Lozier and Courthouse may be outside of the slope range for this ESD

**Table 4. Representative soil features**

|  |   |
|--|---|
| Surface texture                          | (1) Stony loam<br>(2) Extremely stony sandy loam<br>(3) Cobbly loam |
| Family particle size                     | (1) Loamy   |
| Drainage class                           | Moderately well drained to well drained                             |
| Permeability class                       | Slow to moderately slow   |
| Soil depth                               | 0–20 in   |
| Surface fragment cover ≤3"               | 15–60%  |
| Surface fragment cover >3"               | 5–25%   |
| Available water capacity<br>(0-40in)     | 1–3 in  |
| Calcium carbonate equivalent<br>(0-40in) | 0–35%   |
| Electrical conductivity<br>(0-40in)      | 0–2 mmhos/cm  |

|   |         |
|---|---------|
| Sodium adsorption ratio (0-40in)                      | 0-1     |
| Soil reaction (1:1 water) (0-40in)                    | 6.6-8.4 |
| Subsurface fragment volume <=3" (Depth not specified) | 15-45%  |
| Subsurface fragment volume >3" (Depth not specified)  | 5-20%   |

## Ecological dynamics

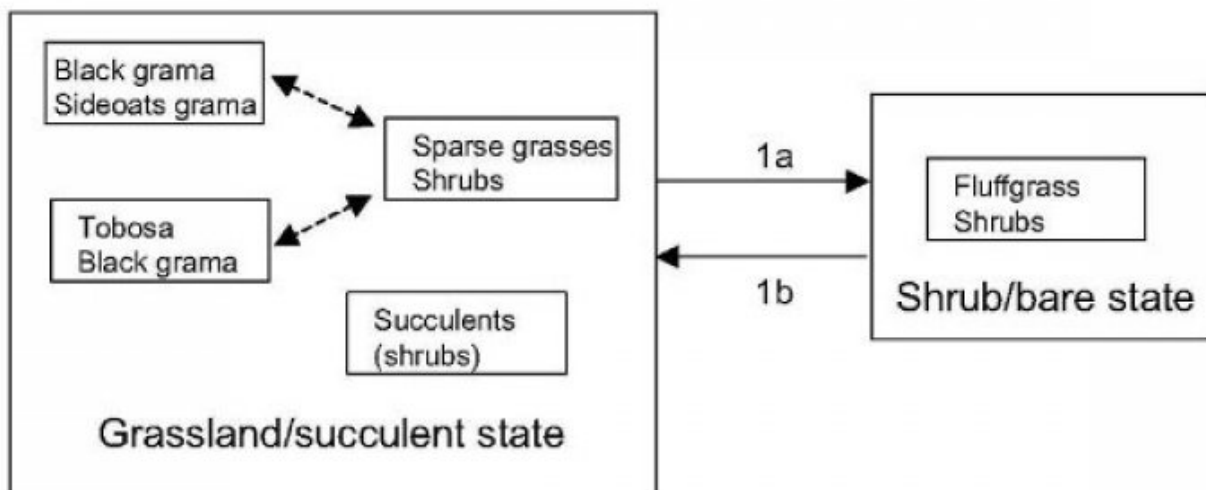
### Overview

This site frequently intergrades with gravelly and limestone hills sites. This site tends to occur at or approaching transitions to higher-elevation land resource units (e.g. CP-4) so plant community composition may grade continuously across relatively short distances. The historic plant community type of the hills site is dominated by black grama (*Bouteloua eriopoda*) and sideoats grama (*Bouteloua curtipendula*). Other grasses, including blue grama (*Bouteloua gracilis*) may be subordinates depending upon aspect and hillslope position. Tobosa (*Pleuraphis mutica*) may dominate on stony loams/clay loams. Shrubs and succulents are common, especially on south-facing slopes. Hills sites often exhibit more shrub cover than adjacent limestone hills sites. The Hills site is resistant to grass loss compared with other sites in SD-2, perhaps due to the presence of a rough, stony surface that 1) retards sheet flow velocity and erosional soil loss and 2) protects the crowns of grasses from herbivory by livestock.

No systematic studies of communities, states or transitions have been performed in the hills site.

### State and transition model

#### State-Transition model: MLRA 42, SD-2, low soil-depth group: Hills



1a. Erosion and loss of soil fertility

1b. Soil accumulation or addition

### State 1

#### Historic Climax Plant Community

## Community 1.1 Historic Climax Plant Community

### Grassland/succulent state



- Black grama, yucca, feather dalea
- Left is drier, S. facing slope
- Right is looking down a N. facing slope.
- Rock outcrop-Torriorthents association, Robledos Mtns, Dona Ana Co. NM

### Grassland/succulent state



- Left- Black grama, various shrubs
- Stonier surface, ungrazed 40 years
- Rock land, warm, White Sands Missile Range, NM
- Right-Black grama, creosotebush
- Steep (ca. 30% slope)—note shrubs on south face of ridge
- Rock outcrop-Torriorthents ass., extremely steep, Caballo Mtns, Sierra Co., NM

### Grassland/succulent state



- Black and sideoats grama, whitethorn, creosotebush
- S. facing slope, moderate grazing use
- Bare ground high, many live plants
- Rock outcrop-Torriorthents ass., extremely steep, Sierra Co. NM

### Grassland/succulent state



- Left—tobosa, some whitethorn, creosotebush, above roadcut and inaccessible to livestock
- Right—whitethorn, creosotebush dominates, below roadcut nearer to water source
- Stony loam soil in Courthouse-Rock outcrop ass. Sierra Co. NM

Figure 4. Grassland/succulent state

Grassland/Succulent State Black grama is typically dominant and bush muhly (*Muhlenbergia porteri*), blue grama, and sideoats grama are subordinates. On heavier soils, tobosa may be dominant. Succulents are also common subordinate plants, including banana yucca (*Yucca bacata*), sotol (*Dasyliirion* spp.), ocotillo (*Fouquieria splendens*) and agaves (*Agave* spp.). Cool season grasses, such as New Mexico feathergrass (*Hesperostipa neomexicana*) may also be present. Creosotebush (*Larrea tridentata*) may also be present. Heavy grazing or drought disturbance within this state leads to increasing bare ground and/or increases in the representation of threeawns (*Aristida* spp.), hairy grama (*Bouteloua hirsuta*), fluffgrass (*Dasyochloa pulchella*), and snakeweeds (*Gutierrezia* spp.). Drier, south-facing slopes tend to have a greater representation of succulents and shrubs, more bare ground, and less grass cover even when currently ungrazed. Abundant rocks and very shallow soils may also restrict grass cover. Steep, northerly-facing slopes often exhibit surprisingly abundant grass growth even where adjacent sites are degraded. With heavy grazing, grasses may be restricted to spaces between rocks but may increase with good management and adequate rainfall. Shrub encroachment (e.g., by creosotebush) that results in competitive influences on grasses is generally not observed. On some soils in some areas, however, whitethorn acacia (*Acacia constricta*) is becoming an important, and apparently recent, invader. It may prove useful to consider a shrub-invaded state if whitethorn dominance proves detrimental to grasses. Diagnosis: Black grama (or tobosa) is usually dominant in undisturbed settings. Grass cover is more or less continuous, with patches of bare ground becoming more common on the drier slopes and with grazing pressure. Shrubs and succulents may be common, especially on south-facing slopes. In cases of drought or heavy grazing, grasses may be inconspicuous and found only alongside rocks. Additional States: Transition to bare state (1a): Sites with steep slopes and relatively smooth surfaces may be susceptible to erosion if overgrazing/drought is severe. Gullies may need to be blocked and water flow redistributed more evenly. Sites with shallower slopes and more rough surfaces may be less likely to experience this transition under similar environmental conditions. Key indicators of approach to transition: Increases in bare ground, evidence of sheet flow including litter dams and loss of soil around rocks, rills, gullies.

Table 5. Annual production by plant type

| Plant Type      | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|-----------------|---------------|--------------------------------|----------------|
| Grass/Grasslike | 227           | 376                            | 525            |
| Shrub/Vine      | 75            | 124                            | 172            |
| Forb            | 23            | 38                             | 53             |
| <b>Total</b>    | <b>325</b>    | <b>538</b>                     | <b>750</b>     |

Table 6. Soil surface cover

|                                   |     |
|-----------------------------------|-----|
| Tree basal cover                  | 0%  |
| Shrub/vine/liana basal cover      | 0%  |
| Grass/grasslike basal cover       | 18% |
| Forb basal cover                  | 0%  |
| Non-vascular plants               | 0%  |
| Biological crusts                 | 0%  |
| Litter                            | 10% |
| Surface fragments >0.25" and <=3" | 0%  |
| Surface fragments >3"             | 0%  |
| Bedrock                           | 0%  |
| Water                             | 0%  |
| Bare ground                       | 22% |

Figure 6. Plant community growth curve (percent production by month). NM2514, R042XB027NM-Hills-Warm Season Plant HCPC. SD-2 Warm Season Plant Community..

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0   | 0   | 0   | 5   | 10  | 10  | 25  | 30  | 15  | 5   | 0   | 0   |

## State 2 Shrub / Bare

### Community 2.1 Shrub / Bare

Shrub/Bare: These communities are largely barren with a variable cover of fluffgrass, snakeweeds, and annuals in addition to some succulents and woody plants. Gullies may be present. Transition to grassland/succulent state (1b): If soil loss exposes the stony substrate, then soil would need to accumulate or be added before large perennial grasses could recover. Gullies may need to be blocked and water flow redistributed more evenly. Seeding would likely be required if source populations were unavailable. Information sources and theoretical background: Communities, states, and transitions are based upon information in the ecological site description and observations by Jim Powell, NRCS, retired, and Brandon Bestelmeyer, Jornada Experimental Range. The speculations regarding the role of surface roughness in providing resistance to grass degradation can and should be empirically verified.

## Additional community tables

Table 7. Community 1.1 plant community composition

| Group                  | Common Name | Symbol | Scientific Name | Annual Production (Lb/Acre) | Foliar Cover (%) |
|------------------------|-------------|--------|-----------------|-----------------------------|------------------|
| <b>Grass/Grasslike</b> |             |        |                 |                             |                  |
| 1                      |             |        |                 | 135–161                     |                  |

|                   |                                 |        |  |         |   |
|-------------------|---------------------------------|--------|--|---------|---|
|                   | black grama                     | BOER4  | <i>Bouteloua eriopoda</i>              | 135–161 | – |
| 2                 |                                 |        |  | 54–81   |   |
|                   | bush muhly                      | MUPO2  | <i>Muhlenbergia porteri</i>            | 54–81   | – |
| 3                 |                                 |        |  | 54–81   |   |
|                   | sideoats grama                  | BOCU   | <i>Bouteloua curtipendula</i>          | 54–81   | – |
|                   | blue grama                      | BOGR2  | <i>Bouteloua gracilis</i>              | 54–81   | – |
| 4                 |                                 |        |  | 5–16    |   |
|                   | threeawn                        | ARIST  | <i>Aristida</i>                        | 5–16    | – |
| 5                 |                                 |        |  | 5–27    |   |
|                   | tobosagrass                     | PLMU3  | <i>Pleuraphis mutica</i>               | 5–27    | – |
| 6                 |                                 |        |  | 5–16    |   |
|                   | New Mexico feathergrass         | HENE5  | <i>Hesperostipa neomexicana</i>        | 5–16    | – |
| 7                 |                                 |        |  | 27–54   |   |
|                   | cane bluestem                   | BOBA3  | <i>Bothriochloa barbinodis</i>         | 27–54   | – |
|                   | Arizona cottontop               | DICA8  | <i>Digitaria californica</i>           | 27–54   | – |
|                   | plains lovegrass                | ERIN   | <i>Eragrostis intermedia</i>           | 27–54   | – |
|                   | tanglehead                      | HECO10 | <i>Heteropogon contortus</i>           | 27–54   | – |
|                   | green sprangletop               | LEDU   | <i>Leptochloa dubia</i>                | 27–54   | – |
| 8                 |                                 |        |  | 5–16    |   |
|                   | Hall's panicgrass               | PAHA   | <i>Panicum hallii</i>                  | 5–16    | – |
|                   | tridens                         | TRIDE  | <i>Tridens</i>                         | 5–16    | – |
| 9                 |                                 |        |  | 5–27    |   |
|                   | Graminoid (grass or grass-like) | 2GRAM  | <i>Graminoid (grass or grass-like)</i> | 5–27    | – |
| <b>Shrub/Vine</b> |                                 |        |  |         |   |
| 10                |                                 |        |  | 43–65   |   |
|                   | agave                           | AGAVE  | <i>Agave</i>                           | 43–65   | – |
|                   | common sotol                    | DAWH2  | <i>Dasyilirion wheeleri</i>            | 43–65   | – |
|                   | ocotillo                        | FOSP2  | <i>Fouquieria splendens</i>            | 43–65   | – |
|                   | yucca                           | YUCCA  | <i>Yucca</i>                           | 43–65   | – |
| 11                |                                 |        |  | 5–16    |   |
|                   | sacahuista                      | NOMI   | <i>Nolina microcarpa</i>               | 5–16    | – |
| 12                |                                 |        |  | 5–16    |   |
|                   | fourwing saltbush               | ATCA2  | <i>Atriplex canescens</i>              | 5–16    | – |
| 13                |                                 |        |  | 5–27    |   |
|                   | oak                             | QUERC  | <i>Quercus</i>                         | 5–27    | – |
|                   | littleleaf sumac                | RHMI3  | <i>Rhus microphylla</i>                | 5–27    | – |
| 14                |                                 |        |  | 0–16    |   |
|                   | juniper                         | JUNIP  | <i>Juniperus</i>                       | 0–16    | – |
| 15                |                                 |        |  | 5–16    |   |
|                   | featherplume                    | DAFO   | <i>Dalea formosa</i>                   | 5–16    | – |
| 16                |                                 |        |  | 5–16    |   |
|                   | broom snakeweed                 | GUSA2  | <i>Gutierrezia sarothrae</i>           | 5–16    | – |
| <b>Forb</b>       |                                 |        |  |         |   |
| 17                |                                 |        |  | 5–27    |   |

|    |   |       |  |       |   |
|----|---|-------|--|-------|---|
|    | buckwheat                                   | ERIOG | <i>Eriogonum</i>                                   | 5–27  | – |
|    | woolly plantain                             | PLPA2 | <i>Plantago patagonica</i>                         | 5–27  | – |
|    | globemallow                                 | SPHAE | <i>Sphaeralcea</i>                                 | 5–27  | – |
| 18 |   |       |  | 16–43 |   |
|    | Forb (herbaceous, not grass nor grass-like) | 2FORB | <i>Forb (herbaceous, not grass nor grass-like)</i> | 16–43 | – |

## Animal community

This site provides habitat which support a resident animal community that is characterized by mule deer, spotted skunk, ringtail, desert cottontail, Texas antelope squirrel, rock pocket mouse, cactus mouse, white throated woodrat, turkey vulture, phrrhuloxia, cactus wren, curve billed thrasher, blue gray gnatchatcher, brown towhee, rufous crowned sparrow, rock rattlesnake, mountain patchnosed snake, canyon treefrog, red spotted toad, long tailed brush lizard, and collared lizard.

Where high cliffs and ledges are present, golden eagles and prairie falcons perch to hunt over the surrounding terrain. This site is considered ancestral range of the desert bighorn sheep.

## Hydrological functions

The runoff curve numbers are determined by field investigations using hydraulic cover conditions and hydrologic soil groups.

Hydrologic Interpretations  
 Soil Series Hydrologic Group  
 Lehmans D  
 Ledru D  
 Luxor D  
 Lozier D  
 Courthouse D  
 Lemitar D  
 Motoque B  
 Pilabo B  
 Laborcita B

## Recreational uses

Recreation potential is limited largely by the hot daytime temperatures of summer and windy spring weather of the lower Sonoran Life Zone, within which the site is located. Suitability for camping and picnicking is fair, limited mostly by rockiness and stoniness of the soils, The site has high suitability for “rock - hounding”, hiking, rock climbing and observation of nature. Hunting is fair for deer, desert bighorn and introduced ibex, fair to good for quail, dove and small game.

## Wood products

This site has insignificant value for wood products.

## Other products

This site, at its potential, is suitable for grazing in all seasons of the year, although most of the green forage is produced during summer months. The site is suitable for grazing by all classes of livestock. In order to maintain and improve this site, grazing management that includes a flexible stocking rate is especially important. As long as woody species do not dominate the site recovery from retrogression can be made at a reasonable rate through good grazing management.

## Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index Ac/AUM

100 - 76----- 3.8 – 4.7

75 – 51----- 4.5 – 7.2

50 – 26----- 7.0 – 11.3

25 – 0----- 11.3 - +

## Other references

Other References:

Data collection for this site was done in conjunction with the progressive soil surveys within the Southern Desertic Basins, Plains and Mountains, Major Land Resource Areas of New Mexico. This site has been mapped and correlated with soils in the following soil surveys. Sierra County Dona Ana County Grant County Hidalgo County Luna County Otero County

Characteristic Soils Are:

Lehmans stony loam, rocky loam

Other Soils included are:

Ledru gravelly clay loam

Lehmans (gravelly sandy clay loam)-Lithic Haplargids complex

Brewster stony loam

Graham clay loam (Grant County)

Tidwell stony loam

Lithic Haplargids

## Contributors

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## 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  |                   |
| Approved by                                 |                   |
| Approval date                               |                   |
| Composition (Indicators 10 and 12) based on | Annual Production |

## Indicators

1. **Number and extent of rills:**
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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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:

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

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14. **Average percent litter cover (%) and depth ( in):**

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

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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:**

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17. **Perennial plant reproductive capability:**

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