

## **Rangeland ecology and animal behaviour**

The removal of leaves or any live part/s of the plant including leaves in any way by animals grazing or by human intervention is called defoliation. The effects of defoliation may be positive or negative, that are explain below.

### **a. Plant morphology:**

- Removal of terminal bud and growth of several lateral buds,
- Increase of foliage (leaves)
- Thickness of crown

### **b. Plant physiology:**

- Adverse effect on metabolism
- Damage on photosynthetic tissues
- Reduced carbohydrate reserve in the roots
- Decrease of root growth and forage production.

### **c. Seed production:**

- Disturbance of entire physiology results
- Less seed production
- Reduced seed sizes and numbers

### **d. Vegetative reproduction:**

- Reduces the photosynthesis plant tissues
- Delaying food synthesis process.
- Reduced size of the rhizomes and bulbs.
- Effect of frequent early grazing
- Effects on rhizomes production.

### **e. Root system:**

- Reduce photosynthesis and decreases nutrient uptake and root size.
- Delays water intake capacity.
- Stop root growths which results moisture stress in plants.

### **f. Soil conditions:**

- Soil compact
- Reduces infiltration and increase runoff.
- Prohibits normal root development and cause poor germination.

### **g. Plant condition:**

- Defoliated plants are subject to diseases, insects and rodents.

- Deteriorates soil moisture conditions
- Directly affects biodiversity.

### **Plant Tolerance to Defoliation**

Plant reacts to the defoliation in many ways. Different plants have different ability to tolerate the phenomenon of defoliation. Following factors affect the phenomenon of defoliation.

1. Species: Deciduous plants have more tolerance capacity than evergreen plants.
2. Seasons/timing: in dry seasons (winter) recovery from defoliation is slow.
3. Frequency: rate of defoliation is more on particular months.
4. Intensity: serious defoliation focused on specific areas or parts.
5. Cutting height: recovery process affect by plants cutting height.
6. Stage of maturity, growth and protein content of the plant. (Less Nitrogen more defoliation)
7. Competition of plants for water, nutrients and light (survival under stress).
8. Carbohydrate cycle in the grass: less synthesis of carbohydrate during photosynthesis results more defoliation.
9. Grazing resistance capacity of the plants reduces the probability of defoliation.

**(a) Avoidance mechanisms:** A mechanism in which plant start to produce large number of small tillers, reduced leaf number and leaf blade areas. This reduces the amount of biomass removed by herbivorous and plants stated to avoid by animals.

**(b) Tolerance mechanisms:** A mechanisms in that facilitates re-growth of the plant following defoliation. It increases the number of apical meristem that may contribute growth after defoliation. Plant started to produces reproductive tillers.

**Grassland:** Land areas composed by the herbaceous species of grass as the dominant component. There are two types of grassland: natural and artificial.

**Natural grasslands** are grasslands in which the plant communities have perennial grass as dominant species. There may be few or no shrubs at all. However, trees are completely absent. Such grassland is determined by the factors like:

- Climate
- Low moisture availability
- Just enough precipitation to grow grass
- Found between the desert and forest or at the rain shadow areas

**Artificial grassland** is grassland of more recent origin. They have been formed by destroying forests by cutting and fire. These grasslands have been maintained largely through grazing animals. These grasslands are determined by the factors like:

- Succession
- Absence of shrubs and original forest
- Maintained by mowing, grazing or burning
- Area with high precipitation

Grassland categories according to climatic zones (NBS, 2002)

Zone	Remarks
Tropical	Grasslands grazed almost all the year round.
Subtropical	Non-palatable species such as ferns, stinging nettle, and Eupatorium species are becoming dominant because of heavy grazing.
Temperate	Winter grazing for cattle, sheep and goats. Burning to improve grasslands is a common practice, causing increased soil erosion.
Subalpine	Seasonal grazing only because of heavy snow cover in winter. Burning of grasslands at the end of the grazing season and in early spring is common.
Alpine	Grasslands are grazed only during the summer (June - September).

### Factors that define the grassland

**Stress:** It is defined as a pressure and tension from the defoliation. It is a factor that inhibits growth and production. Plant can survive under stress. Stress is due to: Climate factors, edaphic factors, topographic factors and biotic factors.

- **Climatic factors:** it is influence by: precipitation, temperature & humidity
- **Edaphic factors:** it is influence by: Soil depth, soil structure, soil texture, soil moisture and soil fertility

- **Topographic factors:** it is influence by: elevation, slope angle, slope aspect, general curvature, plan curvature, and profile curvature are considered as the main causes of landslides
- **Biotic Factors:** it is influence by: Fire, grazing, land clearing, land slides

**Fire:** To the range manager, fire and grazing are the principle tools of rangeland vegetation management. Studies has proved that increase in fire frequency decreases the grass productivity. Wild and uncontrolled fire may be disturbing to all perennial vegetation. The role of fire is considered to be a little controversial. Thus; in many countries burning of the land is prohibited by laws.

**Grazing:** Heavy grazing seriously weakens the pressure species particularly, legumes and encourages the weed to develop better. It slow photosynthesis process resulting in reduced manufacture of food, nutrient uptake and plant vigor.

**Land clearing:** Clearing is accomplished mainly for cultivation. It exposes the soil, increase surface runoff, reduces soil permeability, and increases soil erosion leading to the big landslides. If clearing is confined to remove unwanted grass species in the rangeland, it may have some positive impact.