

Autecology: Introduction to Prairie Plant Adaptations

Reproductive adaptations

Seed Dormancy and Dispersal

Dormancy –

Seed bank –

Breaking dormancy:

Range –

Dispersal –

Plants generally have passive dispersal:

- 1.
- 2.
- 3.

Life History Strategies

Life History –

Selection of life history traits: r vs. K selected

r –

K –

Semelparous –

Iteroparous –

Annuals –

Biennials –

Perennials –

Phenology –

Grime's (1979) life history model for plants

Grime's model is a way to relate life history to the distribution of plants.

Grime recognized three different categories of life history traits:

1. Stress tolerant –

2. Ruderals –

3. Competitors –

An important point of Grime's model is that plants do not **have** to fall into one of the above three categories. There are continuums between the different categories resulting in intermediate life histories.

Light availability

Sunlight plays an important role in the timing and location of plant growth.

Photoperiod –

However, high light intensity combined with higher wind velocity can have severe drying effects on plants.

Absolute humidity –

Relative humidity –

Xerophytes –

Mesophytes –

Hydrophytes –

Adaptations to Xeric Conditions

Morphological adaptations

Root systems –

Transpiration—

Some ways prairie plants are adapted to xeric environments:

Physiological adaptations—Photosynthetic processes

In photosynthesis, different sets of reactions are coupled together to convert light energy into sugars.

The C₃ (Calvin) cycle:

RuBP carboxylase (Rubisco) – enzyme responsible for assimilation of CO₂

Note: Carbon-fixation in C₃ plants occurs only while stomata open.

C₄ and CAM photosynthesis increase water use efficiency in plants.

C₄ plants first bind CO₂ with PEP (phosphoenol pyruvate)

PEP carboxylase has much higher affinity for CO₂ –

C₄ plants carry out the C₃ cycle in the bundle sheath cells as opposed to the mesophyll cells.

CAM (Crassulacean acid metabolism):

Adaptations to Wet Conditions

Hydrophytes:

Disturbance-based Adaptations

Herbivory

A. Grazing and potential plant damage:

B. Potential adaptations:

Fire