Plant Physiology - *What a rangeland manager needs to know*

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PHOTOSYNTHESIS

How is chemical energy stored?

- Non-structural Carbohydrates (CHO's)
- Structural CHO's

Products of Photosynthesis

- Non-structural Carbohydrates (CHO's):
  - Soluble CHO's for _____
  - _____ major form in which soluble CHO's are transported
  - _____ major form in which soluble CHO's are stored
- Structural CHO's
  - Once made these cannot be used for energy by plant or mammals (except through a symbiotic relationship with microbes.)
  - Cellulose is the most important structural CHO in plants -(most abundant CHO in world)

And then there is Respiration

- Energy for assimilation
  - Synthesis of compounds (i.e., proteins and CHO's)
  - Mineral uptake
  - _____
- Maintenance
  - _____
  - _____

Energy also used for?

- Vegetative Growth
  - _____
  - _____
  - _____
- Reproductive Growth
  - elevation of apical meristems in grasses
  - apical dominance in grasses, forbs, and woody plants
- Factors Affecting Photosynthesis and Respiration
  - Leaf area and age
  - _____
  - Temperature (air and soil)
  - _____
  - Soil nutrient levels
  - _____
  - _____
- Grazing & fire alter plant physiological activities
  - _____
  - _____
  - Change Live:Dead ratio of tissue
  - Mechanical
  - Heat

- Carbon Reserves – Fate of non-structural CHO's

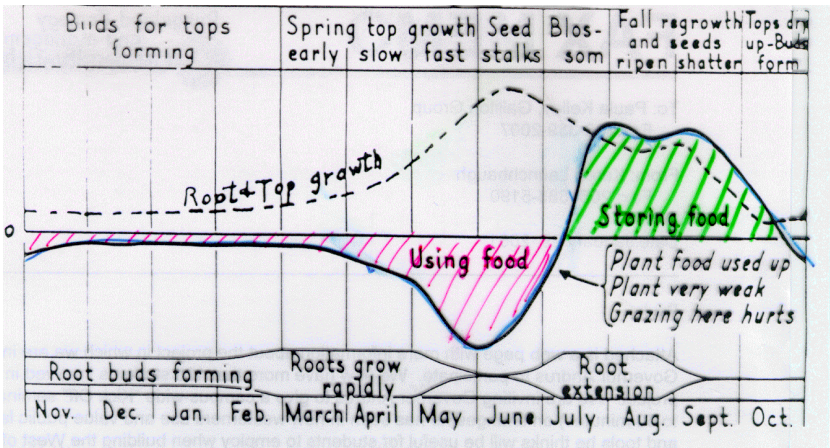
  Carbon Gain = Leaf Area + Psyn Rate

  - After grazing Psyn rate increases (up to 15%) in some plants.

    This is called _____.

THE PHOTOSYNTHETIC LIFE OF A PLANT

- **Historic View (until 1980's)**
  - Premise = CHO reserve levels became synonymous with plant vigor and ability to survive grazing and drought, etc.



  - Management implications:
    - *If you believed this theory, you believed the _____ of defoliation and amount of _____ following defoliation were the key management details.*

  - What did scientists measure?
    - _____

- **Contemporary View (after 1980's)**
  - Premise: *Some challenged the view that CHO reserves were a major reservoir of energy used by the plant for regrowth.*
  - What did scientists measure?
    - _____
    - Found out that pools of CHO's may be growing in early growth.
      - Concentration _____
      - Mass _____
- **Management Implications =**

  - *If you believe this theory (which is the currently accepted theory), it is important to manage the _____ of defoliation. CHO reserves are smaller than once believed. Thus, they are like a battery to "jump-start" growth after defoliation rather than a gas tank to sustain growth. The important point is that when growing conditions are good (i.e., spring) defoliation is not as detrimental as was believed in the "historic" theory because most of the energy from regrowth comes from current photosynthesis, not stored reserves.*