



Grass and the Environment

Cropping systems of the future will Grasslands have many economic benefits, and serve many functions in the agricultural ecosystem. The value of grassland resources to society in general should be evaluated based on all the intangible benefits that are currently not valued or undervalued. In a study evaluating the economic value of different ecological communities to the overall ecosystem, benefits of grassland were estimated at approximately \$100/acre annually.

Water and Soil

Perennial grasses conserve and stabilize the soil. The large to massive root systems of perennial grasses are natural filters as water moves through the soil profile. Grasses reduce soil erosion many times more than cultivated row crops. Perennial grasses maintain or improve soil quality, the primary reason why they are highly regarded when planning conservation practices.

Dense vegetation cover, as occurs with grasses, reduces runoff considerably, particularly the peak runoff rates. Perennial grasses also take up water from a large area of soil, and use water for a longer portion of the year, compared to annual field crops. All this results in a much larger portion of stream discharge coming from groundwater, instead of surface runoff, under grassland.

Air and Climate

Concerns over global climate change tend to center on greenhouse gases that are increasing in concentration, due to fossil fuel production and use, deforestation, and many other factors. Greenhouse gas output varies greatly on agricultural lands, depending on land use, management, rainfall, and temperature etc. The decline in soil organic matter over the decades can be directly related to increased greenhouse gases.

Any perennial crop with a large root system is going to aid in sequestering carbon in the soil.

Grass roots are particularly effective in increasing the soil organic matter fraction that is most resistant to degradation. Due to their perennial nature, some grasslands can be close to greenhouse gas neutral regarding CO₂ fluxes.

There are continuing attempts to develop carbon trading as a way to encourage practices that sequester carbon. The Kyoto Treaty was taken seriously in Europe, and there are many programs to monetarily compensate farmers and others for carbon-conserving activities. Widespread carbon trading in the USA is not likely to happen soon, but when it does, grasslands will be featured prominently in CO₂ reduction strategies.



Figure 2. Grass grown for biomass is compatible with wildlife nesting.

Biodiversity

Biodiversity refers to an abundance of diverse organisms coexisting in a given area, in the air, on the land, and in the soil. The above and below ground biodiversity will be increased by increasing the agricultural land area in perennial grasses. The greater number of species present in perennial grass will support more complex food webs.

Plant and animal productivity are generally

somewhat negatively related to biodiversity, with monocultures being the most productive. Greater biodiversity, however, could improve yield stability. Management practices that enhance biodiversity are usually not rewarded economically, even though biodiversity is critical to the survival of agriculture and the rest of society.

Grass and Open Lands

The public expects agriculture to be diversified, providing aesthetically pleasing rural landscapes. The state of Vermont subsidizes farmers to stay in business to maintain some open spaces for tourists in an otherwise continuous forest canopy. The NY State Comptroller released a report in 2010 entitled "Economic Benefits of Open Space Preservation". The report encourages government organizations to develop well-designed plans to achieve protection of open spaces. Grasslands are near the top of the list for providing aesthetically pleasing open spaces.



Figure 1. Hawk patiently waiting for a plot harvester to uncover dinner. Grasslands are home to a wide variety of wildlife.

Impacts of Grass on Society

Compared with row crops, grasslands have many attributes that are superior for environmental protection. There are also human health benefits from the increased conjugated linoleic acid content of milk and meat products from animals fed grass pasture.

The practice of feeding rations very high in grains to dairy cattle can be seen as detracting from the food available to support a rapidly growing human population. Judicious feeding of grains along with high quality grass forage may be more socioeconomically acceptable in the future.

Summary

Perennial grasses maintain open spaces, provide wildlife habitats, maintain and improve soil and water quality, and minimize soil erosion. Government programs should expect an assessment of environmental impact as a significant criterion for participation. Well-managed grasslands provide numerous benefits to society and the environment; and these benefits should somehow be accounted for in their total monetary value.

Additional Resources

- 2011 Cornell Guide for Integrated Field Crops Management. Electronically accessible at: <http://ipmguidelines.org/Fieldcrops/>.
- Keeney, D.R., and M.A. Sanderson. 2007. Forages and the environment. pp. 167-176. *In* (R.F. Barnes et al., eds.) Forages, Vol. II, The Science of Grassland Agriculture. Blackwell Publishing, Ames, IA.
- Fick, G.W., and E.A. Clark. 1998. The future of grass for dairy cattle. pp. 1-22. *In* (J.H. Cherney and D.J.R. Cherney, eds.) Grass for Dairy Cattle. CAB Publishing, New York, NY.

Disclaimer

This information sheet reflects the current (and past) authors' best effort to interpret a complex body of scientific research, and to translate this into practical management options. Following the guidance provided in this information sheet does not assure compliance with any applicable law, rule, regulation or standard, or the achievement of particular discharge levels from agricultural land.

For more information



Cornell University
Cooperative Extension

Grass Management Manual
<http://forages.org>

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