

Carbon Sequestration in C4 Plants on Reclaimed Mine Sites



Presentation by: Jacob Morris

*Jason Fillhart & Rachel Spirnak
West Virginia Water Research
Institute
National Mine Land Reclamation
Center*

Overview

- West Virginia Surface Mining
- Reclaimed Mine Site Using C4 plants
- Study Site and other information
- C4 plants and their ability to sequester carbon
- Carbon Crediting
- Study Objectives
- Methods
- Benefits
- Project Timeline

*WEST VIRGINIA SURFACE
MINING*



IMPACTS

Numerous mines throughout the state, covering from 4,000 to 12,000 acres

Large contributor to greenhouse gas emissions

After mining, communities need development options to sustain their economies



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*RECLAIMED MINE SITE USING
C4 PLANTS*



Conservational Benefits

The habitat for local plant and animal species that may have been disrupted or lost because of the mining activities can be restored by covering a mine site with vegetation.

Planting vegetation on a former mine site can help stabilize the soil, reducing erosion and minimizing the potential for landslides

Pollutants can be removed from the water by vegetation, keeping them out of surrounding streams and rivers.



Reclaimed Landscape



Plots of efficient C4 grasses

*STUDY SITE AND OTHER
INFORMATION*



STUDY SITE



Alton, WV

Former mine and bond
forfeiture site called DLM

Hundreds of acres
of marginally reclaimed
mine lands

DLM BIOFUEL PLOTS



In 2010, 20 plots were planted with Switchgrass and Miscanthus cultivars for a biofuel production study.

This study will focus on “green” biomass development.

*C4 PLANTS AND THEIR ABILITY
TO SEQUESTER CARBON*

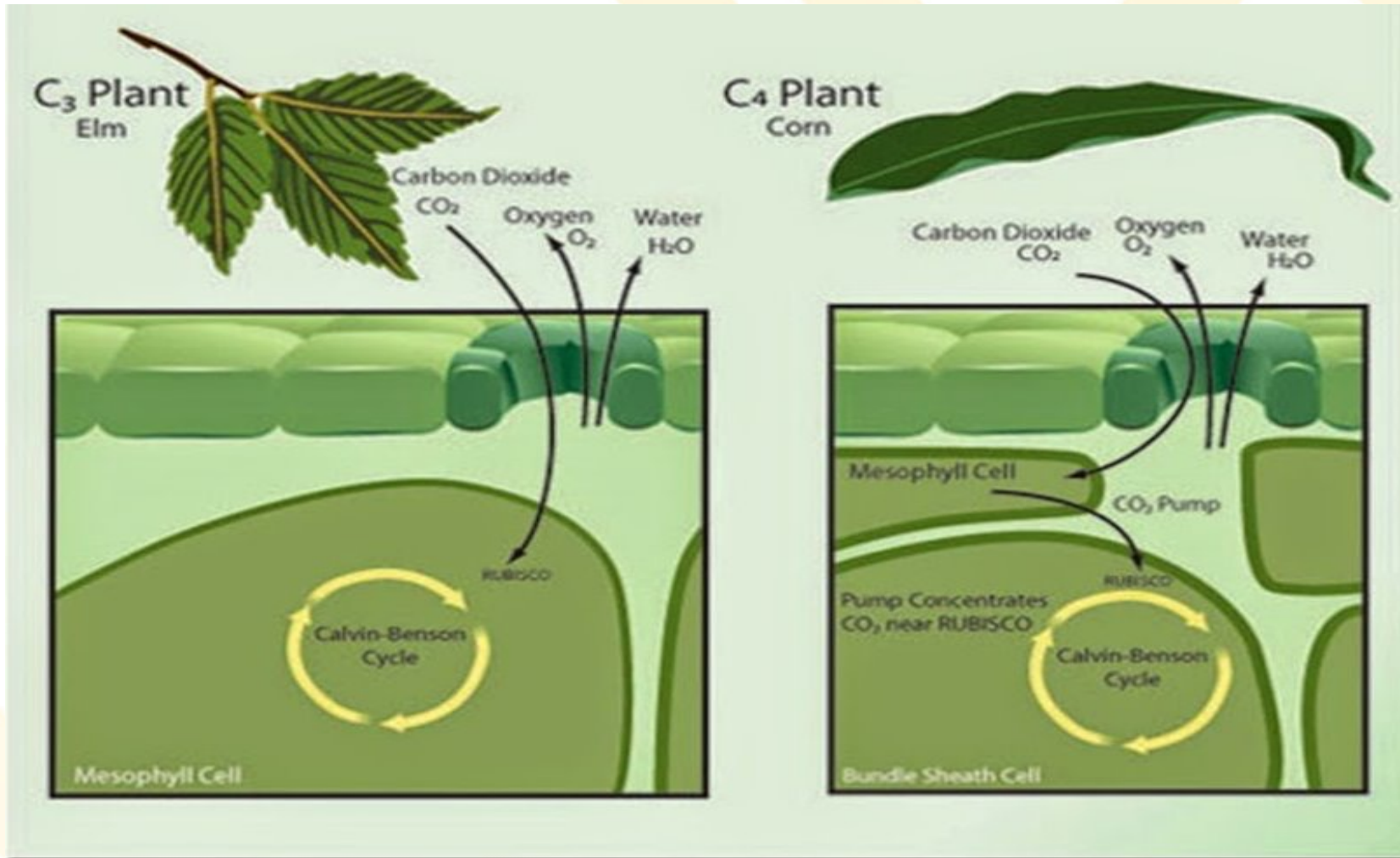


Switchgrass and Miscanthus

- Tall growing perennial grass
- Sequesters atmospheric carbon
- Grow well on marginal and reclaimed soils
- Extensive root system



C4 Plants



Unique carbon fixation pathway to ensure optimal carbon fixation

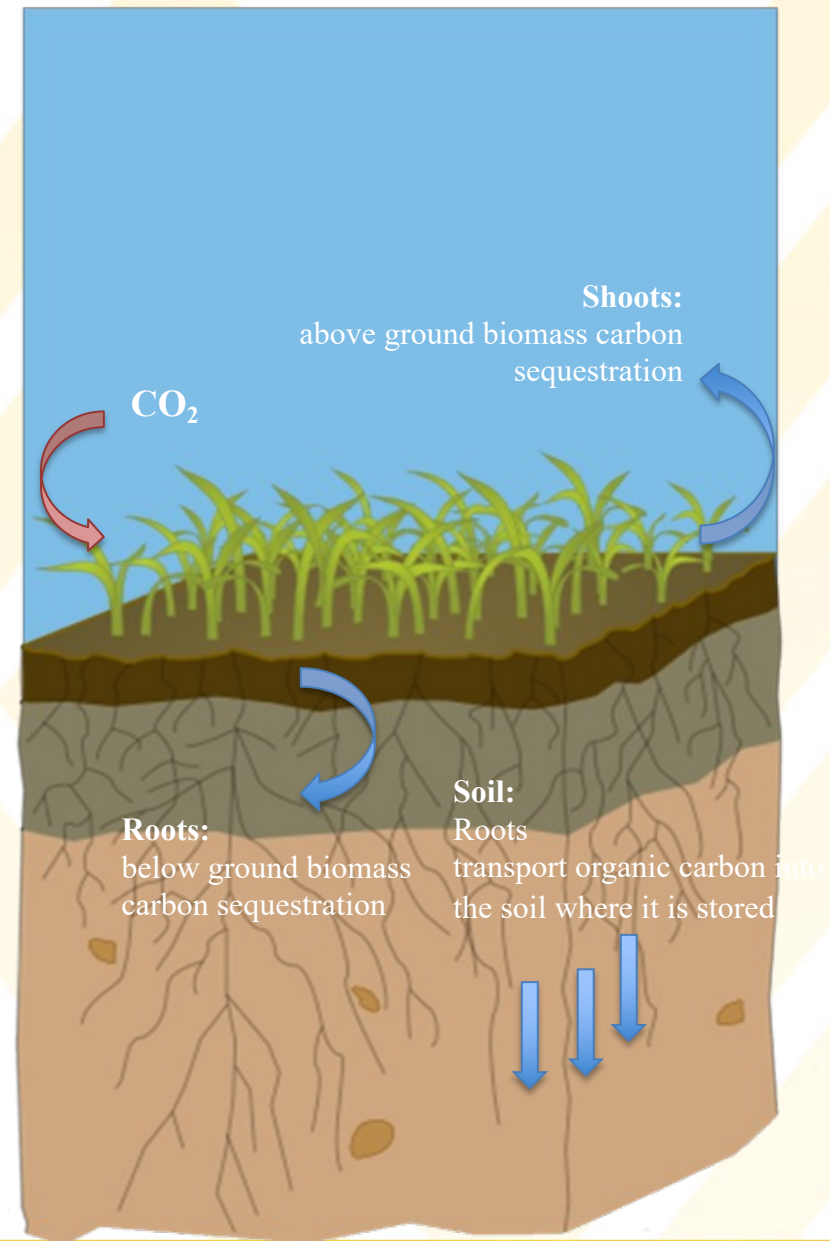
Higher rates of photosynthesis and productivity

Photosynthesis

C4 plants are highly efficient at biomass production

Carbon dioxide from the atmosphere is sequestered in roots, shoots, and soil

CO₂ fixation is caused by photosynthesis and is used for growth and development of other living communities



CARBON CREDITING



ECONOMIC BENEFITS OF CARBON SEQUESTRATION

- Carbon farming can turn the industry into a greenhouse emitter to a carbon absorber
- There is an emerging market for carbon crediting and farmers can get paid to adopt practices
- Can add economic value to communities effected by mining



STUDY OBJECTIVES



1. Closely examine carbon sequestration levels of C4 plants from 10 years of growth to compare abilities of different cultivars

2. Determine feasibility of utilizing reclaimed mine lands as an opportunity for greenhouse gas mitigation

3. Demonstrate carbon credit potential for reclaimed mine lands, offering recommendations for future planting of C4 plants on similar sites



METHODS



1

Sample roots, shoots, and soil

- deciding a soil depth for sampling is important because carbon variation over soil depth is uneven

2

Analyze total organic carbon and nutrient levels

- SOC is determined by subtracting inorganic carbon from total carbon

3

Determine the greenhouse gas mitigation at this site and similar sites

- Determine carbon sequestration potential using plots of switchgrass and miscanthus to get an estimate of how much carbon can be sequestered on other sites



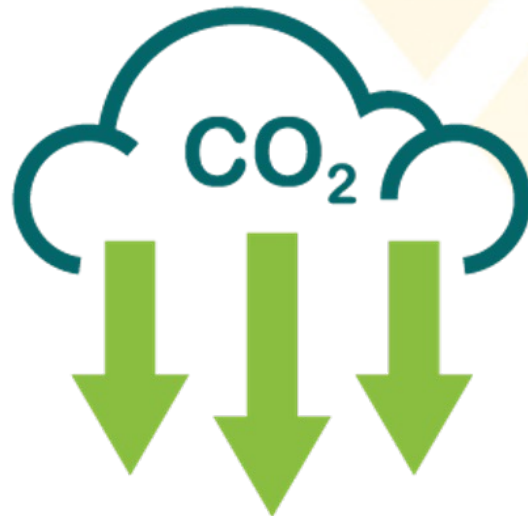
BENEFITS



Benefits

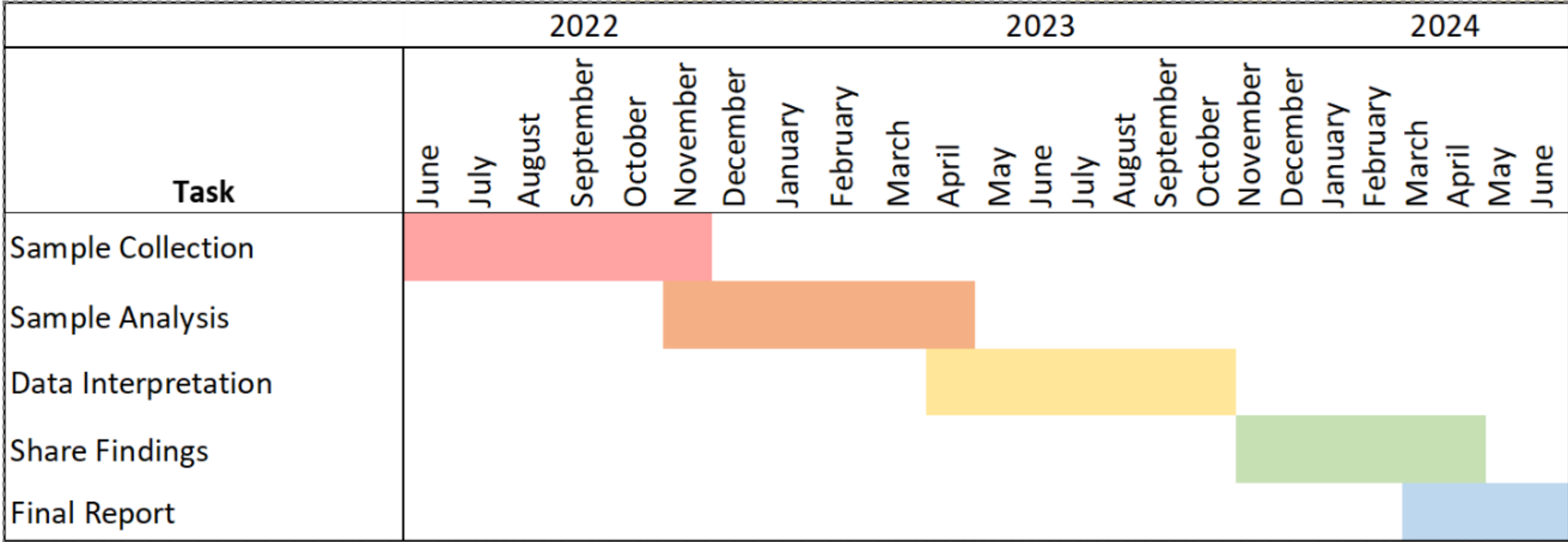
- Creates innovative carbon reduction solutions
- Transforms former abandoned mine site into mitigation site
- Carbon crediting and trading practices as it becomes the industry standard

carbon sequestration is a slow process and is a cost-effective way to mitigate climate change while improving soil fertility



PROJECT TIMELINE





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