Pacific Northwest
NATIONAL LABORATORY

Maximizing the value of cover crops in the Pacific Northwest

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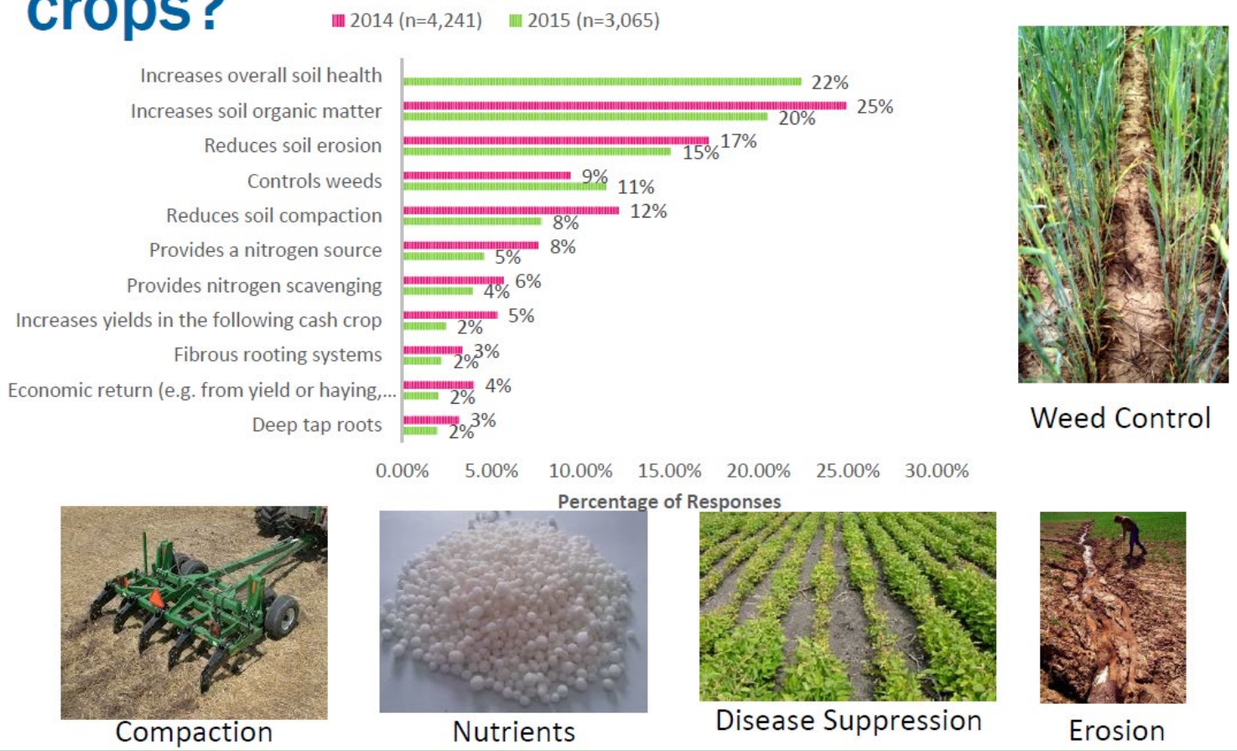
Why Cover Crops?

- **Soil health is the key benefit**
  - **reduce topsoil erosion**
  - **maintain carbon and nitrogen in soil**
  - **enhance water retainment of soil**
  - weed control
  - reduce infestation
- Cover crops as feedstock for biofuels?
  - Underutilized biomass with high potential for growth to benefit local and regional farmers and for energy production
    - ✓ Cover crops are only 3.9% of all U.S. cropland in 2017.

Why are producers interested in cover crops?

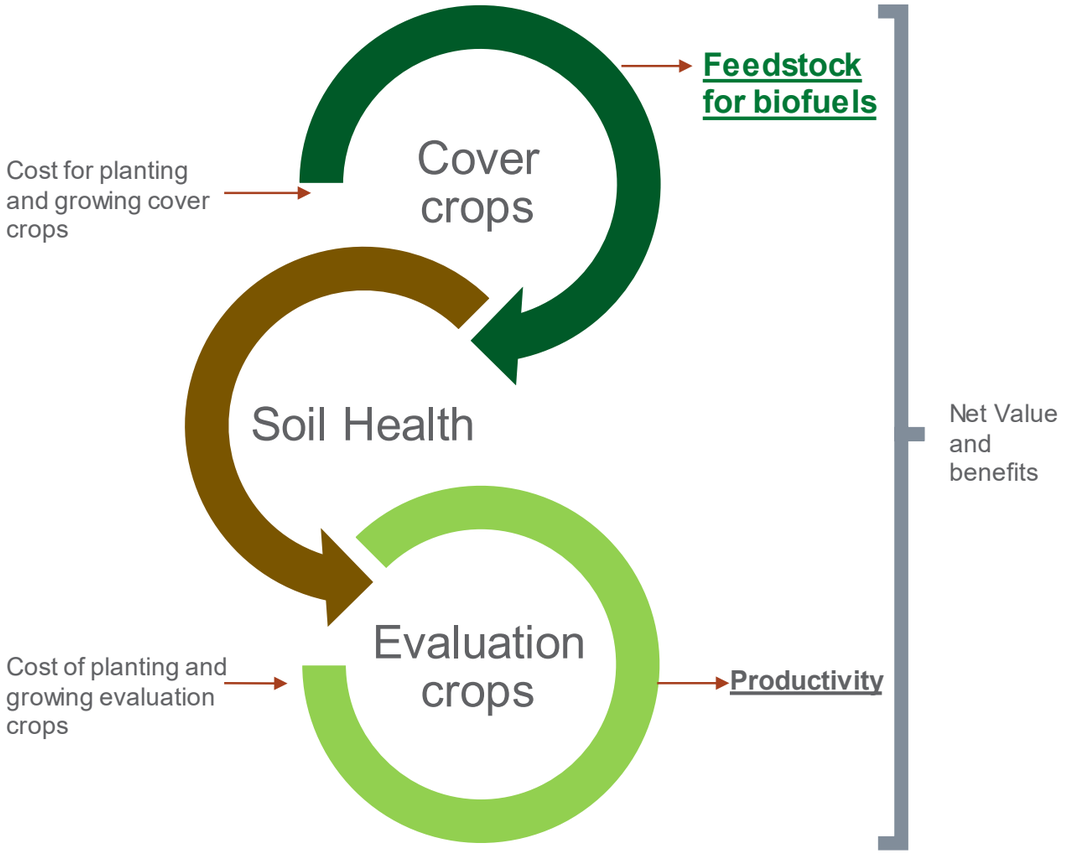


J.Alan Weber. Cover Crop Economics for a Mid-Sized Crop & Livestock Operation (2017)
https://www.sare.org/resources/economic-and-environmental-aspects-of-cover-crops/

Understand trade-off between growing for soil health and for fuels

Maximizing the value of cover crops

- **Project Goal:** Derive greater value from cover crops compared to off-season oil crop.
- **Challenge:** Understand the trade-off impacts of cover crops growth for soil benefits and for feedstock
- **Approach:** Grow four cover crops for two growing seasons:
  - Four cover crops (legume and grass varieties)
  - Three locations (wet, irrigated, dry)
  - Three treatments (Full removal, half-removal and No removal)
  - Cover crops harvested will be evaluated for fuels production
  - Soil will be analyzed for N content.
  - Evaluate impact on evaluation crops yield- TEA/LCA



Outcome: Leveraging of an underutilized feedstock source for fuel source, and improve agricultural and agronomic practices

Field-trial 2 months later(top), 4 months later (bottom)




flood, and snow layer during winter.




Triticale -grass

Fava Bean -legume

Woolypod Vetch- grass

Crimson Clover -legume

Cover crops have varying tolerance of accumulated water- Fava bean impacted heavily by “ponding”

Summary

- Region specific cover crops were successfully planted on all three sites (wet, irrigated and dryland) through the late fall season.
  - This allows for subsequent evaluation crops planting in early summer.
- After harvesting, cover crops biomass will be analyzed for critical materials attributes of cover crops to evaluate performance as biofuel

Clover cover crop. Risa DeMasi. 2017 (https://www.sare.org/wp-content/uploads/DeMasi-National-Conference-on-Cover-Crops-and-Soil-Health-Presentation.pdf)

This complex root system of this clover shows the intensive carbon and nitrogen fixation to enable soil-health and for fuels, furthermore, deeply-rooting cover crops may remediate compaction by “bio-drilling” through compacted layers and by providing channels for future crops’ root growth.

Field day in reveals that farmers are interested in cover crops and potential in biofuels and educational materials were provided to help train in best-practices in cover-cropping.