Improving Soil with Cover Cropping in Potatoes

Cover crops are plants grown between cash crops for the purpose of soil conservation. Cover crops reduce erosion from wind and water, and over time will improve and maintain soil organic matter and soil health. Additionally, cover crops may aid in pest management, increase soil biodiversity and carbon, reduce loss of nutrients, and can increase nutrient availability. In many cases, cover crops have been shown to increase yields of cash crops.

Cover crop basics

There are many cover crops available in the market which can be categorized into groups that include legumes, brassicas, grasses and grains, and other broadleaf species. Cover crops should be selected based on what is important for the resulting cropping system. For potato production, it is common to select a cover crop that will reduce wind and water erosion, prevent nutrient loss, and help manage pests in the soil such as weeds and soil-borne pathogens.

A cover crop that is grown before or after potatoes should have rapid germination and growth, considerable root establishment[1], adequate hardiness through winter, and quick regrowth in the spring[2]. Keep in mind that in some areas, winter conditions may limit time for cover crop establishment and survival, and in others, summer conditions may not promote breakdown of plant material.

Reduce wind and water erosion

Cover crops can be utilized to protect the soil by establishing a living cover to hold the soil in place during vulnerable times, when the potential is high for wind and water erosion. Wind erosion is prevalent in dry, loose, finely granulated soils, on smooth surface where vegetation is limited or bare, in open areas lacking obstructions that will reduce the wind force, and when wind speeds are high enough to move soil particles.[3] Preventing wind erosion on sandy soils with cover crops will aid in preventing sand storms. Water erosion occurs when bare soils are exposed to rainfall that breaks down aggregates and water run-off or snowmelt allow for sheet and rill erosion.

Manage disease, weeds & pests

Managing pests in soil is critical to optimize yield and quality in potato production, and while fumigation is commonly used, alternative approaches to prevent losses to yield and reductions in tuber quality from soil borne pests, alternative approaches including using cover crops is now being researched. Use of some green manure cover crops also have the ability to reduce weeds, pathogens, and disease in fields. These cover crops are established the year before potatoes are planted, incorporated into the soil in a timely manner, and some possess the capability of producing compounds that can suppress pests in the soil and act as biofumigants.[4]

Increase soil health

Cover cropping can be a viable option to promote soil health by increasing soil organic carbon and providing residual and new nitrogen which can be used for the subsequent production crop. Cover crops also produce biomass which helps enhance soil organic matter and can add nitrogen into the soil while also enhancing soil organic matter [5,6,7]. Furthermore, cover crops established after a potato crop can be used as a scavenger crop to secure and utilize residual nutrients, preventing loss of nutrients through leaching thereby protecting water sources. Incorporating cover crops in the spring has shown to be most effective at preventing nitrogen leaching and making nitrogen from the previous season available to the next potato crop[2]. This can ultimately improve soils and reduce the in-season costs of nitrogen fertilizer additions.

Authors: Bryn Evin and Kenneth Frost (Oregon State University), Deana Knuteson and Matthew Ruark (University of Wisconsin-Madison) and Andy Robinson (North Dakota State University/University of Minnesota).

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Contact Matt Ruark at 608-263-2889
ruarklab.soils.wisc.edu

USDA United States Department of Agriculture National Institute of Food and Agriculture

Selecting an appropriate cover crop:

Select species compatible with the cropping system.

Ensure herbicides used in crops are compatible and don't have plant-back restriction with the cover crop.

Select a cover crop species that will not compete with the production crop's planting or harvest dates so it will not negatively impact yield.

Consider treating legume seeds with rhizobium bacteria if not present in the soil at time of planting.

Select cover crops with growth characteristics adequate to provide wind erosion protection.

Take home message

Cover crops can provide many benefits to agricultural production systems. Cover crops used in potato rotations can aid in protecting the soil from wind erosion and nutrient loss, while preventing future yield and quality losses from pests. Selecting appropriate cover crops can result in increased soil health, ultimately benefiting production. Check with local university extension services to determine if a particular cover crop is available and appropriate for your production system.

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