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Conservation Practice Overview

Cover Crop (Code 340)

Cover Crop is the practice of growing grasses, legumes, and forbs planted for seasonal vegetative cover to support one or more conservation purposes. NRCS Conservation Practice Standard code 340 contains criteria required to meet each purpose of the practice. Managing cover crops to meet the criteria of the selected purpose(s) improves the condition of natural resources.

Practice Information

Adding the proper cover crop to a crop rotation adds seasonal soil cover, produces biomass, diversifies plants in the cropping system, influences water availability, and creates antagonistic conditions useful for managing crop pests. Cover crops are applied to support one or more of the following conservation purposes:

- Reduce soil erosion;
- Improve soil health and add organic matter;
- Minimize soil compaction;
- Scavenge excess nutrients and reduce the concern for water quality degradation;
- Improve soil moisture use efficiency;
- Suppress excessive weed pressures and break pest cycles.

Properly selected and managed cover crops can also provide habitat for pollinators and other beneficial organisms; provide forage for grazing livestock; fix atmospheric nitrogen into the soil; and host arbuscular mycorrhizal (AM) fungi and other beneficial soil organisms in between production crops.

Reducing Erosion: Properly selected and managed cover crops reduce soil erosion in several ways. They protect the soil surface from erosive forces of raindrop impact and overland flow of runoff water. They add organic matter essential to soil aggregate stability and a granular soil structure. They increase water infiltration which reduces stormwater runoff volumes. Finally they increase soil surface roughness which traps crop residue and slows down stormwater runoff velocity.

Improving Soil Health: Cover crops improve soil health by adding soil organic matter and a more varied food source to diversify the microbial community below the ground.

Organic matter and plant diversity increase populations of beneficial organisms such as earthworms, certain bacteria, nematodes, protozoa, and AM fungi. AM fungi produce glomalin, a substance that helps glue smaller clay mineral particles together into larger soil aggregates. Stable aggregates are essential to ideal water and air cycling, while microbes make more nutrients available.

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Minimizing soil compaction: Cover crops quick to germinate with sod forming or prostate growth habits quickly cover the soil and minimize surface compaction from raindrop or traffic impact. Cover crops with deep roots penetrate compacted subsoil layers. After the roots decompose, open channels (macropores) in the soil increase percolation, aeration, and crop rooting depth.

Scavenging Nitrogen: Nitrate losses from crop fields not only cause economic loss to farmers but also to other sectors of the economy dependent on clean water. Once beyond the edge of a crop field, runoff water can transport nitrates to streams which then carry them to rivers, lakes, and estuaries. Once leached below the crop root zone, drainage water can carry nitrates to underground aquifers. In salt water areas of the Chesapeake or Delaware Bays, nitrate levels limit how large harmful algal blooms can get. In drinking water supplies nitrate levels in excess of 10ppm can pose serious health risks to infants and pregnant mothers.

Many cover crops are good scavengers of nitrogen and will take up excess nitrogen and store it in plant tissues through the winter and early spring. In one survey of cover crop biomass (mostly cereal rye) on farms in Pennsylvania, every ton of dry matter contained on average 57 lbs. of nitrogen.

Scavenging Phosphorus: Phosphorus loss from crop fields occurs in both soluble and particulate (i.e. attached to soil particles, manure or crop residues) forms. Cover crops reduce runoff of soluble phosphorus through increased infiltration and plant uptake. Particulate phosphorus loss is reduced by trapping manure, residues and soil particles. In streams, rivers, lakes or freshwater areas of estuaries, phosphorous limits the size of harmful algal blooms.

Improving Soil Moisture Use Efficiency: Cover crops can be managed to conserve or remove soil moisture. While cover crops increase water infiltration, they also transpire soil water and dry out fields. In a wet spring transpiration from living covers may be beneficial to dry out the soil. During dry periods, cover crop residue conserves moisture. Deep rooted cover crops reduce soil compaction, improve soil drainage, and increase crop rooting depth to attain subsoil moisture. They can also add organic matter to the soil. A pound of soil organic matter has the ability to absorb 18–20 pounds of water, beneficial in dry periods.

Suppressing Weed Pressure, Breaking Pest Cycles: Rolling and crimping cover crops, especially cereal rye, is a very effective in suppressing weeds by providing a mulch that will by block sunlight and produce natural chemicals that suppress weed growth. Cover crops may also disrupt disease cycles, repel crop pests, and attract beneficials.

Provide Habitat for Pollinators and Other Beneficials: Legumes and other forbs can provide a diversity of food and cover needs to pollinators as well as organisms beneficial to a pest management program. They may also serve as traps diverting pests away from production crops.

Provide Hay or Forage for Grazing Livestock: Research has shown that grazing cover crops late in their growth cycle can improve soil health more rapidly than other termination methods. The conversion of above ground biomass to urine and manure creates a beneficial environment to move biomass into the soil. Grazing can also potentially create more income. High density grazing will maximize the benefit by ensuring even distribution of animal wastes. Harvesting the forage as hay needs to be managed to protect the soil surface and prevent excess biomass removal.

Fixing Atmospheric Nitrogen into the Soil: Properly inoculated legume cover crops can fix nitrogen, and if they grow enough they can reduce subsequent crop nitrogen needs. A hairy vetch cover crop can supply all the nitrogen needed by a subsequent corn crop while crimson clover can supply 80 to 100 lbs. of N per acre.

Technical Guidance

Conservation planners can help you implement the cover crop practice by explaining implementation requirements of plant species selection, seedbed preparation, sole specie or mixture seeding rates, seeding dates, establish- ment procedures, fertility requirements, weed and pest control, termination procedures, and evaluation of the practice to determine if it met the planned purpose(s).

Common Associated Practices

Cover Crop (340) is commonly applied with practices such as Conservation Crop Rotation (328); Residue and Tillage Management, No Till (329); Residue and Tillage Management, Reduced Till (345); Nutrient Management (590), and Integrated Pest Management (595). For further information, contact your local NRCS field office.

References

Clark, A. (ed.). 2007. “Managing Cover Crops Profitably.” 3rd ed. Sustainable Agriculture Network Series; bk 9.

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