

# Cover Crops

## I. What Is a Cover Crop?

A cover crop is a crop planted in a field before or after the main designated crop that is the real moneymaker. The main purpose of a cover crop is to benefit the crops that follow or the soil or to clean up after the previous crop and protect the soil. Cover crops can be used to cut fertilizer and pesticide expenses, improve soil tilth, and protect the environment. A cover crop can even be a crop not intended to be harvested for feed or sale. There is a cover crop to fit almost every type of cropping system.

## II. Cover Crops Improve Soil Fertility

### Some Add Nitrogen to Soil

Leguminous cover crop species vary in their ability to “fix” nitrogen (N) in the soil. *Nitrogen fixation* is the ability of a plant, in a symbiotic relationship with a microorganism (usually *Rhizobia* sp. bacteria), to take free nitrogen from the air and convert it to available nitrogen in root nodules. Simply put, legume crops make nitrogen, and this nitrogen is available to all nitrogen-seeking plants and animals in the soil. One legume, hairy vetch, can fix as much as 100 pounds of nitrogen per acre, while pure stands of clover (red, white, and



crimson) can fix 80 pounds of nitrogen per acre. Some other nitrogen-fixing legumes are lespedeza (30 lbs N per acre), cowpeas (40 lbs N per acre), and soybeans (35 lbs N per acre). Mixed clover and grass stands can fix 40 pounds of nitrogen per acre.

### They Add Organic Matter

If you plant mixed cover crop stands (legumes planted with grasses), less nitrogen is available for your crop than if you plant legumes only. The reason is that the grasses utilize the nitrogen fixed by the legumes. But mixed stands produce more plant matter (organic matter) per acre. This increased organic matter improves soil tilth, which is a physical property of soil affecting plant growth. A cover crop can improve soil characteristics such as texture, moisture-holding ability, and ease of tillage. The addition of all the organic matter also fosters the development of a wide range of important soil microorganisms and earthworms, and it helps to retain plant nutrients in the soil. And, the subsequent decomposition of the grass will also add nitrogen to the soil.

### Some Recycle Lost Nutrients

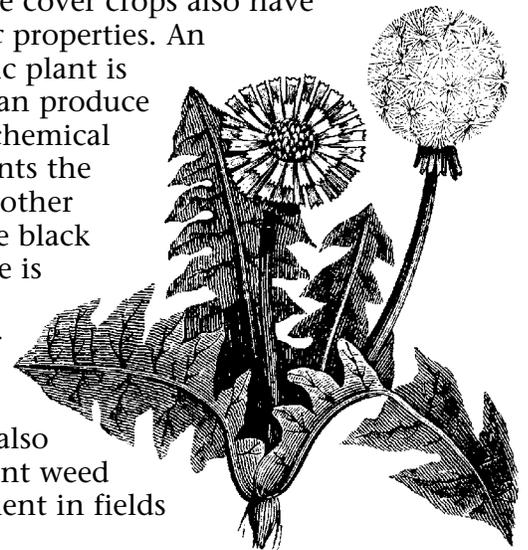
Deep-rooted cover crops such as winter annual grasses (rye, wheat, and barley) can “recycle” nutrients that remain in the soil. Sometimes a crop does not capture or use

up all the available nutrients—nitrogen, especially—in the soil by the end of the growing season. Roots from cover crops can absorb these excess nutrients and later release them, through decomposition, to the subsequent crop. The cover crop, as a result, captures dangerous nitrates that could have otherwise leached into the groundwater.

## III. Cover Crops Help Control Weeds

Cover crops can reduce weed growth. As a “living mulch,” a cover crop can prevent sunlight from reaching the soil surface and allowing weed seeds to germinate and grow. Some cover crops also have *allelopathic* properties. An allelopathic plant is one that can produce a natural chemical that prevents the growth of other plants. The black walnut tree is a familiar allelopathic plant.

Cover crops can also help prevent weed establishment in fields



during noncrop periods. Perennial weeds will rapidly invade a fallow field, creating weed problems that can take years to control. So cover crops are especially important in fields that may be left fallow for an entire season or longer. Since the opportunistic weed is always ready to occupy open soil, cover crops can cover the field during periods between cash crops. Preventing the growth of winter annual and biennial weeds is especially important for producers planning for an early start in the spring. A cover crop is usually easily controlled and leaves a clean seed bed for the new crop. Depending on the cover crop used, it can be plowed under, left in the field and planted over, or killed with an herbicide.

#### IV. Cover Crops Have Many Other Benefits

##### Buffer Adverse Growing Conditions

During droughts, cover crops shade the soil and prevent moisture from escaping through evaporation. They also help cap-

ture water when it rains or snows. A field with a cover crop will capture and retain more water than a sunbaked and hardened open field in which water runoff tends to be a problem. Cover crops can also assist the main crop, which germinates faster and emerges from the soil more quickly when planted over a cover crop. Cover crops help buffer and protect crops against adverse climate and soil conditions. These benefits help lower crop establishment costs.



##### Benefit Wildlife and Environment

Traditional farm production practices have been blamed for the decline in the population of many wildlife species, usually because of habitat destruction. Cover crops benefit wildlife by providing them both food and habitat. Deer especially

enjoy red clover forage. Birds find abundant food in the insects attracted to mixed stands

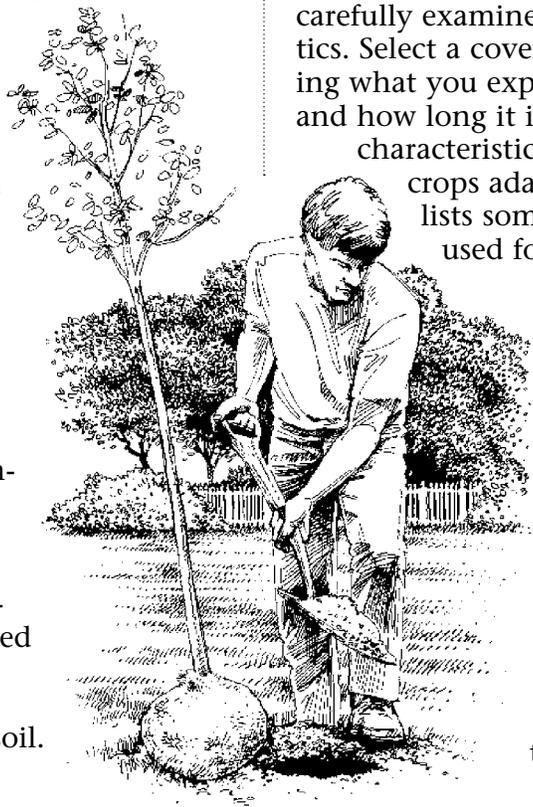


of tall-growing grass and clover, which also provides birds with protective cover.

In recent years, interest in cover crops has focused on reducing sediments and nutrients (particularly nitrogen and phosphorus) in surface and groundwater. Cover crops protect streams from excess nutrients by absorbing leftover nitrogen and phosphorus in the soil and by filtering out soil particles that flow over fields. By holding soil in place on the field during noncrop production periods, cover crops also control erosion and the resulting sediment runoff.

### Used in Tree Plantings

Another good use of cover crops is for tree plantings. Although useful in establishing and maintaining tree crops, cover crops can pose some potential problems. Some cover crops compete with trees for moisture, and the tillage performed during the establishment of the cover crops can damage tree roots and compact the soil.



Cover crop growth can be stunted by shade from established trees. Therefore, the longevity and shade tolerance of a tree species are important considerations when selecting a cover crop to help establish trees in forest development projects.

In any system, when you are developing a farm plan and deciding to use cover crops, carefully examine a cover crop's characteristics. Select a cover crop only after determining what you expect from the cover crop and how long it is needed. Table 1 lists some characteristics of leguminous cover crops adapted to Maryland. Table 2 lists some characteristics of grasses used for cover crops in Maryland.

## V. Establishing Cover Crops

### Selecting and Sowing Cover Crops

Before establishing a cover crop, select a cover crop species with the traits desired *and* the ability to grow in the type of soil and under



the conditions present. Some species grow better than others in low-fertility and/or poorly drained soils. A review of a soils map, along with a soil test, will assist you in evaluating the soil.

Once you select a cover crop species, it is critical that you always sow good live seed. You can insure that you have good seed by checking the testing date on the seed label. The date indicates the germination percentage during a specified guaranteed time. It is impractical to sow poor-quality seed.

When planting leguminous cover crops such as clover, vetch, lespedeza, and soybeans, be sure to inoculate the seed before planting. Inoculum contains beneficial bacteria that the legume needs to fix nitrogen in the soil. In most cases, these bacteria are not found naturally in the soil. Therefore, inoculating seed prior to planting insures the bacteria will be present to form the root nodules critical to leguminous plant health. Since inoculum is not usually interchangeable among legume species, it is also essential that you match the correct bacterium species with the correct legume species. For example, clover inoculum will not work on soybeans or vetch. The inoculum is a living bacteria, so make sure the freshness date on the package has not expired. Also check the expiration date of pre-inoculated seed. The inoculum or



treated seed is best stored in a refrigerator or other cool, dry place. Improper storage, such as on the dashboard of a truck, is the cause of many failed legume plantings.

## Tillage Systems

Cover crops can usually be planted using no-tillage or conventional tillage systems. In a no-tillage system, the soil is not disturbed, and the cover crop seed can be broadcast directly on top of the soil. You can broadcast seed by hand with a cyclone-type seeder into standing vegetation or on top of bare soil.



The no-tillage seeding method is often used when competition from an existing crop or weeds will be low, which allows the cover crop time to establish. Fall and late winter are good times for no-tillage seeding. "Frost seedings," in which the seed is sown in late winter or early spring, positions the seed in place for quick germination as soon as the weather warms up. This type of seeding establishes the newly developing plant ahead of most weeds.

If site conditions and budget allow for equipment use, some excellent no-till grain drills are available for rent at farm equipment dealers. These drills will enable you to plant the cover crop more efficiently, because they are designed to cut through surface trash and properly place the seed for optimum germination.

In conventional tillage planting, the soil is tilled with a plow and/or disk. If soil erosion is not a major concern, tillage is a good way to eliminate some weed competition and prepare a good seed bed. Seed can be broad-

cast or drilled. However, rolling the field with a cultipacker before and after seeding will improve the seed bed quality. Rolling prior to planting firms the soil and prevents seeds from being buried too deeply. Rolling after planting insures good seed-soil contact. Rolling also takes the "fluff" out of the soil, which helps retain soil moisture.

## References

- Sustainable Agriculture Resource and Education Program of CSRS, U.S. Department of Agriculture. n.d. *Handbook #1: Managing Cover Crops Profitably*. Emmaus, PA: Rodale Institute.
- Northeast Organic Farming Association and Cooperative Extension. 1998. *The Real Dirt*. Northeast Region Sustainable Agriculture Research and Education Program. Burlington, VT: University of Vermont.



**Table 1. Cover Crops Adapted to Maryland—Buckwheat and Legumes**

Cover Crop	Type	Characteristics	Seeding Rate per Acre	When to Plant
Buckwheat	Summer annual	Tolerates many soil conditions	50 lb	After mid-May
Cowpea	Summer annual	Good green manure crop	30–40 lb	After mid-May
Crimson Clover	Winter annual	Good nitrogen producer	12–20 lb	Late August
Flat Pea	Long-lived perennial	Very competitive, slow to establish, high nitrogen producer	20–25 lb	Late August
Hairy Vetch	Winter annual	High nitrogen producer	25–40 lb	August
Medium Red Clover	Perennial	Tolerant of many soil conditions	10–15 lb	March–May
White Clover	Perennial	Widely adapted, long-lived	5–7 lb	March–May
Yellow-Blossom Sweet Clover	Biennial	Allelopathic, bee pasture	12–15 lb	May

**Table 2. Cover Crops Adapted to Maryland—Grasses**

Cover Crop	Type	Characteristics	Seeding Rate per Acre	When to Plant
Annual Rye Grass	Winter annual	Germinates quickly, competitive	25–35 lb	Mid-August
Cereal Rye	Winter annual	Grows quickly, allelopathic	60–120 lb	October
Spring Oats	Summer annual	Quick growth, suppresses weeds	30–60 lb	March–April
Sorghum/Sudex	Summer annual	Quick growing, allelopathic	30–40 lb	May–June
Winter Wheat	Winter annual	Tall-growing living mulch	60–120 lb	October

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