

Choosing a Cover Crop

Cover crops can provide multiple valuable benefits to cropping systems. While typically used in the Northeast to protect the soil against winter erosion, or to add biologically-fixed nitrogen, other uses include improvement of overall soil quality, weed management, late-season nutrient capture and even enhancement of biological control agents in the system, such as beneficial organisms. A key to successful use of cover crops is to choose the appropriate species to fit the specific goals of their intended use in the cropping system. As such, a grower should first identify a primary goal or use for the cover crop, characterize the conditions under which it will be grown, then use this information to describe the ideal species before matching the description with the best available cover crop species.

Erosion Control: These species need to be able to quickly develop an extensive below- and above-ground biomass, often during cold and inhospitable weather in the fall. In general, cool-season small grains are the best options. Cereal rye (*Secale cereale*) is the best choice for most Northeastern cropping systems because of its ability to germinate and grow late in the fall when other species have effectively shut down growth for the year.

N-fixation: Legumes used as cover crops have a relationship with a bacteria in their roots that allows them to utilize N from the air and convert it to a plant nutrient. The plants can then be turned into the soil as a "green manure," thus enriching the soil with N for use by the following crop. Typically, legumes used for this purpose are winter annuals, occupying the niche between summer crops. Hairy vetch (*Vicia villosa*) is the most cold-tolerant of the winter annuals and so has been used frequently in Northeastern cropping systems. Growers who are willing to dedicate longer periods to the green manure crop have expanded options, such as Biennial Sweetclover (*Melilotus officianalis*) or the short-lived perennial Red Clover (*Trifolium pratense*).

Soil Improvement: Nearly any cover crop will bring about improvement of some soil biological, chemical or physical characteristics. Covers with lower N contents, such as grasses, may lead to longer-term buildup of stable soil organic matter, but legumes can also lead to improved soil conditions, particularly short-term improvement in soil aggregation and water infiltration.

Weed Control: The use of cover crops for weed management involves manipulation of several principles: competition for light, water and nutrients, physical smothering by residues and phytotoxic effects, or allelopathy. Any cover crop that grows vigorously at a time when weed species would otherwise be germinating and emerging can be used to out compete weeds. Those with thick and decay-resistant residue may be able to act as a mulch, which smother germinating seeds. Cool-season grains, particularly Cereal Rye, has been used successfully in the Northeast as a killed surface mulch in no-till vegetable systems for weed suppression. Generally, the grain can be killed by mowing and left in place once it has initiated flowering. Several cover crop species are noted for the release of chemicals during decomposition that may inhibit the germination of small-seed weeds

in the surface soils. Cereal Rye has the most notable allelopathic effect, but many members of the Cabbage Family, such as Mustard, Forage Kale and Oilseed Radish have exhibited some effect in this regard. It should be noted that cover crops rarely offer acceptable weed control through allelopathic effects alone.

Selection of Cover Crops to Fit the Rotation: As noted above, most growers in the Northeast prefer to establish cover crops during the fall through spring period when the field is otherwise not utilized by economic crops. Winter annual cover crops, including an array of grasses, legumes and brassicas, can be planted in the fall, but vary in their ability to overwinter in the Northeast. The most cold-tolerant winter annual species include Cereal Rye and Hairy Vetch, but several others, such as Crimson Clover (*T. incarnatum*), Winter Wheat (*Triticum aestivum*) and several forage-type brassicas will fairly consistently overwinter in Hardiness zones 6 and above.

Those who choose to keep the cover crop in the field through at least one year will find that Red Clover, White Clover (*T. repens*) and Biennial Sweetclover are all sufficiently hardy to withstand most winters in the Northeast. Other options for cover cropping include some non-traditional time periods, such as Summer Fallow, when heat-tolerant species such as Cowpeas (*Vigna unguiculata*), Buckwheat (*Fagopyron esculentum*), or Sudan Grass hybrids can be grown for weed control and soil improvement. In choosing an appropriate cover crop and its place in the rotation, the ability of the species to grow and survive in the crop environment at the time of seeding, the equipment available for seeding, the cover crop's ability to withstand field traffic, the cost of the seed, and the anticipated method for cover crop demise at the end of its functional life cycle, as well as a number of other things, must be taken into account.

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