The Use of Cover Crops to Manage Soil
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Cover crops are used to manage soils for many different reasons and are known by many different names. Cover crops are literally “crops that cover the soil” and one of their first uses was to reduce soil erosion during fallow periods in annual cropping systems. Cover crops are also known as “green manures,” “catch crops,” or “living mulch.” Green manure cover crops are usually legumes that fix N and are grown to provide N to the following cash crop. Catch crops are cover crops that are grown during fallow periods in cropping systems to take up nutrients, especially N, that would be lost if plants are not present. Lastly, living mulches are cover crops that are grown both during and after the cash crop growing season and are suppressed or managed to reduce their competition with the cash crop when it is growing. After the cash crop has matured and before it begins growing again, the living mulch is allowed to grow unhindered. One way to manage living mulches is to restrict them to the “fallow” spaces between crop rows. Orchards or vineyards are sometimes managed with living mulches, but it is also possible to incorporate living mulches into annual cropping systems. Thus, as can be seen from their many names and descriptions, cover crops can fulfill many soil management functions.

In terms of soil management, the basic premise for using cover crops is to reduce fallow periods and spaces in cropping systems. Natural ecosystems typically have some plants growing, covering the soil, transpiring water, taking up nutrients, fixing carbon, and supporting soil fauna for most of the time that the ground is not frozen. Agricultural cropping systems producing grain, oilseed, and fiber crops in temperate regions typically only have living plants for four to six months of the year and are fallow for the remaining six to eight months. Current planting and tilling practices often leave soil bare and exposed during fall, winter, and early spring. Some perennial cropping systems for nut or fruit crops (e.g., almonds and grapes) keep the spaces between rows fallow and tilled for extended periods. As a result of these fallow periods and fallow spaces in annual and perennial cropping systems, soil is left unprotected from erosive forces, nutrients and organic matter are lost or not replenished, runoff increases, soil fauna are stressed, and soil productivity diminishes. Thus, inserting cover crops into fallow periods or fallow spaces in cropping systems can accomplish multiple soil management goals. This discussion is not intended to be a comprehensive review and will focus on the general principles and evidence for using cover crops to manage soil erosion, runoff, soil nutrients, soil physical properties, soil water, soil organic carbon, soil chemical properties, and soil biology.

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