

BENEFITS OF SMALL GRAINS IN AN ORGANIC CROP ROTATION

Photo courtesy of Rodale Institute.

By Nic Podoll



Small grains provide great value in a grain rotation, especially in an organic system. They break up weed, pest, and disease cycles in row crops, as well as open opportunities for cover crops before planting and after harvest.

Unfortunately, lower crop prices and economic incentives for small grains, compared to corn and soybeans, have resulted in a large decrease of small grain acreage across the United States. As a result, many farmers are missing out on the benefits and the potential of increased profitability over their rotations that small grains and cover crops can provide. The short-term outlook (yield x price – expenses) for a given year does not tell the whole story. When profitability is viewed over the entire course of a rotation, advantages that small grains and cover crops provide can be recognized as savings and unrealized gains that are cashed in by subsequent crops in the rotation.=

Most small grains have much more fibrous and often deeper root systems than row crops like corn and soybeans. The shorter growing season from planting to harvest also gives farmers an opportunity to plant cover crops, significantly increasing the length of time that living roots are in the soil. Through this diversity of plants, the increased depth and breadth of living roots in the soil, and the length of time they are present, the abundance and diversity of the soil microbial community is also enhanced each growing season.

As this occurs over time, the roots of crops release more exudates into the expanded rhizosphere that encourage the soil microbial community and allow the plants to mine soil organic nitrogen (N), which reduces the need for added N. Research has demonstrated that when corn is grown in a more diverse rotation, a “rotation effect” of 3-5% increase in yield is observed. Especially at organic premium prices, this is significant

In addition, research has also shown that adding just one small grain and a following cover crop to a corn-soybean rotation can prevent the loss of up to 30 pounds per acre of N through leaching. The

cover crop also provides an N credit of its own (which varies with species) to the subsequent crop. These effects together in an organic rotation often mean that some small grains and soybeans may require very little or even zero added N while the added N requirements of corn or other heavier feeders are significantly reduced. This increase in soil health and resulting nutrient use efficiency contributes to the increased profit potential over the course of a rotation.

Small grains in conjunction with cover crops also provide advantages in weed control that extend across the whole rotation and continue to improve over time. The planting and harvesting windows of small grains that differ from row crops suppress growth and eliminate many weeds from the seed bank. Fall planted cereals that overwinter, such as rye and winter wheat, or the early spring planting of other small grains, such as oats or spring wheat, suppress both early cool season and warm season weeds. Extra opportunities for spring tillage with later planting of small grains, such as millet and buckwheat, allow for elimination of early cool season and warm season weeds while continuing to suppress other warm season weeds through the growing season. A cover crop planted after harvest of a small grain continues to suppress and eliminate late season weeds. This continually reduces on-farm weed populations over time and the more small grains and cover crops added to the rotation, the greater the effect.

With the addition of two or more small grains to a rotation with differing planting windows (early and late) and cover crops, it is possible to achieve essentially year-round soil coverage with both continuous weed suppression and reductions in the weed seed bank for at least two years before and after row crops. This results in less weed pressure in both small grains and row crops, which reduces the intensity of tillage and cultivation operations over time, increasing soil health as well. It's easy to see how increased weed control saves time and money while increasing yields and contributing to increased profits.

The addition of small grains in the rotation also allows for more efficient use of equipment and labor while further spreading out risk. They have differing planting and harvesting windows compared to the similar timing of corn and soybeans. This allows farmers to spread labor of field operations out compared to growing only corn and soybeans.

This also provides a better opportunity to expand acreage on the farm. It makes it possible to plant and harvest additional acres without having to upgrade or increase equipment size. Alternatively, planting and harvesting operations could all be fit into smaller windows when there is less acreage in any one crop. These ideas extend to other aspects of farming operations as well, such as storage and drying capacity. Additionally, small grains can be used as nurse crops to produce more vigorous stands of hay and forages in an organic system that also provide weed suppression over multiple growing seasons, diversify income and spread risk, and introduce the possibility of grazing animals into the system.

Finally, depending on the region and the marketing opportunities available, some of the more specialty small grains such as millet or buckwheat can produce very strong revenues, especially when organic premiums are being earned. For many small grains, it is also beneficial to clean and save your own seed. Not only is this a cost savings from year to year, but it allows farmers to adapt varieties of grain to their farm over time, increasing their performance and resiliency under stress. This provides enormous economic benefit over the long term. As the effects of climate change are increasingly felt, small grain crops that are regionally adapted ultimately give grain farmers the best chance to maintain profitability when other crops fail to produce.

Through the achievement of greater biodiversity and soil health, small grains in conjunction with cover crops unlock long term advantages in a crop rotation including nutrient use efficiency, better weed control, labor and equipment efficiency, diversifying farm income, spreading risk, and increasing resiliency of farming systems under adverse conditions. These advantages significantly increase profit potential over the course of a rotation as well as solidify the long-term sustainability and resiliency of organic farming systems.