

Cover Crops and Reduced Tillage Systems for Weed Control in Organic Vegetable Production

The organic farming system incorporates both sustainability and productivity principles which can be complex production methods. It only uses biological processes and natural materials to control soil fertility, pest populations, and crop growth. In most cases, weed control is the biggest challenge in the organic vegetable production system. Research suggests that the integrated weed management with reduced tillage and cover crop technique is one of the most effective weed management methods.

What is a cover crop?

A cover crop is a crop used to bridge the gap between two production systems. Using cover crops in the fallow time between two main crops can help to limit weed growth and development as well as weed seed generation through competition. Cover crops play a key role in organic farming improving soil fertility, nutrient availability and balance, reduce weed pressure, and provide habitat for beneficial insect.

Purpose of using cover crop for weed management:

The main purpose of weed control with cover crops is to replace an unmanageable weed population with a controllable cover crop population. Either through direct competition or other interference, e.g allelopathy (toxic substances) that effectively contribute to long or short-term weed control.

Table 1. Example of incorporating different types of cover crop in organic vegetable production:

Season	Types of cover crop	Planting time	Distinct weed control attributes
Annual	Grasses/Cereals -Example	Fall and winter	Through higher 33:1 carbon to nitrogen ratio allelopathic effect. Dense stand of winter rye residue
	Rye, wheat, barley, oats buckwheat etc.		
Biennial and perennial	Legume- Example	Winter and summer	Nitrogen fixation, allelopathic effect, increase habitat for beneficial insect enhance weed seed mortality
	Crimson clover, hairy vetch, Austrian winter pea. berseem clover, soybean Alfalfa		
	Brassicac- Example	Spring and late summer	Allelopathic affect, rapid fall growth, nutrient scavenging ability, great biomass production, and their capacity to serve as a biofumigant.
	Yellow mustard, Rapeseed		

Importance of reducing tillage and cover crop integration: Reduce tillage helps to accumulate plant residues at the soil surface, which inhibit weed seed germination by shading and blocking light. However, the reduced tillage method can be less effective for perennial weed management. So combined method with reduced tillage and the cover crop is most fruitful practice for organic farming weed management. The combination of cover crop, mulches, soil solarization, and biological mean with reduced tillage will be a more sustainable weed management practice for organic growers in the annual and perennial setting.

Table 2. Integrated weed control approach with cover crop and reduce tillage in organic vegetable production:

Tillage system	Cover crop - example	Effective weed suppression and better yield crop e.g.
No -till or Strip till	Wheat, hairy vetch, rye	Tomato, pepper and zucchini
No-tillage	Undistributed cover crop	Pumpkins, summer squash
No tillage, strip-tillage	Egyptian bean, soybean, mixture	Spring broccoli

Reference: Rupinder S. and Sukhbir S. 2019. Contribution of Cover Crops and Reduced Tillage Systems for Weed Management in Organic Vegetable Production. AJAR, 4:24.

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