

Southern Cover Crops

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Cover Crops for Weed Management in Row Crops

Rachel Atwell, Chris Reberg-Horton (NC State University, Raleigh, NC), and Andrew Price (USDA-ARS, Auburn, AL)



Fig. 1. A roll-killed cereal rye and crimson clover cover crop mulch suppressing weeds in a conventional cotton trial in Lewiston, NC. Photo Rachel Atwell

Cover crops can be used to provide weed suppression in subsequent cash crops (Fig. 1). In the Southeastern and Mid-South U.S., questions concerning management of herbicide-resistant *Amaranthus* species, horseweed, and Italian ryegrass, comprise the majority of Cooperative Extension Service calls. Conservation agriculture practices are especially threatened by the emergence and rapid spread of glyphosate-resistant Palmer amaranth. The use of cover crops for weed control can help conventional producers combat herbicide-resistant weeds and organic producers reduce dependency on cultivation as their primary weed control mechanism. When using cover crops for weed control, cover crops are often terminated via roller-crimping that leaves a weed-suppressive mulch on the soil surface into which the cash crop can be directly planted. A roller-crimper terminates weeds by rolling the cover crop down at an appropriate growth stage and simultaneously crimping the cover crop stems which accelerates desiccation. A surface mulch can reduce weed pressure through physical impedance, depriving weeds of light, and through allelopathy. A key to successful weed control when using this system is to achieve high

cover crop biomass. Cereal rye (*Secale cereale*) is a popular cover crop choice in this system for its ability to produce a large quantity of biomass. Cereal rye can be easily terminated via roller-crimping at soft dough stage. However, planting into a high cover crop biomass mulch can be a challenge. Conventional producers can use strip-till rigs, which will move the cover crop residue several inches away from the crop row and allow for good cash crop seed-to-soil contact. Non-organic producers can then affordably use a banded herbicide application to control in-row weeds. For an organic producer, it is important to keep as much cover crop residue in the crop row as possible due to lack of affordable and effective in-row weed control options. Researchers and producers have been working on planter designs which can plant reliably and efficiently into heavy cover crop biomass mulches (Fig. 2).

Weed Suppression Using Cover Crops in Conventional Corn and Cotton Production

Field experiments were conducted from autumn of 2003 through cash crop harvest in 2006 at three locations. The treatments were five cover crop seeding dates each autumn and four cover crop termination dates each spring. The five crimson clover or cereal rye seeding dates were: on the first average 32° F temperature date, two and four weeks prior and two and four weeks after the average 0° C temperature date. Termination dates were four, three, two, and one week prior to the average date for the establishment of the cash crop.

Results showed that biomass production by winter covers decreased with even a week's delay in winter cover crop seeding and resulted in a corresponding increase in summer annual weed biomass (Fig. 3). More than ten times difference in clover biomass was observed when clover was planted on the earliest date and terminated on last date compared to late planting and early termination. Correspondingly, weed biomass was 496 lb/ac in the treatment with the least rye biomass, which was eight times higher than the treatment with the greatest rye biomass.

In this experiment, earlier cover crop planting and leaving cover crops alive up to one week before planting corn and cotton increased cover crop biomass accumulation compared with planting later and terminating the cover crop four weeks before planting. Increased cover crop biomass suppressed subsequent total weed dry biomass. These findings indicate that high residue cover crops have predictable potential for suppressing early season weeds in corn and cotton. If farmers are utilizing glyphosate-resistant corn-cotton rotation systems these findings hold particular importance with regard to current glyphosate resistant weed control issues. Because

corn and cotton yields were not negatively impacted, we can conclude that high residue obtained by planting crimson clover or rye cover crops timely and terminating either a week or two prior to cash crop planting is feasible assuming soil moisture is not limiting at this time. Ideal management will result in maximum cover crop biomass production that provides effective weed suppression.

Weed Suppression Using Cover Crops in Organic Corn and Soybean Production

Using cover crops for weed control can help reduce dependency on cultivation as the primary weed control mechanism in organic grain production. For organic producers, it is important to achieve greater than 8,000 lbs dry cover crop biomass/ac (8,891 kg/ha) to get consistent weed control from the cover crop mulch. Cereal rye can serve as an excellent cover crop for weed suppression prior to organic soybean production. Soybeans fix their own nitrogen and, therefore, limited nitrogen release from the cereal rye cover crop is not problematic. More information on weed control from a cereal rye cover crop in organic soybean production can be obtained from Chapter 9 in the North Carolina Organic Grain Production Guide. Using cover crops for weed control in organic corn production is more complicated. Consistent weed control and nitrogen availability are limiting factors to yield in organic corn production. While a cereal rye cover crop can provide excellent weed suppression in the subsequent cash crop, it has limited value for nitrogen release due to a high C:N. A legume cover crop can provide substantial nitrogen release to a corn crop, but a legume cover crop has limited value for season long weed control because the cover crop residue breaks down rapidly. Using a cover crop mixture of



Fig. 2. Added front toolbar equipped with residue managers to aid planting into high cover crop biomass mulches. Photo Rachel Atwell

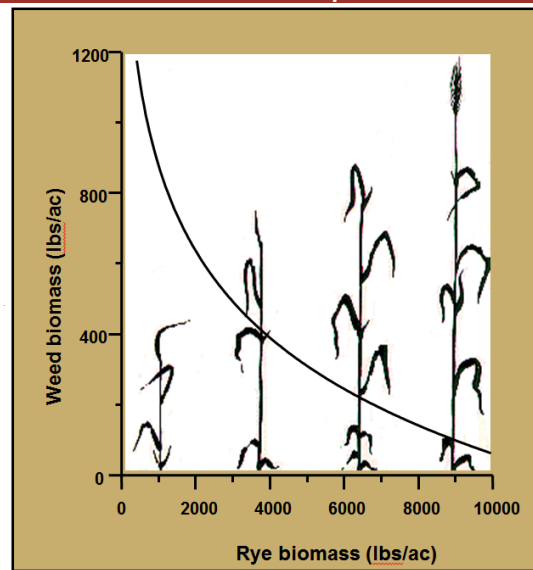


Fig. 3. Rye biomass (depicted) influencing weed biomass.

a small grain and a legume may be the best option that a producer can use to maximize both the weed suppressive and nitrogen fertility benefits necessary from a cover crop mulch in organic corn production. Additional nitrogen fertility beyond that provided through a cover crop mixture is likely necessary to maximize organic corn yield. A study was conducted at three locations (the Rodale Institute, North Carolina State University, and the USDA-ARS Beltsville) evaluating different starter fertilizer sources and application methods in organic corn production using a cover crop mulch for weed suppression. At six of the seven study sites, additional fertility was necessary to maximize organic corn yield. Additional information on this study can be found on the North Carolina Organic Grain Production website (link below).

References

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