

Southern Cover Crops

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Terminating Cover Crops in a Conservation System

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Fig. 1. Principle of rolling/crimping (in the direction of planting cash crop). All photos T. Kornecki

be expensive and/or potentially ineffective. Agricultural production of organically grown row crops and vegetables have been steadily expanding due to growing consumer demand for healthy organically grown products.

Keys for Successful Mechanical Rolling/Crimping of Cover Crops

Cover crops must be at the appropriate growth stage (e.g., early milk and soft dough stage for rye) for mechanical termination without the assistance of an herbicide (Fig. 2). Typically, a cover crop must be planted earlier in the fall (e.g., October and November) to reach the appropriate growth stage in spring.

A short cover crop (such as rye; less than 3 ft tall) will not stay rolled down and eventually will spring back and interfere with planting operations of the cash crop. Rye more than 4 ft. tall is adequate for mechanical rolling.

A firm soil surface facilitates crimping resulting in cover crop's tissue damage at equal spaces along plant's stem restricting nutrients flow for accelerated desiccation; otherwise cover crop residue will not be crimped and will be pushed into the soft soil by crimping bars.

Rolling of a cover crop should be done approximately three weeks before planting a cash crop to assure that there is no competition between cover crop and cash crop for water and nutrients. If three weeks are not available due to weather, termination can be accelerated with herbicides.

Cover Crop Management Methods

Cover crops are an integral component of conservation systems, providing benefits such as improved soil quality for better plant growth and enhanced soil and water conservation for sustainable agricultural production. These cover crops must be managed appropriately for successful direct planting of cash crops into residue covers. Improper cover crop management can lead to planting problems due to interference from cover crop residue such as wrapping residue on planting units that require frequent stops to clean residue that has accumulated on planters. Rolling/crimping technology is a preferred mechanical method to manage cover crops by rolling them down and crimping plant tissue against firm soil at equal intervals. Rolling/crimping accelerates the cover crop termination process by restricting nutrient flow and causing plant death (Fig. 1). This method is beneficial for organic production systems where commercial herbicides are prohibited to complement rolling, and organic herbicides may

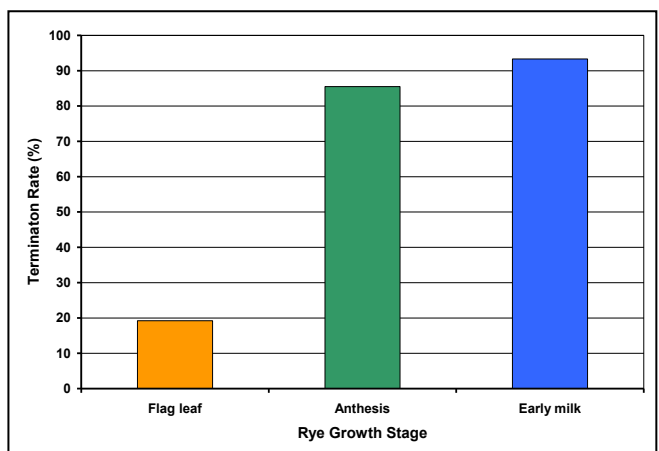


Fig. 2. Rye growth stage and termination rates three weeks after rolling using a roller/crimper without herbicides (Ashford and Reeves, 2003).



Fig. 3. Two-stage roller/crimper; four stage roller/crimper; curved roller/crimper and smooth drum roller with herbicide sprayer.

A four-stage roller/crimper (Fig. 3) was developed at the NSDL (Kornecki, 2011) to improve mechanical termination effectiveness of cover crops and reduce trips across the same cover crop area. This roller generates higher termination rates compared to the smooth roller with glyphosate, two-stage and curved roller/crimper. The 4-stage roller is suitable for organic conservation systems.



Fig. 4. Powered roller/crimper for walk-behind tractors.

A powered roller/crimper for walk behind tractors (Fig. 4) was developed for small garden farms that produce food for local farmers markets. Many of these farms are organic and need effective tools to successfully terminate cover crops in these small farm settings. The roller is as effective as a full size roller/crimper, despite less weight, because crimping force is generated from the engine by compressing springs against the crimping bar assembly (Kornecki, 2012).



Fig. 5. Roller/crimper for elevated beds culture.

Elevated bed roller/crimper allows termination of cover crops on the row tops and furrows. The roller/crimper can be designed for one bed with two furrows (Fig. 5) or two beds with three furrows to fit different bed configurations (Kornecki, 2009).



Fig. 6. Modified RJ transplanter by adding sub-frame with a subsoiler.

Subsoiling and transplanting operations can be combined using a one-row RJ transplanter with an added sub-frame to accommodate a sub-soiling shank and or row cleaners. This arrangement saves time and resources during the planting season (Fig. 6). Rolling, spraying and planting cash crop can also be combined into one run.

References

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