



Organic No-Till Farming with Roller Crimper

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Why No-till?

Conservation tillage (CT) or no-tillage (NT) farming practices can be used to reduce the negative impacts of conventional tillage such as soil erosion and conserve soil moisture. Despite the economic down turn, funding for projects related to conservation innovation in Hawai'i has increased 9.4% since 2008. This indicates that there is a new incentive to conserve farmlands and their productivity in Hawaii as well as other U.S. Pacific territories. While many projects related to watershed protection, wild land conservation or growing cover crops in agriculture land are installed and being greatly promoted, 'Conservation Tillage' (CT) practices that can greatly reduce soil erosion on farm land is receiving limited attention by Hawai'i farmers. The concept was first introduced 65 years ago by Edward H. Faulkner, but the "Conservation Tillage Revolution" occurred only 30 years ago when the first no-till planter was invented in Alabama, making CT widely adopted by growers in mainland U.S. (Gallaher, 2004; Bradley, 2004).

Why Roller Crimper?

Historically, reduced-tillage or no-tillage cropping systems rely on herbicides to kill the previous field cover. Organic no-till was assumed to be impossible until 2003, when Rodale Institute's Farm Manager Jeff Moyer and neighbor John Brubaker designed and built a "Roller Crimper" for the job. A detail description of Roller Crimper can be found at http://newfarm.rodaleinstitute.org/depts/NFfield_trials/1103/notillroller.shtml.

How does it work?

The roller is designed as a single large cylinder with blades mounted in a chevron pattern surrounding the surface of the cylinder (Fig. 1). This chevron pattern prevents bouncing and helps guide the tractor in a straight line. The cylinder itself is 16 inches in diameter, and made in various lengths based on the size of the tractor (picture shown here in Fig. 1 is a 8-ft long roller). The roller can be front- or back-mounted to a tractor using a 3-point hitch with a hydraulic lift. It is best used after a cover crop is well established. The roller can be driven over a 2-month old sunn hemp cover crop as shown in Fig. 2. Water can be added to the drum to increase weight, but not necessary. Fig. 3 shows a dense cover of sunn hemp mulch after one roll of the roller crimper, which can serve as organic weed mat for approximately 1.5 months (Fig. 4a). Additional organic weed management strategies need to be in place for weed management beyond 1.5 month when



sunn hemp is the organic mulch. Fig. 4 b shows that banana leaves are added to the plots for further weed management in these organically managed tomato field plots. Some organic farmers use vinegar-based herbicide for additional weed control along with roll-down cover crop. Choices of cover crop with higher C: N ratio (Sudan grass, oat, millet etc.) might be another way to extend the effectiveness of this no-till farming practice.



Fig. 1. A 8-foot long roller crimper (I & J Manufacturing, LLC., GAP, PA) hooked up to the back of a 60 horse power John Deere tractor.



Fig. 2. Two-month old sunn hemp cover crop grown from May to July at Poamoho Experiment Station is ready for no-till rolling with the roller crimper.



Fig. 3. Dense and compact sunn hemp mulch after one passing of roller crimper.

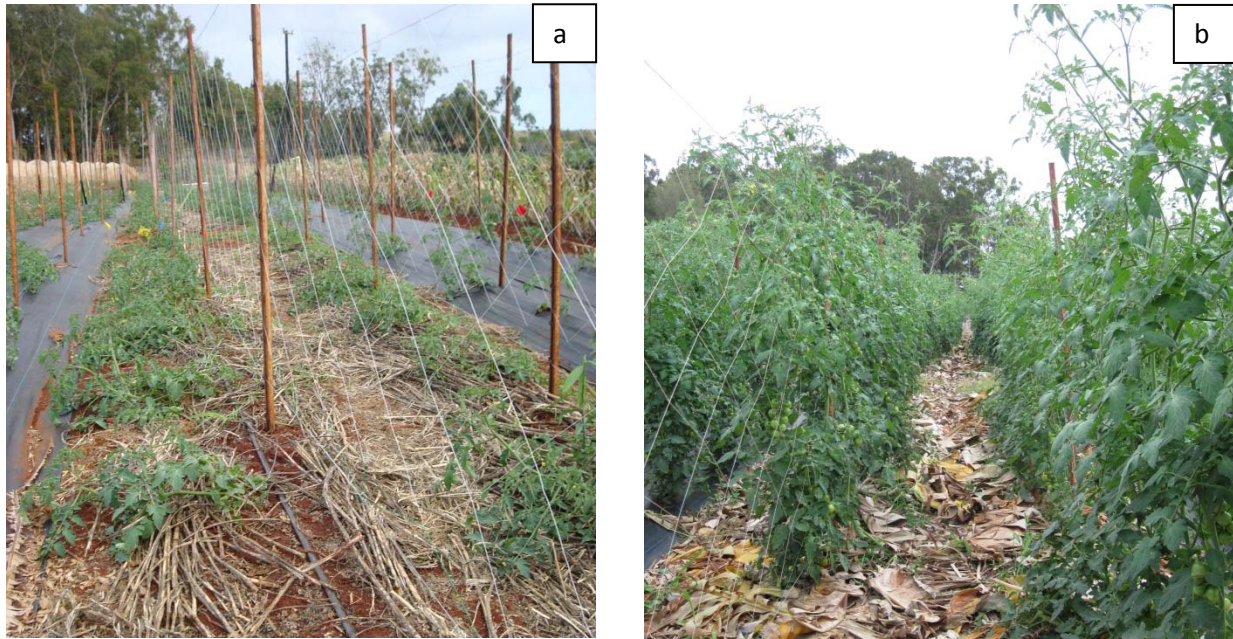


Fig. 4. a) Tomato in previous sunn hemp plot at 1 month after rolling and crimping. b) Banana mulch is added to rolled and crimped sunn hemp plot at about 2 months after termination of the sunn hemp cover crop.

Reference

Gallaher, R. N. 2002. History and future challenges and opportunities in conservation tillage for a sustainable agriculture: Research and Extension Perspective. Proc. of 25th Annual Southern Conservation Tillage Conference for Sustainable Agriculture, Auburn, AL. 24-26 June, 2002. Pp. 2-11.

Bradley, J.F. 2002. Twenty-five year review of conservation tillage in the Southern U.S.: Perspective from industry. Proc. of 25th Annual Southern Conservation Tillage Conference for Sustainable Agriculture, Auburn, AL. 24-26 June, 2002. Pp. 20-24.

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