

Weed Management Strategies

by Sarah Carlson

PFI members have been conducting on-farm research trials on weeds every year since 1987, when the PFI Cooperators' Program began. Now is a good time to review that research, because numerous hot days in this year's growing season seemed to help these "plants out of place" really grow. Whether crops are farmed using steel or herbicides to manage weeds, having multiple "little" hammers allows farmers to use the right tool under the right conditions to improve control.

PFI Cooperators have tested hammers including cultural (cover crops), mechanical (cultivation), chemical (herbicide) and thermal (flaming). For these trials, some years were dry, some years were wet, some years had high weed pressure while others had low. Using one silver bullet tool might lead to unintended consequences like weed resistance and dependence on one technology. "Successful weed management is the result of strategic thinking: If hoeing doesn't work then I'll... If the spring turns dry, we'll..." Being able to tweak the system to match the correct tool with the correct situation will improve weed management.

Conventional Tillage vs Ridge-Tillage

In 1988 Ron Rosmann, one of nine cooperators conducting weed management trials that year, measured increased weeds in conventional tilled versus ridge-tilled fields. More velvetleaf and pigweed were present in the conventional tillage treatment while lambsquarter was greater in the ridge-tillage treatment. At other locations — Dordt College and the farms of Harlan and Sharon Grau, Ray and Marj Stonecypher, Bob and Diane Graff, Allyn and Laura Hagensick, Tom and Marcia Hanks, Todd and Linda Hartsock, and Mark and Rita Mays — side-by-side comparisons of ridge-till with and without banded herbicides showed no corn yield differences in three locations and saved an average \$8.78 per acre in production costs.

Ridge-till with and without herbicide soybean trials at five of six locations showed no yield differences. At the sixth location (the Hanks'), soybean yield without herbicides was reduced by 5.23 bushels per acre, which in 1988 was valued at \$35.00 per acre. The cost of the herbicide at the time was \$24.03 per acre. Farmers used a mixture of

cultural practices to control weeds, including rotary hoeing and cultivating in addition to comparing with and without herbicides.

Low-Input, Mechanical Control Trials

In 1990 low-input weed treatments were compared to higher-input treatments by 14 PFI Cooperators. Ten out of 11 trials using ridge-tillage without herbicides showed no difference in corn or soybean yield to a chemical comparison. In 1992, Cooperator Paul Mugge compared yield and production costs of mechanical control, including two rotary hoe passes plus three cultivations to banding herbicide plus two cultivation passes. He found that yield was not different but the banded herbicide plus cultivation treatment was more profitable. Dick Thompson tried a unique weed management trial in 1995 when he tested early versus late planted soybeans in combination with planting in the light or dark. Dick had read that even a little light could initiate weed germination. He built housing over the units on the ridge-till planter, which included an electric light and was switched on for the light-planting treatments. At the end of the year Dick's results measured no difference in soybean yield in any of the combinations of treatments. Early planting, though, had a greater amount of broadleaf weeds compared to the late planting date. But planting in the light or the dark did not have a significant effect on the weeds.



As a participant in an early PFI weed management trial in 1988, Ray Stonecypher shared details of his research results with field day attendees.

Flame Weeding

In 1998, New Melleray Abbey farm manager Joe Fitzgerald conducted the first formal trial of flame weeding in corn. Flame weeders use jets from a propane tank to burn down weeds similar to burn-down herbicides but use propane instead of chemicals. Flamed weeds are killed by the cell membranes rupturing when exposed to temperatures of 100°C for a split second. The cell then loses water and the plant dies. Also flaming could occur when the soil is too wet for mechanical cultivation. Flame weeding is most effective when leaves are thin and tender and the weed's growing point is above the soil surface. Although flame weeding's effect on weeds was not significantly different in 1998, Joe tested the flame weeder again in 1999. Corn yield was significantly improved and fewer broadleaf and grass weeds were present compared to the cultivation treatment. Flaming was more expensive, but because of better weed control and higher corn yields it was the more profitable treatment.

In 1999, Dennis and Eve Abbas flame-weeded in corn on July 1. Dennis observed reductions in weeds, including quack grass and Canada thistle. Again in 2000 he compared flaming before first cultivation versus flaming before second cultivation and again before second cultivation. The first treatment, flame-weeding before first cultivation, only significantly out-yielded corn compared to the second treatment - but weed pressure was relatively low that year.

In 2000 Gary Guthrie tested weed control in carrots using flame-weeding at an early and later carrot planting date. Broadleaves and grasses were reduced more in the later planting date treatment. The flaming saved on labor and materials at about \$1.30 per 100-foot bed. Building on flame-weeding research, Doug Alert and Margaret Smith flame-weeded and twice cultivated their ridge-till corn. They measured reduced velvetleaf numbers and increased corn yields compared to two cultivation passes only. In 2002



As one of the early participants in PFI flame weeding trials, Paul Mugge started experimenting with flame weeding in 2002.

Paul Mugge tried controlling weeds through a combination of flame weeding and cover crops. Paul measured reduced numbers of broadleaf weeds from either a spring rye cover crop planted on the ridges or a flame-cultivation only. The biggest reduction in weeds came from the combination of cover crops and flame weeding.

Rye on the Ridges

Several farmers have tried planting rye on the "ridges" to control weeds. To plant on the ridges PFI farmers developed the technique of plugging units on the grain drill so that the tubes only plant on the ridges. The valleys in between the ridges are left undisturbed and not planted. The rye is then left to grow and at planting the planter scrapes the ridges clean providing a clean seedbed for the cash crop. In 2004 and 2006 Dick Thompson and Doug Alert both tried this technique. No significant difference in weed control was noticed as had been observed in other years.

Cover Crop Control

In 2010 Aaron Lehman planted a winter rye cover crop in the fall prior to soybeans and then in the spring mowed the rye cover crop near boot stage. He then was able to use the mulch from the cover crop to suppress weeds in his organic soybeans. He observed reduced weed pressure and tried the test again in 2011.

2012 Flame-Weeding Field Days

A new idea to be explored at an upcoming PFI field day, on August 7 in Stanton, is the use of flame weeding for no-till farmers who have glyphosate-resistant weeds on their farm. Mark Peterson, along with Dr. Stevan Knezevic from the University of Nebraska, will present about the potential for flame-weeding in conventional no-till systems. Also check out the new flame-weeder Scott Shriver uses for organic weed management on September 13th near Jefferson at his field day. See the PFI Field Day guide for more information.

Have ideas for on-farm weed management research projects? Contact Sarah Carlson at 515.232.5661 or sarah@practicalfarmers.org. For more on the many trials on weed management PFI farmers have done through the PFI Cooperators' Program, visit www.practicalfarmers.org.



1st Photo Above: What rye planted in ridges looks like in the spring.



2nd Photo Above: A flame weeder in action on the New Melleray Abbey farm. Flame weeders use jets to zap weeds with a split-second dose of propane instead of herbicides.

UPCOMING EVENTS

SAVE THE DATE! January 10-12, 2013 - PFI Annual Conference | Scheman Building | Iowa State University | Ames, IA

UPCOMING FIELD DAYS - Please check our website or call the office to request a field day guide for full details.

August 1, Alta - Integrating Niche Pork, Beef, and Crops

August 3, Adel - Orchard + Kitchen + Store = On-Farm Enterprise

August 4, Waukon - Better Grass and Fly Control: A Dairy's Path to Profits

August 7, Stanton - Cover Crops and Flame-Weeding in Corn and Soybeans

August 9, Winfield - Row-Cropping for Multiple Markets: GMO, Non-GMO & Organics

August 17, Keystone - High-Value Rotations on a Grass-Based System

August 21, Taylor County - Cover Crop Tour: Combatting Compaction

August 24, Brandon - Cedar River Coalition (Iowa Learning Farms)

August 26, Marshalltown - Harvest from the Heart of Iowa Farm Tour

Sept. 8, Solon - A New Farmer's Story: From Production to Policy

Sept. 13, Jefferson - Improving Organics: Small Grains, Flame-Weeding & Corn Hybrids

Sept. 14, River Falls, Wis. - U.S. Testing Network Breeders' Showcase

Sept. 15, Wapello - From Fruits to Nuts- Managing and Marketing Tree Crops

Sept. 16, Iowa Falls - Taste the Difference: Picking Pork Characteristics for Flavor

Sept. 18, Paullina - High-Density Grazing and Permaculture

Sept. 22, Polk & Story Counties - Farm Cruise through Polk and Story Counties

Sept. 26, Emmetsburg - Working Toward Vertical Integration

October 4, Mechanicsville - Tools and Techniques for Year-Round Harvest

October 7, Knoxville & Lacona - Farm Crawl

UPCOMING NORTHEAST IOWA GRAZIER PASTURE WALKS - Check our website, field guide or call the office for full details.

August 1, New Hampton - Garth Griffin

August 4, Waukon - Jeremy and Jody Peake

August 15, Garnavillo - Andy Schaefer

August 29, Guttenberg - Scott Cheme

Sept. 18, Waukon - Joel Winnes

FOR MORE UPCOMING EVENTS, CHECK THE PFI WEBSITE: www.practicalfarmers.org