

Wisconsin takes the



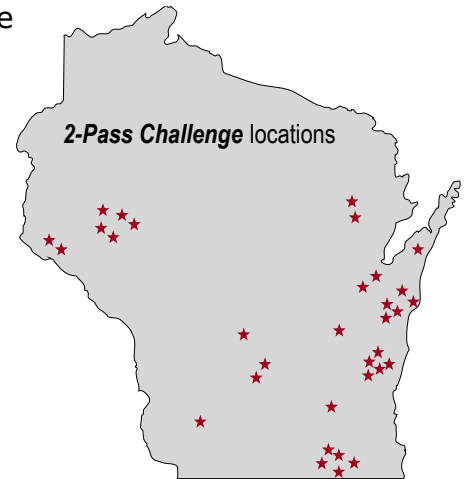
1-Pass herbicide programs have become the standard for most corn producers. The apparent time and cost savings in controlling weeds with a single pre or post-emergence herbicide application is the driving force behind this trend. While there are situations where a 1-pass program will work, it has weaknesses that can result in inconsistent performance.

Timely rainfall is often the most critical factor determining the success or failure of 1-pass pre-emergence programs. Some pre-emergence programs tend to sacrifice control of large seeded broadleaf and perennial weeds. 1-Pass post-emergence programs have also gained in popularity with the introduction of new herbicides, an increase in no-till production, and herbicide-resistant crops. Although post-emergence programs provide the opportunity to scout and select herbicide programs that best match the weed spectrum present, timing is critical for effective control and to protect yield. Since most fields contain several problem weed species, timing a single application to: 1) control all species, 2) limit weed competition, and 3) avoid crop injury can be difficult.

Is a planned 2-pass herbicide program the answer? Maybe. When questioned, most farmers and agronomists agree that a 2-pass herbicide program provides more consistent weed control over a greater range of conditions. So why aren't they using a 2-pass program? Cost and time are cited as the two biggest factors. In today's tight farm economy, many are sacrificing some level of weed control in an effort to save money. But perhaps more emphasis should be placed on protecting crop yield and optimizing profits. Although 2-pass programs are often more expensive due to increased application and herbicide costs, the question is:

Can improved crop safety and weed control increase corn yields to pay for the additional cost of a 2-pass weed control program?

The *2-Pass Challenge* was a series of on-farm trials that compared the costs, weed control and corn yield of 1-pass vs. 2-pass herbicide programs. These trials were split field, on-farm tests during the 2002 and 2003 growing seasons. See the map for locations.



Participants in the *2-Pass Challenge* designed their own

1-pass and 2-pass corn herbicide programs. No restrictions were placed on the herbicides allowed, rates applied or the use of cultivation. A burn-down herbicide in no-till systems was allowed and was not considered to be one of the herbicide applications in either the 1-pass or 2-pass programs. Any of the following herbicide application schemes were acceptable (any 1-pass program vs. any 2-pass program):

1-pass	2-pass
1 PRE	1 PPI + 1 POST
1 PPI	1 PRE + 1 POST
1 POST	1 PPI(reduced rate) + 1 Cultivation
	1 PRE(reduced rate) + 1 Cult.
	1 POST + 1 Cultivation



NPM and IPM Programs

University of Wisconsin-Madison

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Data was collected from 33 grower fields over the two growing seasons. A wide range of herbicide and/or cultivation options was chosen by participants. Weed control costs were calculated based on the actual herbicide rates and cultivation. Herbicide prices were based on average retail prices from several Wisconsin sources within each year. A \$7/acre herbicide application cost and \$7/acre cultivation cost were used in the calculations. Corn was priced at \$2/bu for comparison purposes.

As expected, the cost of the 2-pass programs averaged over \$7/acre more than the 1-pass programs that were chosen by participants (Figure 1). Interestingly, this \$7/acre average cost difference roughly equals the additional application cost of a 2-pass program. Although this average cost difference is not great, it could have been even less, if not for the fact that some 2-pass challenge participants chose 2-pass strategies that cost as much as \$23/acre more than their 1-pass comparison.

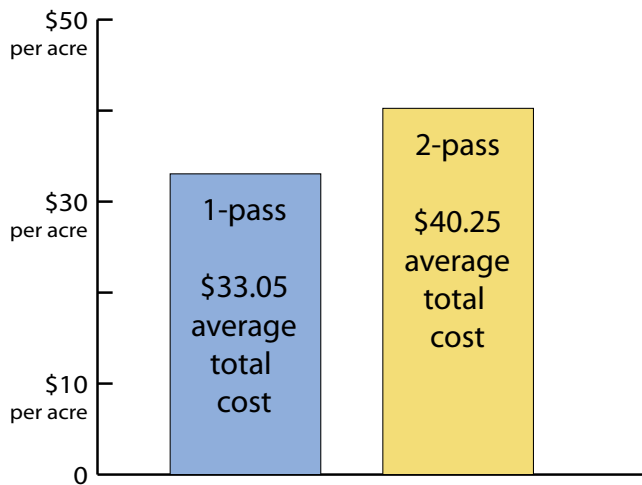
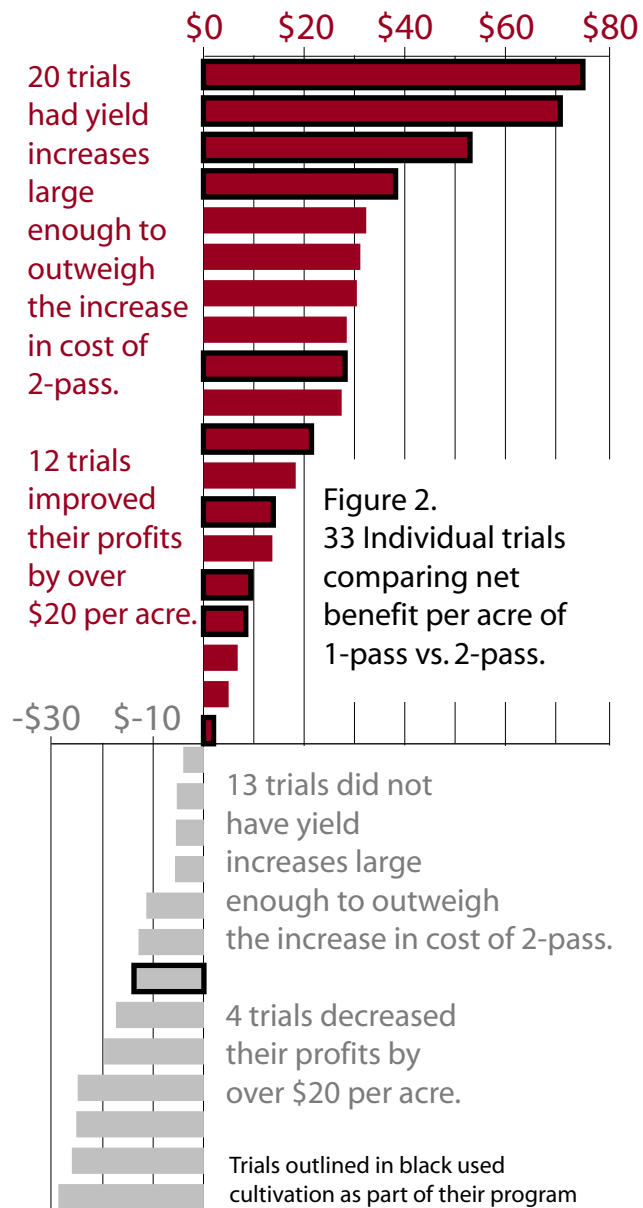


Figure 1. 1-Pass versus 2-pass average total costs of herbicide, cultivation, and application for 33 on-farm trials.

Since we are interested in comparing not only costs, but also the potential economic gains from using a 2-pass program, a 2-pass net benefit was calculated for each 2-Pass Challenge trial. This 2-pass net benefit takes into account all herbicide/cultivation/application costs and subtracts them from the gross return which is based on yield. The difference in net gain between the two programs is the net benefit. The following table demonstrates the net benefit calculations:

Sample Net Benefit Calculations		
	1-pass per acre	2-pass per acre
Gross Return	140 bu x \$2 =\$280	150 bu x \$2 =\$300
Herbicide \$	-\$26	-\$26
Application \$	-\$7	-\$7
Cultivation \$	\$0	-\$7
Net Gain	\$247	\$260
Net Benefit	\$260 - \$247=	\$13 per acre

The net benefit calculation was performed on all of the 2-Pass Challenge comparisons. This data is summarized in figure 2. A positive bar represents an increase in profit from using a 2-pass program. A negative bar represents a decrease in profit when using a 2-pass vs. a 1-pass program.



Can improved crop safety, weed control, and ultimately increased corn yields provide enough added benefit to outweigh the additional cost of a 2-pass weed control program?

The answer is yes.

On average, the 2-pass programs increased yield by 8.5 bu/acre over the 1-pass programs, resulting in an average net benefit of \$13.50 / acre. In total, 20 of the 33 trials had yield increases large enough to outweigh the increase in costs from using a 2-pass program (positive bars in figure 2), but perhaps of greater importance is the magnitude of their gain. Look at the number of trials which improved profitability by more than \$20 / acre. 12 trials improved their bottom line by greater than \$20 / acre, while only 4 trials decreased their bottom line by greater than \$20 / acre. There were certainly many fields that had the potential for significant gains using a 2-pass program. Trials which used cultivation as a component of their 2-pass weed control program are outlined in black. Although a cultivation effect was undoubtedly responsible for some of the gain experienced in these trials, improved weed control was also evident.

In all but one location, the 2-pass program had weed control at least equal to the 1-pass comparison, and in more than half of the locations, the 2-pass program improved weed control which may reduce future weed populations.

Although the *2-Pass Challenge* trials were not replicated on each individual farm, the average of the 33 trials suggests that yield and returns can be increased with a 2-pass program. Think of a 2-pass program as an insurance policy for your weed control (Figure 3)! A 2-pass program should reduce your risk compared to a 1-pass program. So as you sit down to plan your weed control program for the upcoming season, consider the potential advantages that

a planned 2-pass weed control program has to offer.

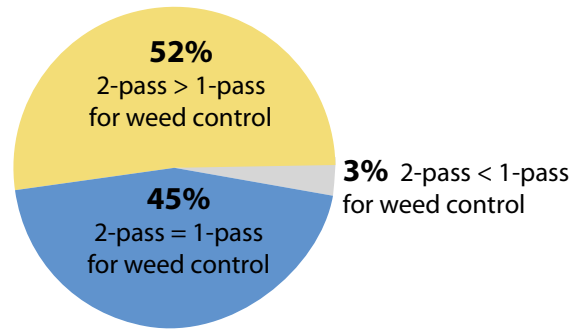


Figure 3. In 97% of the 33 trial comparisons, 2-pass had greater or equal weed control when compared to 1-pass.

Planning Your Program

Don't know where to start? Remember that a major goal of your weed management strategy is to reduce your risk. Planning a 2-pass program for high risk fields can be both effective and profitable. Consider the following points when evaluating fields.

1-pass pre-emergence programs

- Target low risk fields – light weed pressure and no problem weeds like perennials or giant ragweed

1-pass post-emergence programs

- Target low risk fields – light weed pressure and no problem weeds like crabgrass.
- Do not over commit acres – early applications are needed to stop early-season weed competition

2-pass programs

- Target high risk fields – moderate or heavy weed pressure or problem weeds like giant ragweed or perennial weeds like Canada thistle.

Reduced rates of pre-emergence herbicides have been shown in many cases to be an effective and cost efficient means of controlling early season weeds. Reduced herbicide rates often provide consistent early season weed control. Reduced pre-emergence herbicide rates have the potential to fit in a planned 2-pass herbicide program where cultivation or a post-emergence herbicide will be used to clean up later germinating weeds. Consider using a reduced rate pre-emergence herbicide even when planting herbicide-resistant crops. The pre-emergence herbicide will help to limit early weed competition while providing greater flexibility to correctly time the post-emergence application. Reduced rates may not always be appropriate, particularly if you are targeting perennial or difficult to control annual weeds. For more information, ask for publication A3563 – *Reduced Herbicide rates in Corn*, available from the UW-NPM Program.

Cultivation is a viable option for many growers as part of a planned 2-pass program. In addition to weed control, cultivation often results in additional yield response due to the increase in soil aeration and water infiltration. However, cultivation does require greater time and management. Cultivation must be performed when weeds are small enough to dislodge and when the corn is large enough to avoid injury. Since this narrow window of time may coincide with other important operations like hay harvest or spraying other crops, cultivation may need to be limited to specific fields.

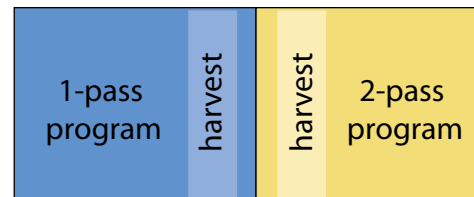
Too busy to cultivate?

Consider the results from the *2-Pass Challenge* field trials. 12 of the 33 trials used cultivation and 11 of those 12 had increased returns as compared to their 1-pass program. This data suggests that the reduced costs and increased yield associated with cultivation could be profitable for you.

Compare herbicides based on their cost, weed spectrum, effectiveness, and environmental safety. Although this point is common sense,

we are all creatures of habit. When we find a program we like, we often stick with it even if cheaper or more effective options exist. With little effort, you can try out new products and strategies in test plots or small fields on your own farm. Depending on your weed species and pressure, the only difference between that “Cadillac” and “no-frills” herbicide program might be the cost, not the control.

Consider conducting your own 2-pass comparison next season. Field layout can be as simple as:



Choose a total field area of at least 5 acres and harvest at least ½ acre in both the 1-pass and 2-pass plot. Do not include in the harvest comparison the first 6 rows on either side of the division between the 1-pass and 2-pass programs. Be sure to include herbicide costs, application costs, cultivation costs and corn yield when comparing your two programs. Also be sure to check the performance of the two weed control programs periodically during the growing season. And finally, if unconvinced after one season, continue the comparison for several years. The strength of a planned 2-pass program will be its consistency over time and a greater range of growing conditions.

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