MINIMUM TILLAGE FOR POTATOES--SOME COMMERCIAL ECONOMICS

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Minimum or reduced pre-plant tillage methods of growing potatoes are now being used on 15 to 20 percent of Washington's potato acreage. The number-one benefit is control of and, in some cases, elimination of spring-time wind erosion.

But the question that always arises in any discussion of a new cultural practice is: Will the practice pay in a commercial production system? The answer in the case of reduced-tillage potatoes is: Yes, with the proper management. Not only that, the reduced-tillage practices in many cases have a definite economic advantage over conventional methods.

Machine and Labor Costs

Table 1 shows machine and labor cost comparisons among the conventional methods used by one grower, his reduced pre-plant tillage method, and the WSU mini-till method discussed in previous years at this conference.

This grower's reduced-tilllage method uses one or two light diskings to work the residue from the previous crop into the top 3 or 4 inches of the soil. Next, the field is fumigated and packed (if fumigation is warranted). These operations are done in the fall if possible.

In the spring the field is undercut with a sweep plow which also applies fertilizer and marks the field out for the planting operation. The potatoes are planted with a conventional planter such that the seed rows are hilled up but plant residue is kept away from the seed pieces. The amount of residue remaining on the surface appears small but is sufficient to control the wind erosion. Before potato emergence, one cultivation is used to remove the top of the ridges. Usually no other tillage operation is used until harvest.

As Table 1 shows, the conventional method costs were $98 per acre, the reduced-tillage costs were $81 per acre, and the mini-till costs were estimated at $76 per acre. The differences between the mini-till and reduced till costs are due to the elimination of the $4 disking with mini-till and the $1 difference between hilling and cultivation operations.

This grower saves $17 per acre with his method compared to conventional practice and has the added advantage of reducing his spring work load. His reduced-till yields and quality have been as good as or better than under conventional practice.

Yield and Quality

One grower made a direct comparison between his conventional practice and the WSU mini-till method on his own farm. The yields and quality (Table 2) for the mini-till were better than conventional. This grower actually spent more on cost of production for mini-till than for conventional, but with the yield and quality advantage, the net dollar advantage was from $128 to $139 in favor of the mini-till (Table 2).

Grower Developed Methods: Yield, Quality and Expenses

Grower 1 (Table 3) is the average of the two mini-till columns from Table 2 with the addition of the value for production expense.

Grower 2 used his version of mini-till with a planter modified as shown in Figure 1. He used a fluted colter followed by a 6-inch sweep running 12 inches deep. He used a rod-mesh

pack to both cover and firm soil around the seed, but found covering disks to be helpful in heavy residue.

The mini-till cultural practice used by grower 2 is to pasture the undisturbed stubble and regrowth of the previous wheat crop over the winter, broadcase fertilizer (except nitrogen, which is later applied through the sprinkler), and plant directly into the stubble. He applies phosphate (which does not move readily) during the previous year to make it available when the potatoes need it. It should be noted that he found potato roots within 1/4 inch of the soil surface under the heavy residue in his field, so lack of phosphate movement may be of little consequence.

Grower 2 experienced some harvest difficulties in corn residue but felt this problem could be overcome by shredding the stocks before potato planting. He experienced no difference in specific gravity or bruise damage between mini-till and conventional practice. He saw a great advantage in the mini-till because it controlled wind erosion even in very light, sandy soil.

The economic advantage of mini-till according to grower 2's figures (Table 3) was $170 per acre.

Grower 3 (Table 3) started his reduced-tillage method by lightly disking the stubble of the previous wheat crop in the fall under dry conditions. Dry stubble was important in chopping the residue and keeping it high in the soil profile.

The fields were then irrigated with 5 to 6 inches of water to start regrowth and were grazed with sheep over the winter. (Fields to be conventionally tilled and planted to potatoes were treated the same up to this point.)

Just before planting, Dawpon® was applied to the mini-till fields and they were marked out using a chisel plow fitted with bull tongues and 16-inch sweeps running 16 inches deep. The potatoes were planted with a conventional planter running in the shank mark of the chisel plow.

Just after planting, Eptam® was applied through the sprinkers for annual weed control. (This herbicide was incorporated before planting in the conventional fields.)

After emergence, Temik® was applied and incorporated with a hilling operation. Later, Sencor® and Eptam® were applied through the irrigation system for annual weed control. The last cultivation was with a dam-pitter which removed between-row regrowth and created small depressions to reduce irrigation runoff.

The conventional practice used by this grower required 4 more diskings, more water, more fertilizer, and less herbicide (no Dawpon®) than the reduced-till method.

The economic advantage of this reduced-till method (Grower 3, Table 3) was $175 per acre compared to conventional, including yield and expense advantages.

Grower 4 (Table 3) used a strip-till method of growing potatoes in sandy soil while controlling wind erosion. A sectioned roto-tiller was used to till 17-inch wide 6-inch deep strips on 34-inch centers. The potatoes were planted into the tilled strips with a conventional planter. The un-tilled strips were left until the potato plants were large enough to control the wind erosion.

With strip tillage, this grower was able to save as much as $25 per acre in excess water that is used under conventional practice to try to control wind erosion. He was able to significantly increase yields and reduce green-end because the surface residue kept the sandy soil on the potato hills much better.

This grower's figures showed the greatest economic advantage ($274 per acre, Table 3) for his reduced-tillage method compared to conventional practice.

Table 1. Machine and Labor Costs Per Acre.

	METHOD		
OPERATION	CONVENTIONAL	REDUCED PRE-PLANT TILLAGE	WSU MINI-TILL
PLOW & PACK	$ 13	$---	$---
DISK & PACK	4	4	---
FUMIGATE	20	20	20
FERTILIZE, SWEEP, MARK	20	20	52
PLANT	32	32	
CULTIVATE	5	5	---
HILL	4	---	4
TOTALS	$ 98	$ 81	$ 76

Labor rate assumed at $3.50 per hour. Costs of hauling, materials and down time not included.

Table 2. One Grower's Comparison.

METHOD--	CONVENTIONAL	MINI-TILL	MINI-TILL
PREVIOUS CROP--	CORN	CORN	WHEAT
SOIL	SANDY	SANDY	"HEAVY"
YIELD (T/A)	28.9	33.4	32.2
NO. 1's	71%	69%	76%
BRUISE-FREE	76%	80%	77%
10 OZ.	29%	37%	34%
NET ADVANTAGE OVER CONVENTIONAL ($/A) AT $50/TON	---	$139	$128

Table 3. Dollar Advantage, Reduced-Till over Conventional.

INCOME INCREASE ($/A)	GROWER			
	1	2	3	4
YIELD	$195	$167	$ 55	$110
QUALITY INCENTIVES	---	---	27	49
EXPENSE DECREASE (INCREASE)	(61)	3	93	115
NET $ ADVANTAGE/A*	$134	$170	$176	$274

*AT $50/TON

Figure 1. Grower-modified potato planter implements for mini-till potato planting.