Perennia
Nova Scotia's Food Development Agency

Final Report

Using Strip-tillage for the Establishment of Horticulture Crops

Proposal to:
Nova Scotia Department of Agriculture

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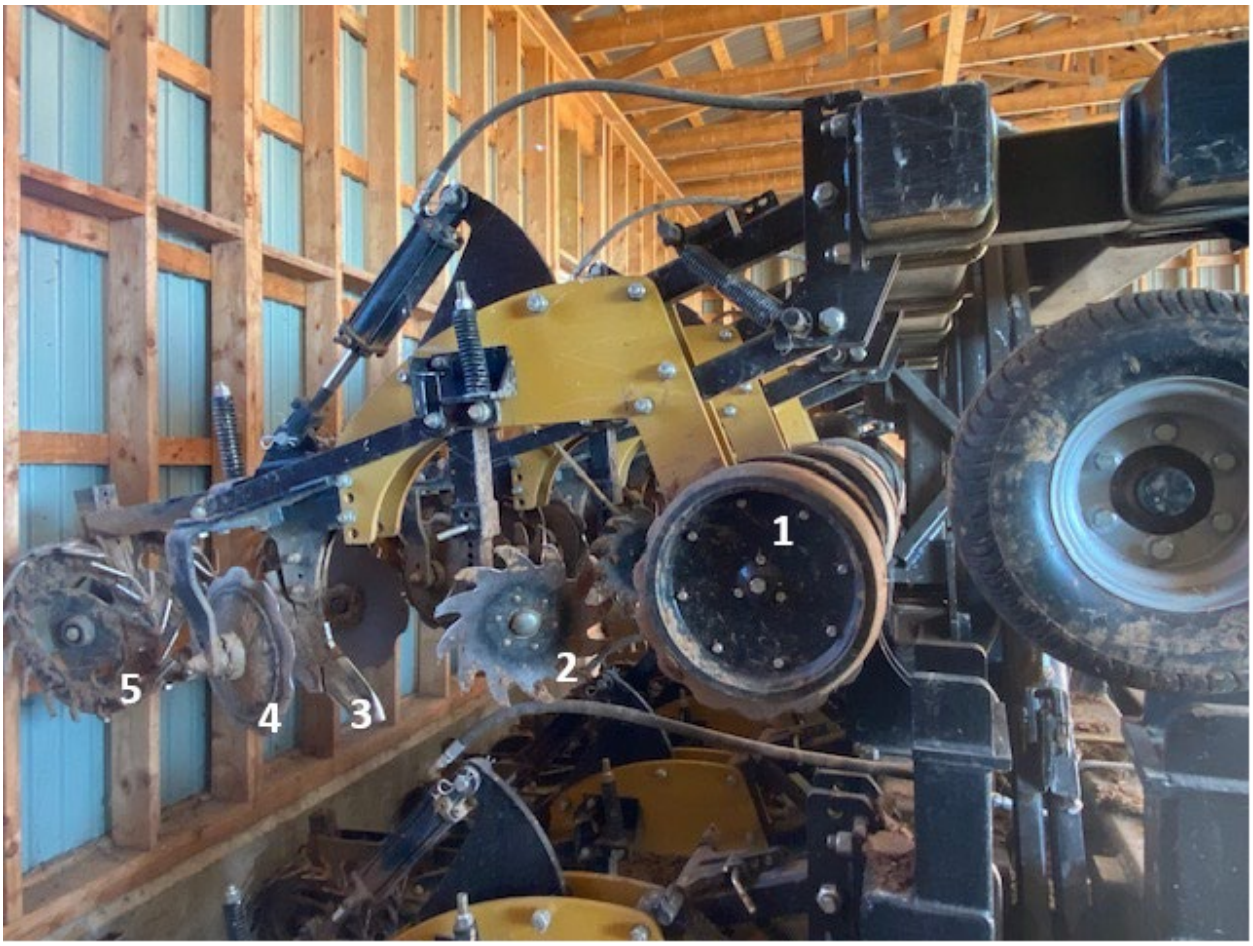
What is Strip-tillage?

Strip-tillage is a conservation tillage practice that involves tilling narrow strips of soil, where the future crop will be planted, while leaving areas between the strips undisturbed and protected by crop residue or living cover crops. This tillage method provides some of the benefits of full tillage, such as soil warming and producing a fine seed bed, with some of the benefits of no-till, such as decreasing erosion and building soil organic matter. This practice is becoming quite common among corn producers in the province as they see improvements to soil health and also fuel and labour savings.

There are some key advantages to adopting strip-till in horticulture production systems that have been realized from corn production which may also be advantageous for your farm:

1. Labour, Time and Fuel Savings: In strip-till there are at maximum two tillage passes. This reduces the amount of soil preparation work performed on the field. Typically, one pass is made in the late summer or early fall (of the previous year) to prepare the strips and to do some deep tillage with the use of shanks. These strips are then freshened in the spring with shallow tillage in order to prepare a finer seed bed and warm the top layer of soil.
2. Improved Soil Health and Structure: Strip-till leaves much more of the soil surface and profile undisturbed. This allows the soil structure to be maintained, increases porosity, and lowers bulk density. As a result, water infiltration increases as does soil biology.
3. Builds Organic Matter: Strip-tilling reduces the amount of oxygen mixed into the soil while leaving crop residues on the soil surface, decreasing organic matter break down.
4. Erosion Control: By leaving crop residue and cover crops on the soil surface, water and wind movement across the field is slowed and the impact of wind and water erosion is decreased. Water infiltration rates are increased as soil structure is maintained decreasing the amount of water moving across the soil surface.
5. Moisture Conservation: Residue left on the surface helps retain moisture in the soil while infiltration rates are increased, leaving more water available for crop production through periods of drought.
6. Weed Control: In strip-tillage, tillage to control weeds is replaced by herbicide use, so crops chosen for this system must have good pre-emergent and post-emergent herbicide options. By eliminating in-crop tillage, residual herbicides are allowed to maintain their weed control barrier at the soil surface for longer into the crop's growing season. Weed seeds are not brought to the surface to germinate with frequent tillage in typical strip-till systems. Reducing tillage also allows the use of an extended stale seed bed technique to control weeds.
7. Nutrient Efficiency: Depending on equipment selection, fertilizers can be applied to the tilled strips, improving nutrient use efficiency compared to broadcast applications by concentrating the nutrients in the root zone of the crop plants.
8. Carbon Sequestration: By leaving crop residues on the soil surface, minimizing organic matter breakdown and decreasing fuel consumption by reducing tillage, strip-tillage can enhance carbon sequestration contributing to the efforts in reducing greenhouse gas emissions.

9. Earlier Planting and Soil Warming: In some cases, planting can occur earlier as wheel traffic is concentrated on untilled strips of crop residue. Soil temperatures in the darker tilled strip also warm faster allowing planting to occur earlier in the spring.



Picture 1: Basic image of a strip-till row unit.

Most strip-till equipment is made from variations of similar components. Each row unit will make one crop row in much the same orientation as a corn planter.

Referring to the strip-till unit above (Picture 1):

1. The depth wheel ensures the unit works at the proper depth while maintaining down pressure on undulating ground. Behind these depth wheels is a cutting coulter to cut surface crop residue before it can be moved out of the way by the row cleaners. If the cutting coulter becomes dull, over time, residue may not be cut, or the residue will be pushed into the ground and the cleaners cannot work properly.
2. Residue row cleaners remove trash from the row so it will not be caught up in the shank and subsequent tillage tools. These row cleaners should be running at the soil surface and are not meant to create tillage or produce a shallow trench.

3. The tillage shank will do deeper tillage and, on some units, will reach below the plow pan and shatter compacted layers increasing drainage and rooting depth (see Picture 2). The aggressiveness of the tillage will depend on the size of the shank and shape of its wings. The shank may also be used as a fertilizer opener if fertilizer is to be placed in the strip. A fertilizer air cart is needed to place granular fertilizer in the strip.

Picture 2: In this soil profile there is a compacted layer present at a depth of 7-9 inches. Ideally, strips would be pulled in the fall while the weather is still dry, and shanks would be set to just under 9 inches to help break up compaction in the strip.

4. Containment and tillage discs keep the soil from being thrown out of the strip by the shank and provide additional tillage.
5. Rolling baskets or crow's feet press wheels break up clots and shape the final berm.

Each row unit will require about 40 tractor hp. The spring freshening pass may require the shank to be adjusted to run shallower or dropped out entirely. Running deep shanks in the fall, while it is still dry, allows shattering of shallow compaction. In the spring, if the shank is set too deep it can bring up cold, moist, clammy soil and create smears. Breaking the soil seal, removing residue and working the soil shallowly to allow the surface to warm and dry out should be the goal of the spring freshening pass. Typically, shanked units will require the shank to create some downward force allowing the coulters to work correctly and therefore cannot be run without the shank. Some designs will not include a shank and instead employ several working discs or coulters (Picture 3). These units will have a lower horsepower requirement and bring fewer stones to the surface but may not perform in heavier crop residue. They will

also need more speed in order to allow the disc to function correctly and break up clots. Still other systems will use two different pieces of equipment; one for a fall pass with a shank and another unit for a spring pass without a shank and working shallow.

Regardless of the equipment chosen, growers should look at the ease of making adjustments to the machinery. If bolts have to be removed and reinstalled to reposition the equipment or adjust angles, it may be time consuming compared to repositioning with pins or adjusting threaded shafts.

Picture 3: Dawn strip-till unit without the use of a shank.

The ideal berm will depend on what the grower is using for transplant or seeding equipment. In general, the zone should be worked deep enough to allow the transplanter or seeding equipment to work at the proper depth. In the case of a transplanter unit this will include enough depth for roots to be spread out in a downward fashion (for instance when working with bare-root strawberries). It may be necessary to equip the transplanter with a "reduced tillage" opener which is available for Holland transplanters. Regardless, the seeding equipment or transplanter should have openers that are in good condition. We often see worn transplant openers being used which results in transplants being placed too high in the soil causing the young transplants to dry out and develop improper roots.

When making the berms or strips, soil should not get thrown outside of the strip area. This will produce a strip that is lower than the surrounding non-tilled soil allowing water to pool, creating erosion which can get worse over winter. Soil in a low trench will also be slower to dry and warm in the spring delaying plant emergence. The edge of the berm should be tapered so that water will not collect in this area and start to run. The berm itself should be slightly raised to aid in drying and soil warming. After planting the berm should only be slightly raised to almost level after firming with the transplanter or seeder.

Picture 4: Pulling strips in late April using a 30-inch customized Yetter strip-tiller.

The shanks should be run at a depth just below the compacted "plow layer" so that it can be shattered allowing water and roots to grow down through this layer. This will also allow transplant equipment to operate at the proper depth. With the fall pass it is desirable if there is crop residue left on the strip soil surface. This will protect the soil from erosion and keep the soil in place. The crop residue will be removed with the spring freshening pass allowing for soil warming and seeder or transplanter passes.

Weed Control in Strip-till Systems:

Weed control is very important in horticultural systems as it not only affects yield but also the airflow of the crop. Increased humidity in the crop canopy can lead to increased diseases in the crop.

Because there is no in-season tillage in a strip-till system, there is an increased dependence on herbicide use. Only crops with good choices for both pre-emergent and post-emergent applications should be selected for adoption to strip-tillage.

The following case study works through eleven horticultural crops, and their herbicide programs.

2025

The site used for the demonstration plots was selected in April after the prepared site was no longer available. Preparing the site in the fall with fertility, weed control and cover crops can better establish the site for success.

In 2024 wheat was harvested in mid-August and a cover crop was planted in early September. The cover crop of oats, tillage radish and peas was poorly established because it was late planted and there was very little soil fertility left after the winter wheat harvest. The site was then prepared by broadcasting NPK granular fertilizer in early April. The tilled strips were then applied to the demonstration area using a Yetter rolling basket unit. The remainder of the nitrogen was applied in-crop dependent on the individual crop needs. The area was then allowed to sit until June 3. At this time glyphosate plus a residual herbicide for weed control was applied. The residual herbicide selected is dependent on the crop planted. By applying the tillage strips and delaying planting we are using a stale seed bed technique to control the early flush of weeds.

Drip irrigation was installed with a single drip line on each row. This system was fed with a 1000 L tote. This did not satisfy the water demands of the crop and was only designed to supplement rain fall.

Sweet Corn: The sweet corn was planted by seed on June 3 and glyphosate and Acuron were applied pre-emergent. The herbicide plan was to apply Accent Total post-emergent when broadleaf weeds emerged. The plot remained weed free until late September and the Accent Total was not required. The drawback to using Acuron in a horticultural system is that it is very difficult to establish a cover crop after harvest and rotational crops can be very restricted. From the label the minimum re-cropping interval for winter wheat is 4.5 months from the time of Acuron application therefore winter wheat or rye could be used as a cover or rotational crop.

Tomatoes: Tomatoes where transplanted on June 3. The previous day a tank mix of glyphosate, Authority and Dual II Magnum was applied. The glyphosate controlled emerged weeds. Authority is a residual product for the control of broadleaf weeds, and the Dual II Magnum is a residual product for the control of annual grasses. The plan included an application of Prism post-emergent, if there were annual grasses or broadleaves that emerged. The pre-plant application controlled weeds for the full season. We were expecting ragweed to be a problem in the plot, as both Authority and Dual II Magnum can be poor in its control, however there was very little ragweed noted in the total plot area. Immediately after planting there was a heavy rain and some burning from the Authority was noted on the young transplants.

Peppers: The peppers were treated very similarly to the tomatoes, but Chateau was substituted for the Authority since Authority is not registered on peppers. Immediately after planting there was a heavy rain and some burning from the Chateau was noted on the young transplants. In wet areas of the plot a trough was created when the tilled strips were applied, which lead to the excessive splashing. Sandea was to be applied post-emergent, but it was decided that we would not need it.

Onions: Onions were transplanted into the plot area on June 3 after glyphosate was applied to the plot area the day before. Two weeks after transplanting Prowl and Chateau were applied. Very few weeds

had emerged in between the glyphosate/planting and Prowl + Chateau application even though we received a large rain the night after transplanting. In-crop applications of Pardner and Venture were in the herbicide plan but again not applied due to excessive heat and dry weather. The major weeds in the crop were sowthistle and cudweed at low populations. The onions here harvested in late September.

Sunflowers: Many market gardens have planted sunflowers in the last few years, and many growers are asking how to efficiently control weeds in this crop. The sunflowers were planted by seed. Authority, glyphosate and Prowl were applied post-planting but pre-emergent to the crop. Quackgrass and a few lamb's quarters escapes were noted. Other than Venture there are no post-emergent herbicides listed for sunflowers. There was no herbicide injury noted on the crop despite some specialty sunflowers being included in the plot. Year-long weed control was acceptable.

Beet Greens: With Betamix herbicide removal from the market weed control in beet greens is very difficult to achieve. Glyphosate was applied pre-plant. The beet greens were direct seeded on June 3 and an application of Dual II Magnum was made before emergence. Many broadleaf weeds emerged soon after beet emergence and these were controlled with Lontrel. The pre-harvest interval for beets is 30 days. It is very important to have a predicted harvest date for this crop to ensure you are compliant with the label when making this application. If the beets are being harvested for beet greens this application may take place soon after beet emergence. Lontrel has a short soil residual, but it did provide a season long weed-free plot. No herbicide injury was noted in the plot either from the Dual II Magnum or the Lontrel.

Snap Beans: There are many good herbicides registered for beans. The snap beans were planted by seed on June 3. For the demo plot we used glyphosate plus Dual II Magnum applied post-planting but pre-emergent followed by Basagran applied post-emergent for broadleaf weeds. In this plot we also applied Venture post-emergent for grass control. The plot remained clean throughout the season. It is very important to have a projected harvest date when deciding whether to apply Venture as it has a very long pre-harvest interval in a quickly maturing bean crop.

Zinnias: Zinnias were planted by seed on June 3. Post-planting but pre-emergent we made an application of Dual II Magnum, glyphosate, and Authority. Weed control was excellent in the plot and lasted late into September. This is important as zinnias will continue to bloom long into the fall.

Broccoli: Broccoli was planted into a plot pre-treated with glyphosate and Dual II Magnum. This was expected to control the weeds for the season as broccoli is a relatively short season crop (60 days after transplanting). For post-emergent herbicides we had planned to use Lontrel (30 day PHI) for broadleaf weeds and Venture (40 day PHI) for grasses if they were required. Broadleaf weeds were controlled very well, but grasses emerged late and the decision for the need for control was not made until after the 40-day pre-harvest interval. As a result, the grass competition was extreme before harvest and did affect yield. Dual II Magnum did provide very good control in the other plots of the trial. Despite the competition the broccoli was harvested the same week as neighboring fields that were planted at the same time on the farm. I suspect the Dual II Magnum did not provide acceptable control of the grasses due to an application error or the open canopy of the broccoli crop.

Weed counts were not taken in 2025 because of the low numbers of weeds in the plots.

In 2024, June-bearing strawberries and pumpkins were chosen to demonstrate the potential of strip-tillage for horticulture production as they are often grown on the same farms in u-pick or roadside stand operations. Having two crops utilizing the same strip-till equipment would better justify the purchase and more acres under the same tillage system would have the potential to produce tangible differences in the condition of the soil on farms.

Strawberries and pumpkins are particularly adapted to strip-till because they are planted late spring in wide rows. This allows the soil to warm up for good emergence. They also have very good pre- and post-emergence herbicides registered for use in crops.

Prior to the growing season, a herbicide plan was developed tailored to the weed species present in the field. The herbicide plan relied on pre-emergent herbicides and incorporated post-emergent herbicide products as a backup. In this way weeds should never be out of control because there is always a layer of protection from the residual herbicide. This gives you time to apply the post-emergent products and achieve acceptable control.

Table 1: Sample herbicide plan for strawberry.

Timing	Late Fall burn-down	Spring after pulling strips	Post-planting before plants wake	2-4 weeks after planting	4-6 weeks after planting		Labour Day	September	Fall Dormancy
Product	Roundup + 2,4-D	Roundup	Chateau		Sinbar		Sinbar		Authority
Options				2,4-D		Venture		Ignite to row centers	Goal if broadleaf weeds present

Roundup was used pre-plant to terminate any weeds that would have emerged inside or outside of the strip in between the time of pulling the strips in spring and planting. Chateau was used after the bare-root plants were planted but before they broke dormancy. Bare-root strawberry plants are normally shipped frozen and then kept on-farm in refrigeration therefore the crowns should still be dormant if the herbicide is applied directly after planting. Chateau should give 4-6 weeks residual control on broad-leaf weeds. Chateau is weak on grass weeds, therefore if grasses become a problem, they can be controlled with Venture post-emergent. Using Chateau will bridge the window of time until Sinbar can be applied before the plants start to runner. It is important to remember that Sinbar must be applied in the rain in order to wash the herbicide off the strawberry leaf and to activate it in the soil. Sinbar is a group 5 herbicide so pigweeds, lamb's quarters and ragweed may not be controlled if group 5 (triazines) resistant weeds are present on the farm. If these weeds become an issue 2, 4-D may have to be used to control them. I expect the Chateau to be enough to control them, but it is good to have a backup. The

early application of Sinbar should extend control to Labour Day where a second application of Sinbar will control young emerged and un-emerged broadleaf weeds through the fall period. There can be a lot of winter annual and perennial weeds germinate in the early fall, and it is important to get them under control as they will overwinter and be present during harvest in early summer. The last chance for controlling weeds is right before straw is applied when the crop is dormant. Small emerged weeds can be taken out during this time with Goal, and products like Chateau or Authority can be applied to give a residual that will last into the spring.

Table 2: Herbicide plan for pumpkin.

Timing	**Late Fall burn-down**	**Post-planting before plants emerge**	**5 leaves before flowers emerge**	**When grasses present**
Product	Roundup + 2,4-D	Roundup 1/2 Command Sandea Dual II Magnum	low rate Sandea	
Options				Venture

The pumpkin program is a little less complicated than the strawberry program as pumpkins are a late planted annual crop. The tillage strip was pulled at the same time as the strip for strawberries and left to sit until planting time in late June. This gave ample time for the soil to warm and weeds to emerge. The pumpkins were then planted, and herbicides were applied before the pumpkins emerged. One of the herbicides in the tank mix was Roundup which would have terminated any emerged weeds at that time. Pumpkins can emerge very quickly at this time of year because the soils are warm and moist. Before making this application make sure the pumpkins have not emerged. Err on the side of making the herbicide application too early rather than too late! The other product in this tank mix is Sandea, a broad-spectrum broadleaf herbicide. This product can be applied both pre- and post-emergent to the weeds and pumpkin crop. It is important to note that there is a maximum use rate/season listed on the label. It is important to apply the low rate at the pre-emergent timing so that the low rate can also be applied post-emergent thereby extending the residual control later into the crop production season. By using the high rate pre-emergent the maximum use rate will be exceeded when the post-emergent application is made. The next product in the tank mix is Dual II Magnum, which is mainly a pre-emergent grass control product but does have some activity on lamb's quarters, redroot pigweed, and common ragweed. The last product in the tank is a very low rate of Command. This product maybe redundant in the mix as it controls broadleaf weeds and barnyard grass, which are covered by other herbicides, but it was included because it has very long residual activity that will last late into the season. Pumpkins are late to canopy in and therefore good residual products are needed to control late emerging weeds. It is important to look at the total crop rotation as both Sandea and Command can be restrictive in the crops that can be planted after their applications. For instance, strawberries can not be planted for 36 months

after a Sandea application. Therefore, careful planning is needed when selecting herbicides in the crop rotation. Alternatively, you should match the crop rotation to the herbicides.

After the pre-emergent application Sandea can be used again at the 5-leaf stage to control emerged broadleaf weeds and extend the residual control farther into the growing season. Venture can be used to control emerging grasses.

It is important to go through the thought process of putting the herbicide program together. Start with using a stale seedbed technique, followed by pre-emergent products and then post-emergent products as an in-season fallback plan. In this manor, all windows of crop production time are covered with residual or post-emergent herbicide products.

Did the Herbicide Plan Work?

Strawberry – 2024

We started out following the plan with Roundup pre-plant and Chateau just after planting. When the weather turned very hot and dry, and broadleaf weeds emerged in early July, we made the decision to apply 2, 4-D to the row centers in order to not further stress the strawberry plants with a herbicide application. We did do an application of Venture for grasses in-season over the entire area. In August we also did an application of Sinbar to the row middles again to not add stress to the strawberry plants. The area within the crop rows stayed very clean throughout the growing season. This was probably because there was very little soil disturbance from foot/wheel traffic in the area and also shading from the strawberry plants themselves. Weed counts at various timings through the summer can be found in the table below.

Table 3: Weed Densities in the Strip-till Strawberry Plot

Weed densities (Number/m2)						
	Lambsquarters	Redroot Pigweed	Ragweed	Wild Mustard	Shepherds Purse	Annual Grasses
June 7th	2	1	1	2		1
July 15th			3	1		3
August 12th	0	0	0	0	2	1

Picture 5: Weed presence in tilled ground in a neighboring plot to the strawberry and pumpkin strip-till plot.

Pumpkins – 2024

In the pumpkin plot we did not see weeds emerge all season. At vine runnering we had a hard decision to make as this is the last chance to apply a broadleaf herbicide. We did apply Sandea even without weeds present in order to keep weeds from emerging later in the year. We felt this was the right decision as pumpkins can be slow to canopy in and the Sandea would offer residual protection from emerging weeds later in the season.

Horticultural Crops – 2025

All of the crops from 2025 established very well and weed control was acceptable in each of the plots. There was some herbicide injury on the peppers from the Chateau application. This could have been corrected by not applying the Chateau directly ahead of a heavy rain and establishing the strips correctly so that they would shed water rather than making a trench to collect water. The grass weeds in the

broccoli plot could also have been better controlled with an application of Venture. The weed control could have been corrected by applying Venture at the correct days to harvest.

Picture 6: Weed free strip-till pumpkin plot taken on September 24.

Did we achieve our goals?

2024

Both the strawberry and pumpkin crops were established with strip-tillage. Weeds were well-controlled through the whole growing season with herbicides and without the use of hand pulling, hoeing or additional tillage.

The rooting of the crops looks quite good with roots moving out of the tilled zone (see Picture 7).

Picture 7: Rooting of the strawberry and pumpkin plants extended outside of the tilled strip. Picture taken September 24 of the planting year.

The strawberry crop was not taken to yield the following year but terminated in the fall because of the risk of spreading disease and virus to neighboring strawberry nursery crops. Daughter plant establishment was assessed on August 25 which is an important date as floral bud initiation begins in strawberries as dictated by the shortening days. At this time, the plot averaged 9-12 well-established daughter strawberry plants per foot of row (Picture 8). The goal of the establishment year is to have at least 4-6 good daughter plants established by this time. Runners established after this do little to add to yield and should be removed with a contact herbicide or a coulter.

Picture 8: Strawberry row established with strip-till. Photo taken August 25 averaging 9 well-established daughter plants per foot of row.

Pumpkin yield was assessed on September 24. The variety planted was Connecticut Field which is a standard pumpkin variety but smaller than Howden. The size was very large for Connecticut field (averaging 18 kg/pumpkin), and yielded 1.1 pumpkins per plant for a calculated yield of 1800 pumpkins/ac. Having a relatively low plant population of 5x5 feet likely contributed to the large size but limited overall yield. The 5 ft x 5 ft spacing is a traditional method for hand planting pumpkins and worked out with the spacing of the strip-till machinery.

2025

Sweet corn yielded very well with large cobs averaging 7.5 inches long over two picks. Tomatoes were the Roma variety and yielded 12 lbs/plant. Banana peppers did not yield as well as expected. Due to the dry conditions and herbicide injury the yield was 1.5 lbs/plant. Onions yielded very well averaging 3.1 inch diameter and matured in early September. The sunflowers and zinnias yielded very well and produced well into the fall. Snap beans yielded 14,300 lbs/ac. Broccoli yield was a little disappointing due to the grass competition but was harvested at the scheduled time. The heads were about half the size they should have been.

Table 9.1 Economic comparison of strip-till followed by herbicides to control weeds compared to a conventional system for pumpkin and strawberry.

Strawberry Matted Row - 2024						
Timing	Task	Strip till- Proposed ($/ac)	Task	Strip till- Actual ($/ac)	Timing	Conventional ($/ac)
Late April	Run Strips	$35.00	Run Strips	$36.00	Tillage (Concertill, Discs, finish harrow)	$71.00
Post planting	Chateau (application+chemical)	$81.85	Chateau (application+chemical)	$81.85	Chateau (application+chemical)	$81.85
8 weeks after planting	Sinbar (application+chemical)	$38.42			Cultivate	$34.00
July	Venture (application+chemical)	$50.16	Venture (application+chemical)	$50.16	Hoe	$134.00
			2,4-D (interrow application +chemical)	$27.50	Cultivate (4 times)	$136.00
Labourday	Sinbar (application+chemical)	$38.42	Sinbar (interrow application+chemical)	$31.00	Sinbar	$38.42
Narrowing rows	Ignite (interrow application +chemical)	$36.00	Ignite (interrow application +chemical)	$36.00		
Total		$279.85		$262.51		$495.27
Pumpkins - 2024						
Timing	Task	Strip till- Proposed ($/ac)	Task	Strip till- Actual ($/ac)	Timing	Conventional ($/ac)
Late April	Run Strips	$35.00	Run Strips	$35.00	Tillage (Concertill, Discs, finish harrow)	$71.00
Post planting	Post Plant/Pre Emergent to Pumpkins (application+ .....Roundup+Sandea+Dual II Mag+1/2Command)	$87.57	Post Plant/Pre Emergent to Pumpkins (application .....Roundup+Sandea+Dual II Mag+1/2Command)	$87.57	Hoe Cultivate (2 times)	$134.00 $68.00
5 Leaf pre bloom	Sandea (application + chemical)	$49.23	Sandea (inter row application + chemical)	$36.61		
At Runnering	Venture	$50.16	Venture	$50.16		
Total		$221.96		$209.34		$273.00

Onions - 2025

Timing	Task	Strip till- Proposed ($/ac)	Task	Strip till- Actual ($/ac)	Timing	Conventional ($/ac)
Late April	Run Strips	$35.00	Run Strips	$35.00	Tillage (Concertill, Discs, finish harrow)	$71.00
Herbicide Application	Pre Plant (application+Roundup)	$36.00	Pre Plant/Post Emergent to Planting Onions (application+		Hoe	$134.00
6 leaf stage	Post Transplant Herbicide (application+Prowl+Chateau)	$88.17	.....Roundup+Prowl+Chateau)	$88.17	Cultivate (2 times)	$68.00
Total		$159.17		$123.17		$273.00

Sunflowers - 2025

Timing	Task	Strip till- Proposed ($/ac)	Task	Strip till- Actual ($/ac)	Timing	Conventional ($/ac)
Late April	Run Strips	$35.00	Run Strips	$35.00	Tillage (Concertill, Discs, finish harrow)	$71.00
Herbicide Application	Pre Emergent to Sunflower (application+ .....Roundup+Dual II Mag+Authority)	$64.30	Pre Emergent to Sunflower (application+ .....Roundup+Dual II Mag+Authority)	$64.30	Hoe Cultivate (2 times)	$134.00 $68.00
	Post Emergent (application+Venture)	$50.16				
Total		$149.46		$99.30		$273.00

Sweet Corn - 2025

Timing	Task	Strip till- Proposed ($/ac)	Task	Strip till- Actual ($/ac)	Timing	Conventional ($/ac)
Late April	Run Strips	$35.00	Run Strips	$35.00	Tillage (Concertill, Discs, finish harrow)	$71.00
Post planting	Post Plant/Pre Emergent to Pumpkins (application+		Post Plant/Pre Emergent to Pumpkins (application +		Hoe	$134.00

	Roundup+Acuron)	$87.57	Roundup + Acuron)	$87.57	Cultivate (2 times)	$68.00
	Post Emergent (application+Accent Total)	$48.90				
Total		$171.47		$122.57		$273.00

Peppers - 2025

Timing	Task	Strip till- Proposed ($/ac)	Task	Strip till- Actual ($/ac)	Timing	Conventional ($/ac)
Late April	Run Strips	$35.00	Run Strips	$35.00	Tillage (Concertill, Discs, finish harrow)	$71.00
Post planting	Post Plant/Pre Emergent to Pumpkins (application+ .....Roundup+Sandea+Dual II Mag+1/2Command)	$87.57	Post Plant/Pre Emergent to Pumpkins (application .....Roundup+Sandea+Dual II Mag+1/2Command)	$87.57	Hoe Cultivate (2 times)	$134.00 $68.00
5 Leaf?pre bloom	Sandea (application+chemical)	$49.23	Sandea (inter row application + chemical)	$36.61		
At Runnering	Venture	$50.16	Venture	$50.16		
Total		$221.96		$209.34		$273.00

Tomatoes - 2025

Timing	Task	Strip till- Proposed ($/ac)	Task	Strip till- Actual ($/ac)	Timing	Conventional ($/ac)
Late April	Run Strips	$35.00	Run Strips	$35.00	Tillage (Concertill, Discs, finish harrow)	$71.00
Pre Transplant	Pre transplant (application + ...Roundup+Dual II Mag+Authority)	$73.05	Pre transplant (application + ...Roundup+Dual II Mag+Authority)	$73.05	Hoe Cultivate (2 times)	$134.00 $68.00
pre bloom	Prism (application Plus Chemical)	$49.23				
	Venture	$50.16				

Total		$207.44		$108.05		$273.00

Broccoli - 2025

Timing	Task	Strip till- Proposed ($/ac)	Task	Strip till- Actual ($/ac)	Timing	Conventional ($/ac)
Late April	Run Strips	$35.00	Run Strips	$35.00	Tillage (Concertill, Discs, finish harrow)	$71.00
Pre Transplant	Post Plant/Pre Emergent to Pumpkins (application + ...Roundup+Dual II Mag)	$87.57	Post Plant/Pre Emergent to Pumpkins (application + ...Roundup+Dual II Mag)	$87.57	Hoe Cultivate (2 times)	$134.00 $68.00
Early establishment & days after Lontrel app.	Lontrel (application+chemical) Venture	$49.23 $50.16	Lontrel (application + Chemical)	$49.23		
Total		$221.96		$171.80		$273.00

Zinnias - 2025

Timing	Task	Strip till- Proposed ($/ac)	Task	Strip till- Actual ($/ac)	Timing	Conventional ($/ac)
Late April	Run Strips	$35.00	Run Strips	$35.00	Tillage (Concertill, Discs, finish harrow)	$71.00
Post planting	Post Plant/Pre Emergent (application+ .....Roundup+Dual II Mag+Authority)	$72.87	Post Plant/Pre Emergent (application+ .....Roundup+Dual II Mag+Authority)	$72.87	Hoe Cultivate (2 times)	$134.00 $68.00
Total		$107.87		$107.87		$273.00

Snap Beans - 2025

Timing	Task	Strip till- Proposed ($/ac)	Task	Strip till- Actual ($/ac)	Timing	Conventional ($/ac)

Late April	Run Strips	$35.00	Run Strips	$35.00	Tillage (Concertill, Discs, finish harrow)	$71.00
Post planting	Post Plant/Pre Emergent to Beans (application+ .....Roundup+Dual II Mag)	$56.96	Post Plant/Pre Emergent to Beans (application+ .....Roundup+Dual II Mag)	$56.96	Hoe Cultivate (2 times)	$134.00 $68.00
3rd Trifoliate	Basagran Forte (application+chemical)	$37.75	Basagran Forte (application+chemical)	$37.75		
week later	Venture	$50.16	Venture	$50.16		
Total		$179.87		$179.87		$273.00

Beets - 2025

Timing	Task	Strip till- Proposed ($/ac)	Task	Strip till- Actual ($/ac)	Timing	Conventional ($/ac)
Late April	Run Strips	$35.00	Run Strips	$35.00	Tillage (Concertill, Discs, finish harrow)	$71.00
Pre plant	Roundup (application+chemical)	$36.00	Roundup (application+chemical)	$36.00		
Pre Emergent	Post Plant/Pre Emergent to Beets (application+ Dual II Mag)	$47.25	Post Plant/Pre Emergent to Beets (application+ Dual II Mag)	$47.25	Hoe Cultivate (2 times)	$134.00 $68.00
Post Emergent	Lontrel (application+chemical)	$42.79	Lontrel (application+chemical)	$42.79		
Total		$161.04		$161.04		$273.00

Sprayer application cost was valued at $24.00/ac

Table 9.1 above, shows there is potential for good financial savings for the establishment of strawberries by switching to strip-till compared to a conventional establishment system. Both the proposed herbicide program and the actual herbicide program have been compared to a standard establishment system using full tillage. The financial savings between the two systems for pumpkins is not as substantial. Comparing the horticultural crops from 2025, there is a considerable savings when comparing the proposed herbicide program and the actual herbicide program to the standard of full tillage. The decision to convert to strip-tillage will probably be based not only on financial or soil health reasons, but on whether a grower has labour to perform the multiple tillage passes or if they are confined by labour. The strip-till approach will be much easier to manage with regard to labour. Growers are encouraged to use their own production costs when comparing the two systems.

Additional information on strip-till:

STRIP-TILLAGE IN ONTARIO: THE BASICS
https://bmpbooks.com/media/Strip-Tillage_Basic_EN_AODA_FINAL.pdf

STRIP-TILLAGE IN ONTARIO: MAKING IT WORK
https://bmpbooks.com/media/Strip-Tillage-Making-It-Work_EN_AODA_FINAL_M1.pdf

2021 Herbicide Weed Screen for Pumpkins
https://www.youtube.com/watch?v=NmSX4FqK7T4&t=703s