



# DOs AND DON'Ts FOR SUCCESS IN CON-TILL / NO-TILL

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## Tom Barcellos: T-Bar Dairy

**T**om Barcellos first experimented with Conservation Tillage (CT) in 2001, and has subsequently become one of the leading CT producers in CA. Necessity is the mother of all invention is how the saying goes, and this was true for Tom's first CT experience. He was behind on his field preparation and was a tractor down. This situation led Tom to his decision to put Round-up Ready corn to the test and began his CT conversion. Since that time, Tom has parked 5 of his tractors which used to be running overtime and he has not had a problem of being behind on field prep either!

Tom, like all farmers who transition to CT (or a new practice), took time in understanding and learning the different mentality that it takes to farm using CT. Tom discovered early on that different soil

types required different management styles and had to be treated on an individual soil type basis, and in some instances it lead to stopping planting in the afternoons as some soils would harden in the sun. In addition to adjusting his management style, Tom realized how important timing is to the CT system. The timing of different operations throughout the growing season



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has a huge impact on the yield and quality of the crop and the margin for error is different to conventional farming. Prior to switching to CT, Tom practiced conventional tillage practices:

Discing, ripping, listing, bedding, mulching, planting, cultivating and fertilizing, and that is just for the corn. Tom now practices a combination of No-Till and Strip-Till on all of his fields.

There are many different applications to how and when CT is best used and Tom Barcellos as done most of them.

## Winter Forage



Figure 1. Planting winter forage using a No-till planter

Tom plants winter wheat in two main ways, into corn stubble or into an alfalfa stand.

An RTK (sub-inch) guidance system is vital to the performance of CT systems.

In this example of planning winter wheat (or oats), the stand had been sprayed for winter weeds already and there had been 1" of rain 3 days prior. The small amount of rain softened the soil enough for Tom to drill the grain in with a No-Till planter, and a also pulled a harrow behind it to ensure seed coverage. Had it not rained, a pre-irrigation would have achieved similar results, except for the waiting time for going back into the field to plant. An RTK (sub-inch) guidance system is vital to the performance of CT systems. In Figure 1 the field was going to be maintained as an Alfalfa field, subsequently Tom seeds these fields at ~60% of normal seeding rates. He

has found that not only is there a good yield of wheat, but it seems that the Alfalfa stand is rejuvenated for the following season. The same system applies for planting into corn fields, and this is where the RTK system becomes important as planting on the previous corn stubble can be problematic if the system is not calibrated correctly as seeds may be planted onto the old corn rows and no germination will occur.



Figure 2. John Deere 1590 No-Till drill that Tom uses. Down pressure and a slower speed is critical for seed placement into soil.



Figure 3. Winter forage no-tilled into alfalfa field.

Figure 3 show the field from Figure 1 two weeks after No-Till into alfalfa. Another light shower came 6 days after seeding to complete germination. Adequate soil moisture is important at seeding, and although in the pictures it was achieved by rain, a pre-irrigation and subsequent winter rains would produce the same results. Tom plants his winter grains anytime from the beginning of December to 1st week of January depending on if it is Oats or Wheat. Broadcast fertilizer will work nicely and will be taken in through irrigation or rains.



Figure 4. Wheat no-tilled into corn stubble.

Figure 4 gives an example of wheat No-Tilled directly into corn stubble. The RTK guidance system ensures that the wheat drill row doesn't overrun the corn stubble row.



Figure 5. Winter forage harvest.

Wheat being harvested for silage in April is shown in Figure 5. Toms' yields started at 18-20 tons/acre when he first started CT (which was the same as his previous conventional fields) and as the CT system has developed and improved, so have the yields.

**CT helps increase the Organic Matter content of the soil.**

Tom is consistently achieving 24-25 tons/acre now and has had some fields that have yielded as high as 27 tons/acre of winter forage. The improvement in yield is attributed to a number of factors. Experience of farming with CT has allowed Tom to understand the system better and to optimize his yields. The timing of planting, fertilization and more astute water management have developed over time as Tom adjusted his methods to achieve the better yields. The other factor that has aided the increase in yield is the increased soil health on the farm. CT helps increase the Organic Matter content of the soil which over time leads to a more biologically balanced soil which produces better forage and crops.

# Corn Planting



Figure 6. Winter forage harvest with Strip-till and planting occurring at the same time.

After the winter wheat has matured to the desired stage the fields are chopped as usual and planting for corn can begin. Figure 6 shows as unusual situation in which the chopping machinery, strip-till machinery and the planter are

all in the same field at the same time. Eight days prior to the scheduled chopping, there was 1½" of rain, which provided adequate soil moisture for this to happen. But it does illustrate the important time savings that CT provides through only one pass of tillage equipment through the field. The normal course planting corn would be to chop the silage and start strip-tilling behind that followed by a pre-irrigation, after which planting can occur.

Figure 7, 8 and 9 show the Orthman 1TR1P strip-till bar and the John Deere 1700 corn planter with a No-till attachment added to the front of it (Figure 10). The No-Till attachment gives Tom the flexibility to plant corn using the strip-till or the no-till CT method. It is also beneficial as after an irrigation the strips of cultivated soil may crust over and this can sometimes cause problems for a regular JD 1700, with the No-till attachment, this and any litter that may have migrated onto the



Figure 7.



Figure 8.



Figure 9.



Figure 10.

strip are easily dealt with. There are also coulters attachment bolts to planter frame and down pressure springs are added which are an important addition as it ensures uniform seed placement in a harsher soil environment than in a highly prepared seedbed. Fertilizer can be applied at planting or on the strip-till bar.



Figure 11.

Figure 11 shows the original equipment that Tom employed in his tractors. The operator has a speed monitor, GPS autopilot screen, removable data logger, insecticide controller and fertilizer control switch. Newer equipment is combining most of the controllers into one screen, but they are all important to ensure a good crop when using no-till or strip-till.



Figure 12. Strip-tilled corn emergence.

Two weeks after planting it was time to run the first irrigation for Figure 12, irrigation scheduling on CT fields is slightly different to conventional fields and the timing of each irrigation is VERY important. Generally Tom irrigates more frequently with less water in each irrigation, although over the whole year he has found water use to be about the same as conventional fields. The water will permeate the soil quicker due to the soil being more porous and having a better structure. Irrigation on no-till fields occurs 3-5 days sooner than the strip-till field. Moisture management in a CT system can make or break the crop and must be closely monitored.



Figure 13.

Figure 13 shows another method employed to plant corn on Tom Barcellos's farm. The field was strip tilled and planted directly into an alfalfa field. The field was irrigated after baling no till oats and once the field firmed enough to hold the tractors without tracking the strip tiller worked a nice seedbed for planter. In this case a conventional planter would work as the field was pre-irrigated and the soil in the strip would not form a crust or be affected by irrigation. This again shows the time and labor savings of CT as the process only takes 2 tractors and can be done reasonably quickly. The alfalfa field was sprayed out the next day.



Figure 14.



Figure 15.

Starter fertilizer is applied at recommended rates based on soil analysis or past experience. It is recommended that a starter is used as early nutrition for CT system is important and not having a starter would likely affect yields. The same blends use in all applications of conventional or no-till strip-till scenario for pre-plant on Toms' farms. Spray to kill alfalfa works best at this time because alfalfa is lush and growing well to optimize intake of round up or other chemical. Stressed plants do not take herbicide in well and tend to continue growth after later irrigations.

Five weeks after round-up spray and two quick irrigations the field in Figure 17 is well on its way and a second application of Round up doesn't appear



Figure 16. Shows the alfalfa field sprayed and corn growing. Time for water on the field!



Figure 17.

necessary as the field looks clean. Again timing of applications of chemicals is crucial as because tillage has not been done weeds have the ability to quickly establish and reduce the potential yield, so careful field monitoring is needed. Fertilization on CT fields is very similar to the fertilizer program that would be followed on a conventional field, although over time it may be possible to reduce the fertilizer bill as the soil improves.



Figures 18.

41 ton Silage, No-Till 6 years, 35 ton Field average are shown in Figure 18, and the pictures are NOT PHOTOSHOPPED! They were taken from 20 feet up and this illustrates the potential for CT. Steve Ford is pictured in Figure 19 in front of 45 ton Silage, which had a 34 ton field average. Steve Ford worked with these projects to find the right seed varieties that respond to no-till and strip-till. It is recommended to consult with your seed dealer to find the right variety for your conditions and to try some experiments to see which variety works best for your field.

## Triple Cropping

The ability to prepare fields for planting so quickly give Tom more time over the course of a year and has allowed him to triple crop in some areas of his farm. Figure 20 shows a field being seeded in BMR Sorghum-Sudan hybrid into corn stubble August 2005 for third crop following wheat and corn. Triple cropping is particularly important to dairy farmers as this is extra feed that can be feed to cows as well taking out some additional nutrients from the soil to meet field nutrient measurements. As the picture shows, despite this photo being taken directly after corn harvest there are no ruts visible, which shows the health of the soil in its ability to 'bounce' back. No-till



Figure 19.

into corn works nicely in this situation, although strip-till could be used too. No visible ruts in the field mean there is not any compaction, but if ruts are apparent, Tom uses his discretion and may do some light tillage with a spring-tooth or light disc which would remove some of the damage. Again there is the timing issue of when to go into the field to harvest and Tom takes into consideration the implications of harvesting on a wet field. There is some more flexibility in CT as there is more time in the season due to not having to spend as much time in the field.



Figure 20.