



No-till farming is defined as:

- The farming where the soil is left alone from harvest to planting. Planting or drilling is accomplished in a narrow seedbed or slot created by disk openers. Coulters, residue managers, seed farmers, and modified closing wheels are used on the drill or planter to ensure adequate seed to soil contact. In a properly designed no-till system, pest control is accomplished primarily with the following cultural practices: rotation, sanitation, and competition.



No-Till early days

- The first uses of no-till were started in the mid 1980's.
- When no-till first came out not many farmers used it because it was too expensive. There wasn't adequate equipment and the herbicides that were used were too expensive at the time.
- In the early to mid 1990's no-till started to flourish.



The founder of No-Till farming

- *Paul Schaffert invented the first no-till drill*
- *He worked with the University of Nebraska*
- *In 1977 he won the No-Till Farmer of the Year.*



Benefits of No-Till drilling

- Less work
- More money
- Erosion control, environmentally friendly
- Saves time
- Reduces soil erosion
- More wildlife
- Reduces air pollution



Keys to No-Till drilling

- Diversity in crop selection and aggressive rotation
- Patience and a willingness to work at it for at least five years
- A willingness to accept and deal with more risk
- Equipment that is fine-tuned to deal with no-till operations
- Aggressive residue management – starting at the beginning of the season

Why No-Till farming is so great

- It protects the soil from erosion.
- No-Till builds organic matter.
- Saves the lives of millions of earth worms each year.
- Produces a healthier crop.
- Creates a great cover for animals.

No-Till vs. Tillage

Annual precipitation and runoff for continuous corn watersheds, no-till and conventional tillage, 1979-1988

year	Precipitation mm	runoff no-till mm	runoff conventional mm
1979	1124	3.81	140.2
1980	1175	4.90	312.8
1981	1057	0.14	142.2
1982	889	0.00	-
1983	1027	0.00	-
1984	909	2.31	-
1985	929	0.01	-
1986	966	9.23	-
1987	841	0.15	-
1988	854	0.03	-

What Soil Erosion looks like



Types of erosion

- Wind erosion- usually happens in flat areas that are dry. The wind blows the dirt of the surface.
- Water erosion- The water runs off all of the dirt on the surface and cuts down in the soil.
- Tillage erosion- This occurs when the farmer tills his land too much. The soil gets broken down and loses the ability to keep water

Benefits of No-till

- 1. Increased residue*
- 2. Improved soil structure*
- 3. Reduced field time*
- 4. Increased earthworm populations.*
- 5. Increased water holding capacity*

Down Fall of No-till

- Wetter soil in the spring*
- A shift from annual to perennial weeds*
- A delay in seeding for the wet soils*
- Needs more management*
- Increased weeds, disease, and insects*



Cover Crops

- Cover crops add organic matter to the soil
- Cover crops reduce soil erosion
- Cover crops can enhance nitrogen cycling within the plant-soil system



Types of Cover Crops



- Buckwheat
- Pearl Millet
- Cowpea
- Soybean

Global warming

No-till farming helps store carbon in fields and that can help countries meet targeted reductions in atmospheric carbon dioxide, reducing the effects of global warming.

Soil Conservation

From 1982 to 1992, 900 million tons of top soil were saved by using no-till farming. That is enough soil in a year to fill up a convoy of dump trucks 95 wide stretching from Los Angeles to New York.

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Advantages and Disadvantages of No-till

Advantages

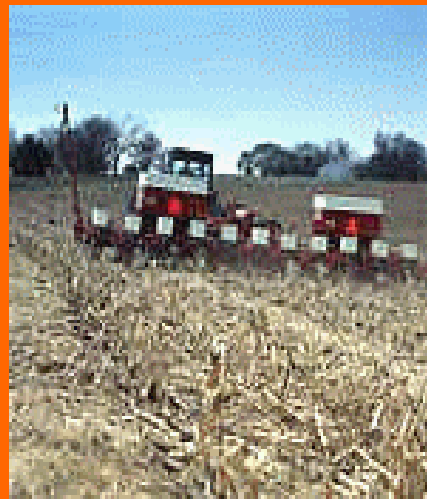
- Maximum erosion control
- Soil moisture conservation
- Minimum fuel and labor costs

Disadvantages

- NO incorporation
- Increased dependence of herbicides
- Slow soil warming
- Some limitations with poorly drained soils, especially with heavy residue

No Till Farming

- No Till
 - The soil is left undisturbed from harvest to planting.
 - No till has enabled soil to stay where it is supposed to.



No Till

- No till farming helps soil retain carbon.
- A lack of carbon in the soil may cause erosion.



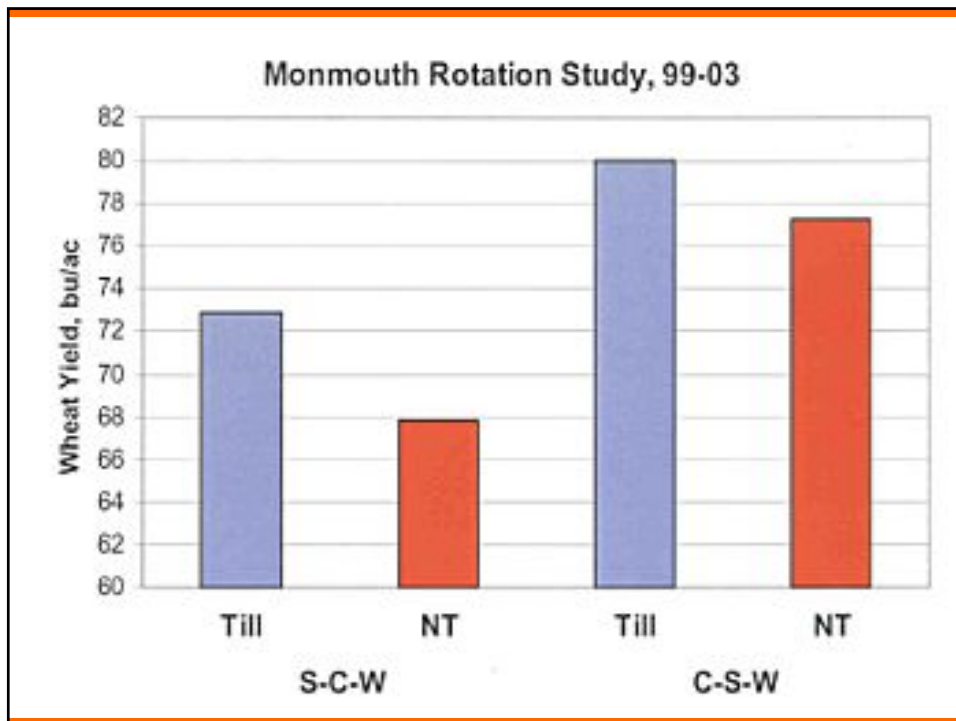
More Benefits of No tilling

- 1) Reduced labor
 - 2) Fuel saving
 - 3) Decreased soil compaction
 - 4) Reduced release of carbon gases
 - 5) Reduced machinery wear
- Improved water filtration
 - Improved long term productivity



Steps to No Till

- Improve your knowledge about all aspects of the system but especially in weed control.
- Avoid soils with bad drainage
- Use Chisel plows
- Buy no-till machine
- Start only %10 of your farm to gain experience



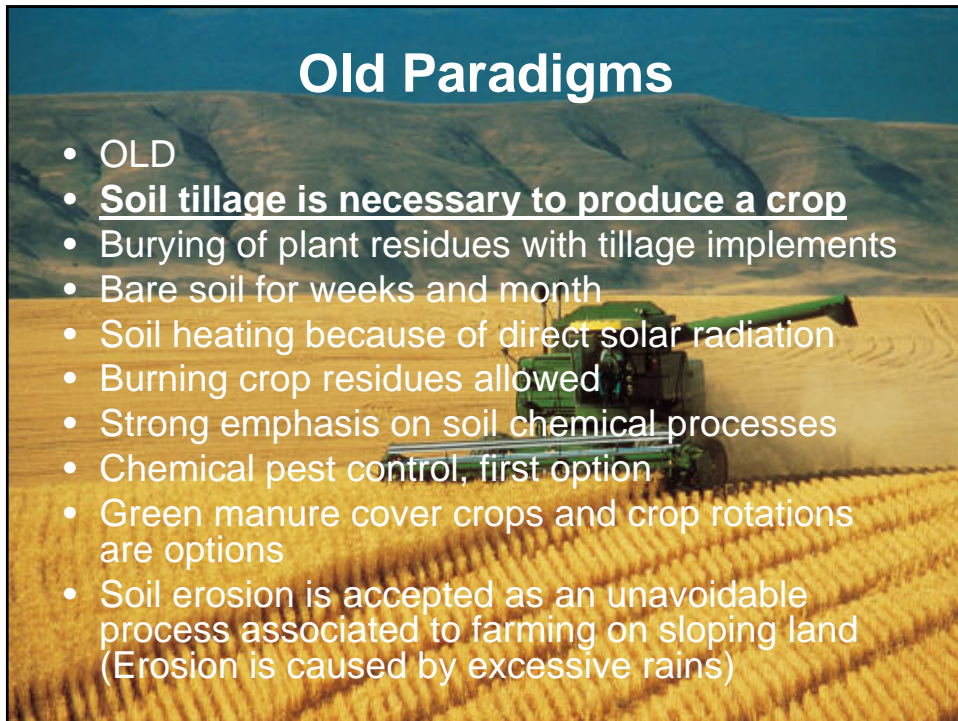
Weed control

- No-till implies that no tillage will be done for seedbed preparation before crop planting. This means that herbicides will be used for weed control, supplemented with cultivation when necessary. Herbicides applications in no-till may be made before planting (preplant), at crop planting, or postemergence.



Old Paradigms

- OLD
- Soil tillage is necessary to produce a crop
- Burying of plant residues with tillage implements
- Bare soil for weeks and month
- Soil heating because of direct solar radiation
- Burning crop residues allowed
- Strong emphasis on soil chemical processes
- Chemical pest control, first option
- Green manure cover crops and crop rotations are options
- Soil erosion is accepted as an unavoidable process associated to farming on sloping land (Erosion is caused by excessive rains)





New Paradigms

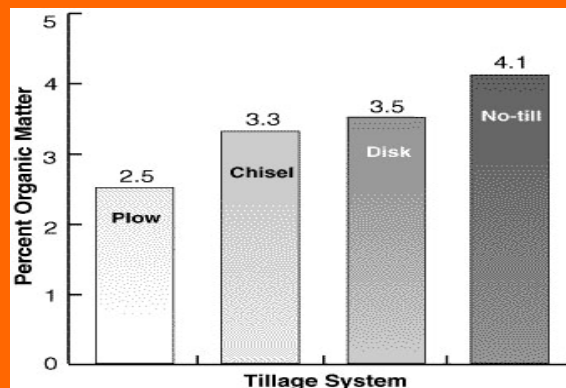
- Tillage is not necessary for crop production
- Crop residues remain on the soil surface as mulch
- Permanent soil cover
- Reduced soil temperatures
- Burning mulch prohibited
- Emphasis on soil biological processes
- Biological pest control, first option
- Green manure cover crops and crop rotations compulsory
- Soil erosion is merely a symptom, that for that area and ecosystem unsuited methods of farming are being used (Erosion is caused by soil mismanagement)

Laws of No-Till Farming

- Any agricultural or livestock production system that contributes to constantly reduce organic matter content of the soil is not sustainable and results in poor soils and farmers.
- Under tropical and subtropical conditions intensive and repeated tillage will generally mineralize (reduce) organic matter at rates greater than possibilities of reposition. This results in a decreasing organic matter content of the soil and diminishing crop yields over time.
- High rainfall and wind intensities prevailing in the tropics and subtropics are generally associated under intensive and repeated tillage, with soil loss rates (due to wind or water erosion) greater than natural soil regeneration. This results in loss of nutrients and organic matter and in diminishing yields over time.

Laws...Continued

- Under tropical and subtropical conditions intensive and repeated tillage will generally damage the soil structure and lead to excessively high soil temperatures. This will have negative effects on root growth, soil flora and fauna (soil biological processes) and on soil moisture resulting in diminishing yields over time.
- Any agricultural or livestock production system in which important losses of nutrients occur through extraction without reposition (i.e. soil exploitation) through volatilization (i.e. regular burning), and/or through leaching (i.e. fallow periods without crops), is not sustainable and results in poor soils and farmers.



The risk of erosion increases if land:

- has little vegetation on it is steep
- is on the bank of a river or lake is disturbed
 - has erosion prone geology
- is under pressure from high stock density or machinery
- is in an area of high and intensive rainfall.

Erosion Potential



- Low erosion potential
- Medium erosion potential
- High erosion potential

Percentage of Waikato land prone to soil loss through erosion

NO TILL INFORMATION

The word **STEEP** means **Solution to Environmental and Economic Problems**; is an innovative interdisciplinary research/education program focusing on developing profitable cropping systems, technologies for controlling cropland soil erosion and protecting environmental quality which was put into act in 1975.

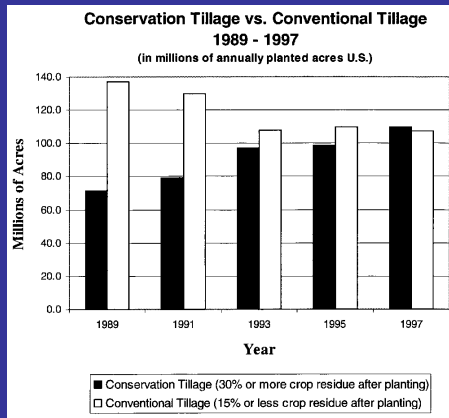
Fertilizer applications should be planned for no-till. If anhydrous ammonia is to be used as the preplant nitrogen source for no-till corn or grain sorghum, it should be knifed into the soil before broadcast application of herbicides. Otherwise severe displacement of herbicide-treated soil will occur and allow weeds to become established in the seedbed. This is especially true with early preplant application of herbicides. Dry or liquid nitrogen fertilizers can be surface applied in no-till, but some volatilization losses can occur from non-incorporated urea-based products, or by runoff with heavy rainfall. Nitrogen can be applied through irrigation systems or side-dressed for no-till corn or grain sorghum. Starter fertilizers are best applied in a band with the planter.



- Maintenance of residue on the soil surface through conservation tillage is the most effective and least costly method of reducing soil erosion. Among conservation tillage systems, no-till eliminates seedbed tillage and provides excellent erosion control. No-till planting is well suited to many Nebraska soils having good internal drainage.
- Weed control may be the biggest challenge in no-till row crop production. Following are several suggestions that should improve weed control in no till.



No



NO-TILL CROPPING SYSTEM

Stems, stalks and leaves (crop residue) are left on the soil surface at harvest, providing a protective blanket for the soil.

The crop residue protects the soil from wind and rain and provides shelter and food for wildlife.

Seeds are planted directly into the crop residue in small grooves or strips. The protective blanket remains in place.

The crop residue provides organic matter for the soil and conserves moisture that is used by growing plants.

(Note: The above graphic is most representative for wheat and corn cropping regions of U.S.)

Till



A tractor pulls a large (12-row) planter through a field, depositing seeds in the soil while hardly disturbing the surface of the field (no-till). The field is covered with stalks and other crop residues from a past corn harvest. These crop residues will protect the soil while nourishing the new crop.

No-Till Farming

Profits of no-tillage

	FIRST YEAR (US\$)		TENTH YEAR (US\$)	
	CC	SD	CC	SD
Total Farm Income	64,688	63,675	61,454	102,856
Total Variable Costs	38,818	36,674	41,792	56,077
Total Fixed Costs	18,567	17,229	18,567	13,075
Net Farm Income	7,304	9,771	1,095	33,703

What farmers think about no-till

Ron Stoss a local Great Bend farmer said "no till is a good concept for the land but the transfer from tilling to no till is very expensive."

Larry Teichmann a local Great Bend farmer said, "there is a lot of work involved in no till but it is great for the land."

What no-till looks like



In Conclusion

- In conclusion we would like to state that No-Till is very economical to the environment. I think that we have provided adequate information about the No-Till farming procedure. We have stated the benefits and keys to proper No-Till farming.