

# The Blue Revolution

**“The entire body of ‘reasoning’ about the management of the soil has been based upon the axiomatic assumption of the correctness of plowing. But plowing is not correct.”**  
**Edward H. Faulkner, Plowman’s Folly (1943)**



JOHN GERAGHTY\*

EDWARD Faulkner’s book quoted above caused consternation among the agricultural community in the USA in the middle of the last century. It is now ironic that fifty years later Faulkner’s argument has stood the test of time and even with the benefit of modern scientific evaluation his assertions have never been disproven.

In another recently published book, again from the USA, called Sustainable Soils, the foreword by Donald Reicosky, an eminent soil scientist with the North Central Soil Conservation Research Laboratory (USDA), does include a reference to Ireland. It reads;

*“Plow contests championed more complete tillage, doing it better, deeper and faster than ever before. In view of our present understanding of tillage practices, it is ironic that such contests are still in vogue, as indicated by a recent advertisement for such a contest painted on an Irish barn. These events point to the social need for better education and communication about tillage impacts on soil organic matter.”*

Internationally they are calling it the Blue Revolution — a follow-on from the Green Revolution that occurred in agriculture in the second half of the 20th century.

The revolution is at an advanced stage in the Americas, Australia and South Africa and is gaining momentum throughout Asia and Europe and even among small holders throughout the African Continent. And we are not part of it.

The Blue Revolution is based around one key development — abandoning the plough and adopting reduced or no cultivation systems — minimum tillage and no-tillage. Tillage farmers are doing this to reduce costs and increase on-farm profit.

And there is now well documented research that clearly demonstrates the Blue Revolution is also delivering significant environmental



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benefits. While all this is going on abroad Ireland brings up the rear. Paddy last.

Over 95 million hectares worldwide today are neither ploughed nor cultivated for crop production. It is an area over 250 times the present tillage area in Ireland. Minimal soil disturbance practices are adopted. Soils are constantly covered with either residue from the previous crop or with cover crops sown in the fallow window between succeeding cash crops. The use of rotations is essential to succeed with the system. The bottom line is that this is all good agricultural practice. It is necessary for profitable farming and it is also good for the environment. Using modern day jargon it is a no-brainer.

Minimum tillage is only practiced on roughly 5-6 per cent of arable land in Ireland. By contrast 45 per cent of arable land in the UK and up to 50 per cent of arable land in France is devoted to these practices.

Presently in the UK the big topic of discussion is the transition process from minimum tillage to no-tillage systems. Despite the excellent minimum tillage research work and positive results obtained by Dermot Forristal, Tony Fortune and Tom Kennedy in Oakpark there has been slow uptake of reduced cultivation practices.

The results have not been used or highlighted to the extent to which they should have been.

## SOIL CULTIVATION

There are, broadly speaking, four soil cultivation practices

being used in Ireland today. We have the traditional plough based system practiced on nearly 95 per cent of our entire tillage area. There is minimum tillage or ECOTillage promoted by Monsanto over a four year period in the early noughties which adhered to the principle of shallow cultivation.

In recent years another form of ‘minimum’ tillage has taken hold. Some machinery companies playing on farmer’s innate and inherited love of seeing soil exposed have pushed cultivation implements that are aggressive in terms of soil movement, that bury residue and that need to be worked at increased depth. While there is no soil inversion if I showed these implements at work to a farmer from the Americas or Australia

they would call the practice ‘chisel plowing’. No-tillage is largely untried but some farmers have direct-drilled winter wheat after sugar beet, spring beans and winter and spring oilseed rape.

One farmer has direct-drilled wheat into grassland with both positive and interesting results. Based on both theory and practice two of these systems are sustainable

and two are unsustainable for reasons summarised in Tables 2-5.

## SOIL ORGANIC MATTER (SOM)

This is the lifeblood of any sustainable and productive soil. It is the one variable in soils that farmers can either increase or decrease as a direct result of the tillage practices they adopt. International research data reviewed in 1999 recorded that anywhere between 16 and 60% of organic matter levels had been lost from continuous tillage land. In the UK the figure for the reduction of SOM on intensive tillage land stands at 50 per cent since around 1950. Our similar practices during this period would strongly point to similar reduction levels here despite opinions to the contrary here.

Today our tillage land can neither hold water during inclement weather, as in recent weeks, nor can it hold water during dry periods as instanced by the effect of drought conditions on spring crops where yields are adversely affected.

The primary reason for the inability of soil to hold water at both extremes is the absence of sufficient SOM levels.

Unwittingly we created this scenario ourselves due to continuous over cultivation and inversion of our tillage soils. Loss of this organic matter, the ingredient that binds sand, silt and clay particles together, has also resulted in poor soil structure. The loss of good soil structure when combined with inclement weather results in soil erosion. Again two tillage systems are sustainable and two are not.

## AGRONOMY PRACTICES

One has to give credit to Michael Hennessy of Teagasc who almost two months ago cautioned tillage farmers about the perceived profitability of growing continuous wheat.

It was wise and balanced counsel but will no doubt be ignored by continuous wheat growers due to a strengthened wheat price. In many respects we have completely ignored the good agricultural practice associated with using crop rotations.

With no-tillage their use is mandatory. The system would not work anywhere in the world without them. The loss of sugar beet as a crop was a tremendous blow not only in terms of direct profitability but with regard to good crop rotation practice. The continued interest in growing oilseed rape has introduced another rotation option but the growth of oilseed rape has to be consistently profitable for the producer independent of any welcome energy grants.

If cover crops were used correctly they would have a positive impact in building

Table 1: A summary of the key aspects of various cultivation systems

Cultivation System			
Unsustainable			Sustainable
Ploughing	Minimum Tillage (Maximum Tillage)	Minimum Tillage (ECOTillage)	No Tillage (CA)
Soil Inversion	Non-Inversion	Non-Inversion	Non-Inversion
Cultivation: 7”+	Cultivation: 4-6”	Cultivation: <4”	No Cultivation
Excessive Soil movement	Excessive Soil movement	Reduced Soil movement	Little Soil movement

Table 2: A summary of the effects on soil of various cultivation systems

Effects on Soil			
Unsustainable			Sustainable
Ploughing	Minimum Tillage Maximum Tillage	Minimum Tillage ECOTillage	No-Tillage (CA)
Loses Soil	Maintains Soil Organic Matter	Maintains/Gains Soil Organic Matter	Increases Soil Organic Matter
Destroys Soil Structure	Destroys Soil Structure	Improves Soil Structure	Improves-Builds Soil Structure
Increases Soil erosion	Causes some Soil erosion	Causes little Soil erosion	No Soil Erosion

Table 4: A Summary of Fixed Input Trends across Cultivation Systems

Fuel/Machinery/Labour			
Unsustainable			Sustainable
Ploughing	Minimum Tillage Maximum Tillage	Minimum Tillage ECOTillage	No-Tillage (CA)
Highest Fuel usage	High Fuel usage	Reduced Fuel usage	Least Fuel usage
Most Tractors numbers	Fewer Tractors numbers	Fewer Tractors numbers	Least Tractors numbers
Highest Labour requirement	Reduced Labour requirement	Reduced Labour requirement	Least Labour requirement

Table 3: A summary of agronomy practices and input levels

Agronomy Practices and Inputs			
Unsustainable			Sustainable
Ploughing	Minimum Tillage (Maximum Tillage)	Minimum Tillage (ECOTillage)	No Tillage (CA)
Monoculture with little rotation	Monoculture with little rotation	Rotations maybe in cropping mix	Rotations Only
No Cover Crops	No Cover Crops	Cover Crops maybe	Cover Crops a must
High Inputs constant	High Inputs constant	Reduced Inputs (over time)	Least Inputs (over time)

Table 5: Summary of future international and EU regulations

International and EU Regulations			
Unsustainable			Sustainable
Ploughing	Minimum Tillage Maximum Tillage	Minimum Tillage ECOTillage	No-Tillage (CA)
Most CO <sub>2</sub> emissions	Increased CO <sub>2</sub> emissions	Reduced CO <sub>2</sub> emissions	Least CO <sub>2</sub> emissions
Soil Carbon Loss	Soil Carbon Loss	Soil Carbon fixing	Carbon sequestration
Least biodiversity	Low biodiversity	More biodiversity	Most biodiversity
Non-compliant	Non-compliant	compliant	Fully compliant

