

# How much carbon dioxide is lost from organic matter?

A general rule of thumb is that under grain or row crop production approximately 1 % of the remaining organic matter in the soil is lost per year. In the prairie provinces 2.5% organic matter has been lost over the past 50 years from annual grain crop production or an average of .05% /year. In the diagram from a study at the University of Guelph, approximately 1 % organic matter was lost over 20 years from continuous corn production or approximately (.05% year). Many soils were originally in the 5% organic matter level range and annual cropping on these soils has released large quantities of CO<sub>2</sub>.

How large? The 2.5 % decline in soil organic matter represents a loss of approximately 95,000 lbs of CO<sub>2</sub> per acre or 38,000 lbs per 1 % organic matter. The diagram shows that the loss of soil organic matter tends to stabilize over time it also can be increased again if the soil is put into soil restoring perennial crops. The perennial alfalfa crop increased soil organic matter at a rate of approximately 0.04% per year. A reasonable value for organic matter loss per year attributable to corn production is approximately .035% if we use a 1% loss per year of the soils remaining organic matter from a 3.5% organic matter soil.

If the 1330 lb CO<sub>2</sub>/ acre (0.035 x 38,000) is lost per year and we use the 1987 record corn yield of 119 bu/ acre a carbon dioxide loss of 11.17 lb CO<sub>2</sub>/ per bushel occurs or 4.47 lb CO<sub>2</sub> per gallon of ethanol (1 bushel yields 2.5 gallon of ethanol). As was done previously we can credit the corn distillers with (4.47 x .32= 1.43 lb) some of the loss. Therefore each gallon of corn ethanol produces 3.04 lb CO<sub>2</sub>. If each gallon of ethanol provides 80,000 BTU of energy then 1 2.5 gallons provides 1,000,000 BTU or a loss of 38.0 lbs CO<sub>2</sub>/ million BTU corn ethanol.

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