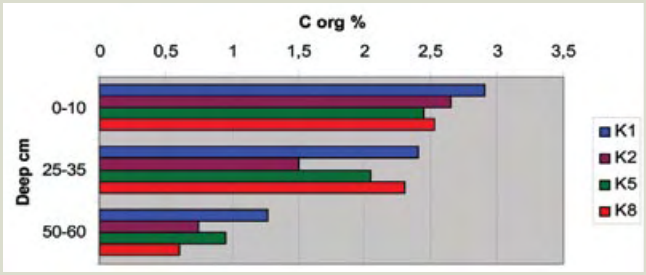
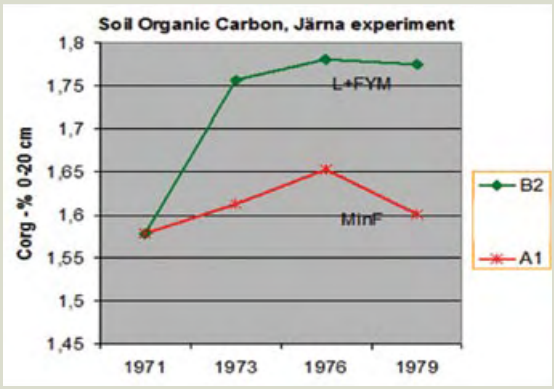
Bio-Agricultural farming - higher levels of soil organic carbon than conventional farming.

Soil Organic Carbon 1989 in K-experiment



Organic carbon 0-10, 25-35 and 50-60 cm 1989 in K experiment in Järna in the treatments K1 (Biodynamic composted manure and the BD field preparation), K2 (Biodynamic composted manure without the use of the BD field preparation), K5 (without maure or other fertilisers) and K8 (High fertiliser, NPK). *The total amount of organic carbon to a depth of 60 cm is 160 ton per ha (16 kg per m2) in the biodynamic treatment and 135 ton per ha (13 kg m2) in the mineral fertilised treatment.*

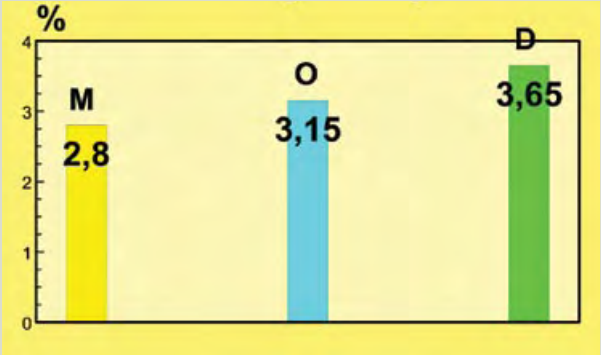


Trials comparing biodynamical and conventional cultivation in Järna 1971 – 1979 (Petterson,1982). The soil organic carbon content in percentage of dried soil (=humus content x factor 0.58) in the trial stage A1 (conventional cultivation without ley and mineral fertilisers) and B2 (biodynamic cultivation with leys and biodynamically composted farm yard manure).

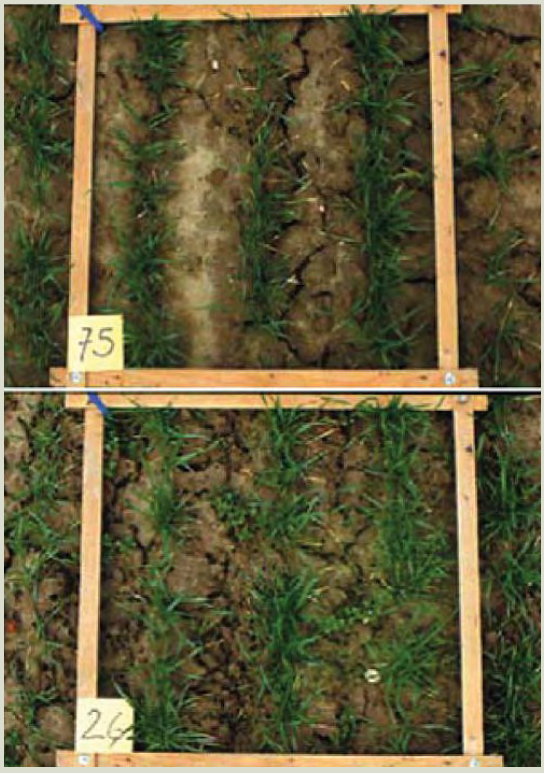
32 YEAR STUDY – NORDIC RESEARCH CIRCLE, JAERNA. BO PETTERSON 1958-1990. 5, 6, 31

Humus – the Life of the Soil.

Humus content after 20 year in DOK trials comparing conventional, organic and biodynamic treatments.

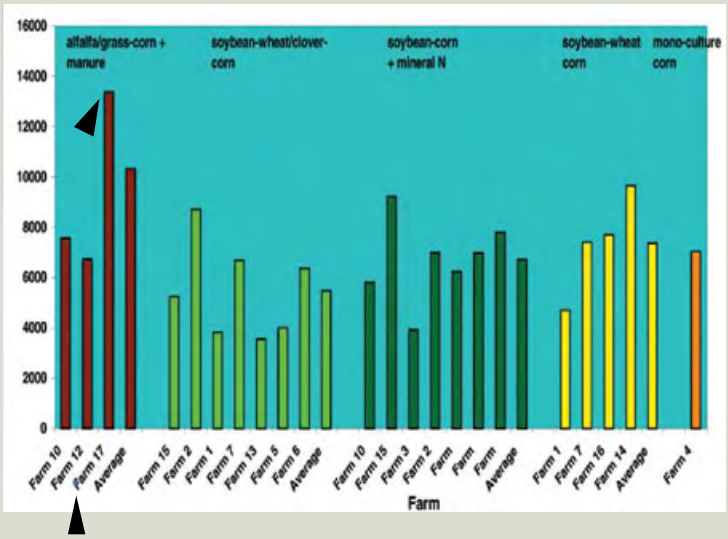


Humus content after 20 year in DOK trials comparing conventional, organic and biodynamic treatments. In the Swiss DOK trials comparing biodynamic, organic and conventional treatments in FiBL the humus content was, after 20 years, in conventional farming 2.8% (M), in organic farming with organic manure 3.15% (O) and in biodynamic farming with biodynamic manure treatments and the use of biodynamic preparations 3.65% (D) (Mader, et al, 2002)
3, 51, 53, 54



Healthy roots and increased carbon sequestration.

Higher carbon sequestration potential. 50



FARM 17
BIODYNAMIC ROOT

Biodynamic root yields, have up to 40% higher bio-mass than conventionally grown root yields, resulting in higher carbon sequestration potential.

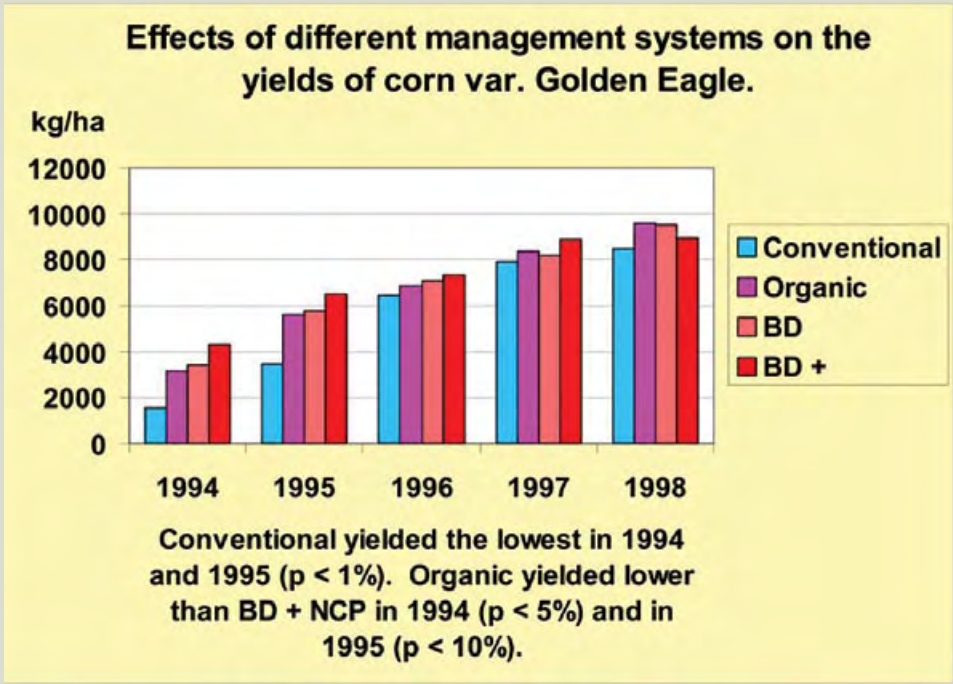
MICHAEL FIELDS AGRICULTURAL INSTITUTE

Several hours after washing — Just washed

Following Wheat/Red Clover — Following Soybeans

Higher Yields with Bio-Agriculture. 12

Bio-Agricultural yields are higher in dry seasons than conventional yields using mineral fertilisers.



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Future Farming – a return to roots. 49 Perennial grasses & carbon sequestration

Even with conventional farming, the stronger, longer roots of perennial and native grasses have higher carbon sequestration rates than annuals. Perennial grasses show rates between 1.2 and 2.4 Tonnes of CO_2-e/hectare/year and are more sustainable.

CARBON FACTOR

Global warming potential—greenhouse gases released into the atmosphere by crop production inputs, minus carbon sequestered in soil—is negative for perennial crops. The more resilient perennials are also expected to fare better than annuals in a warming climate.

SOIL CARBON SEQUESTERED
(kilograms per hectare per year)

Annual crops	0 to 450
Perennial crops	320 to 1,100

GLOBAL WARMING POTENTIAL
(kilograms of CO_2 equivalent per hectare per year)

Annual crops	140 to 1,140
Perennial crops	–1,050 to –200

ESTIMATED IMPACT ON YIELD OF 3° C TO 8° C TEMPERATURE INCREASE
(megagrams per hectare)

Annual crops	–1.5 to –0.5
Perennial crops	+5

SUSTAINABLE FARMING: NEW VS. NOW

The potential advantages of future perennial crop plants are visible today by comparing perennial wheatgrass (below left), growing alongside domesticated annual wheat (below right). Although perennial wheat, could one day yield grain similar to those of the annual crop, it might live for many years and look much more like its wheatgrass relative belowground. Perennial crops would transform the process of farming and its environmental effects, by using resources more effectively, thereby being less dependent on human inputs and more productive for a longer time. Perennials also anchor and support the ecosystem that nourishes them, whereas short-lived and short-rooted annuals allow water, soil and nutrients to be lost.

Jerry D. Glover, Cindy M. Cox, John P, Reganold, 2007.

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