The reality of soil C?

Unexciting it is, yet careful must you be.

Some simple accounting:

- 1 ha of soil to 10 cm depth

typically weighs 1100 to 1300 tonne

At 1% C by weight

There is 11 to 13 tonne C/ha in the topsoil

So….

- To increase soil C from 1% to 1.1% requires 1.1 to 1.3 tonne C/ha

- Or, to increase soil C from 1% to 2% requires 11 to 13 tonne C/ha.

In theory:

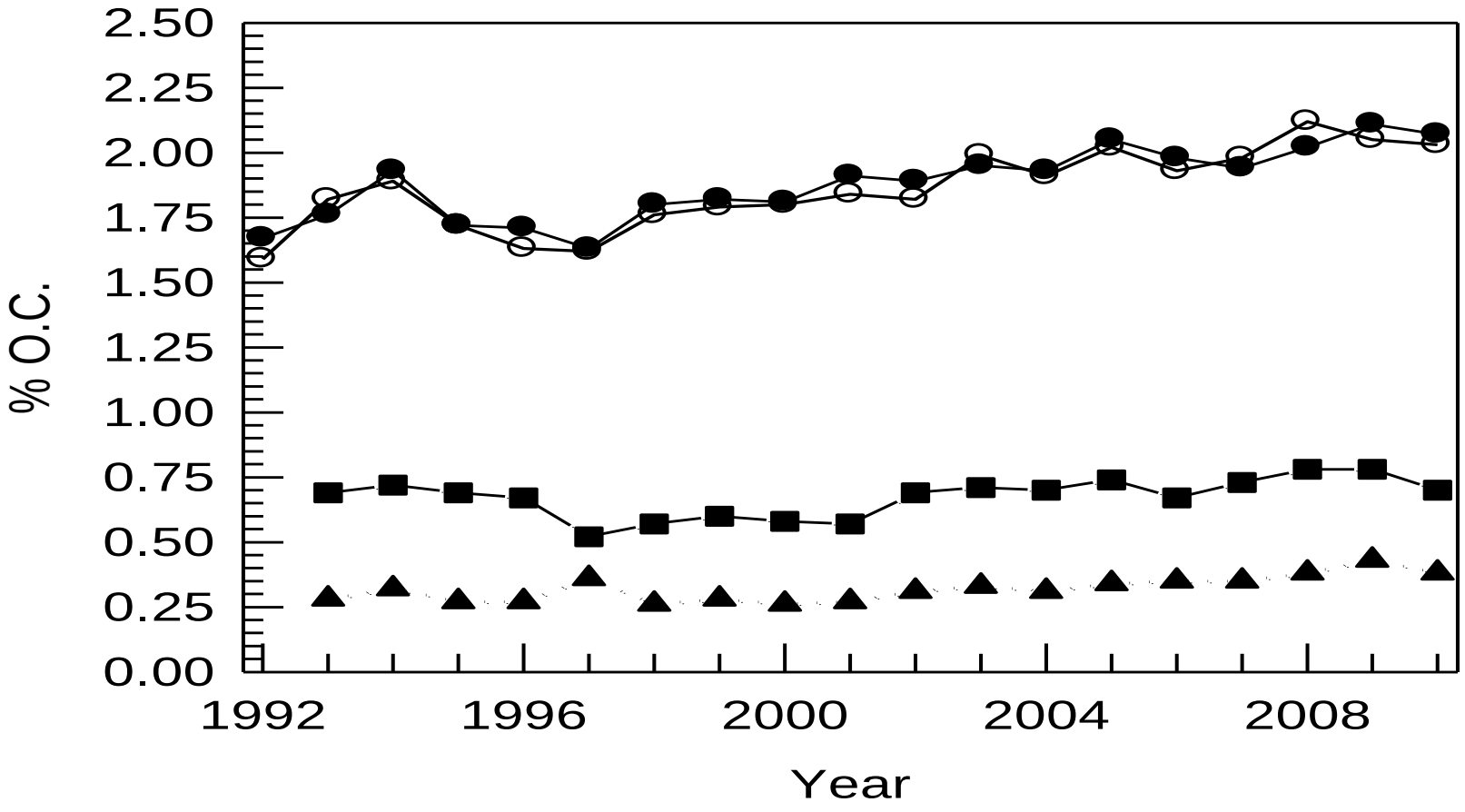
- If you grow a 10 t/ha crop or pasture, and remove half in grain or grazed product, you return 5 t/ha of dry matter to the soil.
- At 40%C in dry matter, that is 2 t C/ha returned to soil.
- Therefore you could expect up to ~0.2% increase in soil C each year IF it was a good season and if the organic matter was inert.

But in practice…

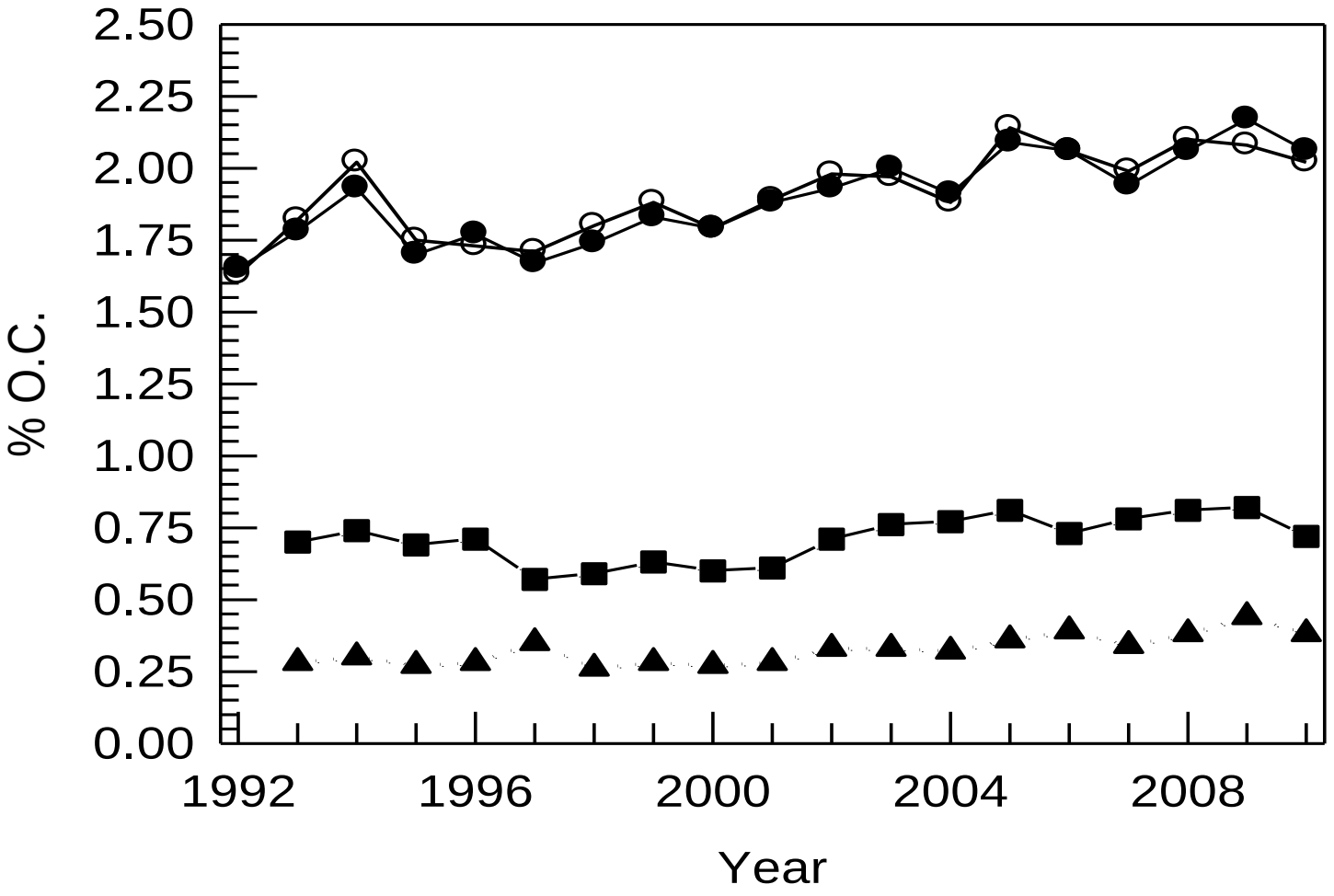
- Organic matter mineralises (bacteria, fungi, actinomyces, etc) to release N, P, S (and C) to themselves and to plants.
- Therefore less than a 0.2% increase generally occurs, even in a good year.
- In practice, the highest accumulation rate we have measured is 0.7 tonne C/ha per year.

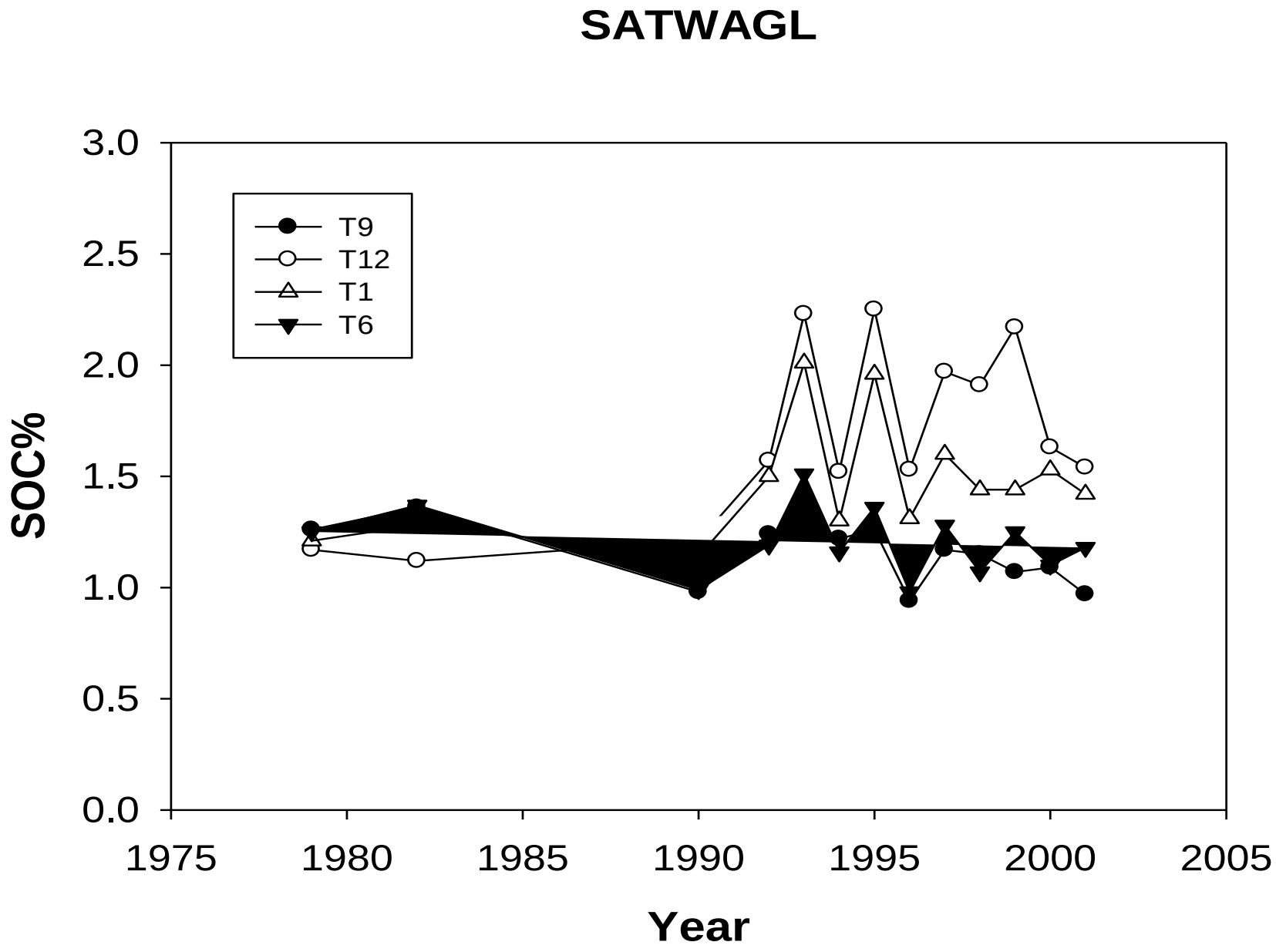
(and down to -0.3 tonne C/ha per year)

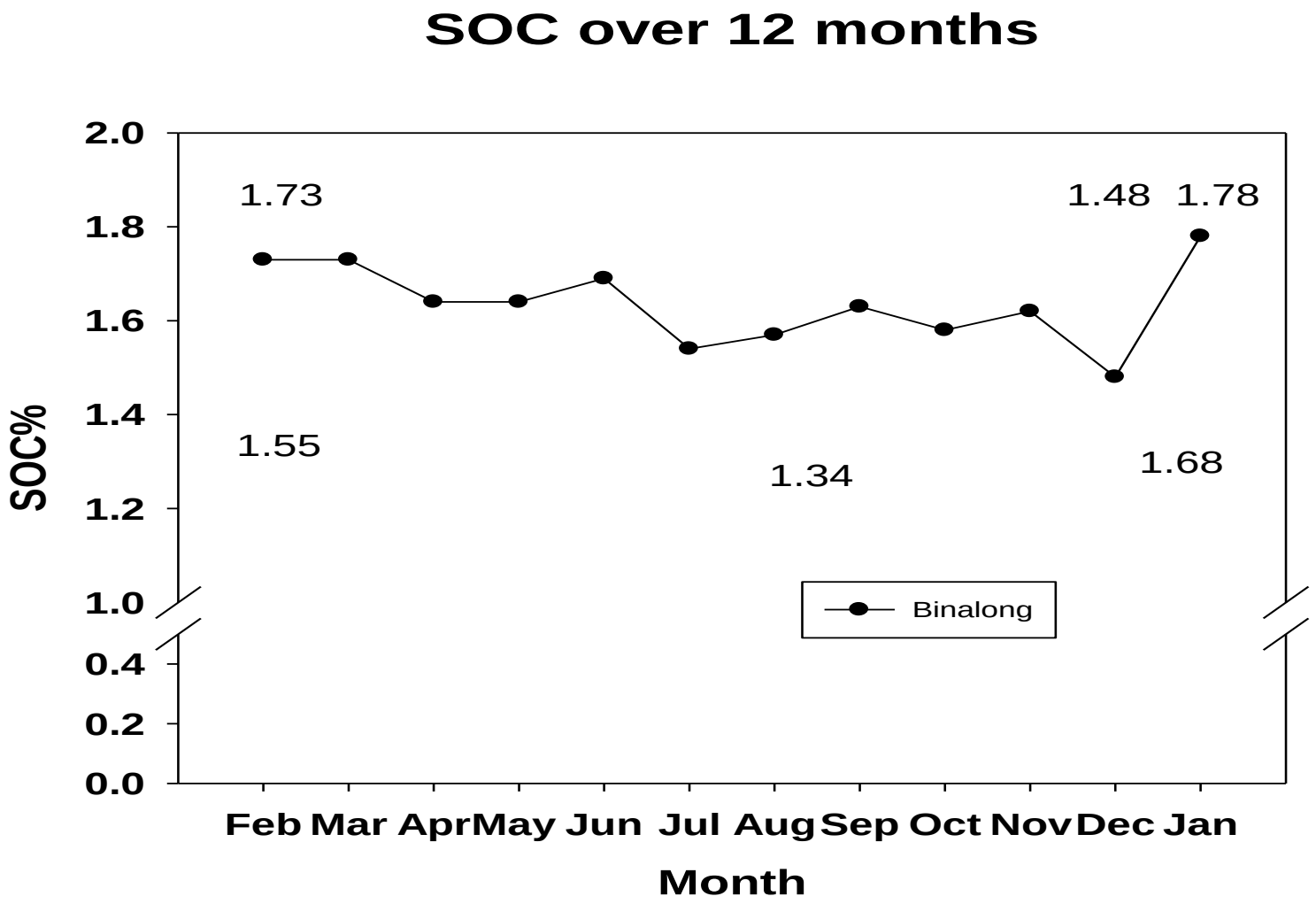
Book Book annual pastures

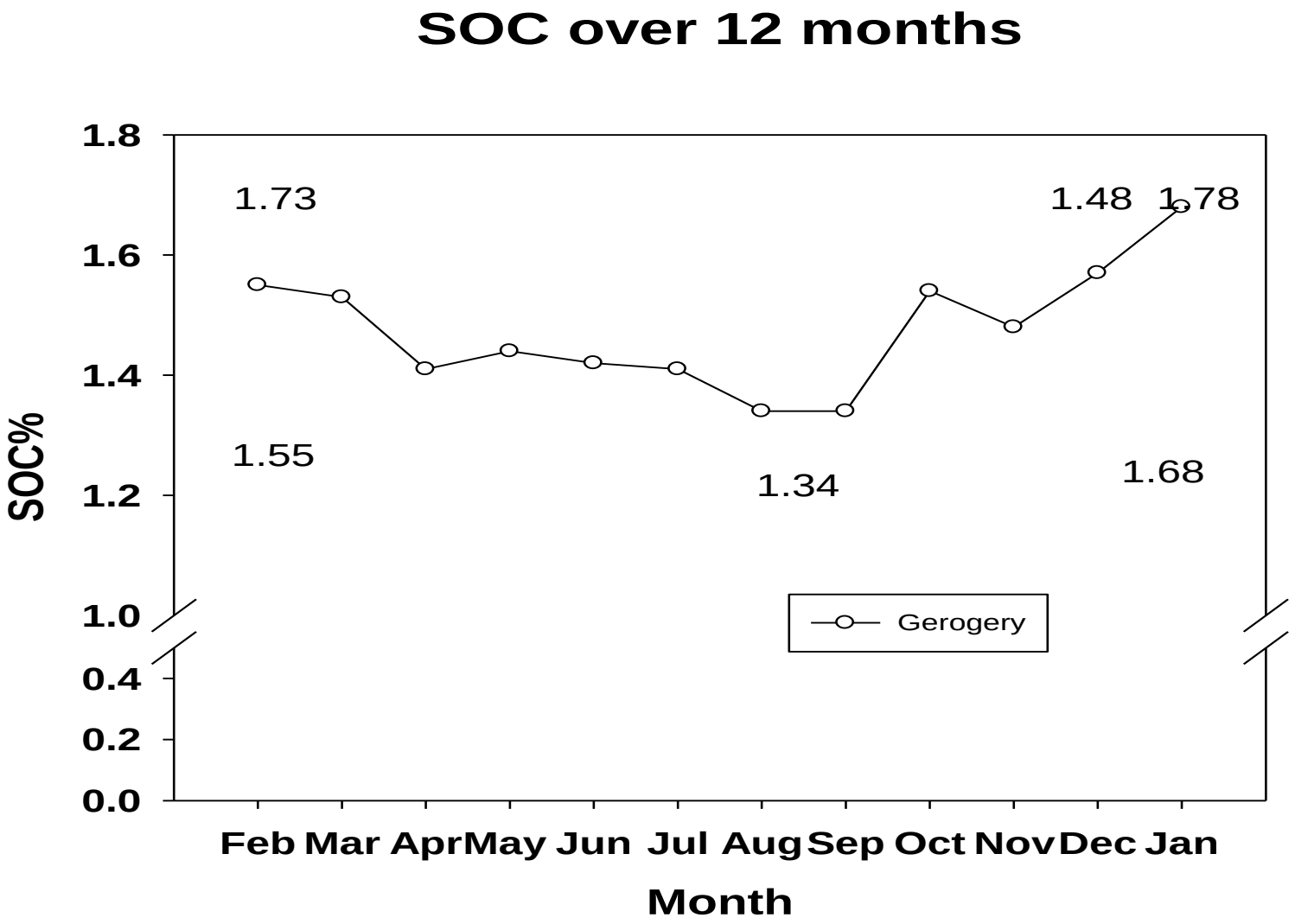


Book Book perennial pastures




SATWAGL
3.0
2.5
2.0
1.5
1.0
0.5
0.0
SOC%
T9
T12
T1
T6
1975
1980
1985
1990
1995
2000
2005
Year


SOC over 12 months
SOC%
2.0
1.8
1.6
1.4
1.2
1.0
0.4
0.2
0.0
1.73
1.48
1.78
1.55
1.34
1.68
Binalong
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan
Month


SOC over 12 months
SOC%
1.8
1.6
1.4
1.2
1.0
0.4
0.2
0.0
1.73
1.55
1.34
1.48
1.78
1.68
Gerogery
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan
Month

Can we fix this?

- Yes, by removing all “POC” from each soil sample, that is roots, surface detritus, etc.

- But……1. tedious
  2. unpopular

Conclusion

- Soil C is variable-

  between years and within years

- Net changes over the years are small.

- C income could easily become a C tax…