W
als correlated to soil test results to rec-
mendations are based on calibration tri-
extraction for P and Ammonium Acetate
Accredited Test of Sodium Bicarbonate
the current OMAF method using the
calculated from one area to the next.
all research results are universally trans-
ing how unique some of the recommen-
dations for farmers.
results of soil tests into fertilizer recom-
emended so industry could interpret the
brated to crop response and a series of
grown there. Soil test values were cali-
trials in these areas to reflect the unique-
graphic areas in North America devel-
veloped soil test methods and calibration
reason for the existence of these philoso-
phies is because of the limited recommen-
dations and research specific to the areas
where the research was conducted.
Researchers working in specific geo-
graphic areas in North America devel-
oped soil test methods and calibration
trials in these areas to reflect the unique-
ness of these geographies and crops
grown there. Soil test values were cali-
brated to crop response and a series of
charts, tables or formulae where devel-
oped so industry could interpret the
results of soil tests into fertilizer recom-
endations for farmers.
One of the greatest
impacts of man on the soil
is the elevated levels of
nutrients resulting from
land management prac-
tices.
Throughout North America an
increasingly greater number of fields are
testing high to very high in P and K. In
Ontario, the average soil test level for P
has increased in the last 10 years from
26 to 38 ppm. The Nutrient Manage-
ment Plans allow for the application of
nutrients to high testing soils but at a
rate to match crop removal. Currently,
the NMan software program calculates
removal rates based on crop yields it also
recognizes that it takes 35 pounds of
P2O5 to increase the soil test 1 ppm
and 19 pounds of K2O to raise the K test
1 ppm.
Cation Balance uses the
test results to calcu-
late the ratios or saturations
of the basic cations
of K, Mg, and Ca.
The researchers who developed this
approach observed in their data the
saturation of the Cation Exchange Capac-
ity (CEC) of 5, 10, 65 % of K, Mg, and
Ca produced the higher yields. This
approach has been challenged on
numerous occasions. There are many
fields that do not fall into these ratios
and still produce high yields. When
these fields are subjected to fertilizer
applications in an effort to balance
them, the result is no improvement in
yield and higher cost of production. It is
realized that high Cation Exchange
Capacity soils with high levels of
Exchangeable Calcium and Magnesium
do not respond to the saturation balance
method readily. A further spin on this
method is to express the saturation
ratios Ca:Mg, Ca:K, Mg:K, as being
ideal at 6.5, 13, and 2 respectively. The
ratios on world record corn fields in
1973 were 4, 23, 6 and in 1979 were 3,
18 and 5 so you can see a wide deviation
from the ideal ratio and still produce
world record yields. However in some
soils these ratios are important especi-
ally in sandy lower CEC fields. Excessive
rates of potash can induce a magnesium
deficiency as can an application of cal-
citic lime in a low testing magnesium
soil. The ratios do offer some guidelines
in preventing over application and a
method to calculate the correcting bal-
ance. In horticulture crops with the
increase use of fertigation the need to
watch low testing calcium sandy soil is
more critical as moisture has been
removed as a limiting factor.

Nutrient Recommendation
Philosophies
By Dale Cowan, CCA-ON

We are in a science based industry
that uses technology and science to seek production efficiencies that
increase profitability, reduce costs and
meet compliance issues in a document-
defensible and defensible manner. Why then
do we talk about recommendation philoso-
phy, why are we not definitive in using
science to come up with a single recom-
mandation if we are so steeply science
driven?

In a perfect world we would all have
sandy loam soil, weekly rain, no com-
paicion, uniform emergence, top yield-
ing varieties, no diseases, no bugs, no
leaching, no runoff, excellent drainage,
uniform landscape, and deep topsoil. We
would all plant our crops early, harvest
under ideal conditions, control weeds in
a single a pass, all think the same, have
the same knowledge base, and be will-
ing to take the same risks. We all know
we are not always perfect.

The current recommendation
philosophies are Sufficiency, Crop
Removal and Maintenance, and Base
Saturation or Cation Balance. The rea-
son for the existence of these philoso-
phies is because of the limited recommen-
dations and research specific to the areas
where the research was conducted.

Researchers working in specific geo-
graphic areas in North America devel-
oped soil test methods and calibration
trials in these areas to reflect the unique-
ness of these geographies and crops
grown there. Soil test values were cali-
ibrated to crop response and a series of
charts, tables or formulae where devel-
oped so industry could interpret the
results of soil tests into fertilizer recom-
endations for farmers.

What is sometimes lost in the trans-
lation is the importance of understand-
ning how unique some of the recommen-
dations are to the specific areas and not
all research results are universally trans-
lated from one area to the next.

Sufficiency Recommendation
Method of fertilizer application is the
current OMAF method using the
Accredited Test of Sodium Bicarbonate
ratio test for K and Mg. Recommen-
dations are based on calibration tri-
als correlated to soil test results to rec-
ommend sufficient nutrients to give
maximum economic yield response. It
requires a series of fertility rate trials to
measure crop response to additional
nutrients. The published recommenda-
tion tables assume above average man-
agement and that fields have no major
limiting factors. Over the past 20 years,
field level demonstrations (in Ontario)
and rate comparisons have supported the
original calibration work. Yield goals
are not included for P and K as the rec-
ommended rate is based on response to
applied nutrients. Higher yielding fields
have features that allow high yields
because of greater root massing and a
well structure soil. Fields which respond
to higher than recommended rates usu-
ally have a high spatial variability. More
detailed sampling of management zones
may offer site-specific recommendation.

Since the calibrations are based on
the average response (that can be quite
variable) from a large number of trials,
you could expect that the response in
your situation may be quite different
(than the average) and therefore you risk
under-fertilizing your crop under optim-
al growing conditions more than with
the other approaches.

Crop Removal and Soil Test
Maintenance is designed to use the soil test lev-
els to calculate the additional nutrients
required to meet a specified nutrient
level and or additional nutrients to cover
those lost in the harvested portion
removed from the field.

Dale Cowan is a Certified Crop Adviser and President of Agri-Food Laboratories, Guelph.

This industry driven program helps ensure that Ontario crop producers are well served by those
providing their crop production advice. This article was written by one of those CCA’s.