Appendix A

Nmax is the amount of nitrogen applied to give the maximum yield, Ymax, according to the response curve as an exponential plus a linear trend. This is found by differentiating the expression for the curve and equating the result to zero

$$y = A + B.R^{N} + C.N$$

Hence,

$$\frac{dy}{dN} = \ln(R).B.R^{N} + C = 0$$

Rearranging this gives

$$N_{max} = \ln\left(- \frac{C}{B.\ln(R)} \right) / \ln(R)$$

Note that this is a maximum iff B and C are < 0.

Substituting N_{max} into the exponential plus linear expression gives

$$Y_{max} = A + B.R^{N_{max}} + C.N_{max}$$

Or in terms of the parameters *A*, *B*, *C* and *R*

$$Y_{max} = A + B.R^{\ln\left(- \frac{C}{B.\ln(R)} \right) / \ln(R)} + C.\ln\left(- \frac{C}{B.\ln(R)} \right) / \ln(R)$$