

Nutrient Requirements of Tropical Turfgrass

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Sustainable Turfgrass Management in Asia 2013

Pattaya, Thailand



high performance turf
needs enough nutrients

Tifeagle, Sentosa GC, Singapore

How do we
determine the right
amount of nutrients
to supply?

seashore paspalum, The
Challenge at Manele, Hawaii



What is in the grass?

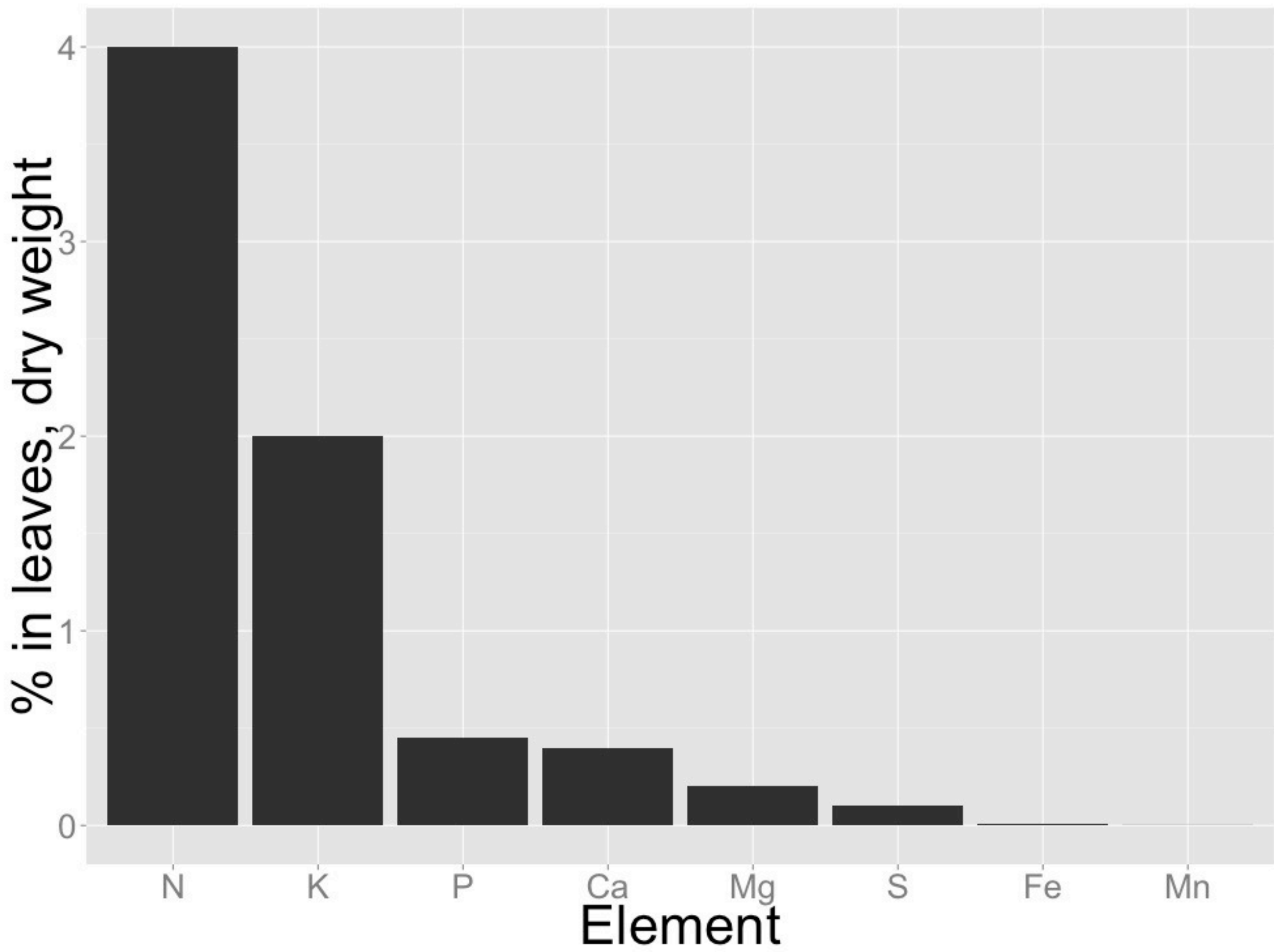
17 essential elements

C, H, & O, from CO_2 in the air and water (H_2O) from the soil

Mineral elements: **N, K, P, Ca, Mg, S, Fe, Mn, Zn, Cu, B, Mo, Cl, Ni**

manilagrass, Wack Wack Golf & CC, Philippines







mowing removes
nutrients from the grass

manilagrass, Singapore

mowing removes
nutrients from the
grass

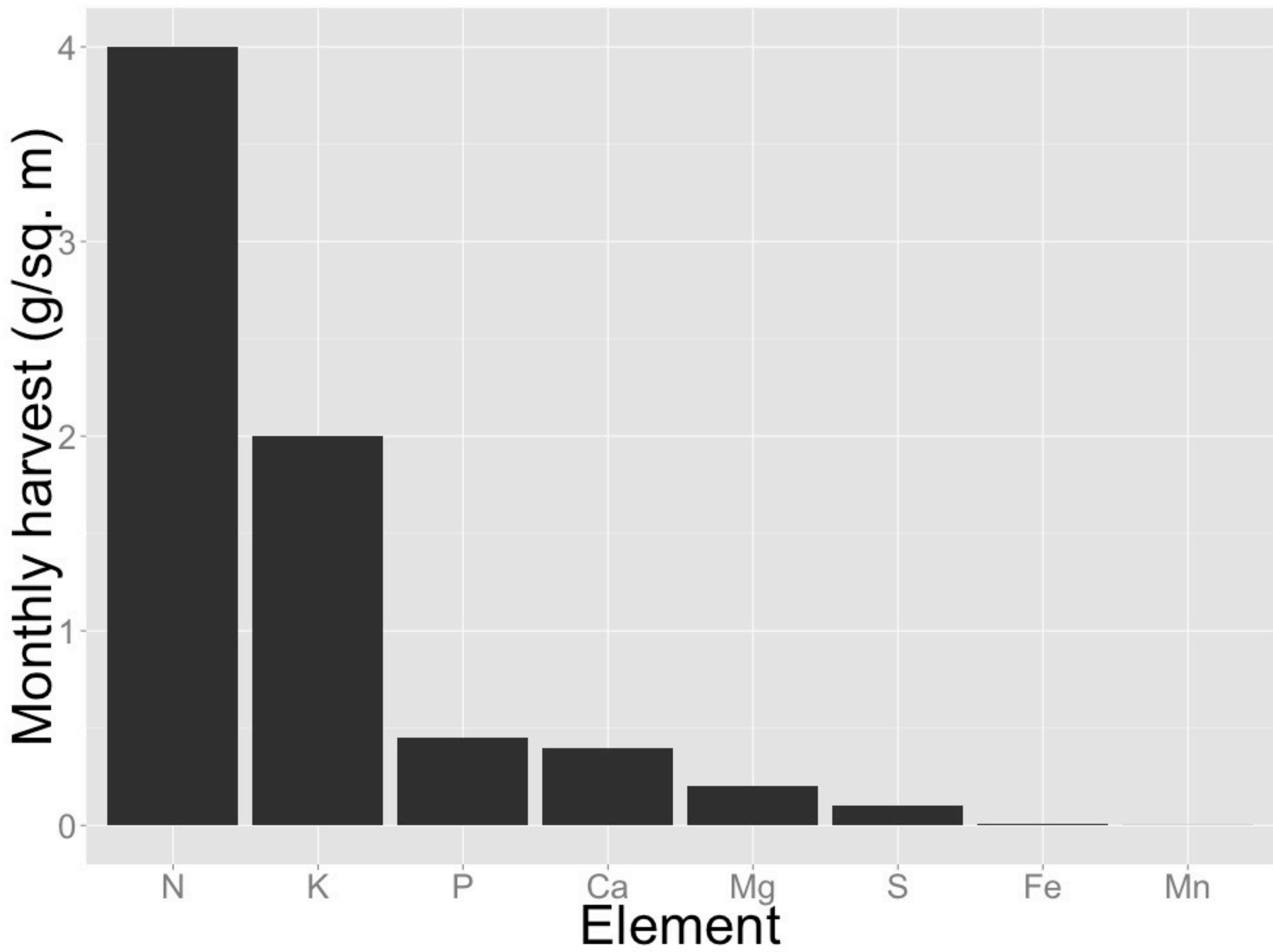
during periods of active growth,
monthly clipping removal may be
about 100 to 125 g/m² on a dry
matter basis

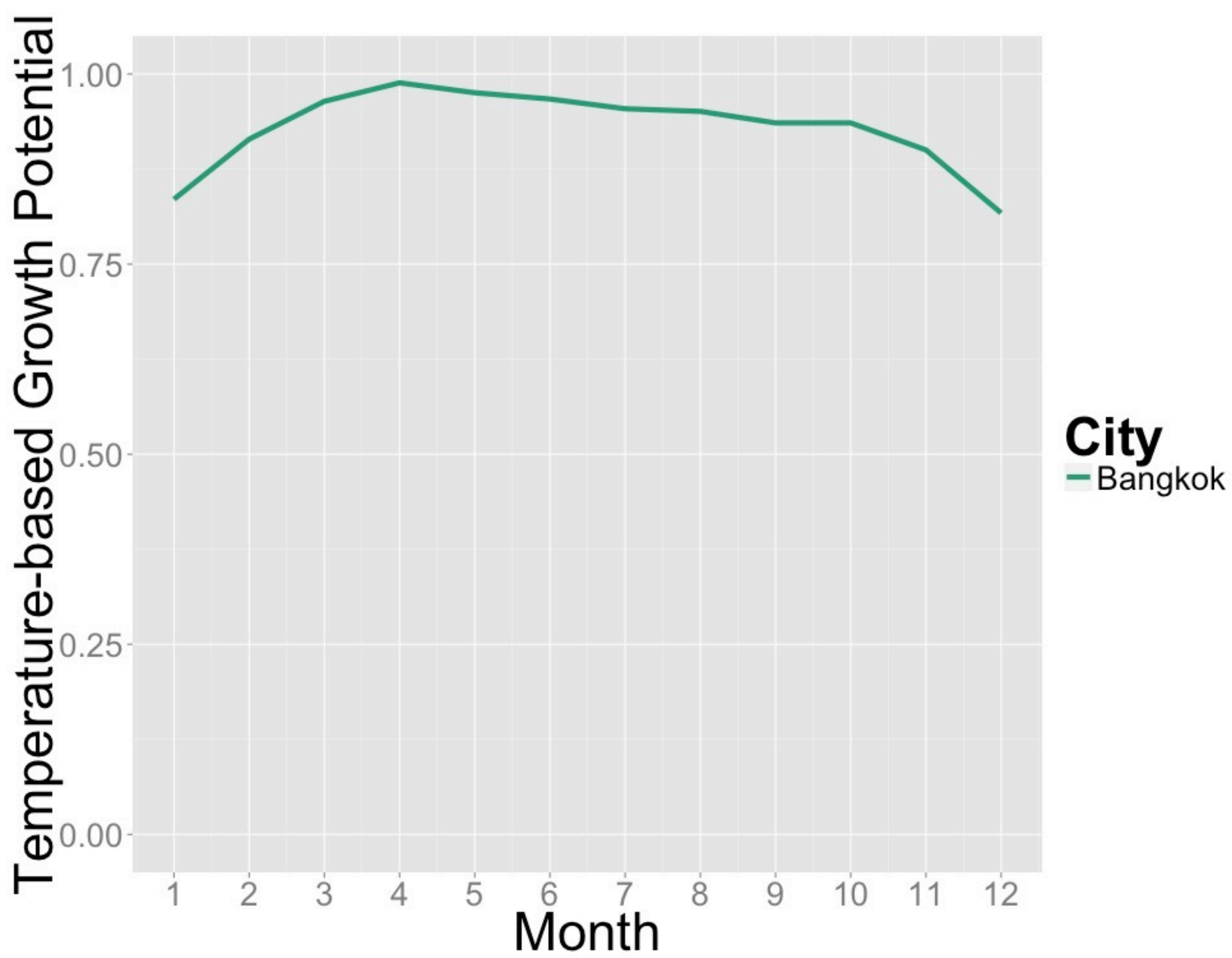


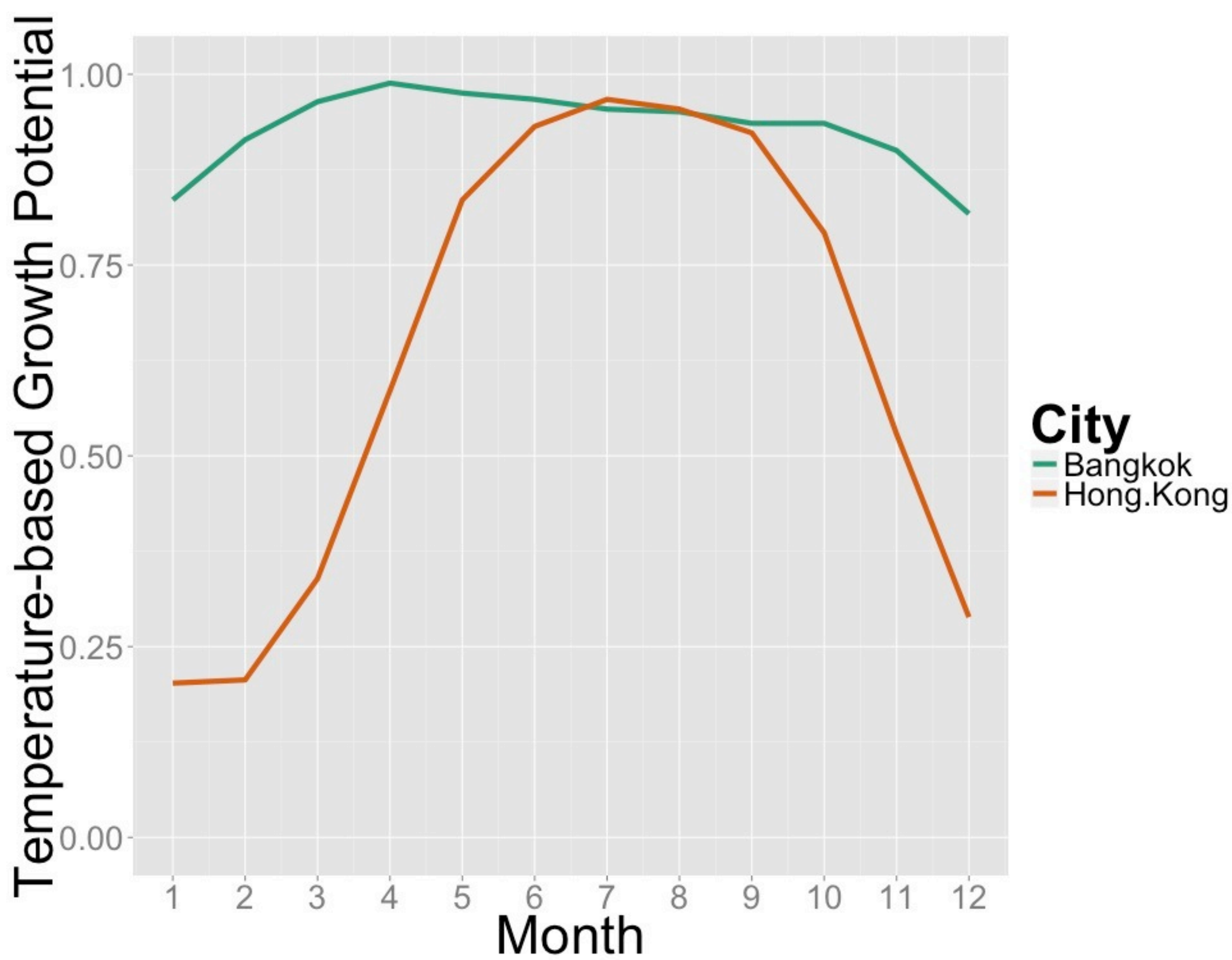


N:P:K ratio in leaves is
about 8:1:4

leaf clippings contain nutrients







$$GP = \frac{1}{e^{0.5\left(\frac{t-t_o}{var}\right)^2}}$$

GP = growth potential, on a scale of 0 to 1

$e = 2.71828$, a mathematical constant

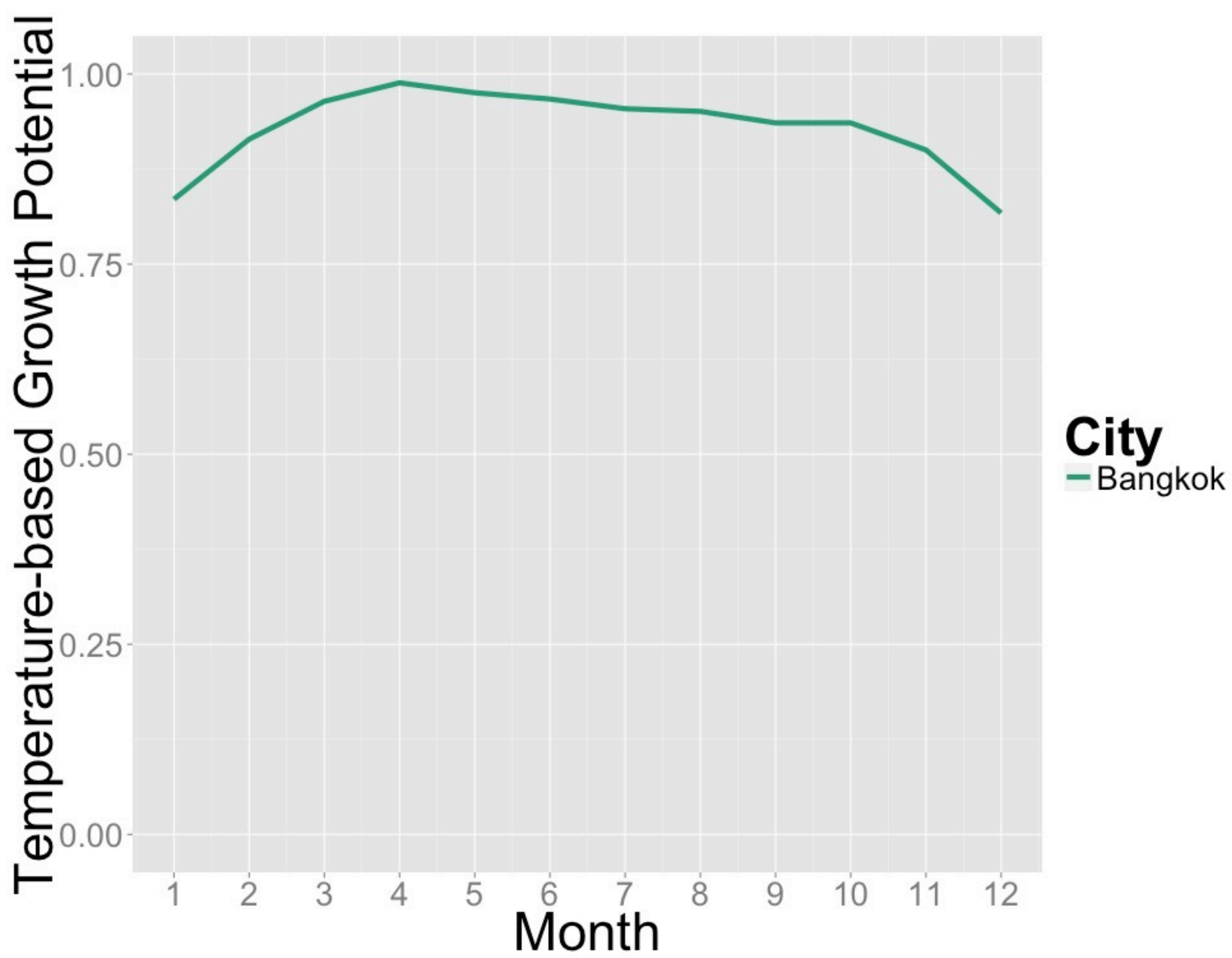
t = average temperature for a location, in °C

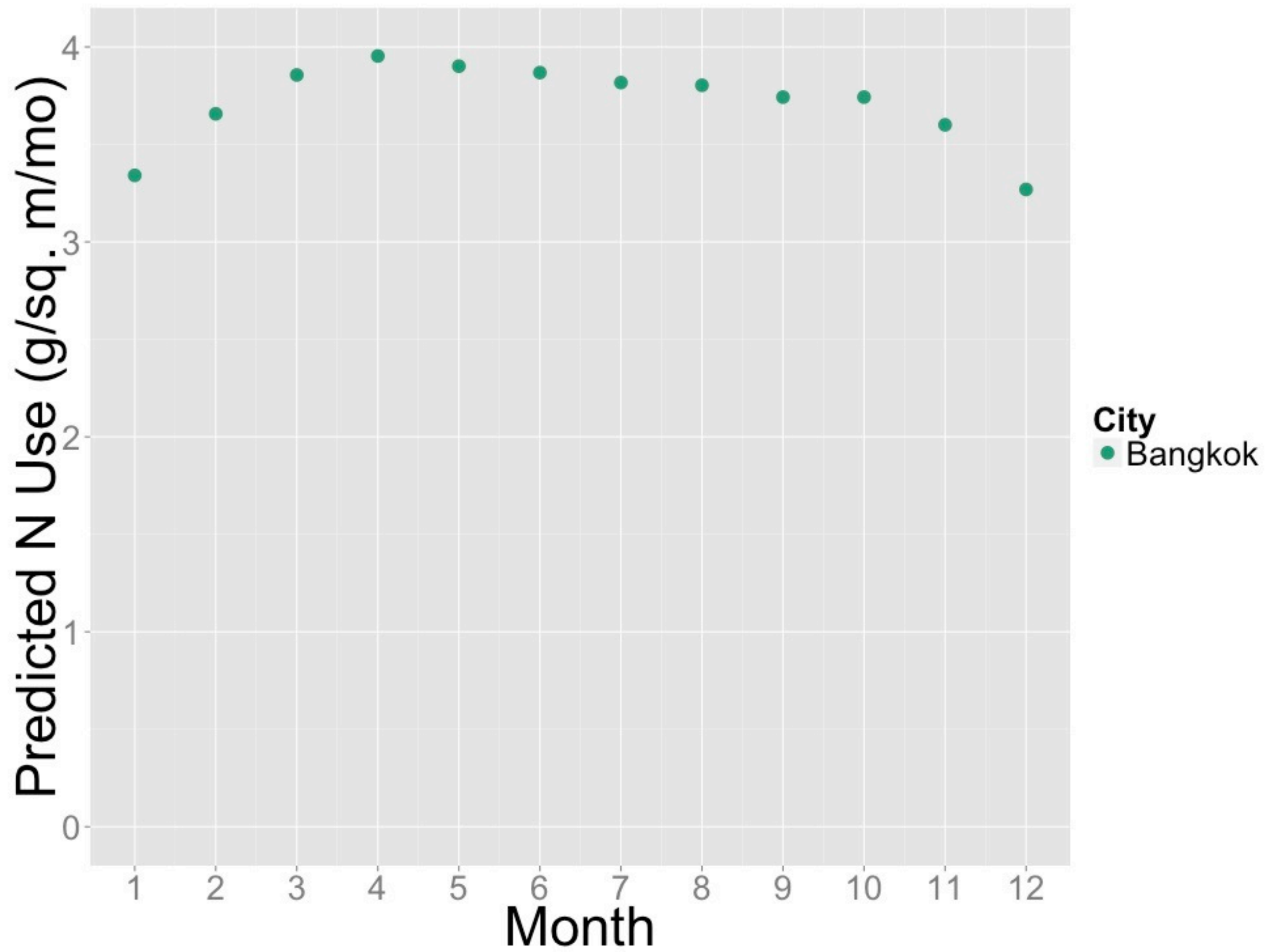
t_o = optimum temperature, 20 for C_3 grass, 31 for C_4 grass

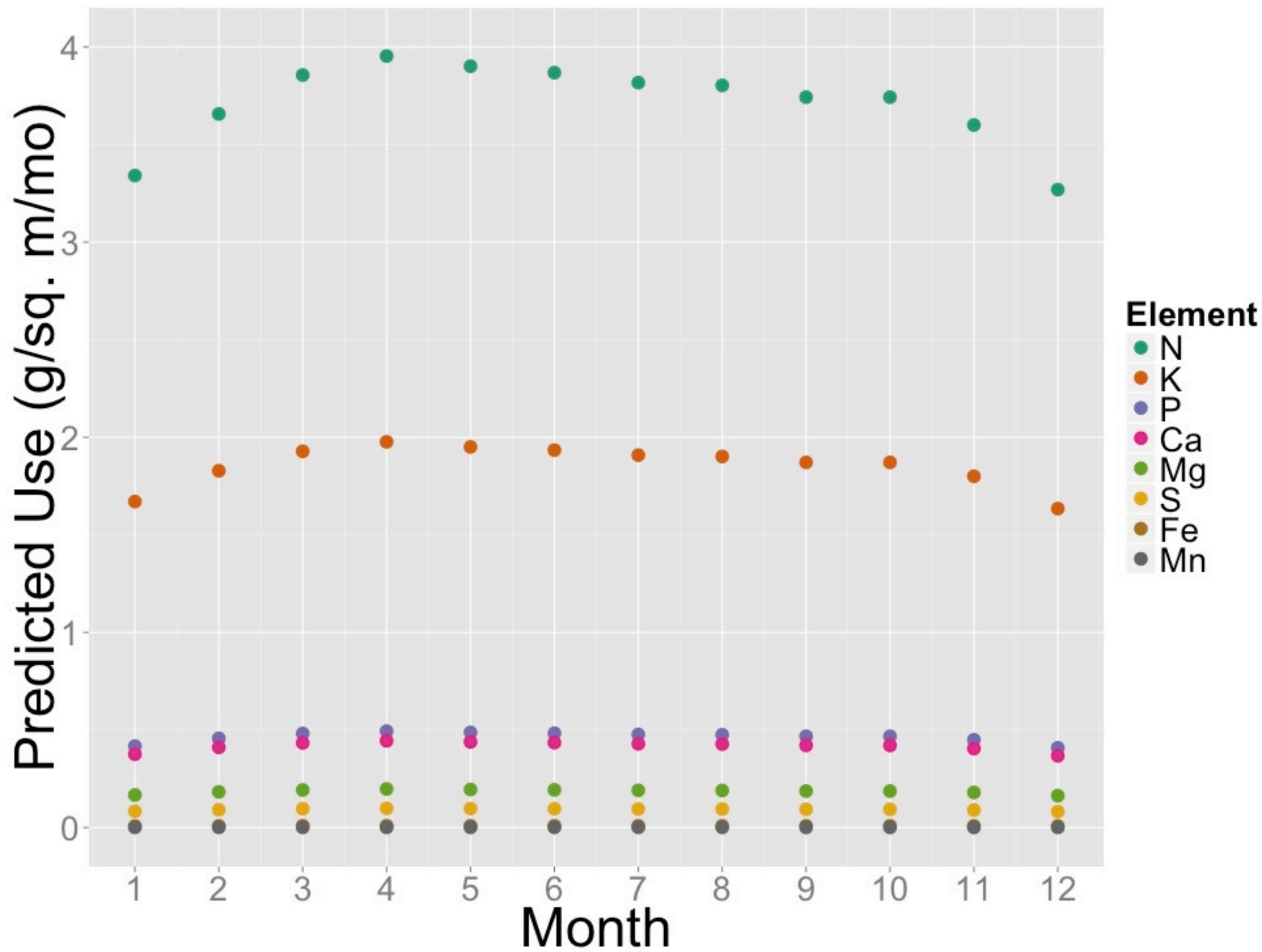
var = adjusts the change in GP as temperature moves away from t_o ; I use 5.5 for C_3 and 8.5 for C_4

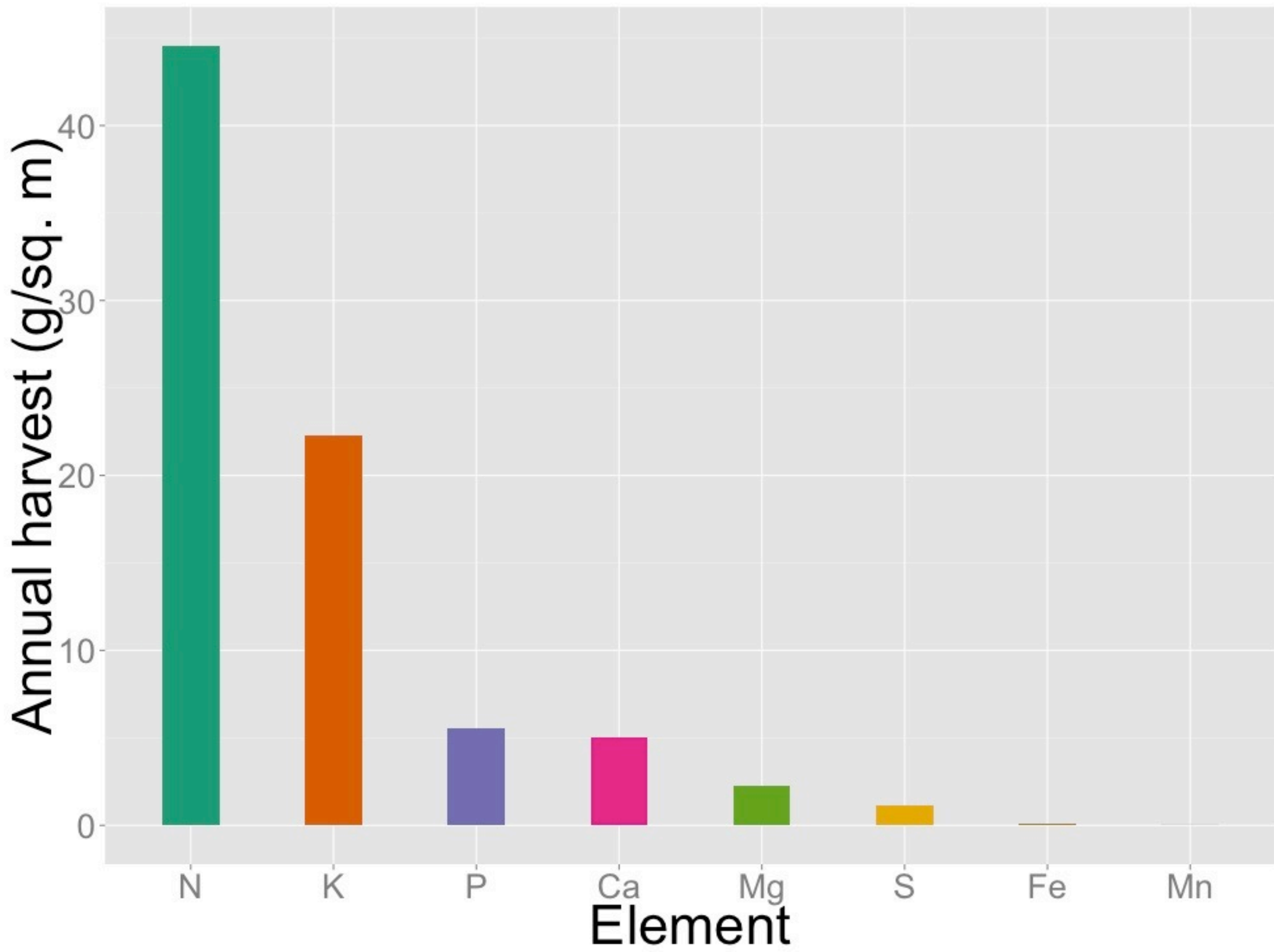


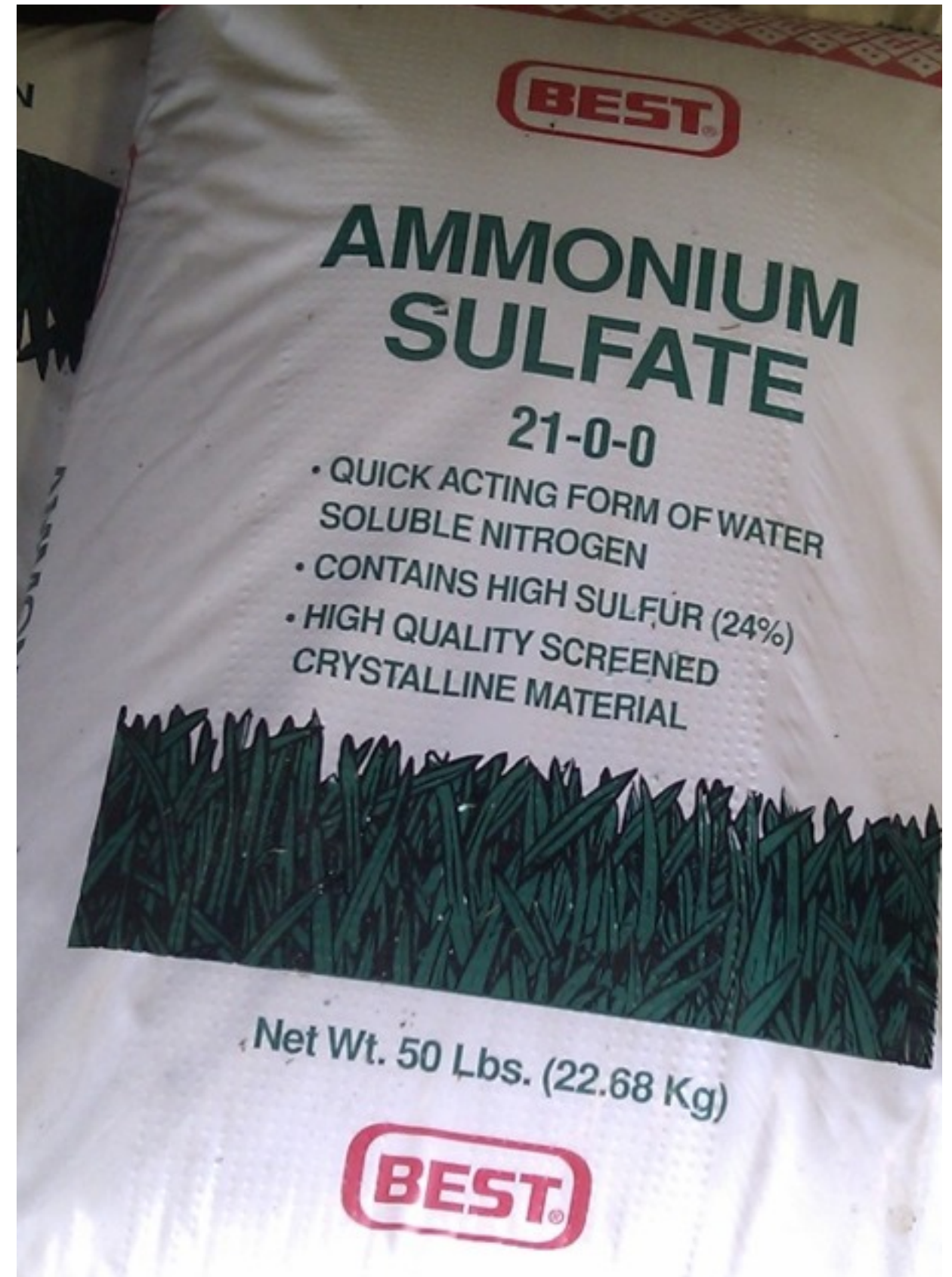
bermudagrass (*Cynodon*), about 4 g N/m²/mo
seashore paspalum (*P. vaginatum*) & manilagrass (*Z. matrella*), about 3 g N/m²/mo











How much can grass get from soil, and how much is needed as fertilizer?

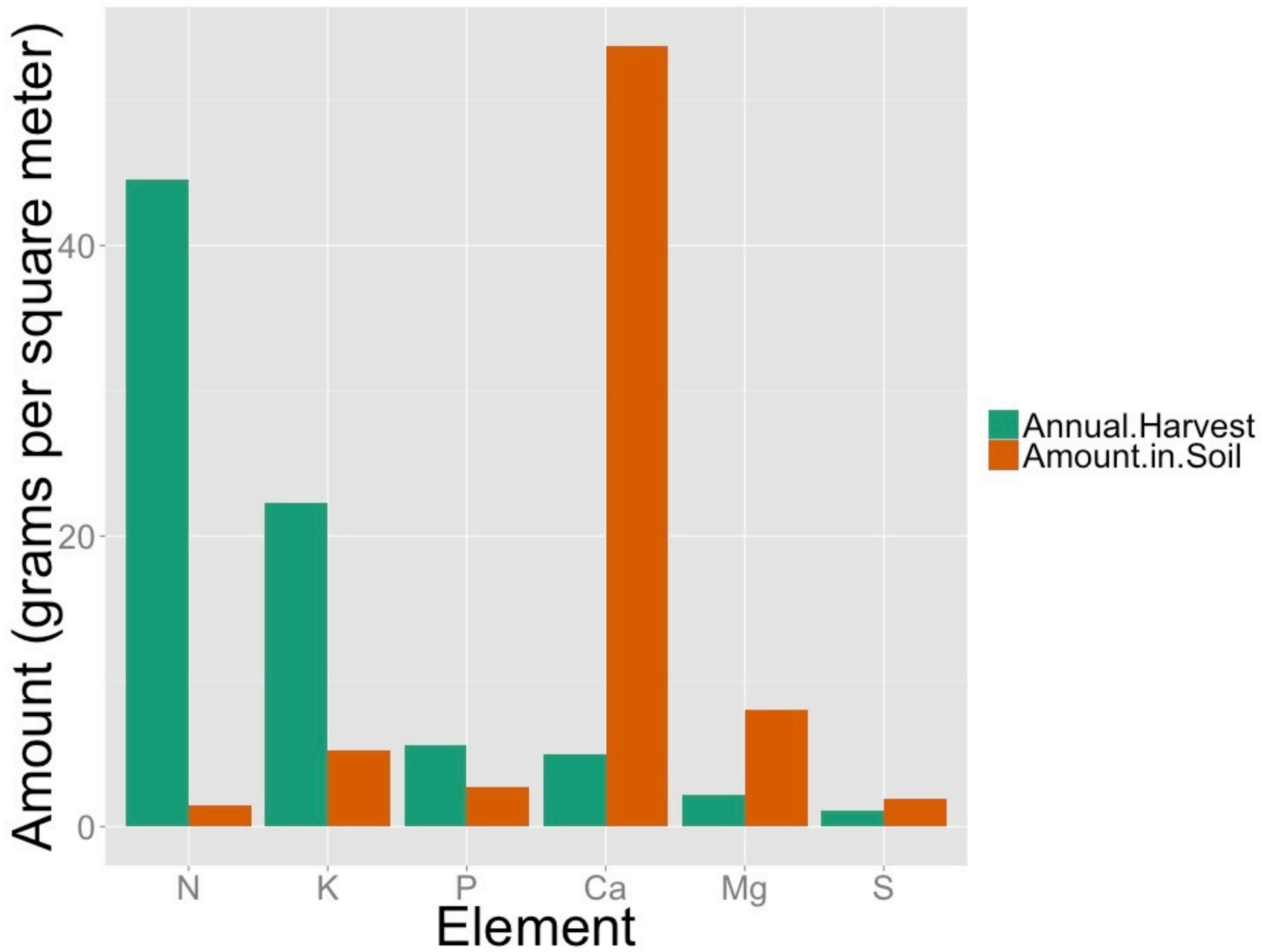
Minimum Levels for Sustainable Nutrition Soil Guidelines

Minimum Level for Sustainable Nutrition (MLSN) is a new, more sustainable approach to managing soil nutrient levels that can help you to decrease fertilizer inputs and costs, while still maintaining desired turf quality and playability levels. The MLSN guidelines were developed in a joint project between PACE Turf and the Asian Turfgrass Center. All soil analyses were conducted at Brookside Laboratories, New Knoxville, OH.

	MLSN Soil Guideline
pH	>5.5
Potassium (K ppm)	35
Phosphorus (P ppm); pH<7.5, Mehlich 3	18
Phosphorus (P ppm); pH<7.5, Bray 2	25
Phosphorus (P ppm); pH>7.5, Olsen	6
Calcium (Ca ppm)	360
Magnesium (Mg ppm)	54
Sulfur as sulfate (S ppm)	13
Sodium (Na ppm)	<110
Electrical conductivity (EC dS/m)	<2
Total Nitrogen (N ppm)*	<3

Managing sodium and salts: In locations where poor quality irrigation water makes it difficult to meet the guideline of <110 ppm sodium or <2 dS/m salts, MLSN guidelines and overall management practices may need to be modified on a site-specific basis. For more information on salinity and sodium management, see Carrow RN and Duncan R., 1998. Salt affected turfgrass sites: assessment and management. Sleeping Bear Press, 173 pp.

For more information, see the Facebook MLSN page at: www.facebook.com/mlsnturf





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