

NUTRIENT UPTAKE AND REMOVAL BY FIELD CROPS

EASTERN CANADA 2001

The ranges in nutrient uptake¹ and removal² values given in this chart are general estimates. They are based on typical nutrient concentrations and yields for good growing conditions in eastern Canada. Actual uptake and removal will vary with crop yield, crop variety, soil fertility and from year to year. Accurate removal values can only be determined by laboratory analysis. Crop uptake of nutrients is affected by soil and climatic conditions. Low soil moisture, poor aeration due to compaction or excessive moisture, low soil temperatures,

high lime in the root zone, nutrient imbalances, and other factors may restrict uptake of plant nutrients.

Crop fertility requirements will differ from these nutrient removal values. Crops are not able to extract all available plant nutrients from the soil,

and fertilizers are not 100 percent efficient. For any given yield, the total nutrient supply in the soil (soil plus added fertilizer) will be somewhat greater than the amount removed by the crop. The best way to determine fertilizer requirements is regular soil analysis.

Pounds per Acre

Grains & Oilseeds		N*	P ₂ O ₅	K ₂ O	Ca	Mg	S
Grain Corn 150 bu/A	uptake	170 - 240	75 - 110	130 - 240	25 - 50	18 - 30	13 - 16
	removal	100 - 150	55 - 66	39 - 44	1	13	10 - 11
Soybean 50 bu/A	uptake	230 - 290	40 - 50	120 - 220	25 - 30	20 - 25	17
	removal	187 - 200	40 - 44	69 - 70	9 - 11	7 - 9	5
Winter Wheat 75 bu/A	uptake	140 - 160	50 - 55	95 - 150	13	17 - 23	15 - 19
	removal	85 - 95	40 - 50	26 - 28	2	12	6
Barley 75 bu/A	uptake	90 - 110	35 - 40	75 - 110	17	8 - 13	13 - 15
	removal	65 - 85	28 - 30	20 - 25	2	4	6
Oats 75 bu/A	uptake	70 - 85	30 - 35	90 - 110	9	10 - 15	14
	removal	45 - 60	19	14 - 15	2	3	5
Winter Rye 50 bu/A	uptake	80 - 85	30 - 40	50 - 120	13	7	14 - 15
	removal	55 - 60	15 - 25	17 - 18	3	4	5 - 10
Dry Beans 30 bu/A	uptake						
	removal	75	25	25	2	2	5
Canola 45 bu/A	uptake	130 - 150	60 - 75	100 - 120	-	-	27 - 28
	removal	90 - 100	50 - 60	25 - 30	9 - 12	12 - 15	15
Forages - Dry Matter		N*	P ₂ O ₅	K ₂ O	Ca	Mg	S
Corn silage 8 tons/A	removal	170 - 240	75 - 110	130 - 240	25 - 50	18 - 30	13 - 16
Legume Haylage 5 tons/A	removal	270 - 360	55 - 80	220 - 350	110 - 180	20 - 35	19 - 20
Mixed Haylage 5 tons/A	removal	230 - 340	50 - 80	220 - 360	95 - 160	15 - 35	15 - 30
Grass Haylage 4 tons/A	removal	130 - 220	40 - 60	160 - 290	40 - 90	10 - 20	-
Legume Hay, 1st cut 5 tons/A	removal	220 - 330	50 - 80	200 - 350	100 - 150	20 - 35	20 - 30
Mixed Hay, 1st cut 5 tons/A	removal	170 - 270	50 - 70	170 - 300	80 - 140	18 - 30	15 - 20
Grass Hay, 1st cut 4 tons/A	removal	100 - 180	35 - 55	110 - 220	40 - 85	10 - 20	10 - 15
Hay, 2nd cut+ 3 tons/A	removal	150 - 220	35 - 50	120 - 190	70 - 100	15 - 25	10 - 15

¹ Total nutrient taken up by the crop. ² Nutrient removed in harvested portion of the crop.
*Soybeans, dry beans and forage legumes get most of their nitrogen from the air.

NUTRIENT UPTAKE AND REMOVAL BY HORTICULTURAL CROPS

Ranges of nutrient uptake and removal for yield levels typical of good growing conditions for horticultural crops:

		N*	P ₂ O ₅	K ₂ O	Ca	Mg	S
Potato 20 tons/A	uptake	210 - 230	65 - 75	300 - 440	20	40	18
	removal	125 - 135	35 - 50	210 - 250	5	10	10 - 12
Tomato 40 tons/A	uptake	220 - 240	85 - 90	440 - 480	30	36	54
	removal	140 - 160	50 - 70	280 - 290	14 - 24	22 - 24	28
Tobacco 1 tons/A	uptake	85 - 110	15 - 30	160 - 180	-	16	13
	removal	55 - 75	10 - 15	100 - 120	75	18	14
Cabbage 35 tons/A	uptake	225 - 270	65 - 85	250 - 280	84	35 - 36	65 - 80
	removal	225 - 270	65 - 85	250 - 280	84	35 - 36	65 - 80
Broccoli 5 tons/A	uptake	150 - 180	10	210	-	-	-
	removal	20	2	45	-	-	-
Carrot 25 tons/A	uptake	140 - 150	25	350	-	-	-
	removal	80	20	200	-	-	-
Onion 20 tons/A	uptake	120 - 145	25 - 55	105 - 155	30	12	25 - 50
	removal	110 - 120	20 - 50	90 - 110	25 - 30	5 - 12	29 - 50
Apple 12 tons/A	uptake	100	50	180	-	-	24
	removal						
Peaches 15 tons/A	uptake	50	20	60	-	11	-
	removal						
Corn, sweet 6 tons/A	uptake	150 - 190	20 - 60	100 - 180	-	27	15
	removal	55	8	30			
Beans, green 5 tons/A	uptake	170 - 175	16 - 40	100 - 200	-	21	-
	removal	120	10	55	-		
Grapes 6 tons/A	uptake	50	20	80	-	9	-
	removal						
Peas, green 2 tons/A	uptake	170 - 260	20 - 60	80 - 170	-	30	15
	removal	100	10	30			
Sugar Beets 22 tons/A	uptake	180 - 210	30 - 70	380 - 410	-	60	30 - 35
	removal	85 - 95	10 - 40	140 - 180	-		13

*Legumes such as beans and peas get much of their nitrogen from the air.

Approximate Bushel Weights

Crop	Pounds
Wheat, alfalfa, clover, birdsfoot trefoil	60
Beans, peas, potatoes	60
Rye, corn,	56
Canola,	50
Barley,	48
Timothy seed	45
Reed canary grass	44-48
Oats	32
Bromegrass, Kentucky bluegrass, Orchard grass	14

Conversion Factors

Tonne (metric)/hectare x 0.446 = ton/acre
Ton/acre x 2.24 = tonne/hectare
Tonne x 1.102 = ton
Ton x 0.9072 = tonne
Kilogram (kg) x 2.205 = pound
Pound x 0.454 = kilogram (kg)
Hectare x 2.47 = acre
Kilogram/hectare x 0.891 = pound/acre
Pound/acre x 1.12 = kilogram/hectare
Acre x 0.405 = hectare
P x 2.3 = P ₂ O ₅
P ₂ O ₅ x 0.43 = P
K x 1.2 = K ₂ O
K ₂ O x 0.83 = K

Compiled by the



from research and agronomic information obtained in Canada, 1998.