

Illinois is the nations leading pumpkin producer. The crop is grown on about 12,300 acres. Soil fertility requirements are distributed with the Technical Note. The fertility guidelines will be used when developing nutrient management plans with pumpkin producers.

N-P-K Fertilizer Requirements and Recommendations in Pumpkins and Related Crops

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1. Nitrogen fertilization recommendations

Due to the various physio-chemical transformations and mobility of N in most soils, chemical tests for plant-available soil N can be highly inaccurate and misleading. Subsequently, fertility recommendations for N in pumpkins are not based on soil N tests, but rather are based primarily on crop yield potential, with adjustments made for soil organic matter content. In Table 1, N fertilizer recommendations are for a crop yield potential of 15-25 tons/acre, a relatively high but achievable yield level.

Table 1. Nitrogen fertilizer recommendations in pumpkins (and related crops).²

soil organic matter content (%)			
< 2	2-9.9	10-20	>20
(lbs N/acre)			
100	80	60	30

²for a yield goal of 15-25 tons/acre

On sandy soils, and other soils with less than 2% organic matter, it is common practice to split the N application, with 1/2 the N applied pre-plant, and 1/2 side-dressed when vines run.

If the previous crop was soybean, a credit of 30-40 lbs N/acre can be taken. If the prior crop was a legume vegetable, such as green bean or peas, a credit of 20 lbs N/acre can be taken. However, in both cases, no credit should be taken if pumpkins are to be grown on sandy soils. For each ton of solid dairy or cattle manure applied, N recommendations can be reduced 3-4 lbs/acre. If liquid sources of dairy or cattle manure are used, subtract 10 lbs N/acre for each 1000 gallons/acre of material applied. However, in no case should amounts of manure in excess of N fertilizer requirements be applied.

2. Phosphorus (P) and potassium (K) fertilization recommendations

P and K soil test levels. As regards P and K fertility requirements, pumpkins and winter squashes are classified as demand-level '5' crops, which means they have a relatively high demand for P and K.

Unlike N, however, P and K fertilizer recommendations are based on the levels of plant-available nutrient in the soil. Optimum soil test levels of exchangeable P and K for pumpkins are shown in Table 2 (next page).

Table 2. Optimum soil test levels for P and K in pumpkins and related crops.

soil type	soil P1	soil K
	(lbs/acre)	
loam, silt, clay	60-75	250-350
sands	60-75	200-300

P and K fertilizer recommendations. When P and K soil tests are in the optimum range, P and K fertilizer recommendations are set to a rate approximately equal to the amount removed in the harvested part (pumpkin fruit) of the crop. This is known as the ‘maintenance’ level and is roughly equal to 10 lbs P/acre and 105 lbs K/acre. Based on these totals, and converting P and K to their respective oxide equivalents (and increasing the P requirement 50% to account for fixation by soil particles), the fertilizer maintenance requirement (FMR*) for P and K in pumpkins for a yield goal of 20-25 tons fruit/acre calculates out to approximately 125 lbs K₂O/acre and 50 lbs P₂O₅/acre.

When soil test results are below the optimum range. Additional P and K is added in with the maintenance P and K level. Conversely, when soil test results are above the optimum range, P and K fertilizer recommendations are reduced to approximately 1/4 to 1/2 the maintenance levels. These calculations are factored in to the P and K fertilizer recommendations in Tables 3 and 4, respectively. The recommendations in each table are based on a fruit-yield potential of 20-25 tons/acre, for plant population densities of 1,850-4,500 plants/acre. Note; soil test results are expressed in lbs/acre, while fertilizer recommendations are given as P₂O₅ and K₂O equivalents.

Table 3. Phosphorus fertilizer requirements (P₂O₅) in pumpkins for various levels of soil P fertility

P1 soil test (lbs P/ac)	expected yield level		
	maximum	95%	90%
	(lbs P ₂ O ₅ /ac)		
100	0	-	-
90	30	-	-
80	60	0	-
70	90	20	-
60	120	50	0
50	150	80	30
40	180	110	60
30	210	140	90
20	240	170	120
10	270	200	150

P ‘maintenance’ level (~ 50 lbs P₂O₅/acre)

Table 4. Potassium fertilizer requirements (K₂O) in pumpkins for various levels of soil K fertility

K soil test (lbs K/ac)	expected yield level		
	maximum	95%	90%
	(lbs K ₂ O/ac)		
400	60	-	-
300	150	60	-
280	160	70	10
260	180	90	30
240	200	110	40
220	210	120	60
200	230	140	80
180	250	160	90
160	260	170	110
140	280	190	130
120	300	210	140
100	310	220	160
80	330	240	180
60	350	260	190
40	360	270	210

K 'maintenance' level (~ 125 lbs K₂O/acre)