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Everything in Moderation when Applying Potash

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A [recent article](#)¹ in Progressive Farmer overviewed research showing yield reductions attributed to potash (0-0-60, KCl or MOP) applications in corn (North Dakota) and soybean (Minnesota and Indiana). Although the mechanism(s) of “toxicity” were not known the yield reductions were large enough and frequent enough to be considered real. In the corn studies conducted by Dave Franzen at North Dakota State University the potash was applied in spring and detrimental rates were greater than 200 pounds per acre (120 lb K₂O/acre). My (Casteel) soybean research in Indiana examined potash applied at or shortly after planting as a means of intensifying management. Rather, I observed 3 to 5 bu/ac yield reductions at this timing. Detrimental potash rates were 200 pounds per acre in some trials on prairie soils near West Lafayette and loam to coarse-textured soils near Wanatah in 2016 and 2017. I still observed yield reduction at a lower rate of 100 pounds per acre (60 lb K₂O/acre) in 2019, but not in 2020 near LaCrosse. Dan Kaiser at the University of Minnesota also saw yield reductions from potash applications ahead of soybean (spring and even some fall timings), and suggested chloride might be the culprit. Even though these observations of yield reductions cannot be fully explained at this time, these reports have caused some farmers to evaluate their timing and rate of potash application.

We do not fully understand the mechanisms causing these yield reductions at this time, but we would like to provide guidance (our best educated guess) to avoid the potential negative effects of potash applications.

Do not apply potash to soils that do not need it, soils that have K levels above the maintenance range (see table below).

Cation exchange capacity	Low soil test Build-up range	Maintenance Range Crop removal recommended	High soil test No K fertilizer recommended
meq/100g	----- Soil test K level in parts per million or (pounds per acre) -----		
≤5	<100 (<200)	100-130 (200-260)	>130 (>260)
>5	<120 (<240)	120-170 (240-340)	>170 (>340)

On soils in the maintenance range (see table above) apply potash to replace crop removal plus 20 pounds K₂O per acre. Crop removal is 0.2 pounds of K₂O per bushel of corn and 1.15 pounds of K₂O per bushel of soybean. Do not apply the potash within 2 weeks ahead of planting soybeans and avoid applying to corn during this time frame as well, if possible. Rainfall between application and planting will likely lessen the potential for detrimental effects, but at least an inch or two of percolating rainfall will be needed to move the chloride out of the seed zone in silt loam and heavier-textured soils.

Only apply build-up rates of potash at low soil test levels (**see table on previous page**) that warrant a high application rate and only fertilize for two crops on soils that can hold the potassium - those having a cation exchange capacity of at least 5 meq/100 g and preferably closer to 10 meq/100g. Build-up application rates can be found on p. 38 of the [Tri-State Fertilizer Recommendations](#)². High rates of potash with the purpose to build-up the soil or to support two crops' worth should be applied in the fall of the year. Most of the time in Indiana, winter and spring rainfall will move chloride downward in the soil profile and it is not likely to be an issue come planting time. Potassium will still remain in the soil because it is attracted to the cation exchange capacity and substantial amounts will not be lost over the winter.

The approach is a little different for sandier (low cation exchange capacity) soils. For soils with cation exchange capacities less than 5 meq/100 g make annual applications of potash and do not try and build soil test levels to the maintenance range. Potassium will leach through the soil more easily the lower the cation exchange. If soil test levels are just below the maintenance range, crop removal rates should be adequate to provide for the crop. At soil test levels far less than the critical level higher rates may be needed, but they should be applied well before planting if applied in the spring. If field conditions do not allow this early spring potash application, then wait and apply the potash after the corn or soybeans have emerged through early vegetative stages (e.g., V2 or V3) and consider reducing the potash application rate. Currently we are conducting research to try and determine what rates are needed to maximize profit on soils low in K, if one doesn't intend to add extra K to build up soil test levels.

¹Watch Your Crop K Applications, Too Much Potassium Can Sometimes Ding Corn, Soybean Yields. Emily Unglesbee.

<https://www.dtnpf.com/agriculture/web/ag/crops/article/2020/12/02/much-potassium-can-sometimes-ding>

²Tri-State Fertilizer Recommendations for Corn, Soybean, Wheat, and Alfalfa. Bulletin 974. 2020. Culman, Fulford, Camberato, Steinke. College of Food, Agricultural, and Environmental Sciences. Columbus, OH: The Ohio State University.

<https://www.canr.msu.edu/soilfertility/Files/Main-page/FINAL%20PRINT.pdf>

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