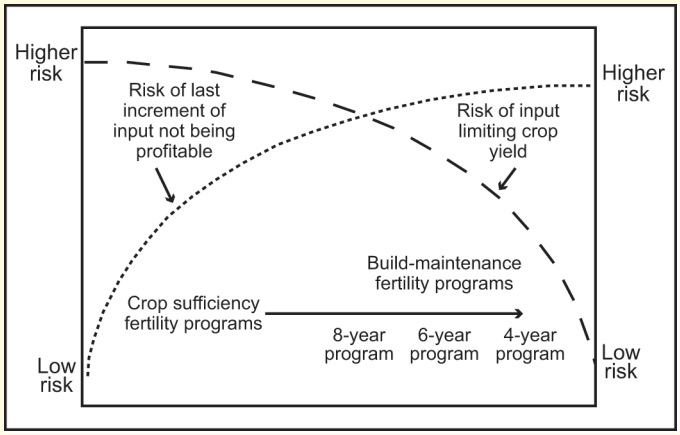
Module 5.2-1 High soil test levels allow flexibility in timing of phosphorus and potassium application. The Kansas State University (KSU) soil testing laboratory makes fertilizer recommendations based on the sufficiency approach or the build-maintenance approach to nutrient management. The customer chooses which of these approaches best fits their operation. The goal of the sufficiency approach is to apply just enough P and/or K to maximize profitability in the year of application, but minimize nutrient applications and fertilizer costs. The objective of build-maintenance fertility programs is to manage P and/or K soil test levels as controllable variables. At low soil test values, recommendations are intended to apply enough P and/or K to both meet the nutrient needs of the immediate crop and to build soil test levels to a non-limiting value, above the critical level. KSU faculty generated some classic information and figures on relationships among soil test level, crop yield, and fertilizer recommendations. The generalized relationship in the following graph shows how as soil test level increases flexibility in timing also increases, and the risk of input (fertilizer) limiting crop yield is reduced. **Source:** Leikam, D.F., et al. 2003. Better Crops with Plant Food. Vol. 87, No. 3, p. 6-10. For more information, see Section 8.5.



Submitted by W.M. Stewart, IPNI, USA, December 2011.

Module 5.3-1 Spring applied nitrogen increases nitrogen recovery and profit for corn in southern Minnesota. A long-term U.S. Corn Belt study conducted in Waseca, MN compared fall application of ammonia with and without a nitrification inhibitor (N-Serve, or nitrapyrin) to spring preplant application without the nitrification inhibitor. The table below shows the result of this 15-year study. In short, the data show that applications of N (as ammonia) in the late fall with the nitrification inhibitor and spring preplant were best management practices. However, it should be noted that when spring conditions were wet the spring application resulted in substantially greater yield and profit than fall+N-Serve. Overall, the least risky timing option was spring preplant, followed by fall+N-Serve, with fall (no inhibitor) being the most risky and least efficient. Thus, N application for corn should be avoided in areas with warm/open winters, and where it is appropriate it should be delayed until soil temperature is below 50°F and expected to continue cooling so as to slow nitrification in the fall and avoid increased nitrate leaching and/or denitrification. Use of a nitrification inhibitor can help further delay nitrification, but even with an inhibitor, fall application, where appropriate, should be delayed until soil temperature cools. **Source:** Randall, G. 2008. *In* Proc. 20th Annual Integrated Crop Manag. Conf., Dec. 10-11, Iowa State Univ., Ames. p. 225-235.

Parameter (mean of 15 years, 1987 to 2001)	Time of N Application		
	Fall	Fall + N-Serve	Spring
Yield (bu/A)	144	153	156
Economic return over fall N ($/A/yr)[1]	-- --	$28	$48
Flow-weighted NO_3-N (mg/L) in tile drainage water	14.1	12.2	12
Nitrogen recovery in grain (%)[2]	38	46	47

[1] Based on N @ $0.70/lb N; N-Serve = $8.00/A; Corn = $4.00/bu
[2] Nitrogen content of the corn grain as a percent of the amount of fertilizer N applied.

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