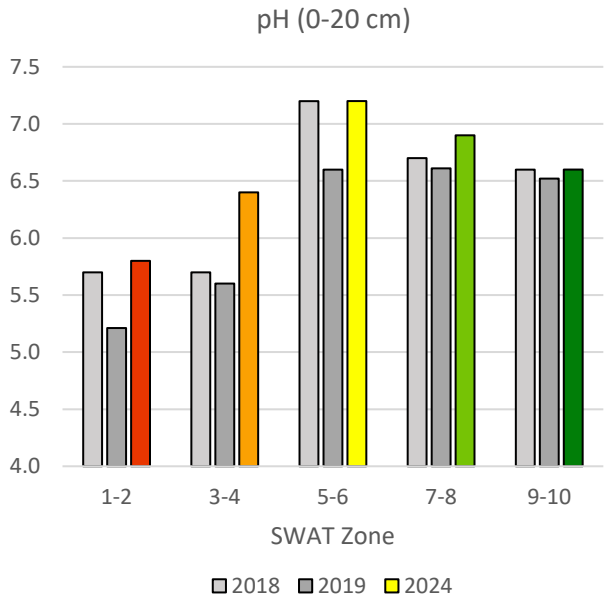
CASE STUDY 5: VARIABLE RATE LIME

Liming of acid soils is a common practice in many parts of the world. Very acid soils (pH < 5.5) can severely limit yield and nutrient use efficiency leading to loss of nitrogen, phosphorus, and organic carbon. pH can vary across many landscapes, often based on parent material, soil texture, and buffer capacity. This presents a significant opportunity to apply pH amendments only to areas that need it, such as wood ash in this case study (Figure 1). In many cases, this can be a simple on/off prescription, or when needed, a prescription with multiple rates.

In this example, soil pH was tested in 2018 and again in 2019, confirming SWAT zones 1-4 had low enough pH to justify liming, and without treatment would continue to acidify further due to relatively low buffer capacity. In 2022 a prescription was used to apply wood ash in zones 1-4, and in 2024 a follow up pH test showed an increase in pH, with further improvement likely as the ash has more time to react. Rather than applying product to the entire field, treating only the areas that needed it reduced the amount of product used by 60%. The soil pH test results and the variable lime application rate are shown in Figure 2.

Figure 1. *Wood ash used to amend pH. Wood ash is also a source of carbon and several essential nutrients.*



APPLICATION SUMMARY

Zone	Area	Yield Goal	Layer 1
	Acres	bu/ac	Ash
1	9.7	75	6
2	34.1	80	6
3	40.5	85	6
4	42.7	90	6
5	40.3	100	0
6	43.2	95	0
7	38.9	90	0
8	31.2	85	0
9	20.7	75	0
10	10.4	70	0
	311.7	**87.6**	**2.4**

Figure 2*. Results from soil pH tests in 2018 and 2019 (top) used to develop prescription for wood ash application for zones 1-4 (bottom). Soil pH response tested again in 2024 showed the improvement (top).*