Potential Reasons of Increased New England States Phosphorus Pollution: A Review

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Introduction:

After the green revolution that followed World War 2, the use of chemical fertilizers increased to increase yields but at the expense of the environment. The common usage of P fertilizers has led to P pollution in the waterways of the United States of America due to lack of preventative measures to prevent the erosion of P in bodies of water. As a result, wildlife and the environment are at risk. Studies carried out by the Environmental Protection Agency (EPA) has reported and confirmed the presence of P pollution in the Northeastern United States of America .

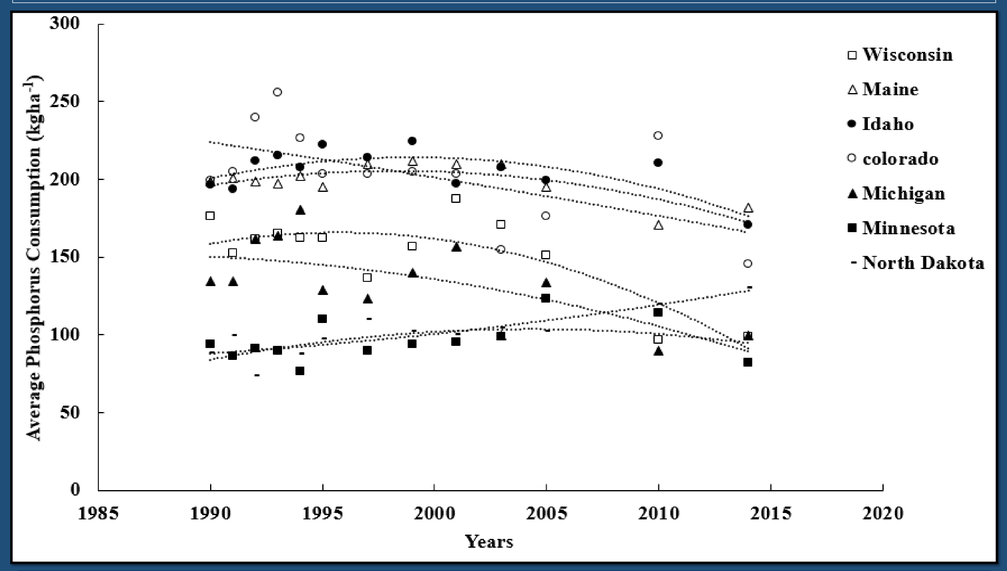

Fig. 1. The trend of average phosphorus (kg.ha-1) used under potato in the key potato-growing states. The polynomial regression analysis was utilized to a potential relationship between years and phoasphorus use. Source: USDA, National Agricultural Statistics Service, and New England Ag Statistics.

Methodology:

Nutrient analysis data from UMaine Soil Testing Laboratory (UMSTL) was used. Loam, gravelly loam, sandy loam, and silty loam with a parent material of glacial outwash are the soils present in Aroostook County, Maine. Table 1.

Table 1: Before planting at the site, a comprehensive soil test was conducted. Soil samples were collected from 0-15cm deep and 15-46 cm deep from the study using a standard soil probe.

Location/ Soil Sample Depth	OM	pH	OM	pH	P	K	Ca	Mg	N	S	B	Cu	Fe
	%		ppm										
Easton/0–15 cm	3.4	5.4	18	386	1065	125	26	133	0.5	1.25	4.9	5.4	1.0
Easton/15–46 cm	3.1	5.5	20	459	1065	114	18	167	0.4	1.19	4.6	6.1	1.0

Results:

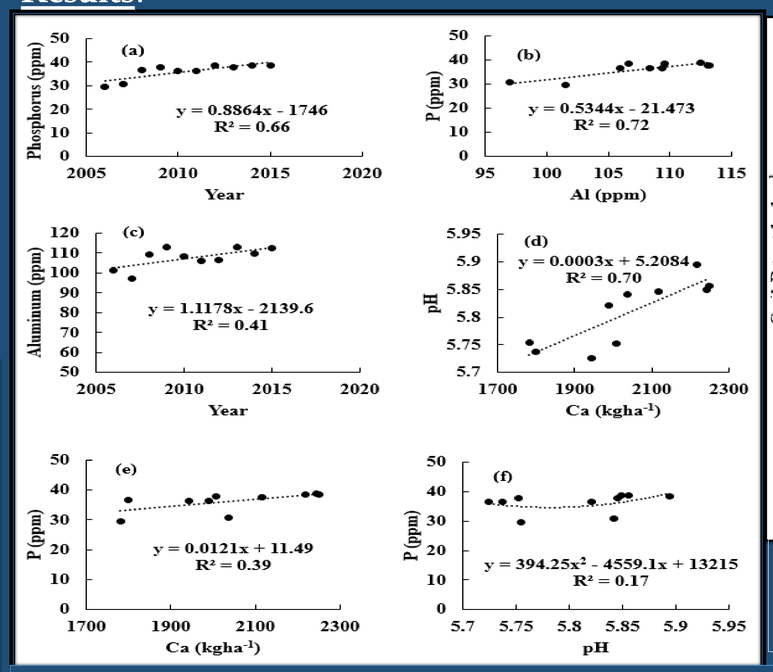

Fig. 2: The aluminum and soil phosphorous levels in Aroostook County, Maine. The University of Maine Soil Testing Laboratory has been receiving soil samples since 2006. Figure 2 (a) represents the change in phosphorous levels with time (p=0.03), figure 2 (b) represents the relationship between Al and P (p=0.01), figure 2 (c) accounts for the change in aluminum levels with time (p=0.2), figure 2 (d) represents the relationship between Ca and pH (p=0.02), figure 2 (e) represents the relationship between Ca and P(p=0.2), and figure 2 (f) represents the relationship between pH and P (p=0.6). The polynomial model was used in 2 (f) because it was best suited. The trend was positive and properly depicted the significant association of soil phosphorus buildup with successive years.

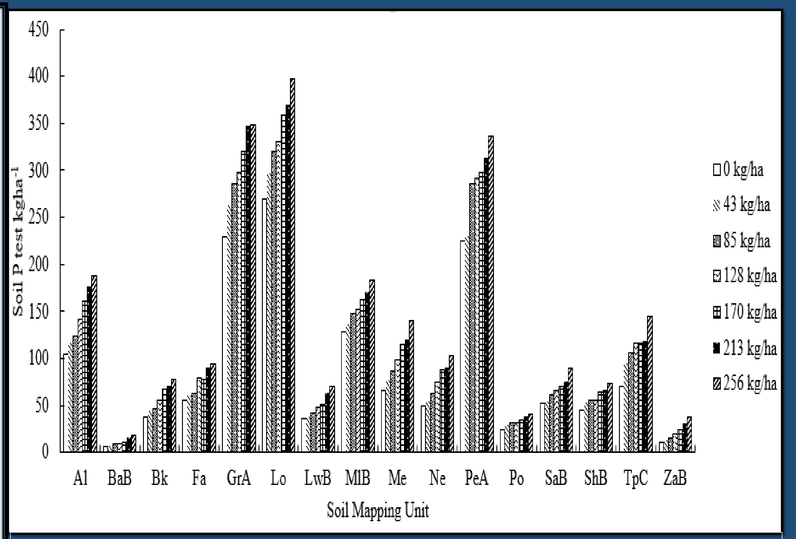

Fig.3. Representing the change n phosphorus (P) levels with seven P rates under 16 different soil mapping units in Kentucky, United States

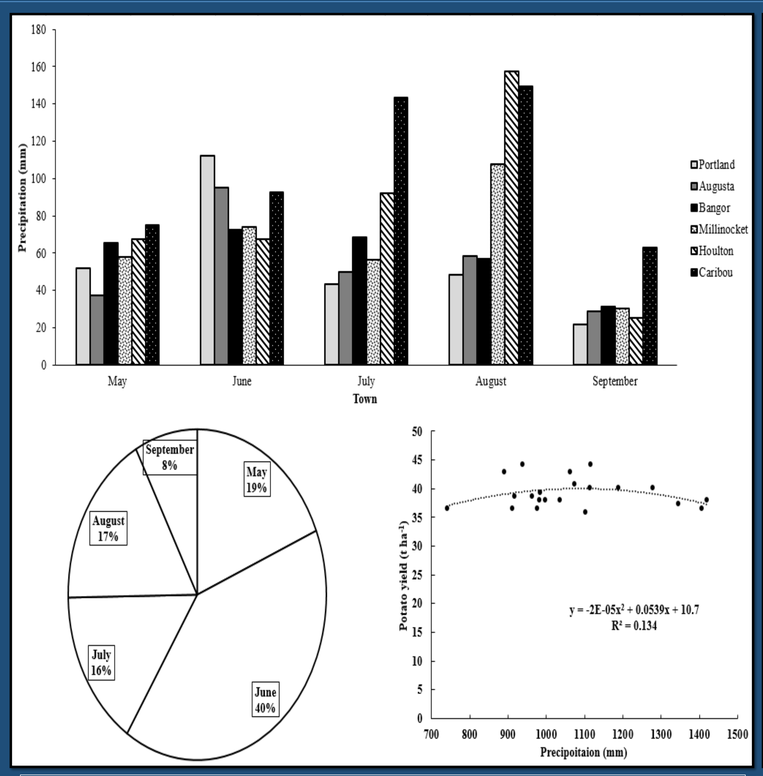

Figure 5. Represents the bar graph with a variation of rainfall in a different town of Maine from South (Portland, Augusta, and Bangor) to the north (Millinocket, Houlton, and Caribou). Pie graph represents the variation in rainfall within the months. The scattered graph represents the relationship between the yearly sum of rainfall and potato yield of last 21 years.

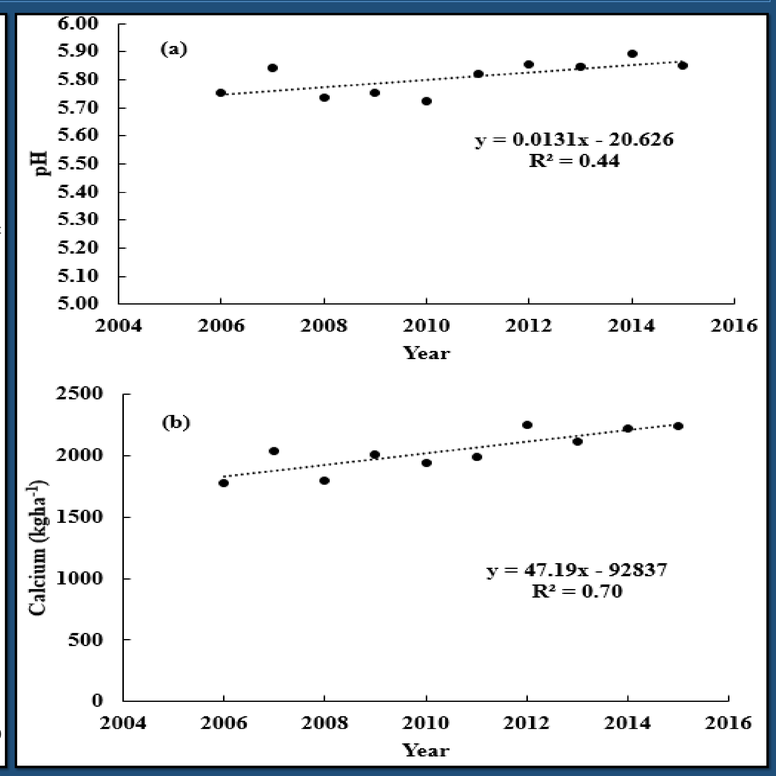

Fig. 4. The trend of change in the soil pH and calcium level over time in Aroostook County. The figure 4 (a) represents the change in pH, and figure 4 (b) is showing a shift in calcium level with time.