

The Forest Health/Nutrition Experiment: Six-year Growth and Mortality Results

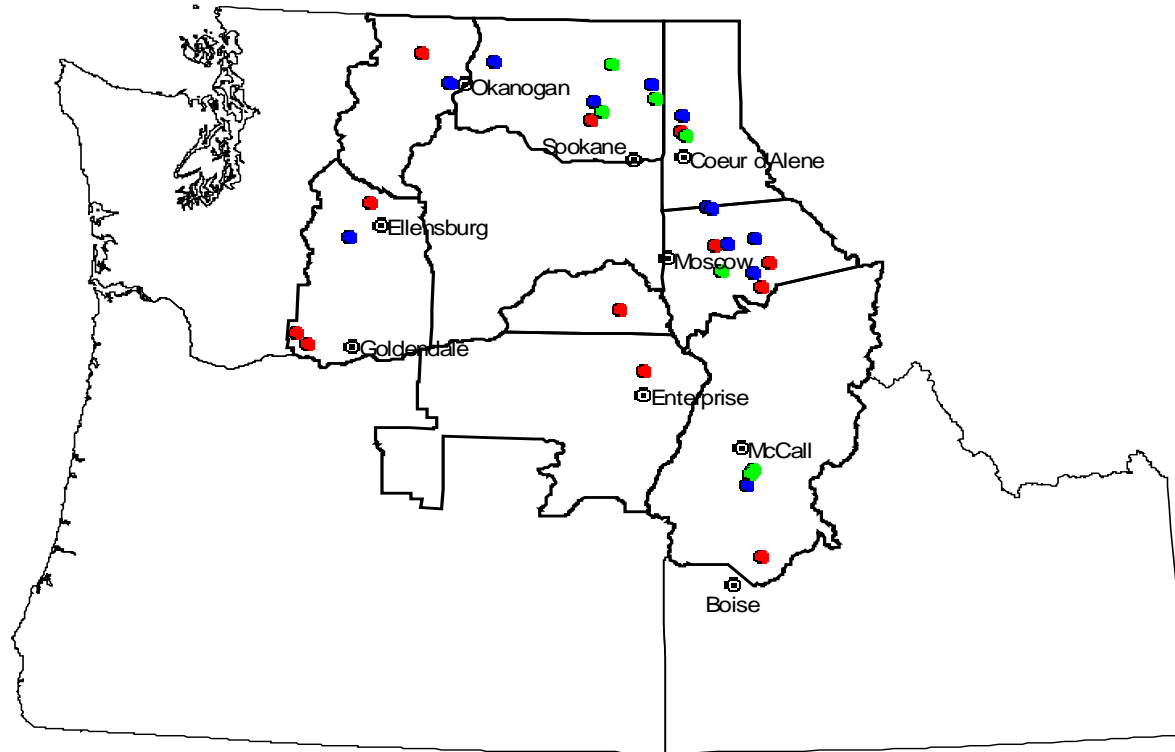


Jim Moore, Peter Mika

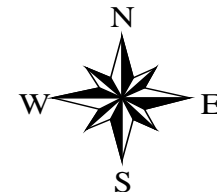
Terry Shaw & Mariann Johnston

2003 IFTNC Annual Meeting

IFTNC Forest Health / Nutrition Experimental Locations (1994-1996)



- 1994
- 1995
- 1996



Design of the experiment

- Sites stratified by 4 rock types and 3 vegetation types
- A core N and K 4-treatment experiment at all sites
- Additional fertilizer treatments tailored to site conditions
- Large experimental plots to monitor mortality

Sites Established: 1994-1996

by Rock Type and Vegetation Series

	Douglas-fir	Grand fir	Cedar/ Hemlock	TOTAL
Granite	K,B (1) K (2) N,B (1)	K (4)	K (2)	10
Basalt	N (1) R (2)	K (3)	N (1) R (2)	9
Metamorphic		K (1)	K (3)	4
Mixed	N (2)	K (2)	K (1) N (3)	8
TOTAL	9	10	12	31

N-Rate (N), Repeated N-Rate (R), N-K Response Surface (K), Bark Beetle (B)

Core Design

0#N/a
0#K/a

300#N/a
0#K/a

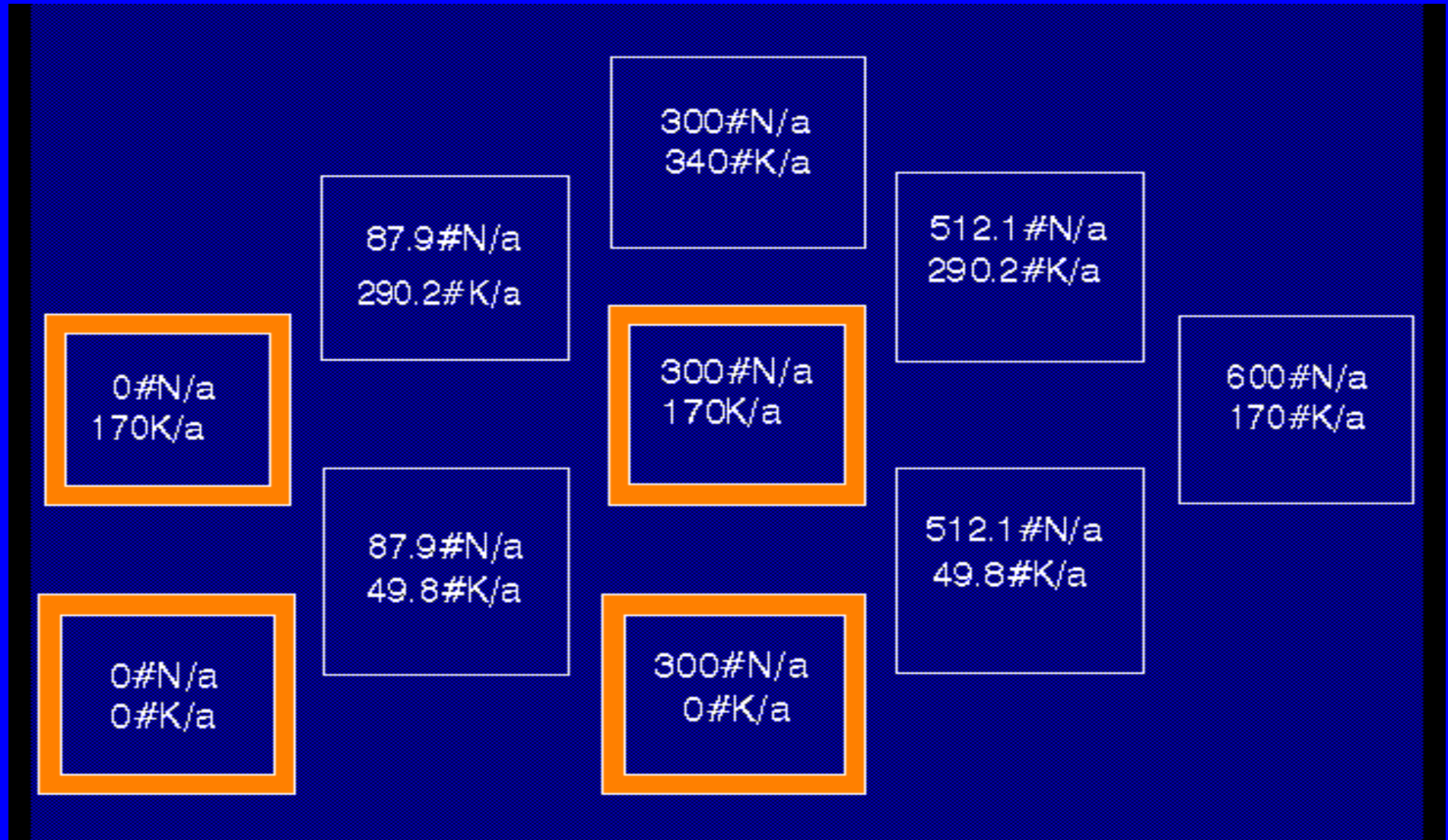
0#N/a
170#K/a

300#N/a
170#K/a

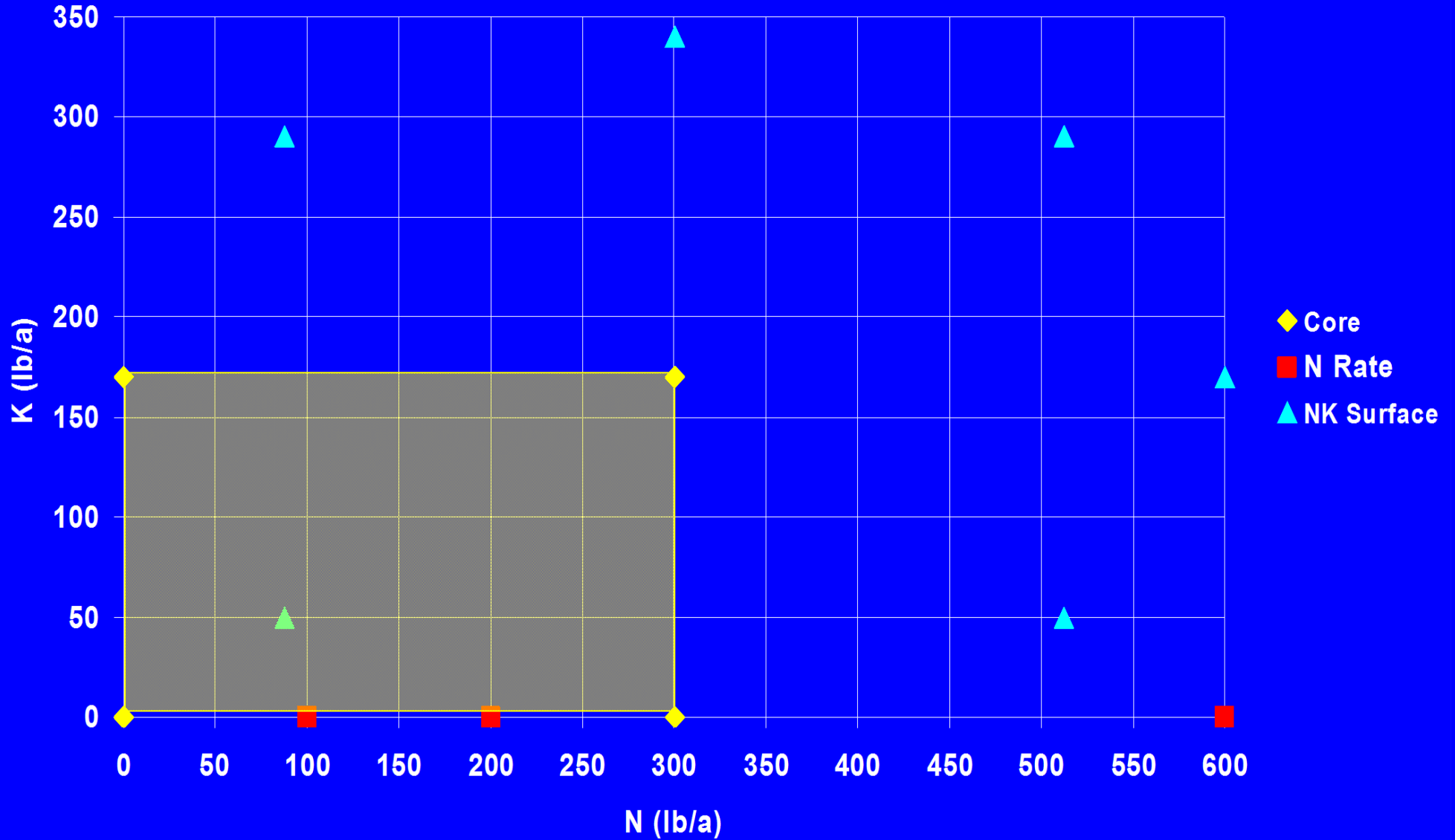
Nitrogen Rate Design

0#N/a 0#K/a	100#N/a 0#K/a	200#N/a 0#K/a	300#N/a 0#K/a	600#N/a 0#K/a
	100#N/a @ 8 years	200#N/a @ 8 years	300#N/a @ 8 years	600#N/a @ 8 years
	100#N/a @ 4 years	200#N/a @ 4 years	300#N/a @ 4 years	
0#N/a 170#K/a			300#N/a 170#K/a	

N-K Response Surface Design



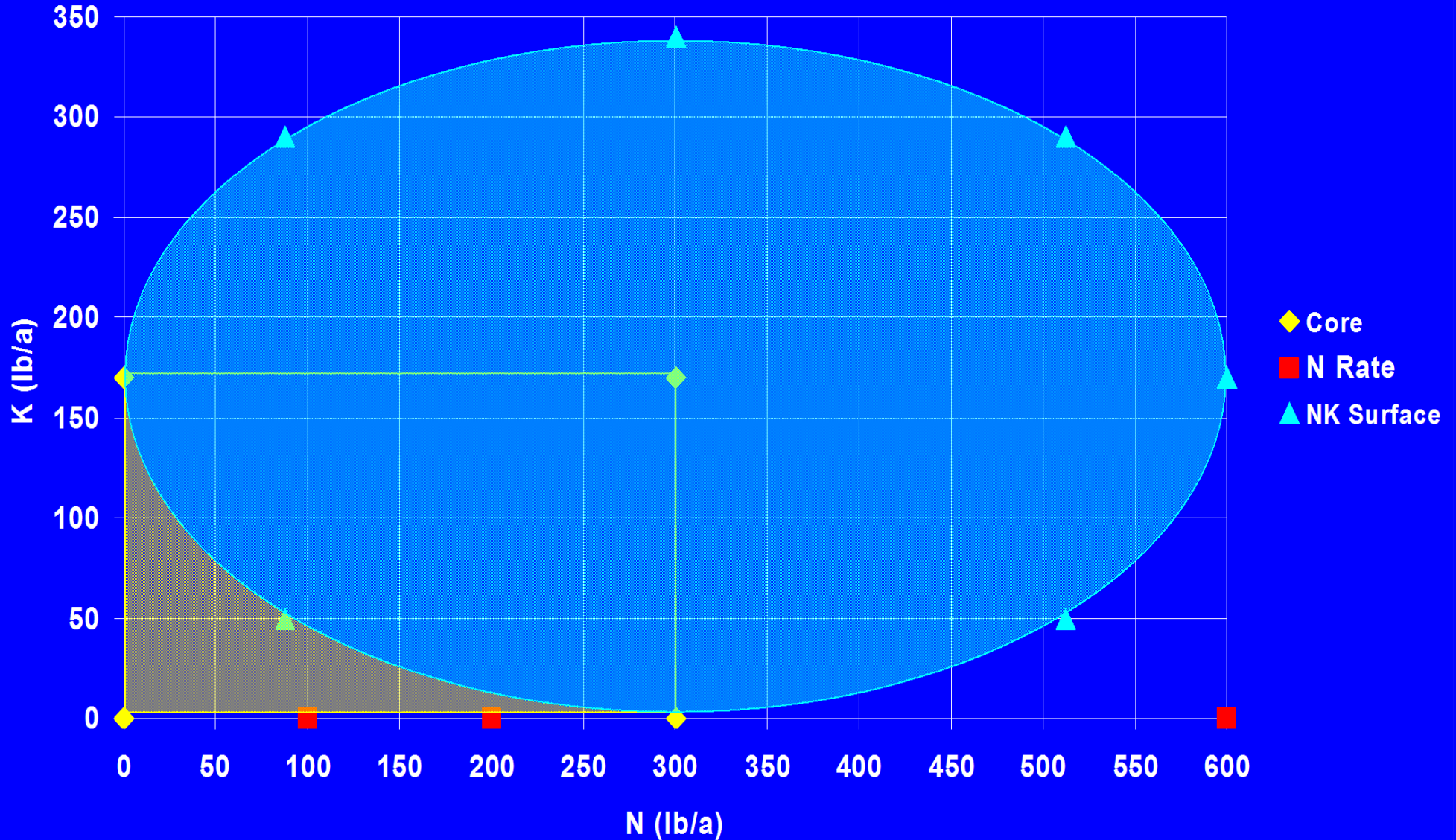
Fertilizer Application Rates: Core Coverage



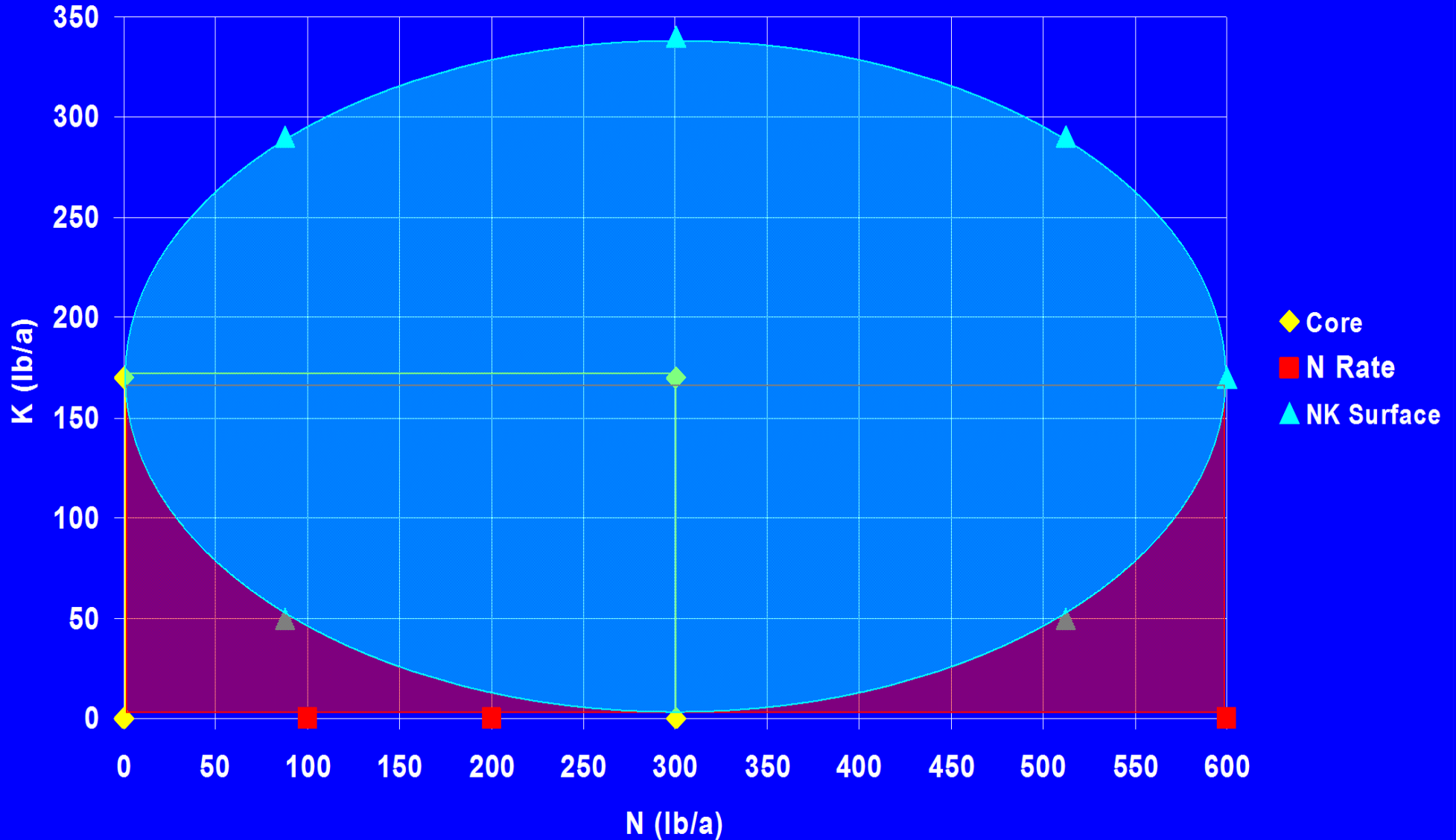
Fertilizer Application Rates: N Rate Coverage



Fertilizer Application Rates: NK Response Surface Coverage



Fertilizer Application Rates: Maximum Coverage



Topics for Today:

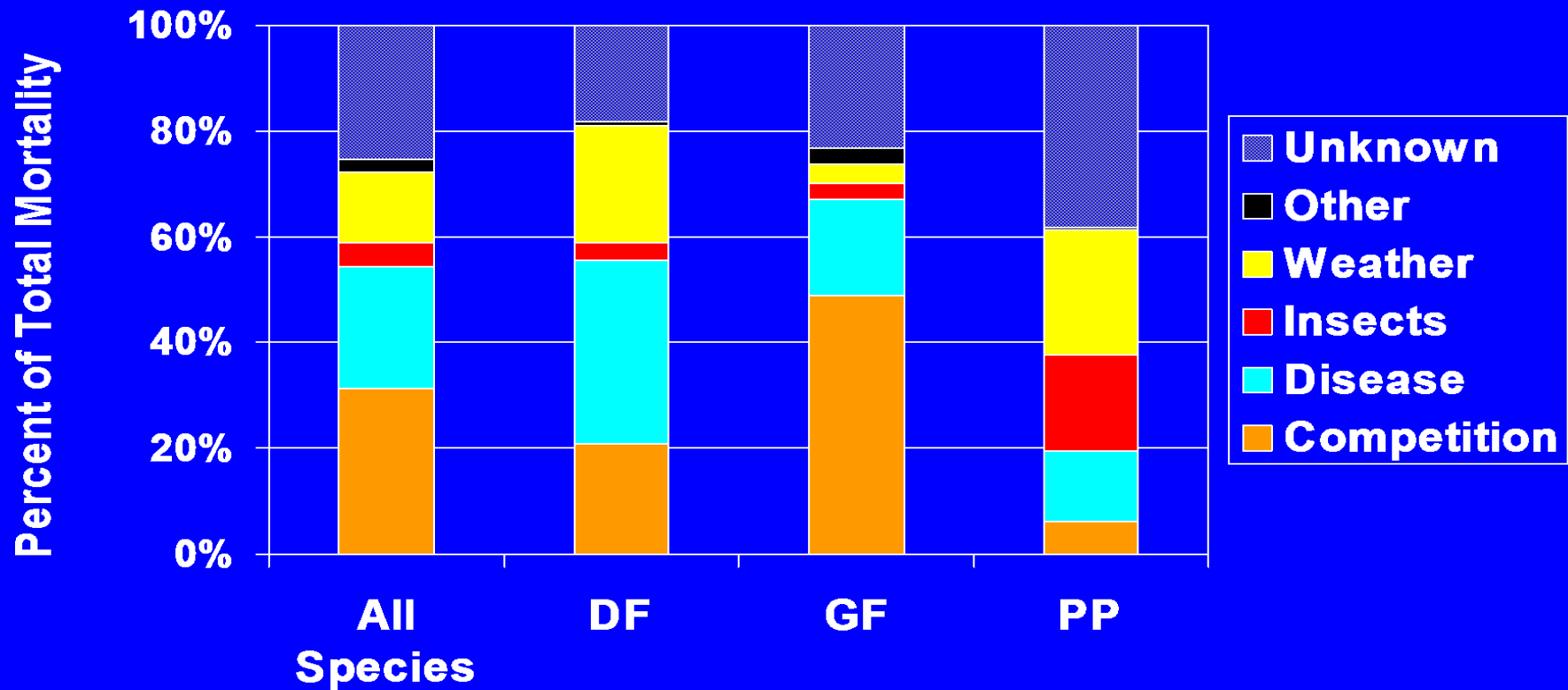
- Mortality
 - What's dying
 - Causes of mortality
 - N and K response surface for mortality
- N and K Fertilizer Effects
 - on BA growth: N and K response surface
- S Fertilizer Effects: KCl vs. K_2SO_4
- Micronutrient Effects (B, Cu, Mo, Zn)

What's Dying?

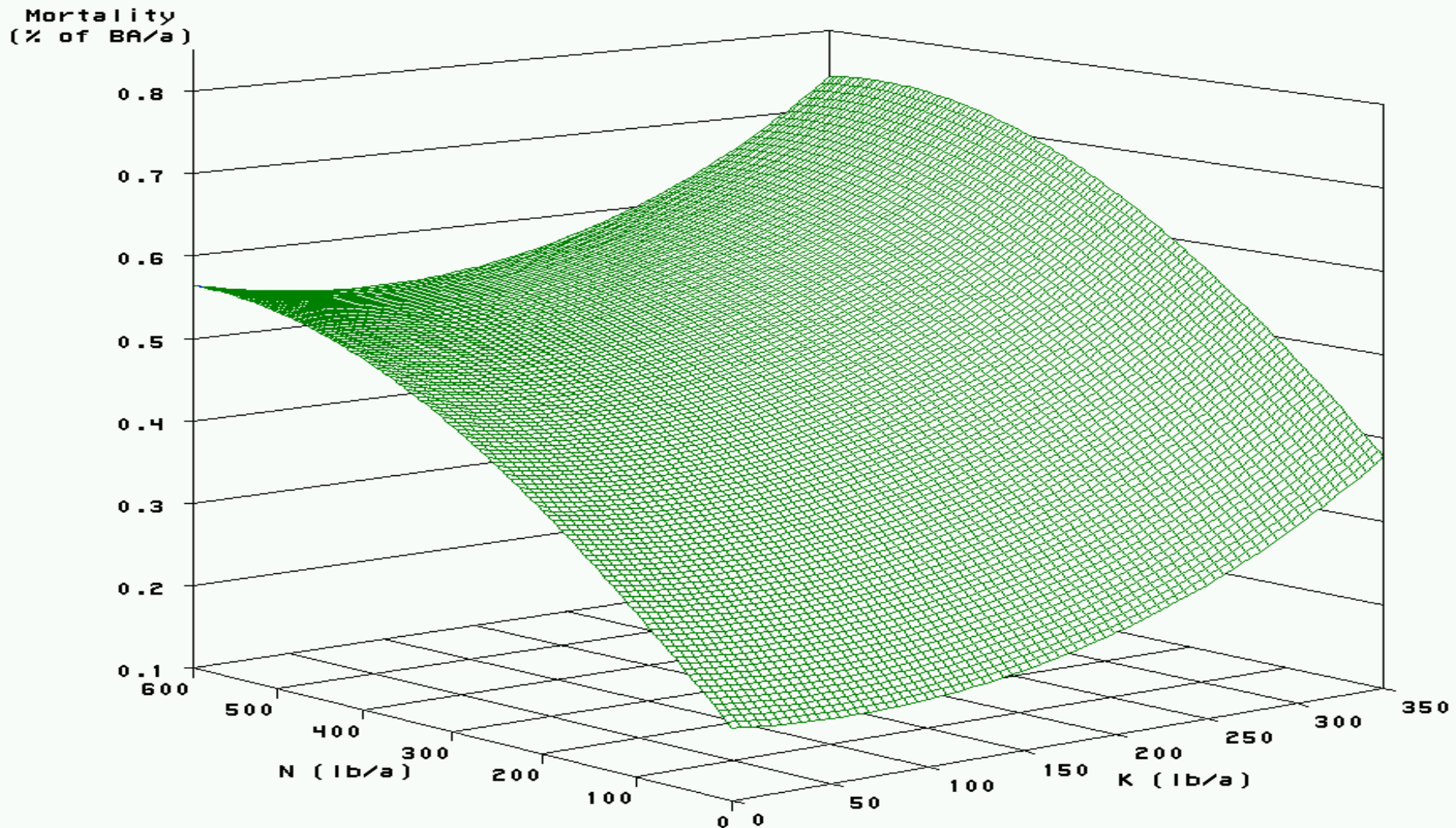
	Total Trees	Dead Trees	% Mortality
All species	44271	2080	4.70
Douglas-fir	17821	723	4.06
Grand Fir	11585	752	6.49
Ponderosa Pine	6559	165	2.52
Western Redcedar	3575	158	4.42
Lodgepole Pine	1724	120	6.96
Western Larch	1563	53	3.39

	Mean DBH	Inner-Quartile Range
All trees	6.8 inches	3.6 to 9.3 inches
Dead trees	4.4 inches	1.2 to 6.3 inches

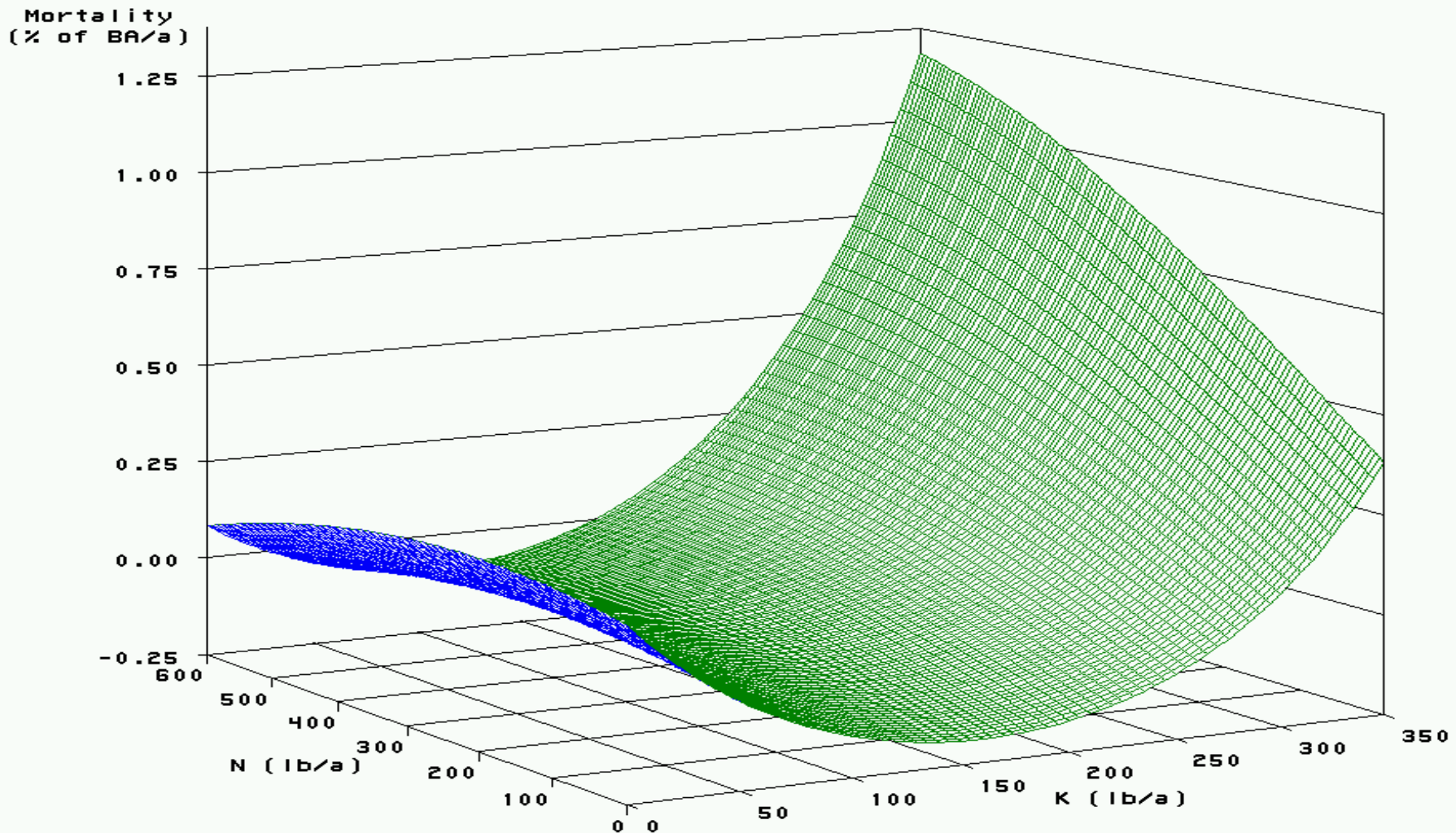
Causes of Mortality



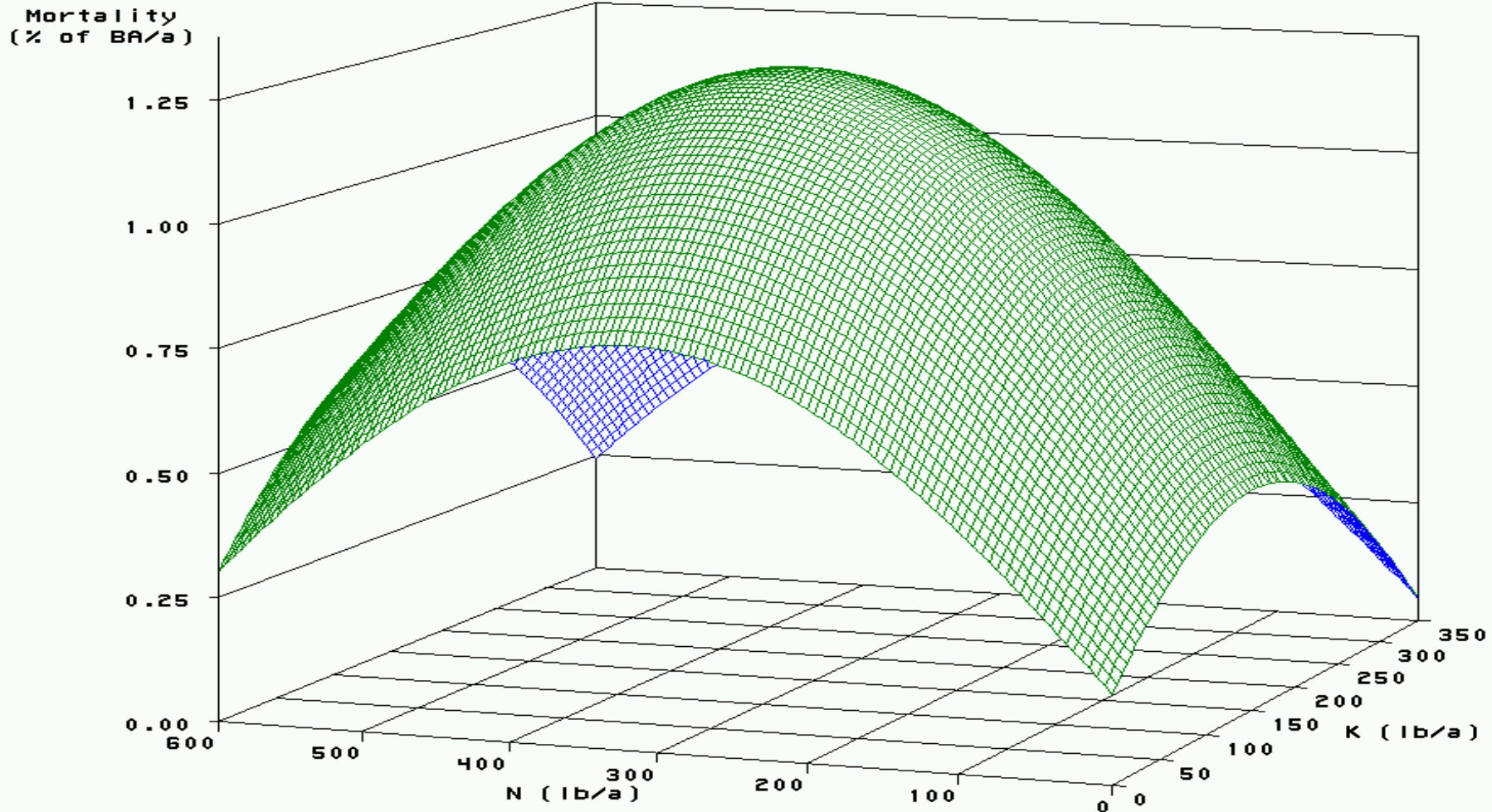
N and K fertilizer effects on 6-year mortality (% of BA/a)



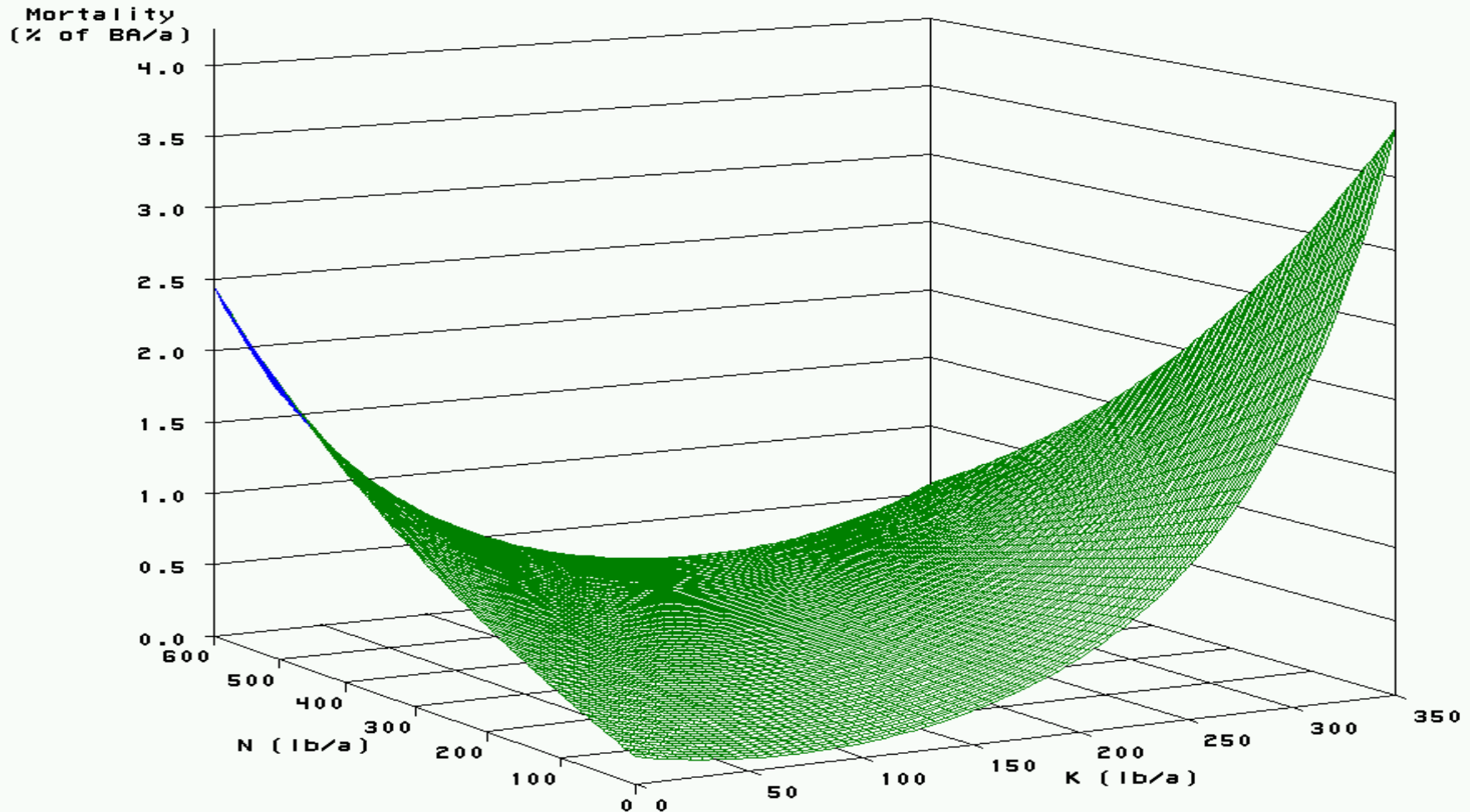
N and K fertilizer effects on 6-year mortality (% of BA/a) Basalt, Grand Fir Series



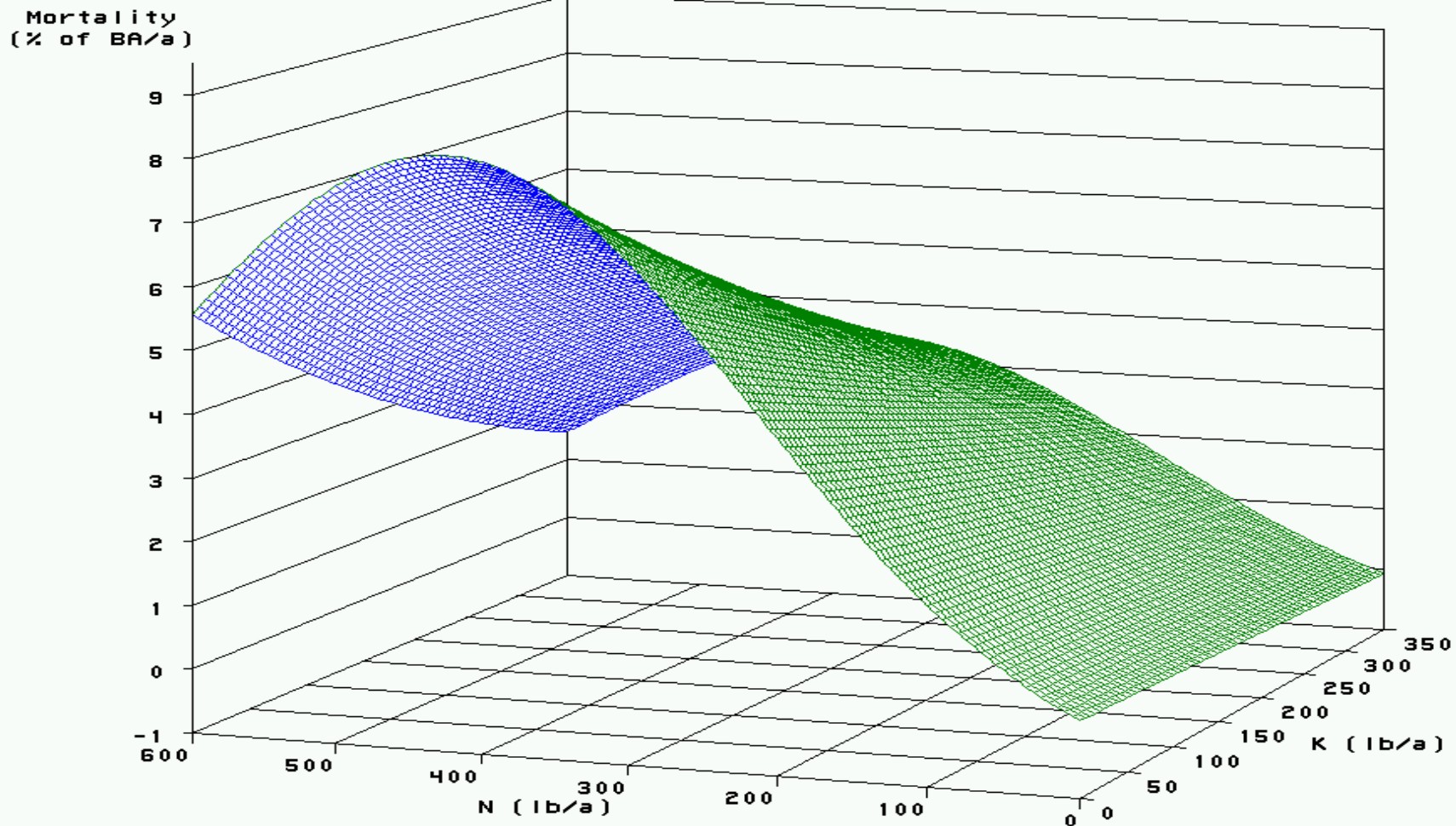
N and K fertilizer effects on 6-year mortality (% of BA/a) Granite, Douglas-fir Series



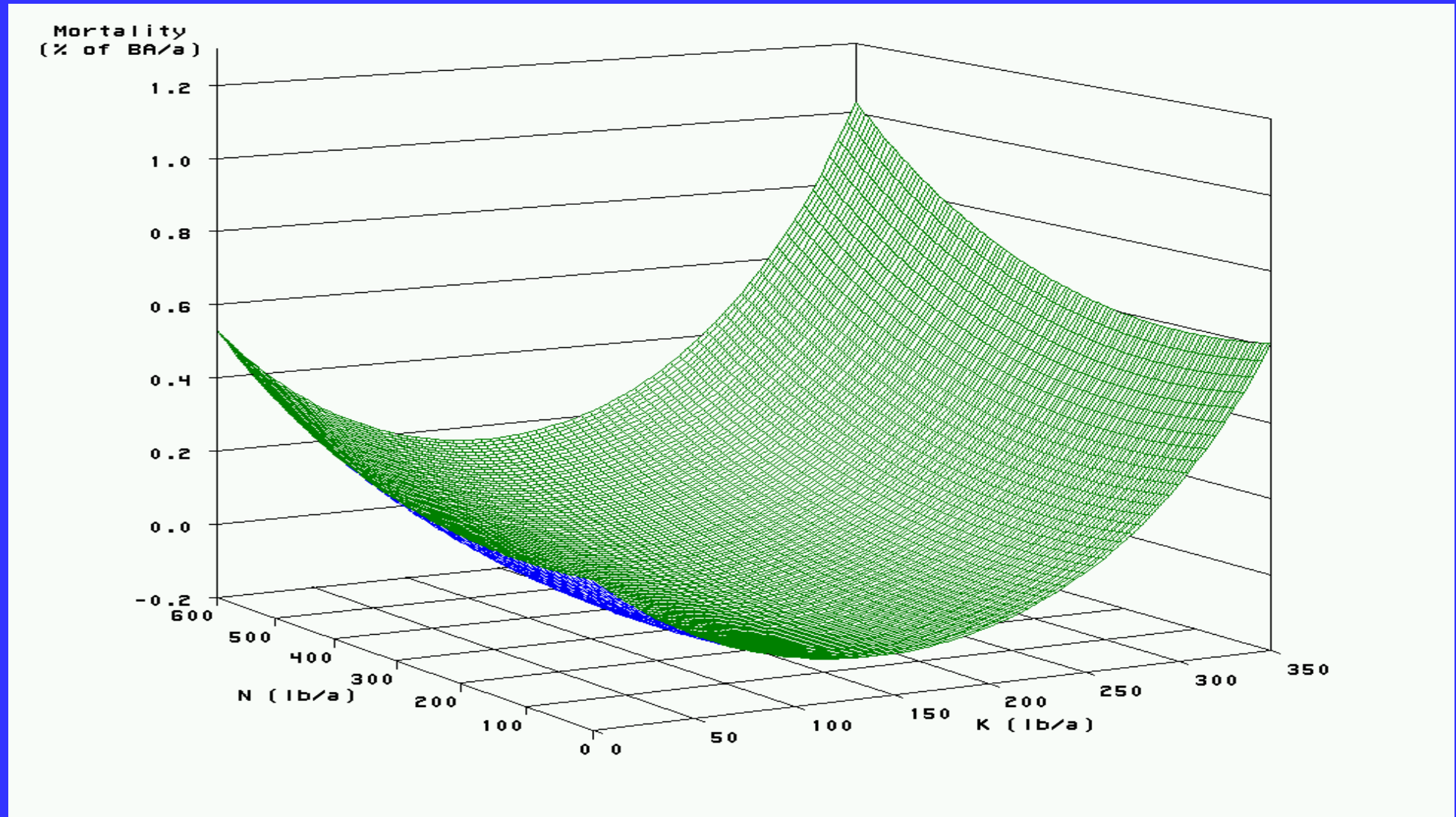
N and K fertilizer effects on 6-year mortality (% of BA/a) Granite, Western Redcedar/Western Hemlock Series



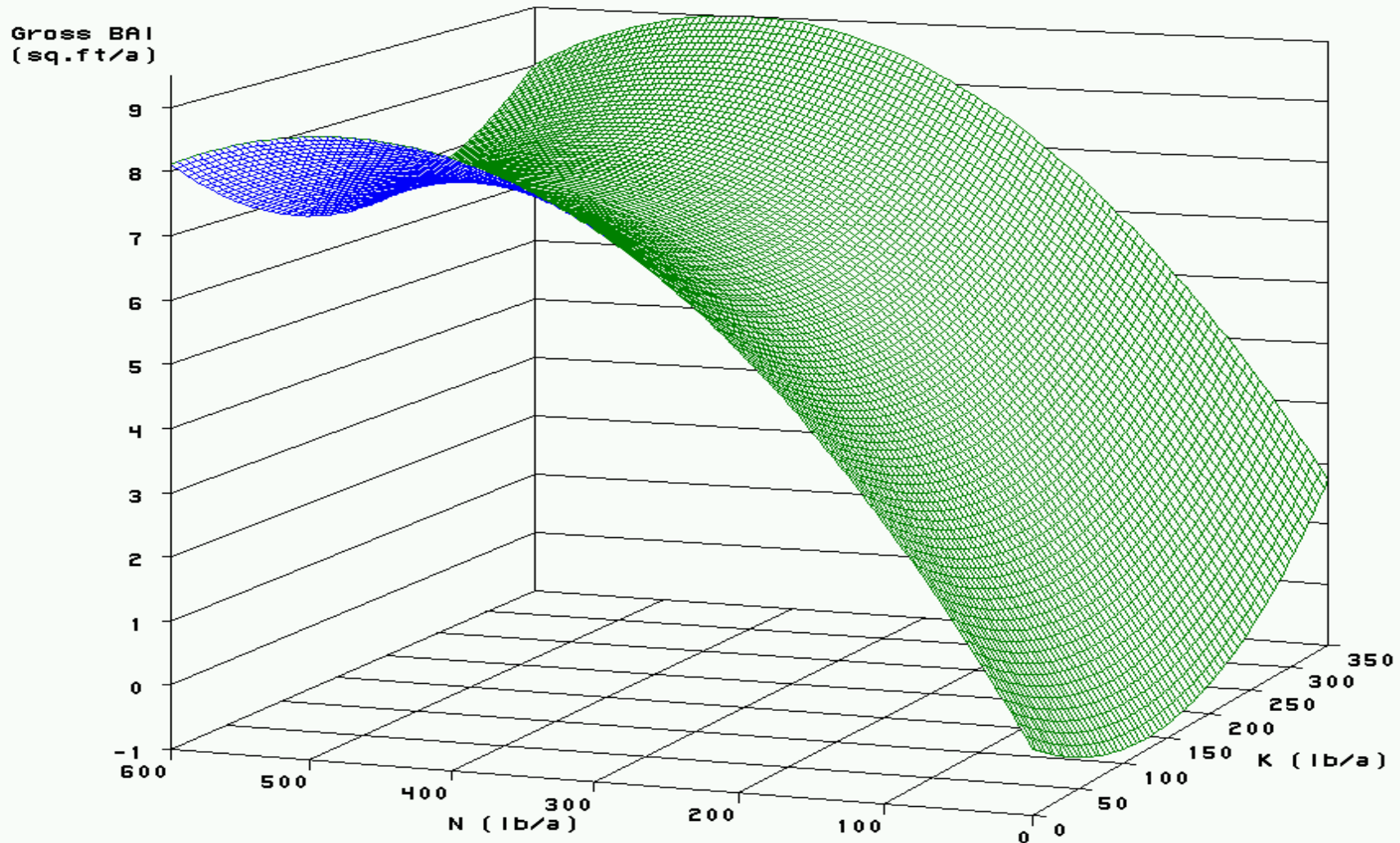
N and K fertilizer effects on 6-year mortality (% of BA/a) Metasediment, Grand Fir Series



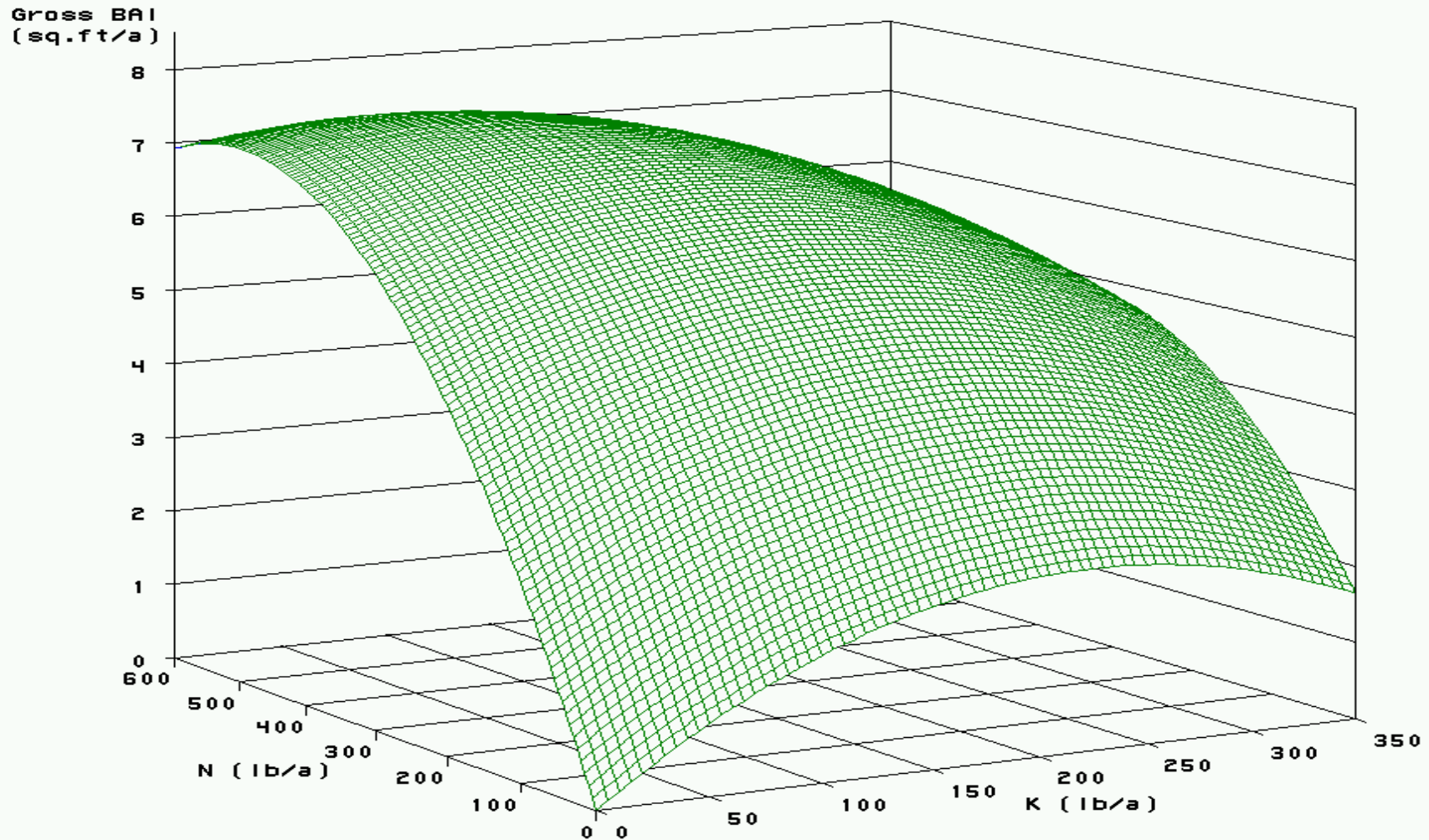
N and K fertilizer effects on 6-year mortality (% of BA/a) Metasediment, Western Redcedar/Western Hemlock Series



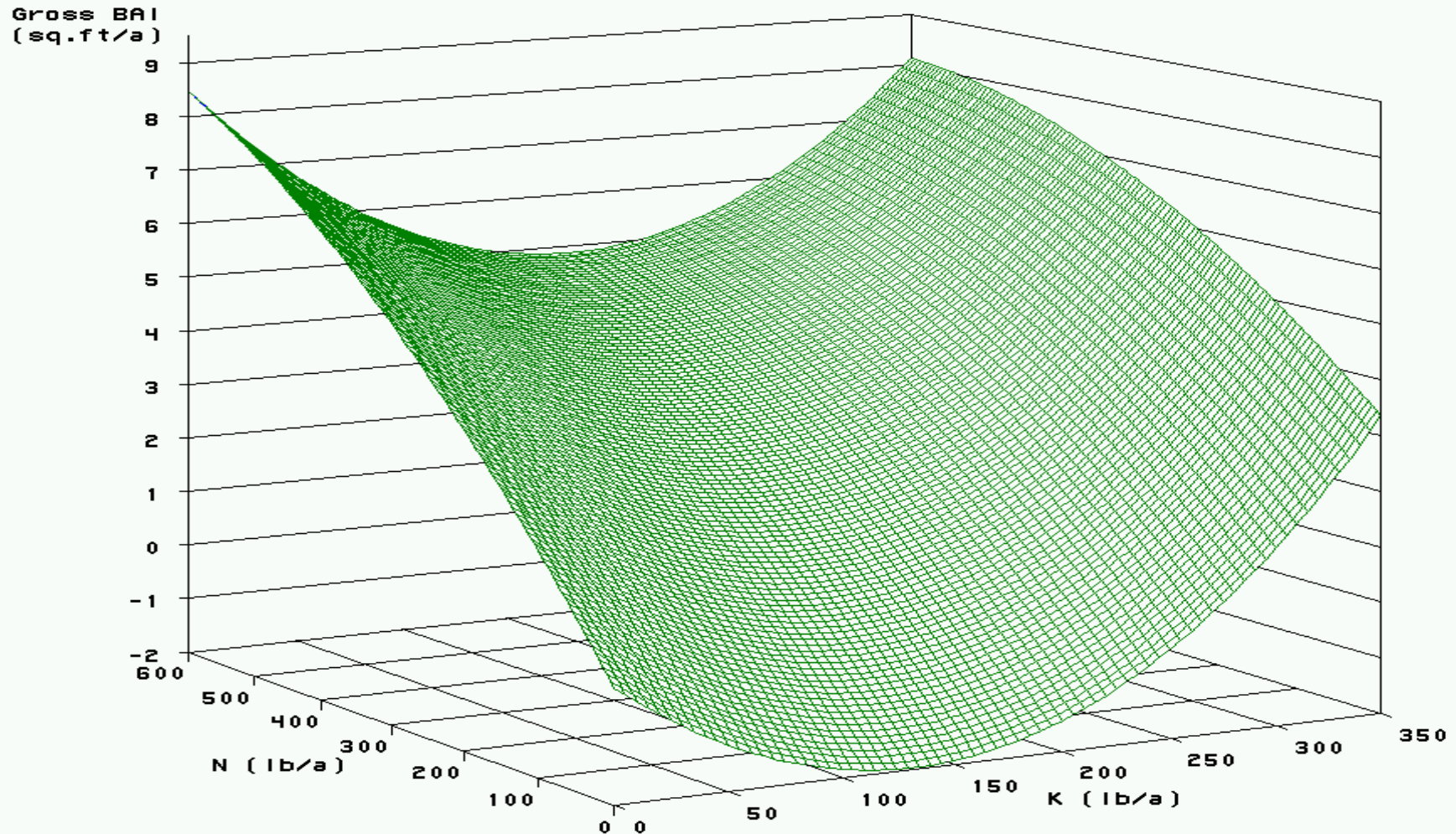
N and K fertilizer effects on 6-year gross BA growth



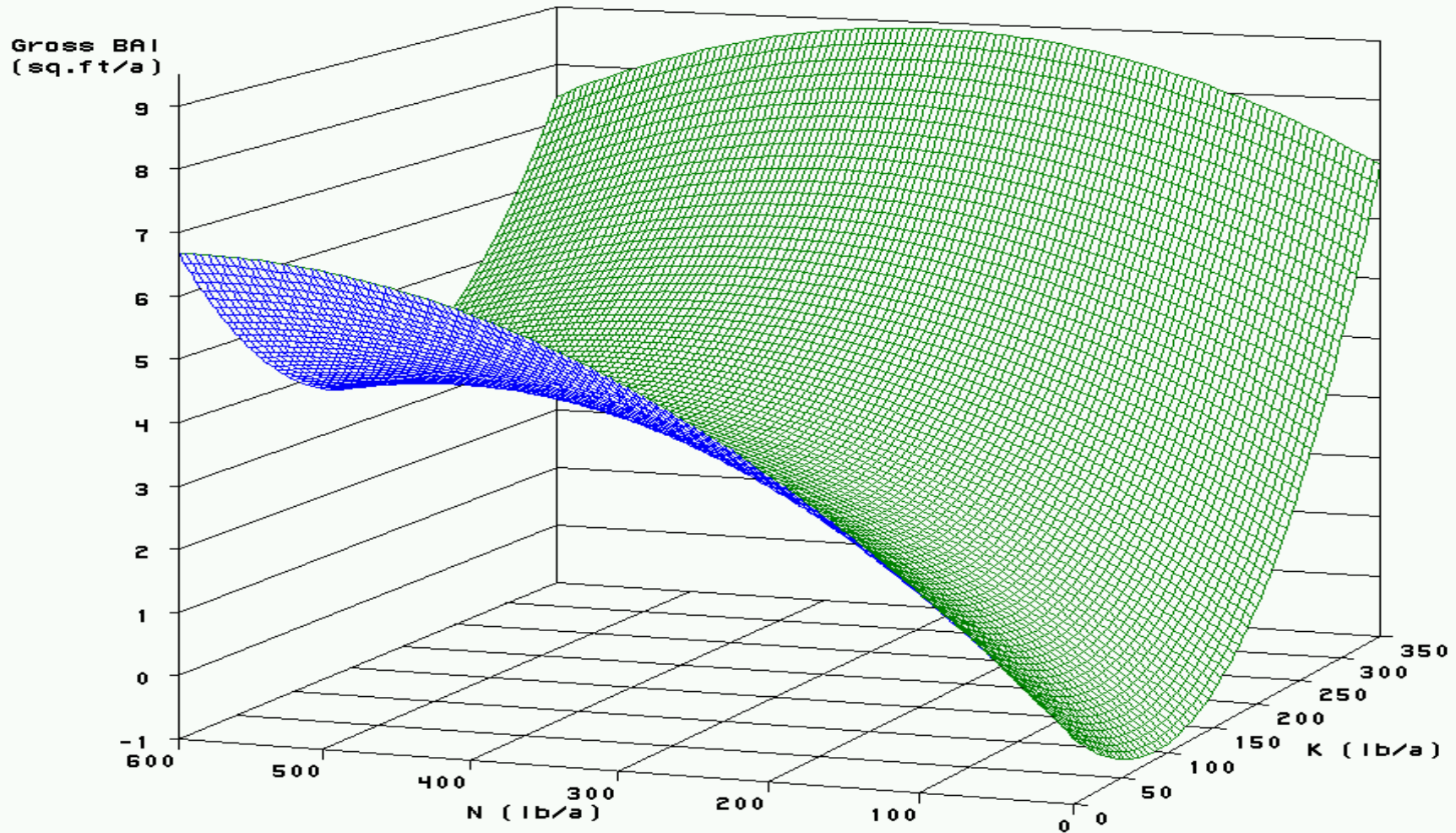
N and K fertilizer effects on 6-year gross BA growth Basalt, Grand Fir series



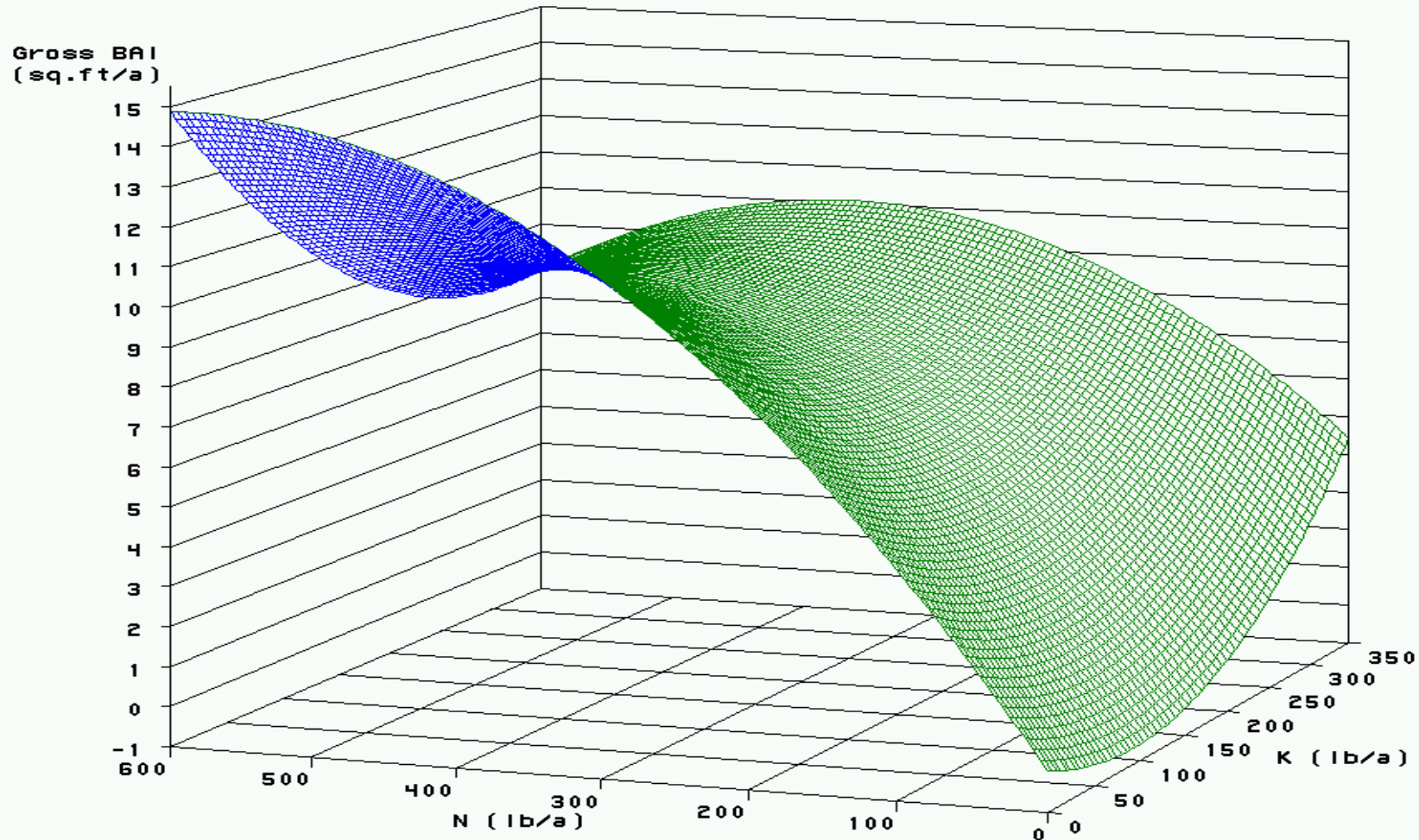
N and K fertilizer effects on 6-year gross BA growth Granite, Douglas-fir series



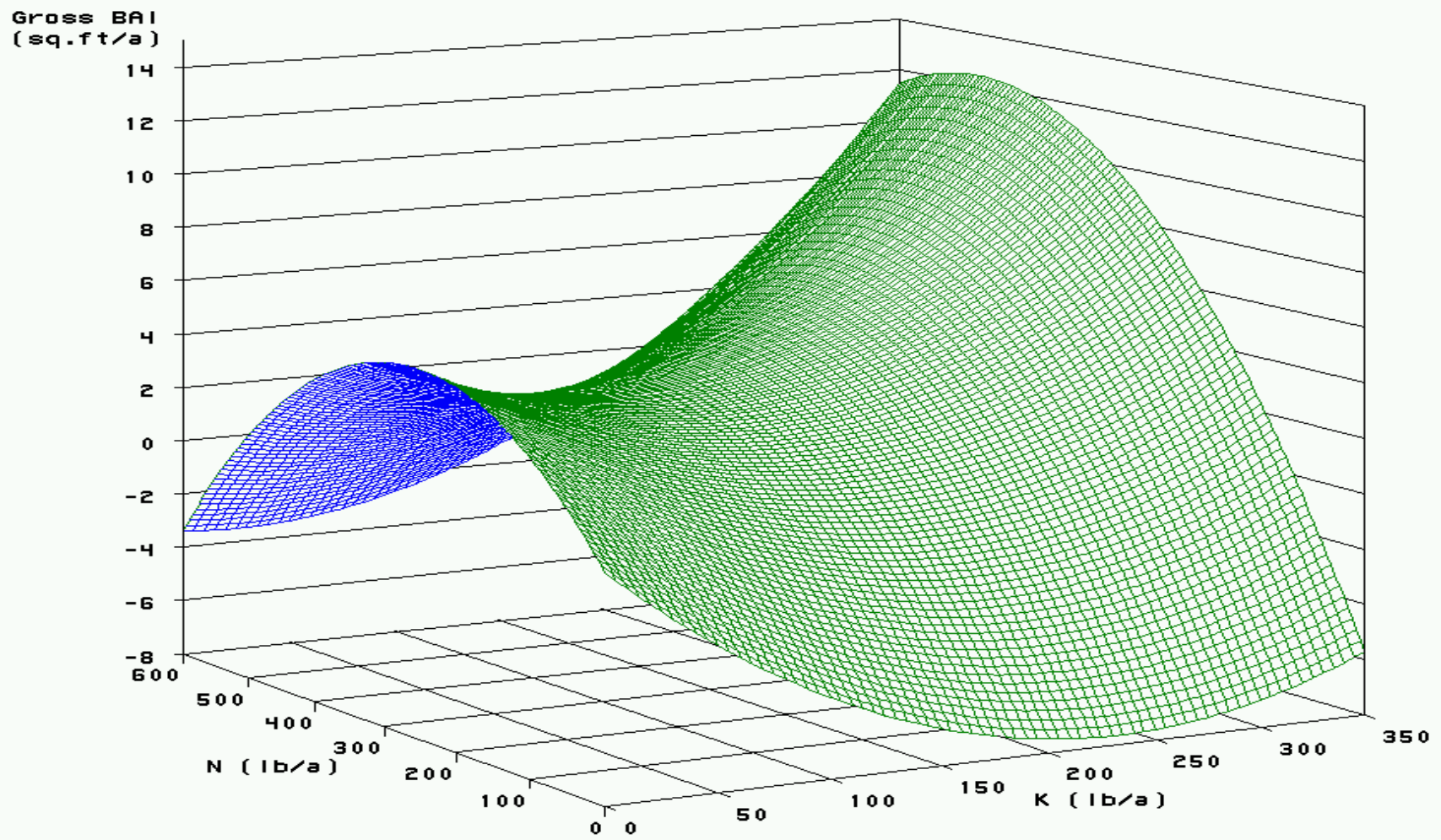
N and K fertilizer effects on 6-year gross BA growth Granite, Grand Fir series



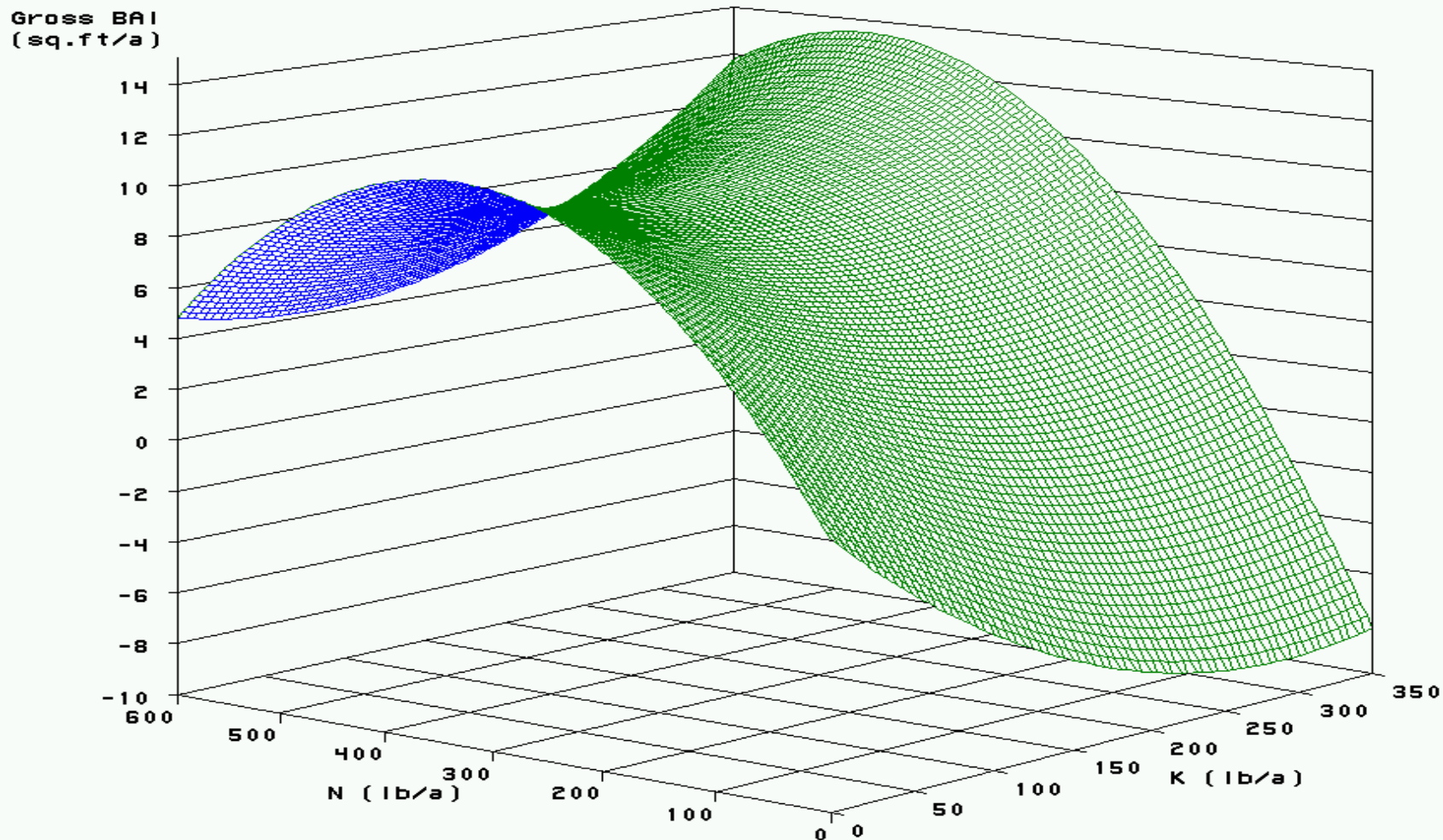
N and K fertilizer effects on 6-year gross BA growth Granite, Western Redcedar/Western Hemlock series



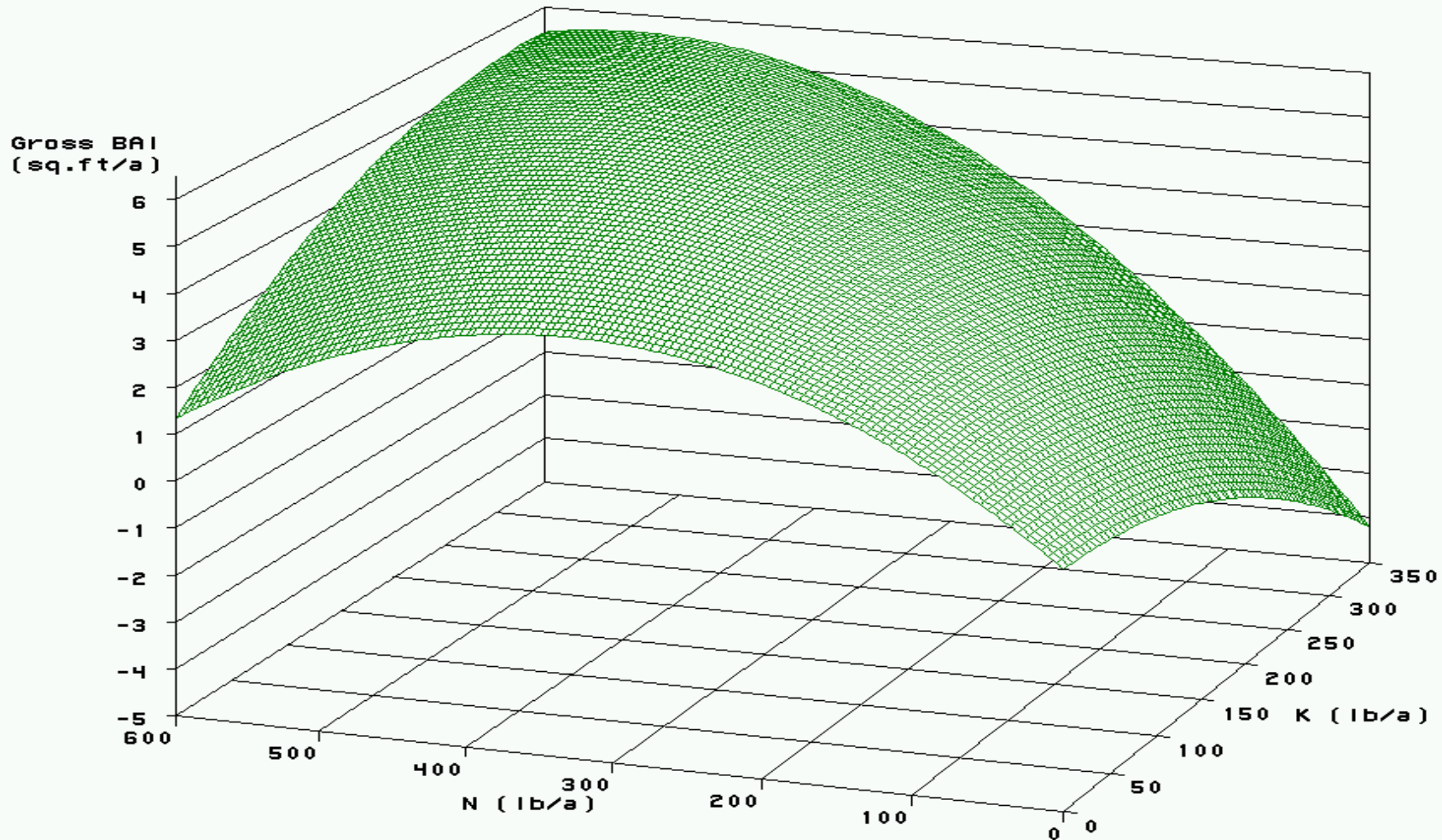
N and K fertilizer effects on 6-year gross BA growth Metasediment, Grand Fir series



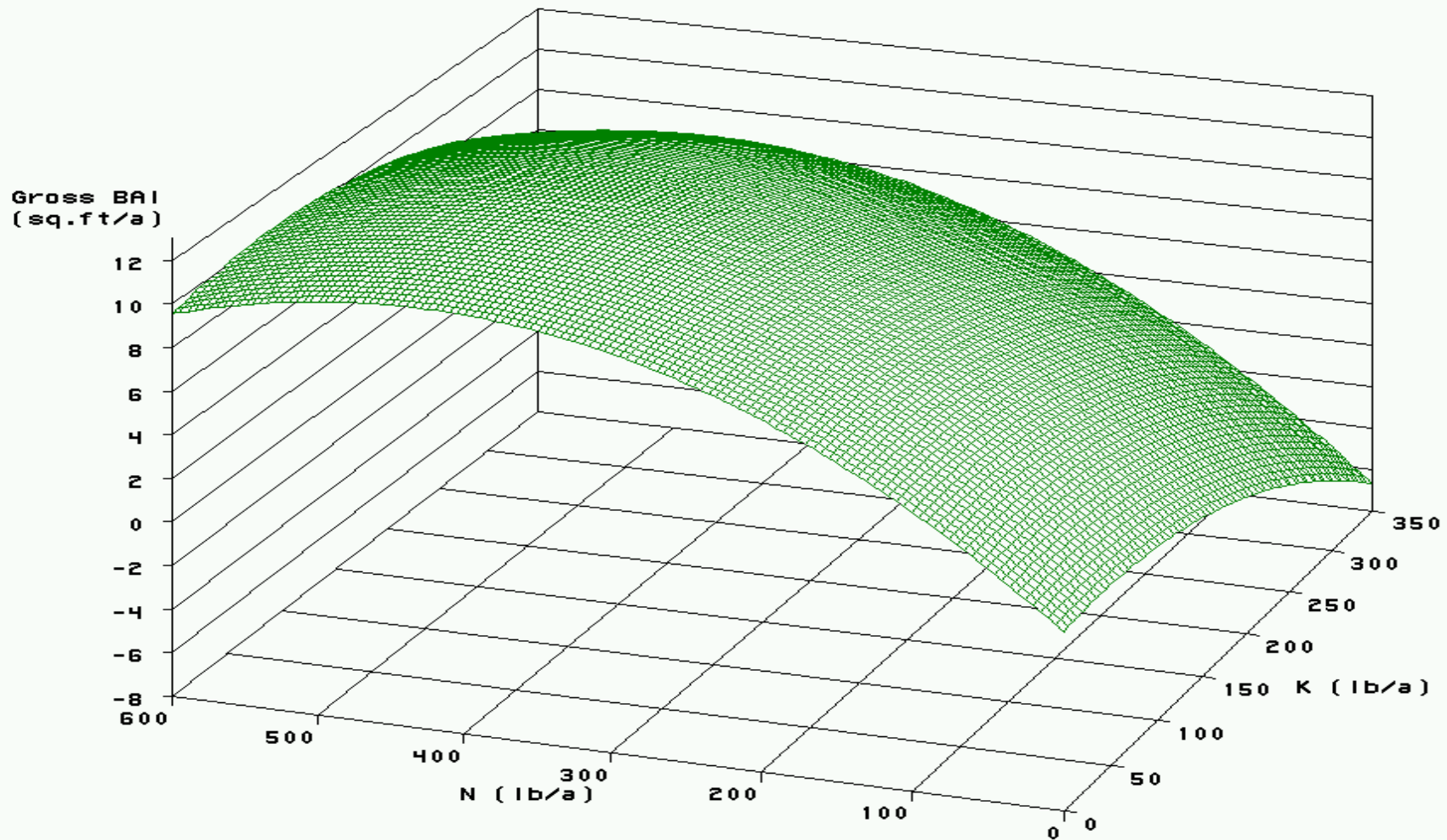
N and K fertilizer effects on 6-year gross BA growth Metasediment, Western Redcedar/Western Hemlock series



N and K fertilizer effects on 6-year gross BA growth Mixed, Grand Fir series



N and K fertilizer effects on 6-year gross BA growth Mixed, Western Redcedar/Western Hemlock series



KCl, K₂SO₄, and micronutrients: effects on 6-year BA Growth

