Integrating Plant Horticultural and Soilborne Disease Control by Methyl Bromide Alternatives in Strawberry

Mark Bolda, UCCE

California Berry Cultivars

Steve Fennimore, UCCE; Steve Koike, UCCE and Joji Muramoto, UCSC

Three Potentials for Adjustment post Methyl Bromide

- Length of cold conditioning
- Color of plastic
- Amount of nitrogen

The treatments of the trial

- Methyl bromide – 350#
- Untreated control
- Chloropicrin – 350 # Tri-chlor
- Dominus 100 – 340 #
- Anaerobic soil disinfestation (ASD) – 9 Tons
- Steam

Steam

Steam

More definitions

Silver plastic mulch

Green plastic mulch

Cold Conditioning (Planting dates)

Albion MacDoel dug 10/23/2015

- Early * 10/27/2015 = 3 days chill
- Standard * 11/4/2015 = 11 days chill
- Late * 11/10/2015 = 16 days chill

Fertility

- Pre-plant 625# 18-8-13 slow release
- In-season 20-20-20 Peter's @ 25 lbs per application, 14 total applications (every 20 days)
- Total of 182.5 lbs of nitrogen per acre.
- 50% of total use = 126.25 lbs N
- 200% of total use = 295 lbs of N

Treatments

- Untreated control

  + green plastic, regular fertilizer, standard planting

- Steam

  + silver mulch, regular fertilizer, early & standard planting

- ASD

  + green & silver mulch, regular & 50% fertilizer, early, standard & late planting

- Chloropicrin

  + green & silver mulch, regular & 200% fertilizer, late & standard planting

- Dominus

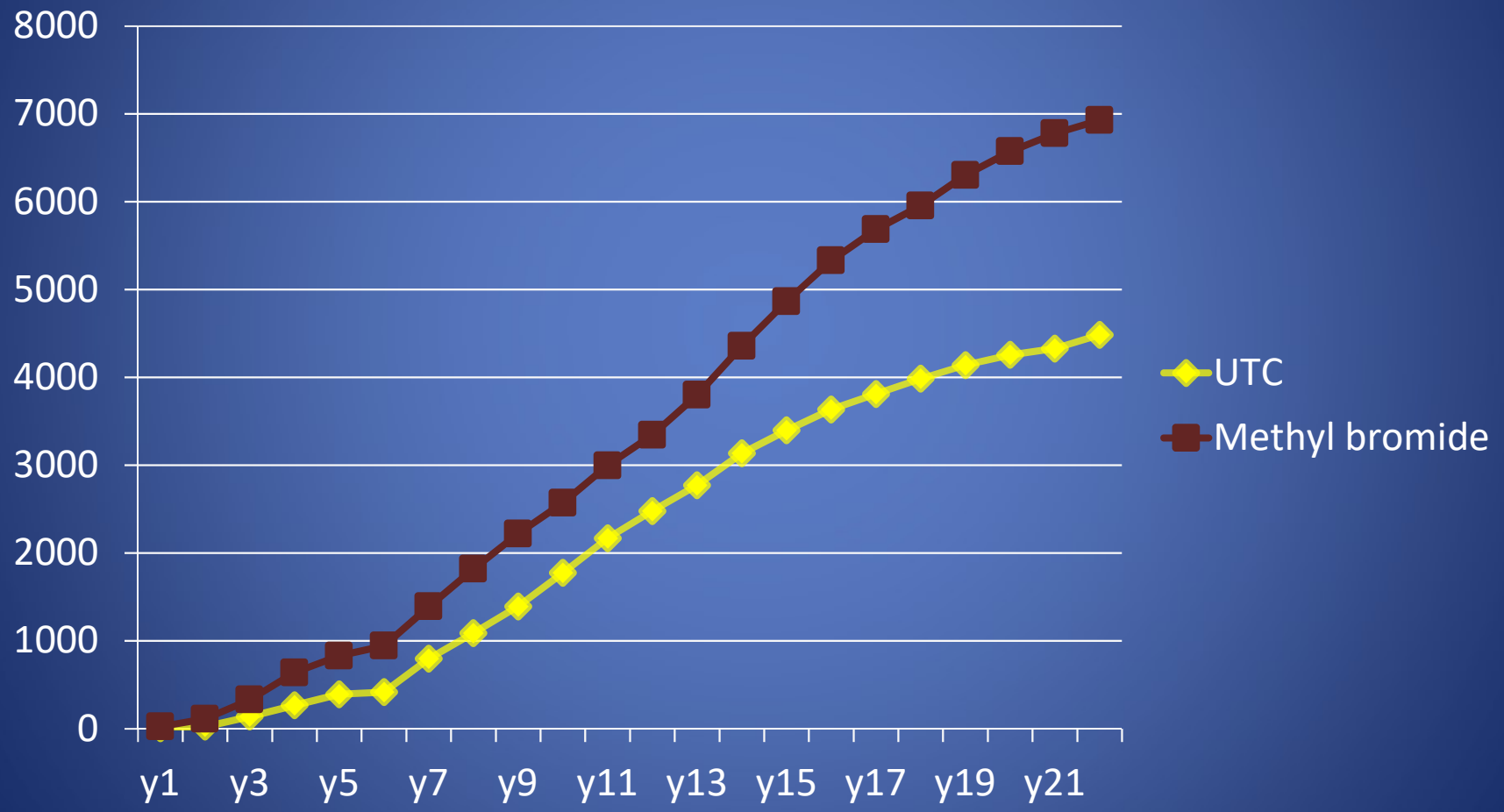
  + green & silver mulch, regular & 200% fertilizer, late & standard planting

Data gathering

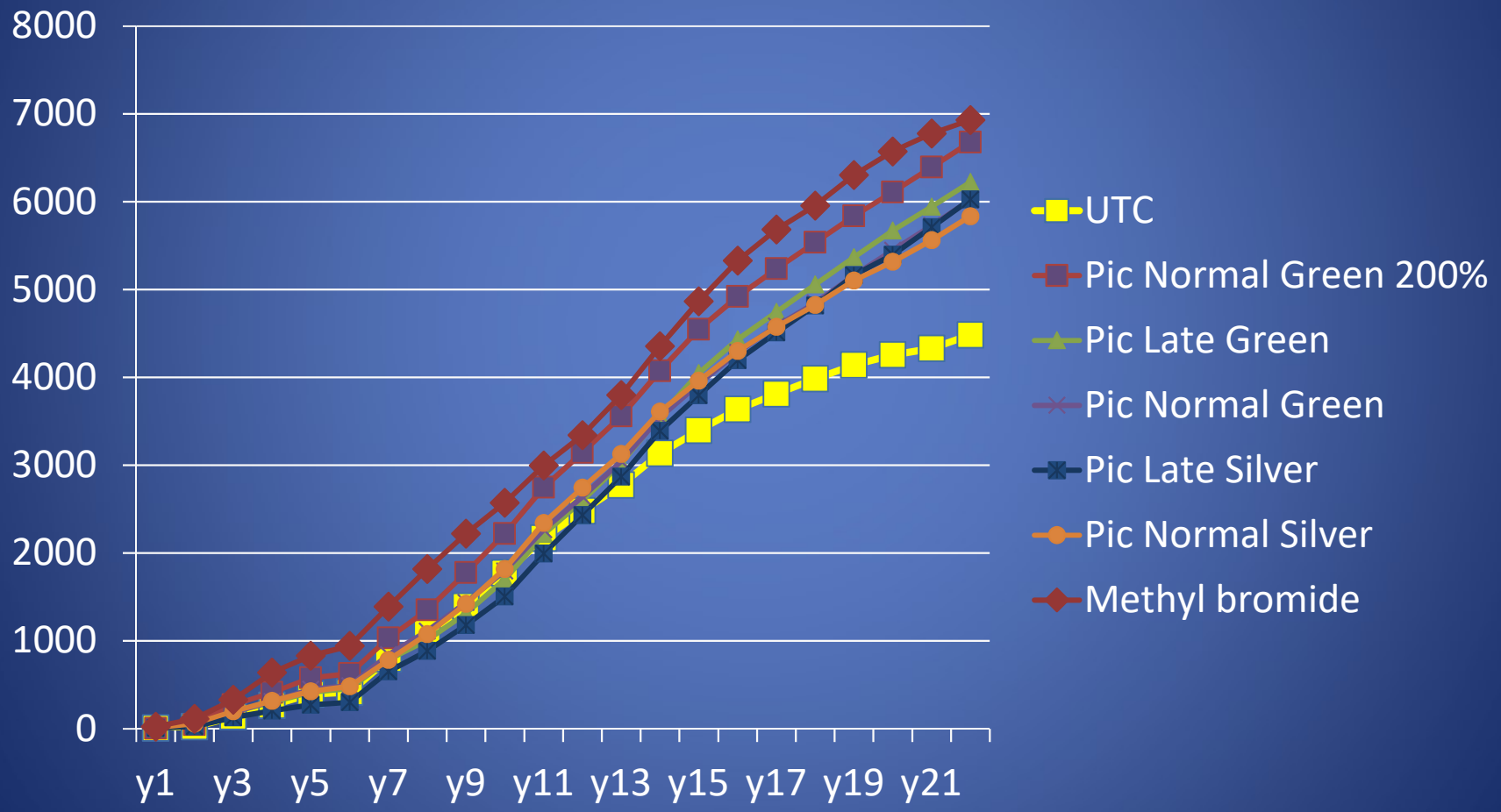
- Plant parameters fruit yield and quality, plant performance early
- Fumigant and non-fumigant performance on weeds.
- Nitrogen dynamics in the soil.
- Disease.

	1/6/2016		3/10/2016	
MB	11.58	f-i	33.38	a
Dom slv std	10.8	ij	28.03	def
Dom slv late	13.23	de	28.88	cde
Dom grn std	10.75	ij	26.9	fgh
Dom grn late	12.85	def	30.2	c
Dom 200%	10.98	hij	28.75	cde
Pic slv std	11.25	g-j	26.35	fgh
Pic slv late	11.03	hij	27.28	efg
Pic grn std	10.3	ij	26.93	fgh
Pic grn late	11.65	f-i	30.03	c
Pic 200%	11.48	f-i	28.75	cde
ASD slv early	17.18	a	27.48	ef
ASD slv std	13.55	de	30.43	bc
ASD slv late	12.88	def	32.43	a
ASD grn early	16.75	ab	29.65	cd
ASD grn std	15.48	bc	32.1	ab
ASD grn late	13.15	de	32.9	a
ASD 50%	12.65	efg	27.8	ef
Steam slv early	13.28	de	25.25	hi
Steam slv std	11.15	hij	24.6	i
UTC	11.48	f-i	27.38	efg

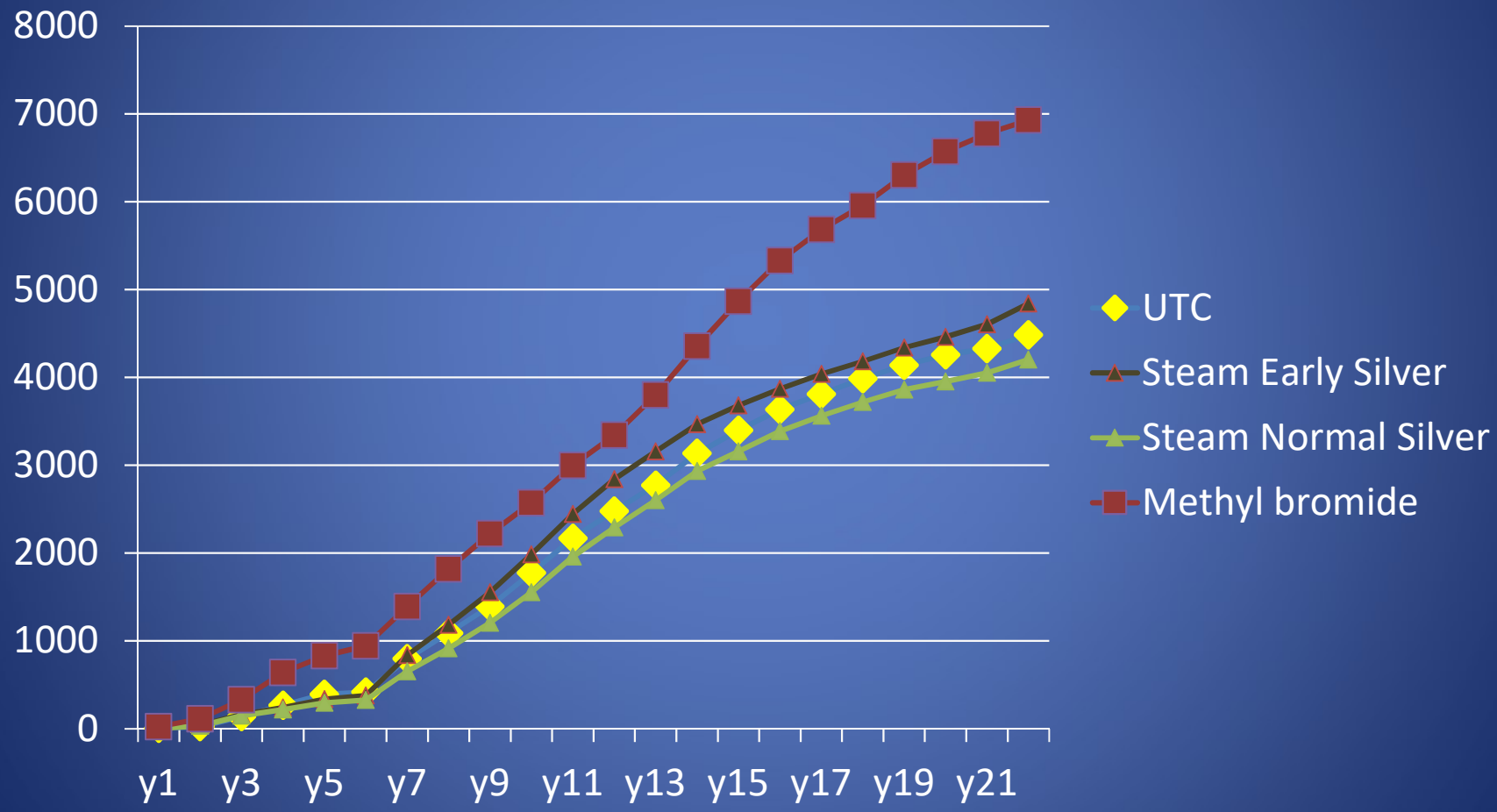
Untreated Control Compared to Methyl Bromide Standard



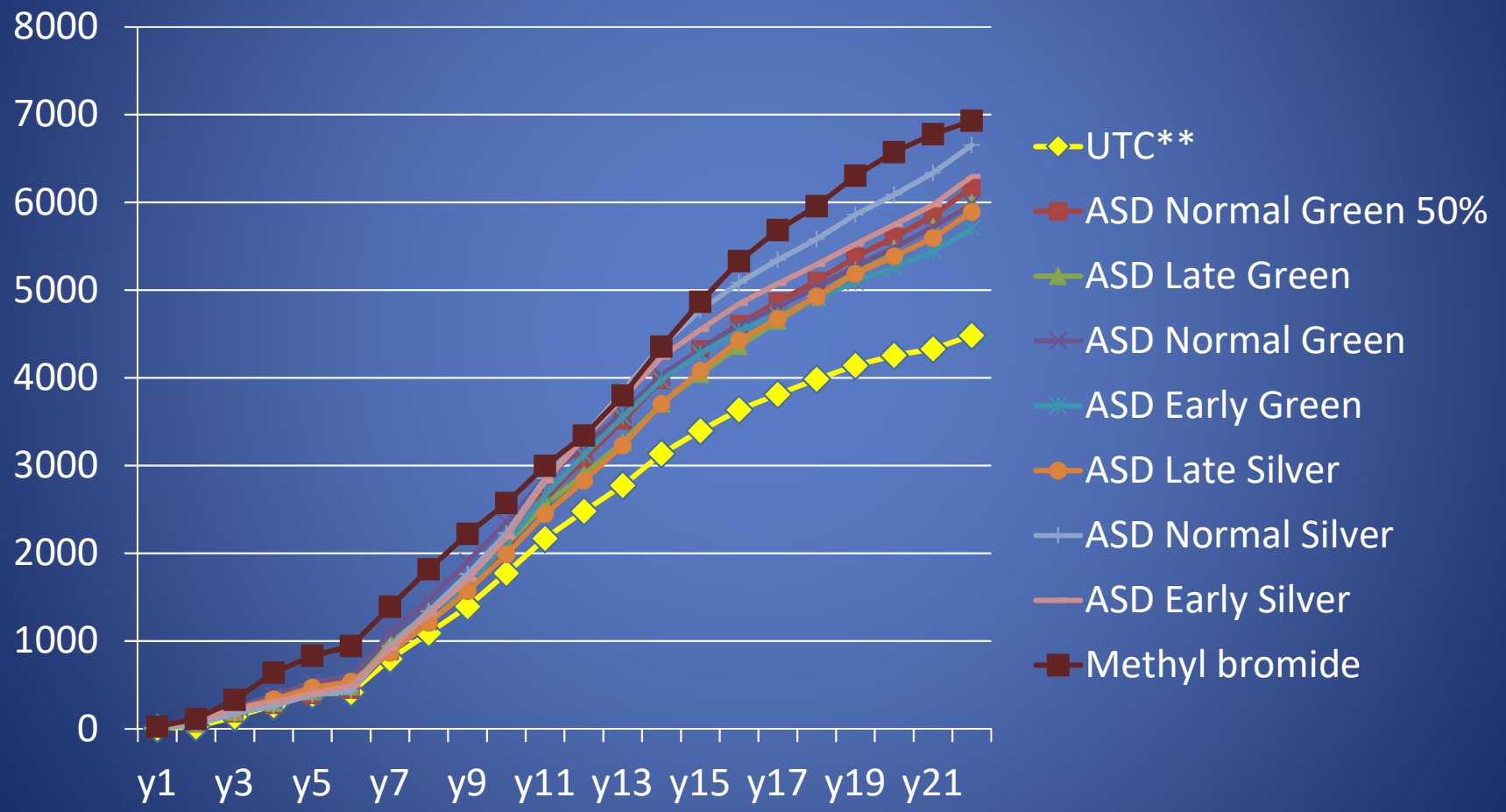
Chloropicrin v UTC v Methyl Bromide



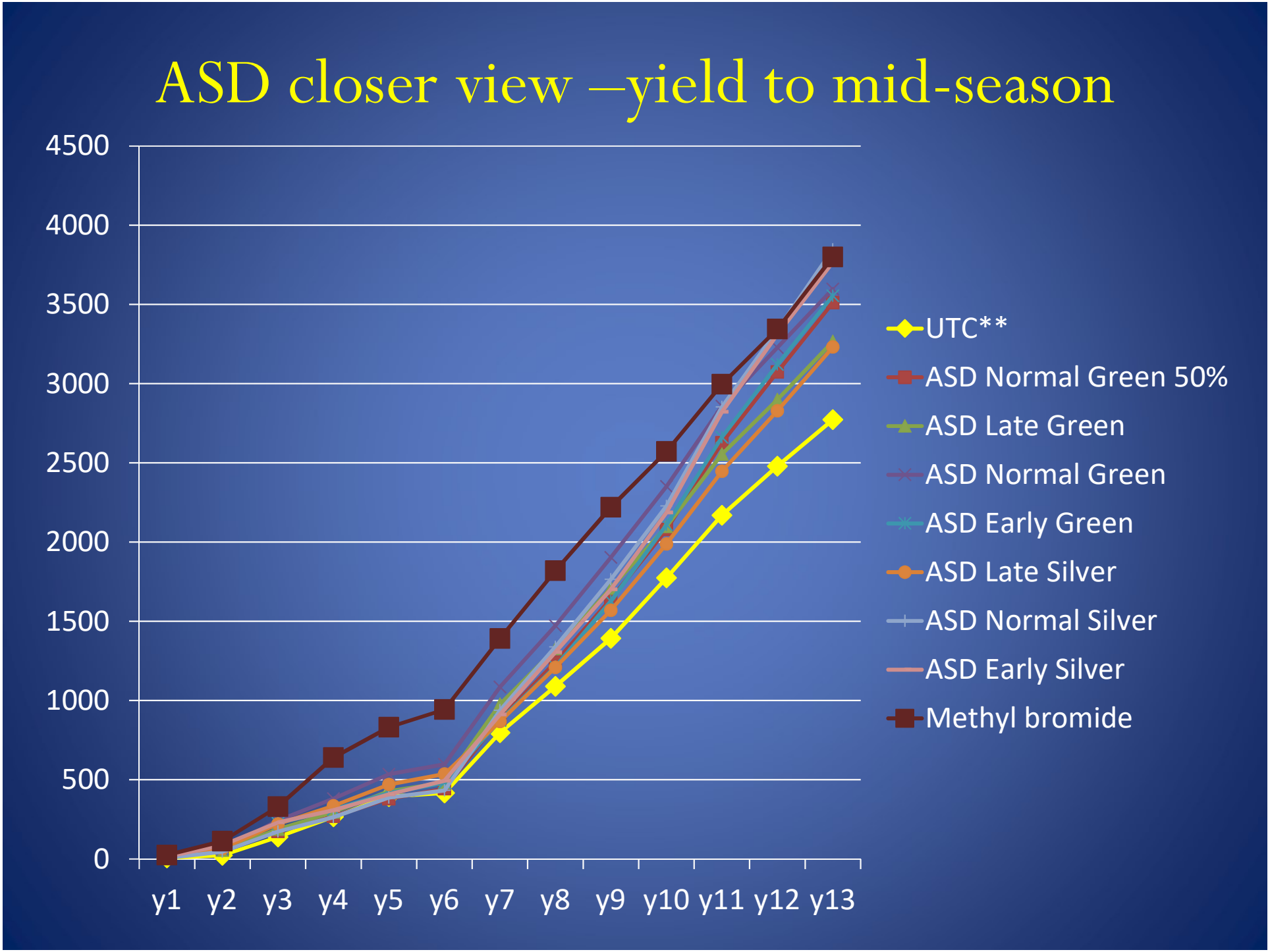
Steam performance



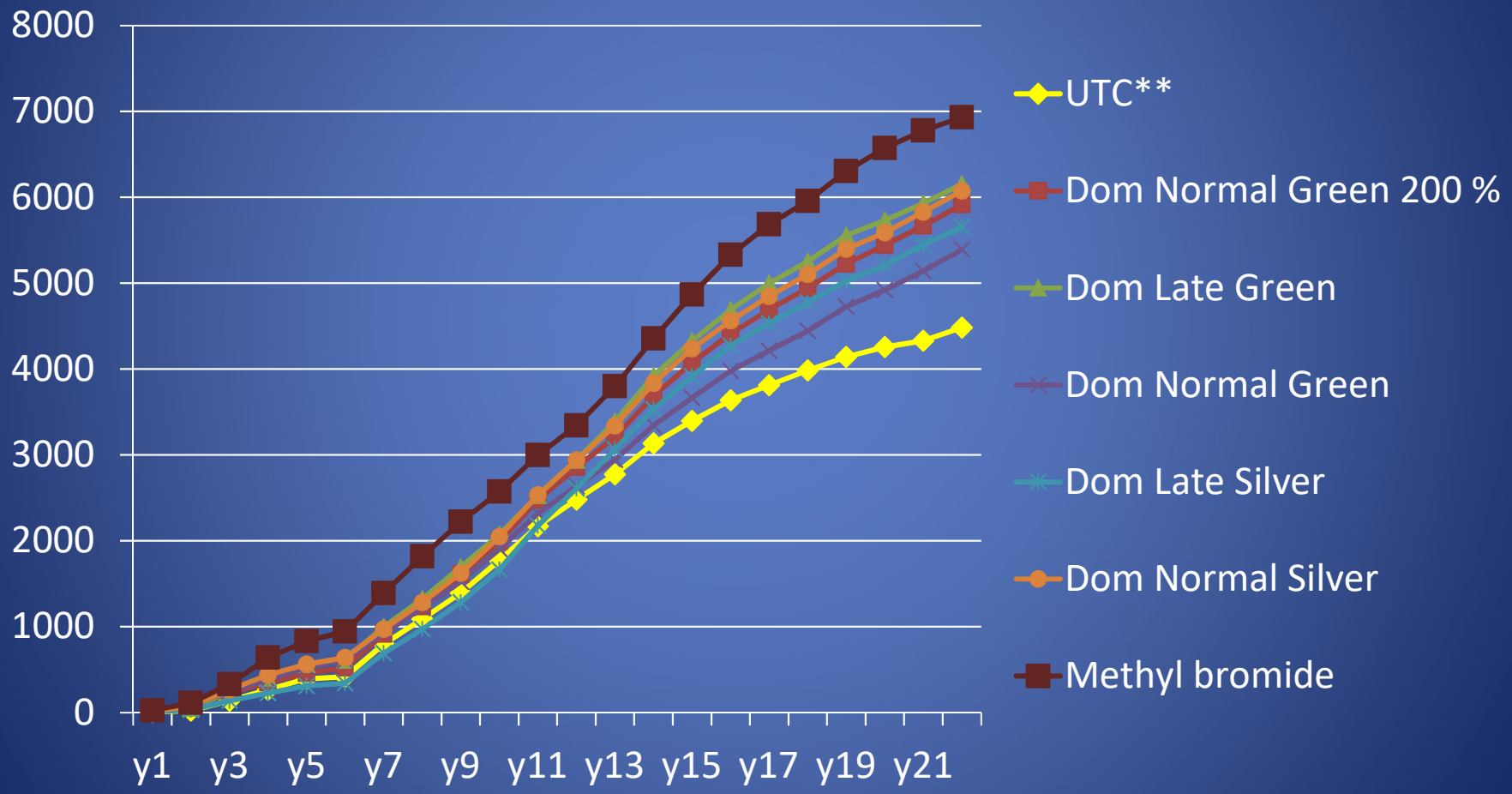
ASD, UTC and Methyl Bromide

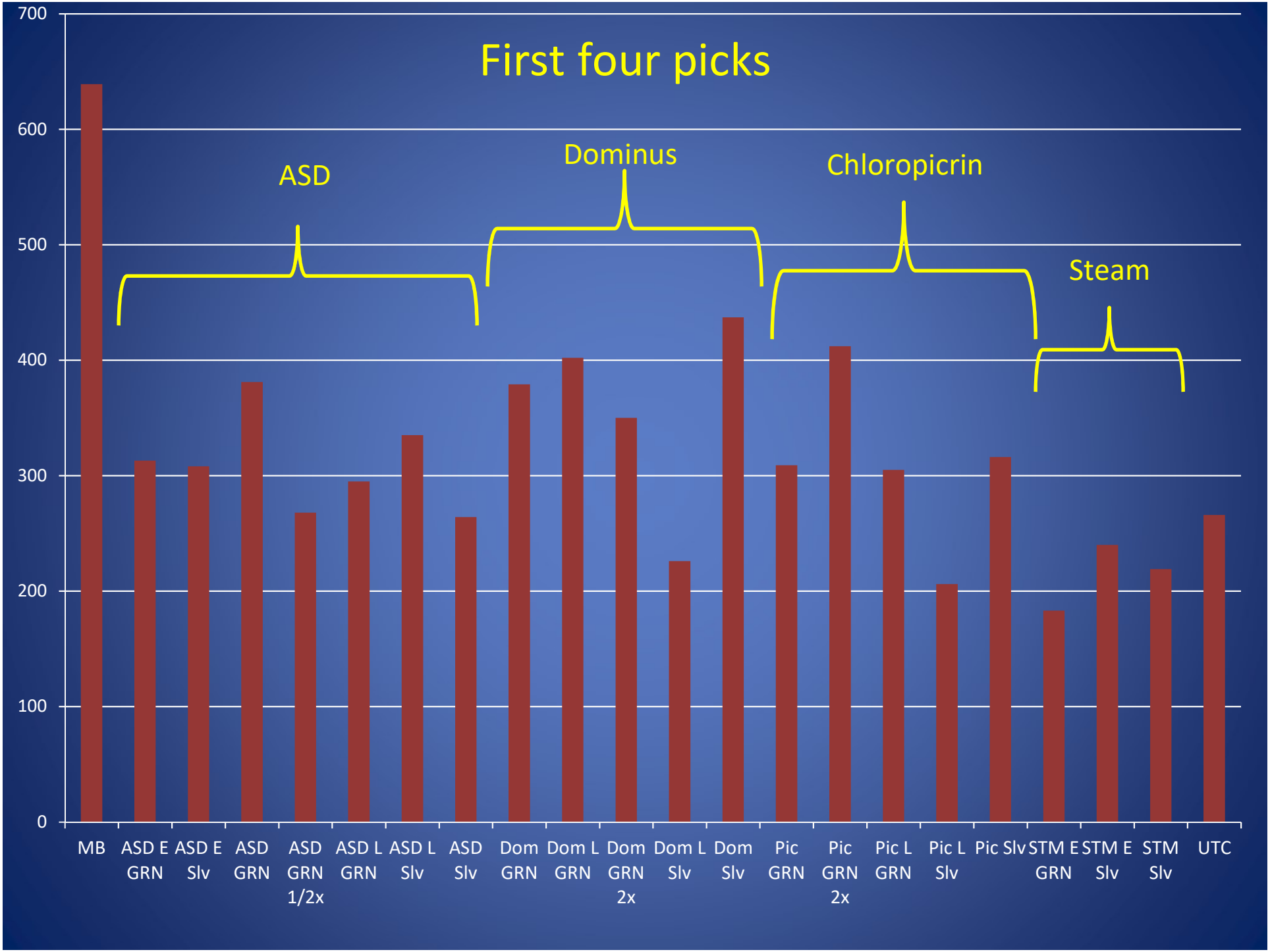


ASD closer view –yield to mid-season



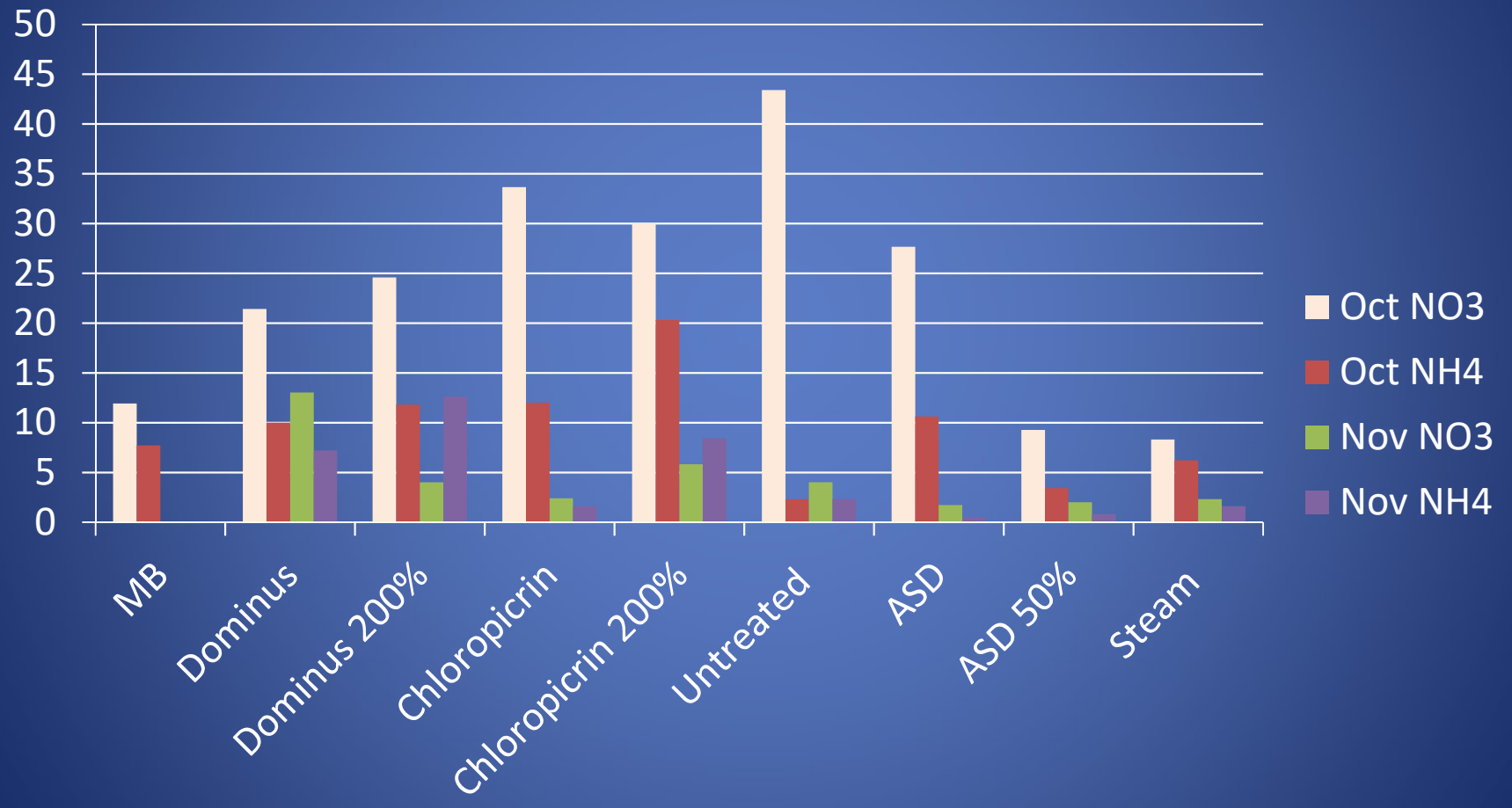
Dominus


8000
7000
6000
5000
4000
3000
2000
1000
0
y1
y3
y5
y7
y9
y11
y13
y15
y17
y19
y21
UTC**
Dom Normal Green 200 %
Dom Late Green
Dom Normal Green
Dom Late Silver
Dom Normal Silver
Methyl bromide

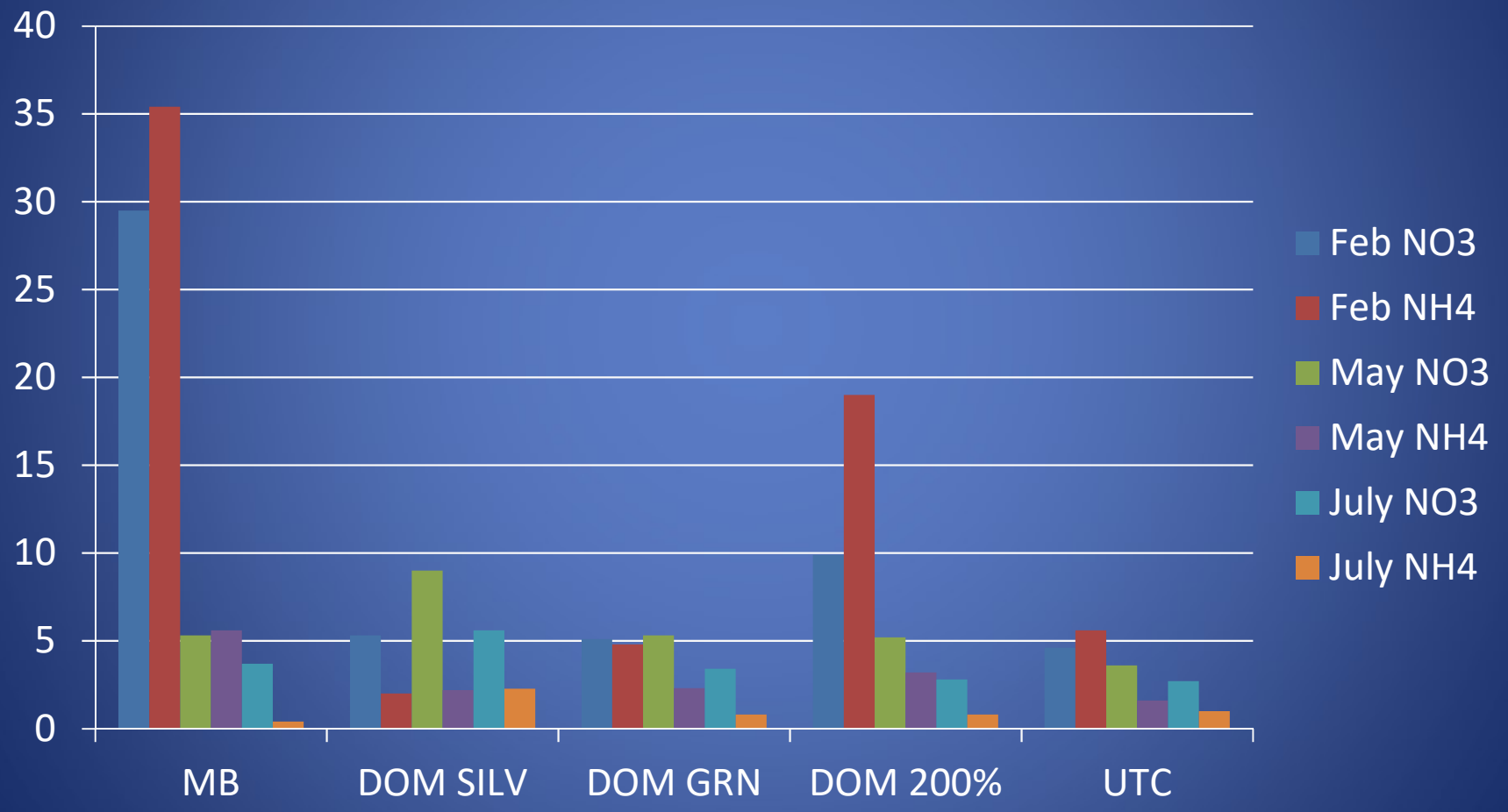

First four picks
700
600
500
400
300
200
100
0
ASD
Dominus
Chloropicrin
Steam
MB
ASD E GRN
ASD E Slv
ASD GRN
ASD GRN 1/2x
ASD L GRN
ASD L Slv
ASD Slv
Dom GRN
Dom L GRN
Dom GRN 2x
Dom L Slv
Dom Slv
Pic GRN
Pic GRN 2x
Pic L GRN
Pic L Slv
Pic Slv
STM E GRN
STM E Slv
STM Slv
UTC

Nitrogen Dynamics

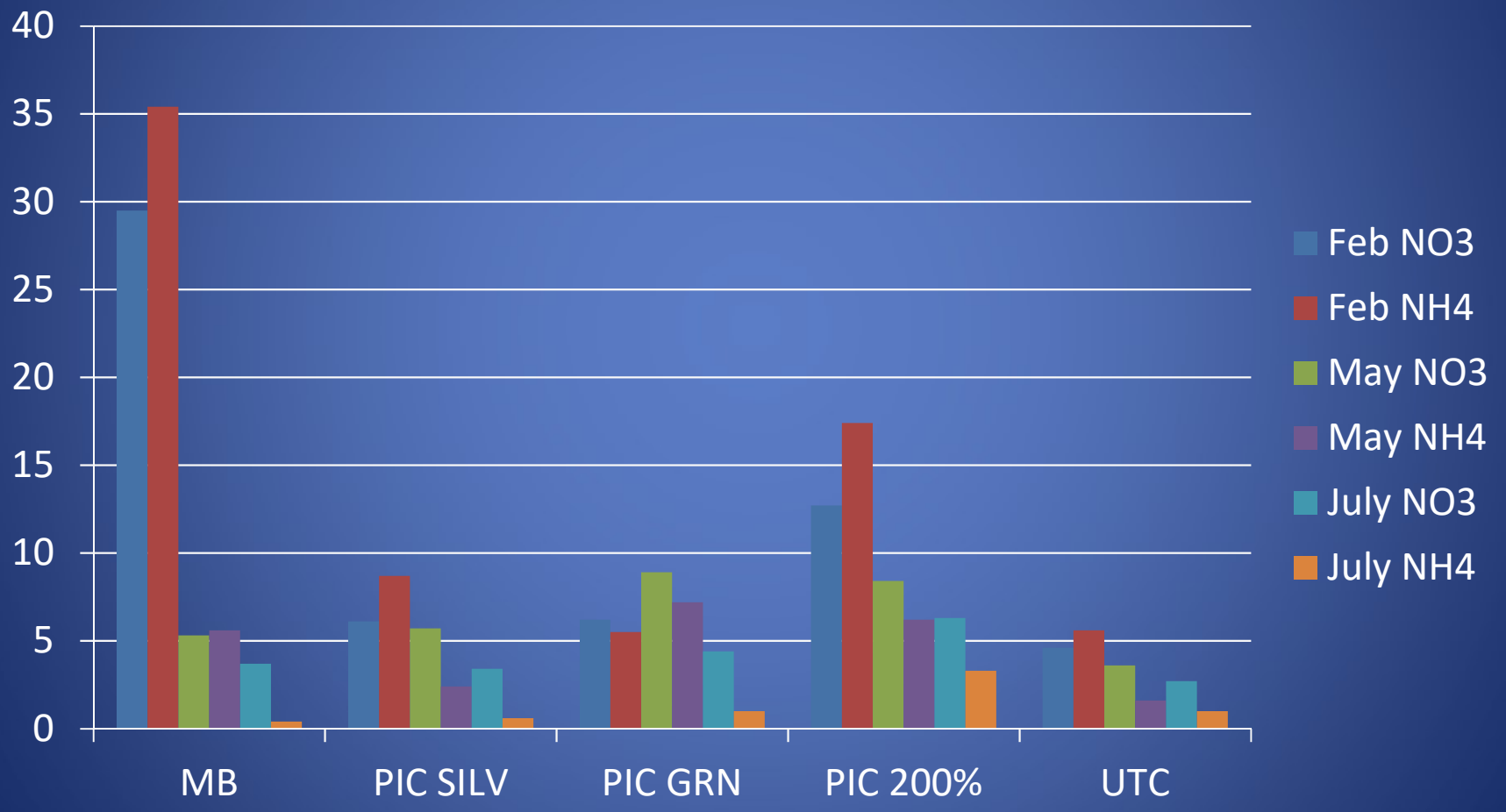
(in ppm dry soil)



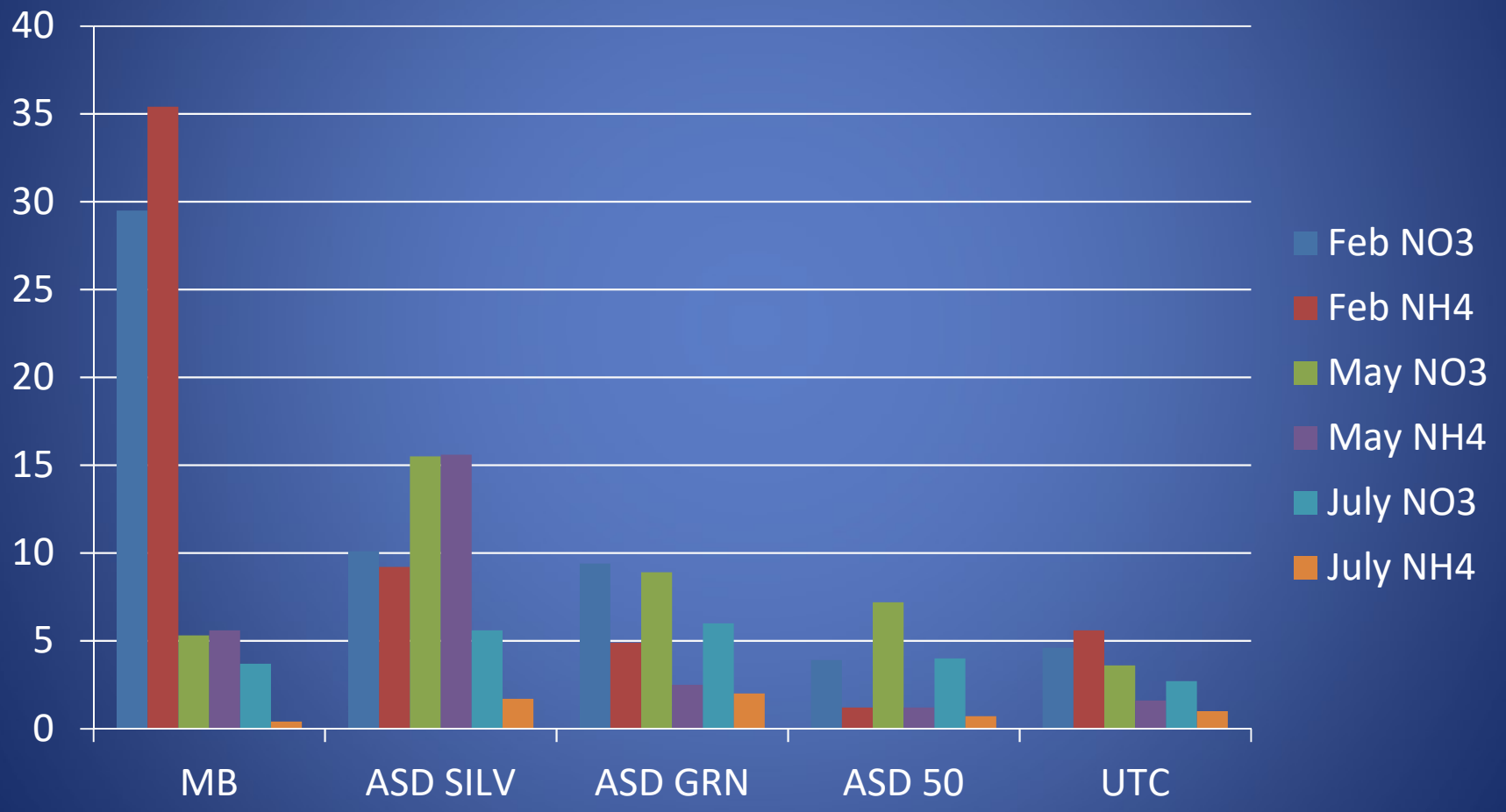
Dominus Nitrogen



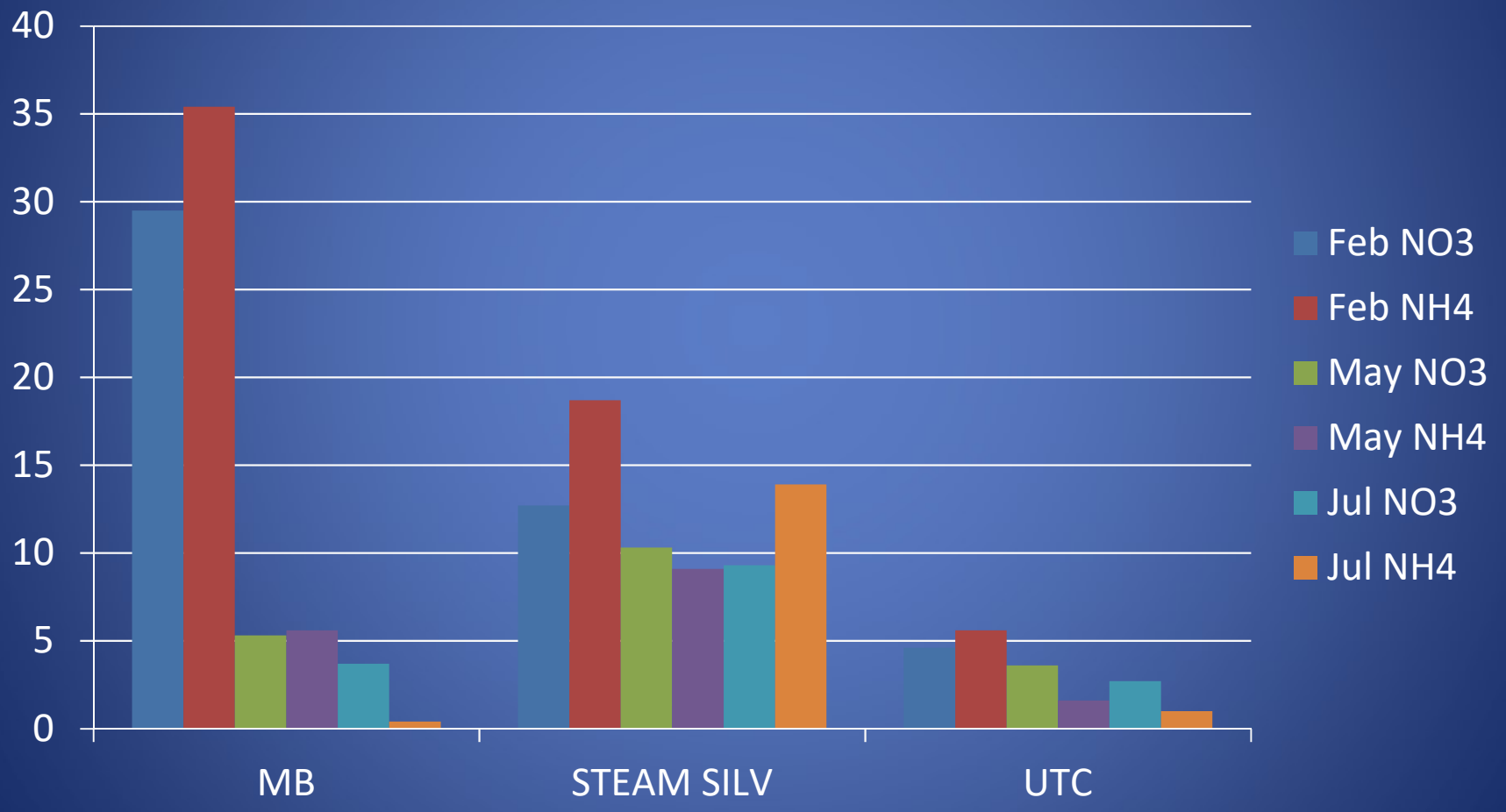
Chloropicrin Nitrogen



ASD Nitrogen



Steam Nitrogen



Concluding Thoughts

- Higher levels of nitrogen, especially early, could close the gap in plant performance from methyl bromide and its alternatives.
- Cooler plastics could be slowing nitrification of soil amendments and leaving nitrogen available for longer, thus contributing to better plant performance.