Taking a look at soil variability

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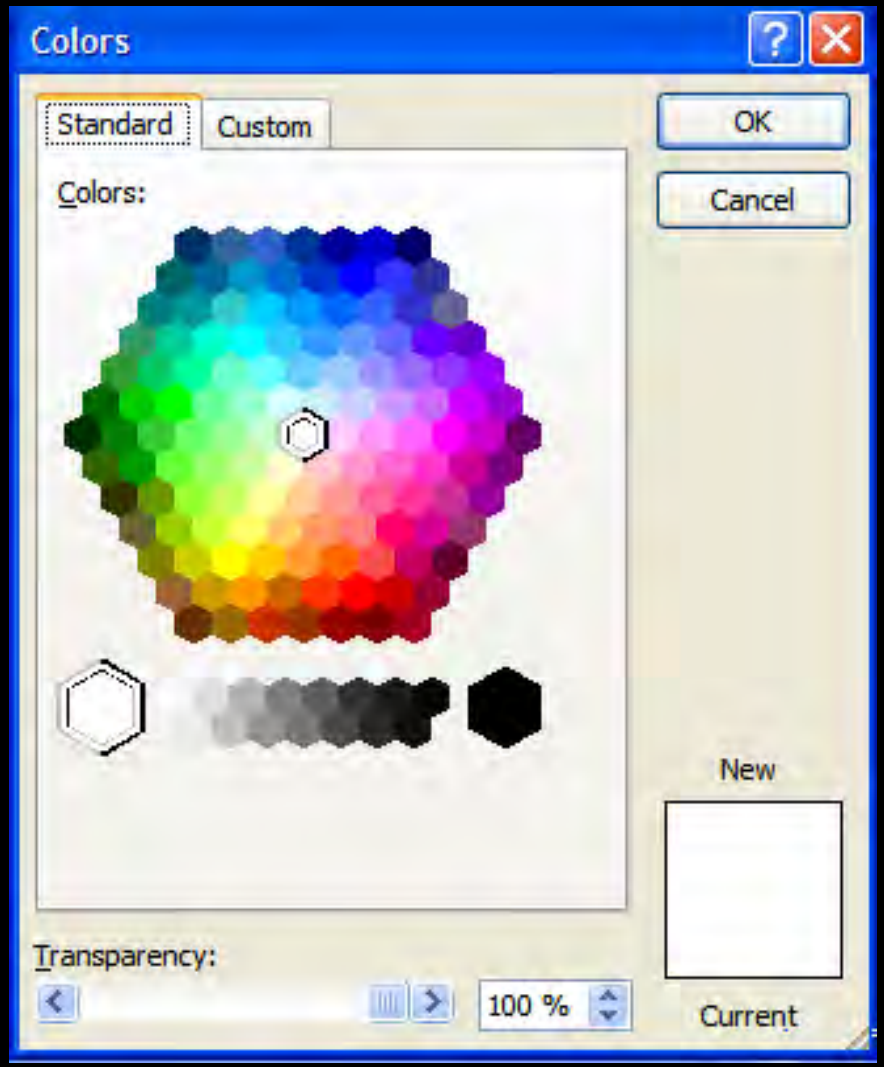
Soil Basics

- Unlike plants or animals, soils do not occur as distinct or easily separable entities
- “Soils” are a continuum
  - Of changing properties or behaviour from one position on the landscape to the next
  - Variation usually related to one of the soil forming factors:

    Parent Material, Climate, Biota, Topography, Time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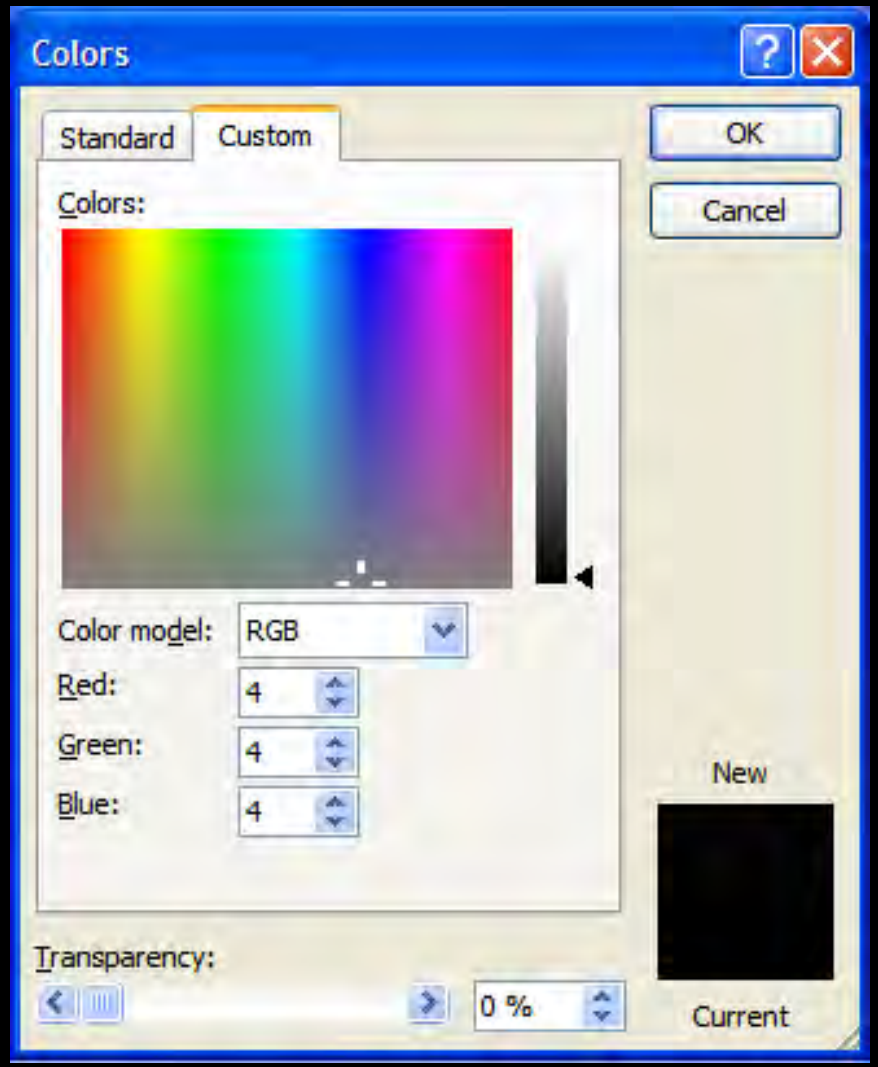
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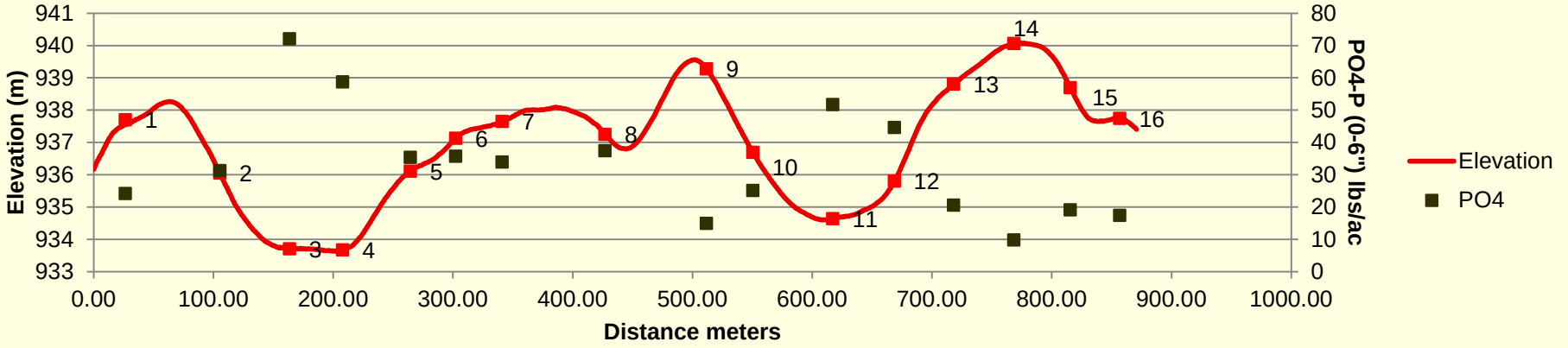
Variable Rate Fertilizer Study

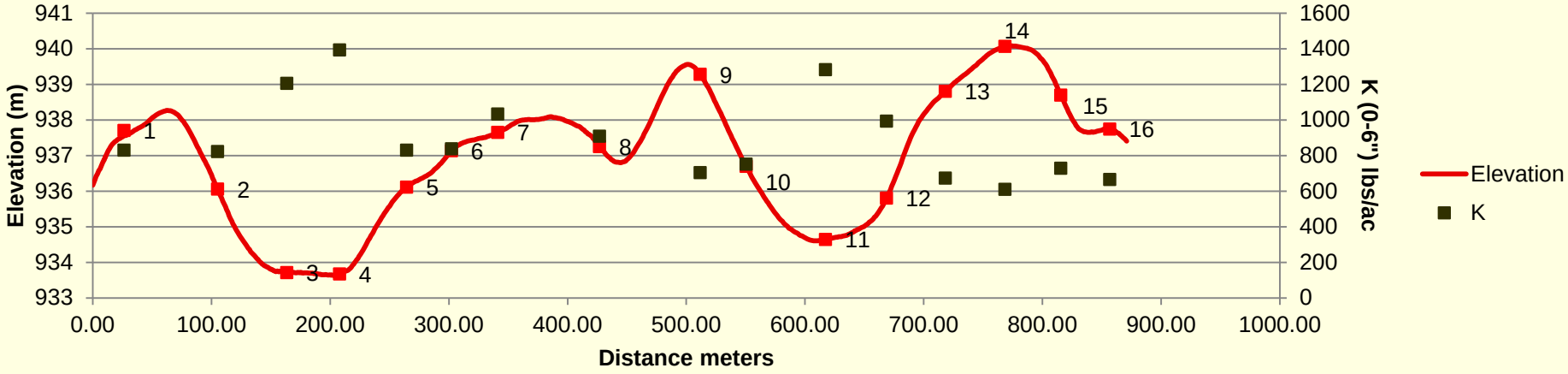
- ½ mile transect
- 16 sampling sites

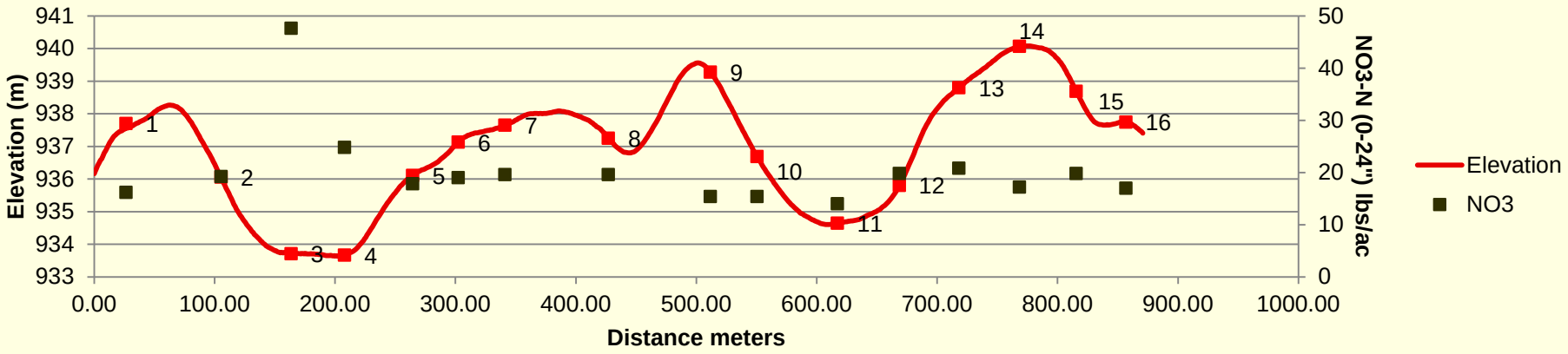
Raymond soil variability 2012

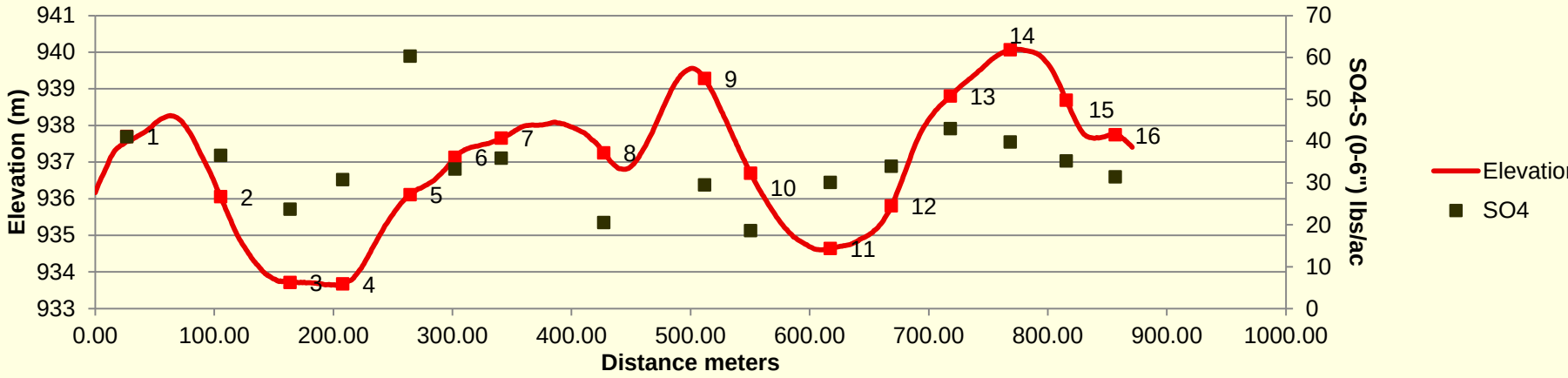
	Min	Median	Max
NO3	14	19	48
PO4	10	33	72
K	610	829	1392
SO4	19	34	60
pH	5.5	7.0	7.7
OM	3.7	4.4	5.4

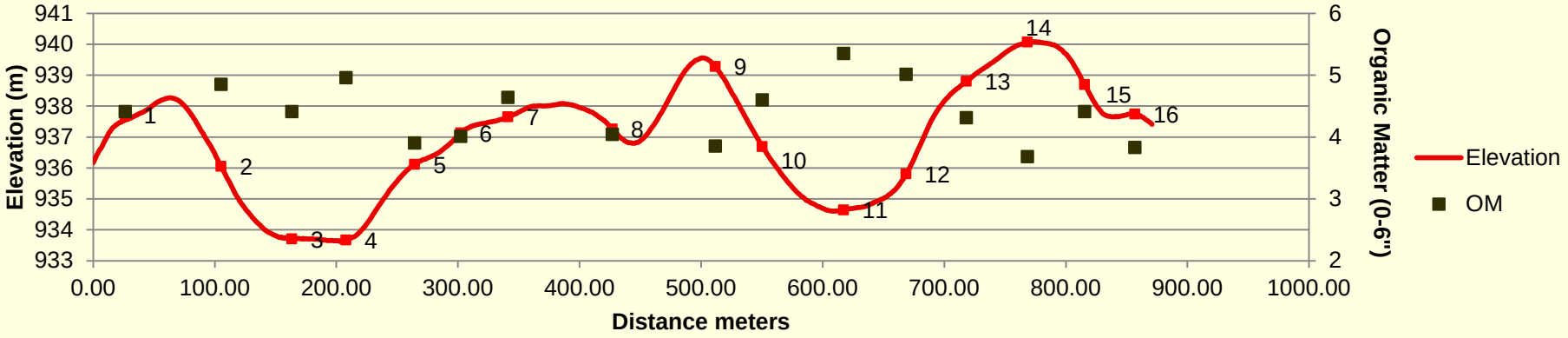
Nutrients in lb/ac; Nitrate to 2 feet; PKS pH, OM based on 0-6” depth


Elevation (m)
PO4-P (0-6") lbs/ac
Distance meters
Elevation
PO4


Elevation (m)
K (0-6") lbs/ac
Distance meters
Elevation
K


Elevation (m)
NO3-N (0-24") lbs/ac
Distance meters
Elevation
NO3


Elevation (m)
SO4-S (0-6") lbs/ac
Distance meters
Elevation
SO4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Distance meters
Organic Matter (0-6")
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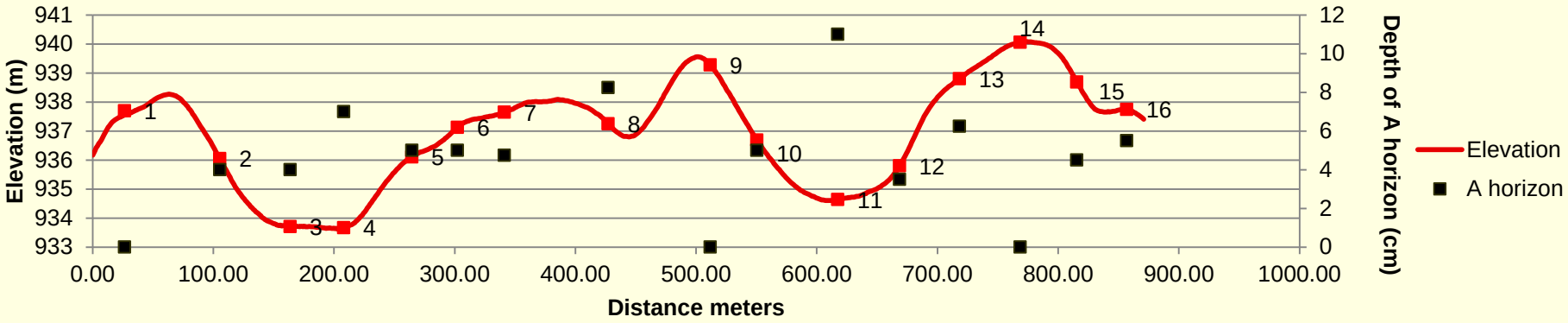
16
Elevation
OM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Distance meters
Depth of A horizon (cm)
12
10
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6
4
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13
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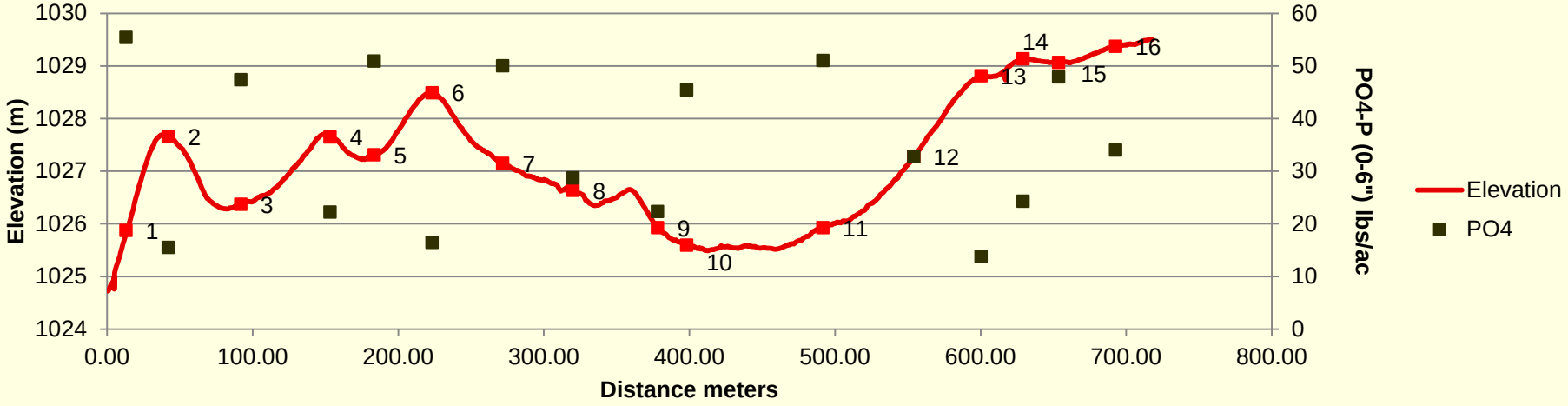
15
16
Elevation
A horizon

Claresholm soil variability 2012

	Min	Median	Max
NO3	4	11	29
PO4	14	33	55
K	266	563	1392
SO4	22	36	904
pH	6.0	7.2	7.8
OM	2.1	3.7	4.2

Nutrients in lb/ac; Nitrate to 2 feet; PKS pH, OM based on 0-6” depth


Elevation (m)
PO4-P (0-6") lbs/ac
Distance meters
Elevation
PO4
1030
1029
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1024
60
50
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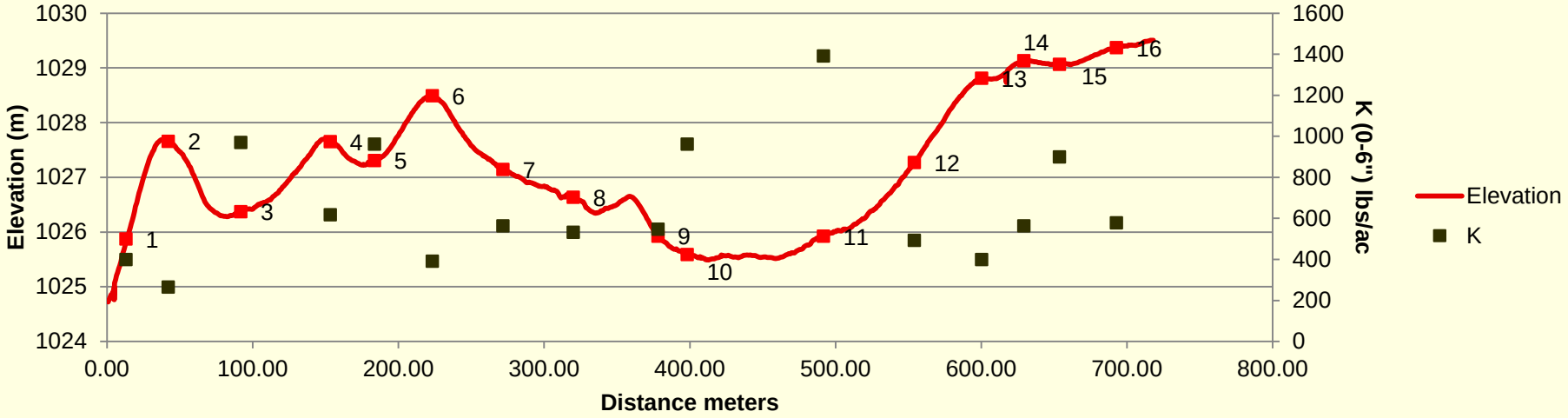
Elevation (m)
K (0-6") lbs/ac
Distance meters
Elevation
K
1030
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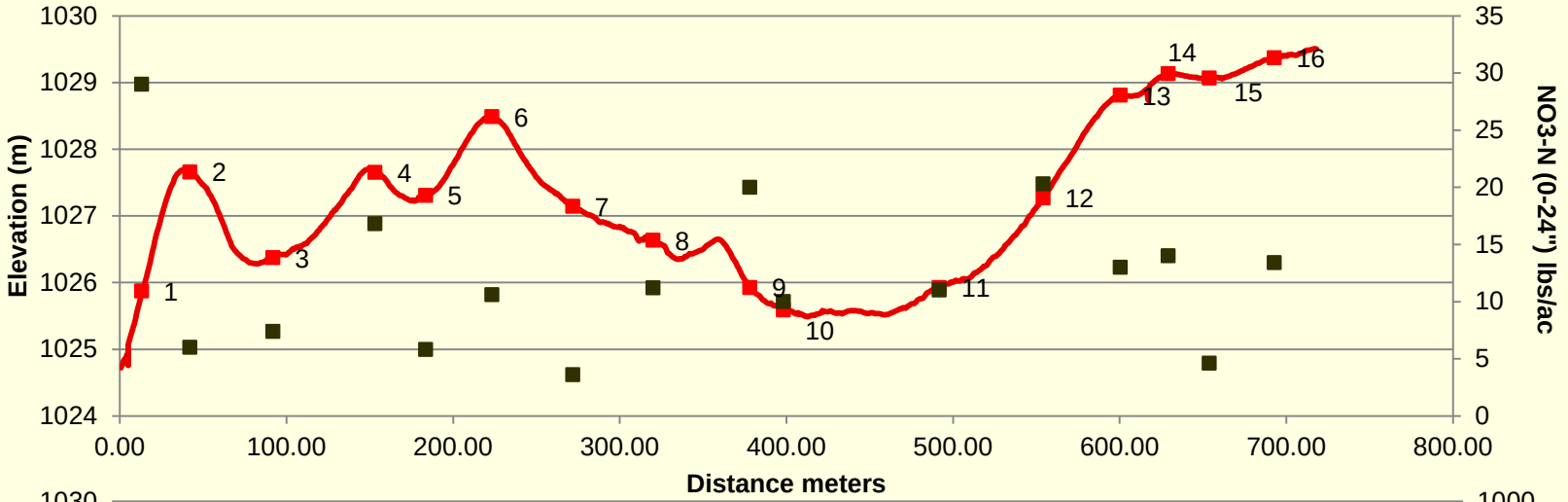
Elevation (m)
NO3-N (0-24") lbs/ac
Distance meters
Elevation
NO3
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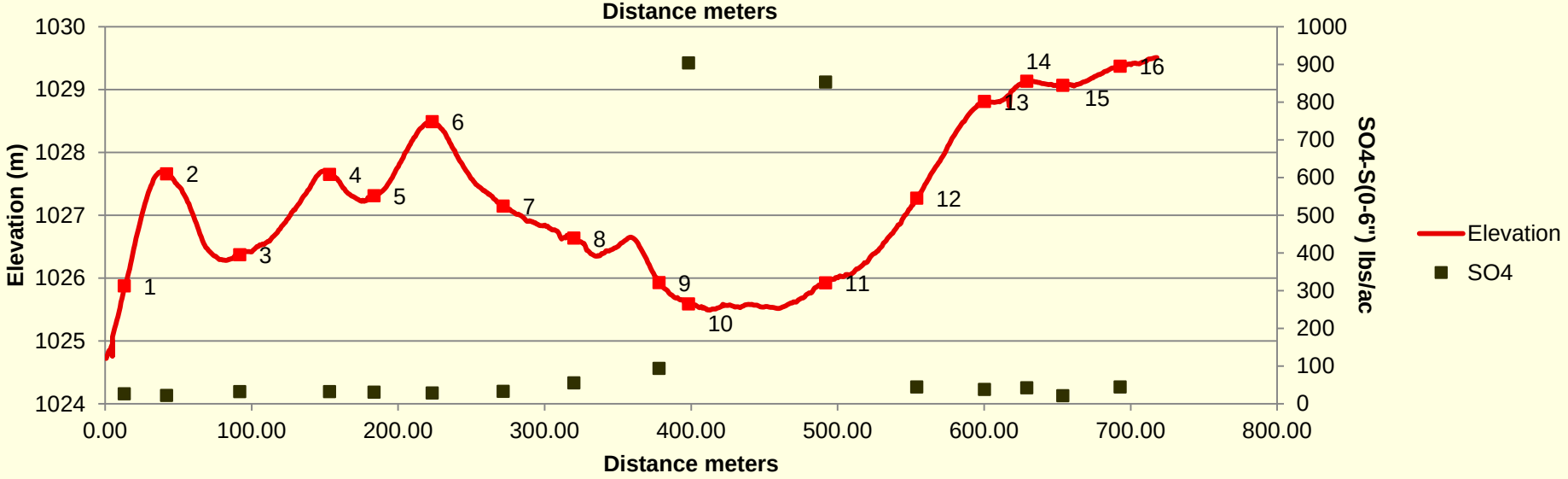
Elevation (m)
SO4-S(0-6") lbs/ac
Distance meters
Elevation
SO4
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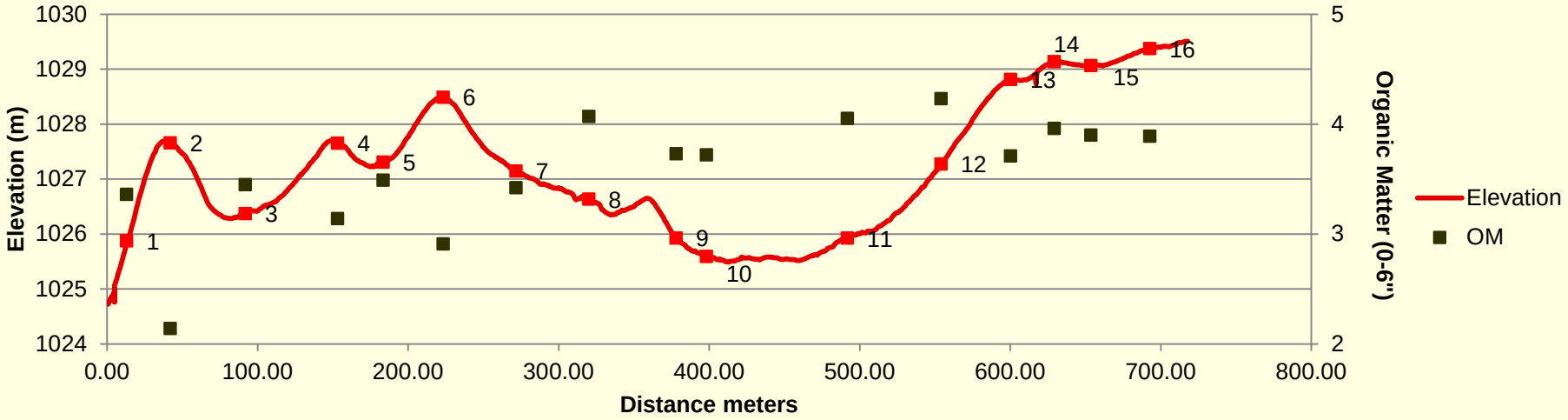
Elevation (m)
Organic Matter (0-6")
Distance meters
Elevation
OM
1030
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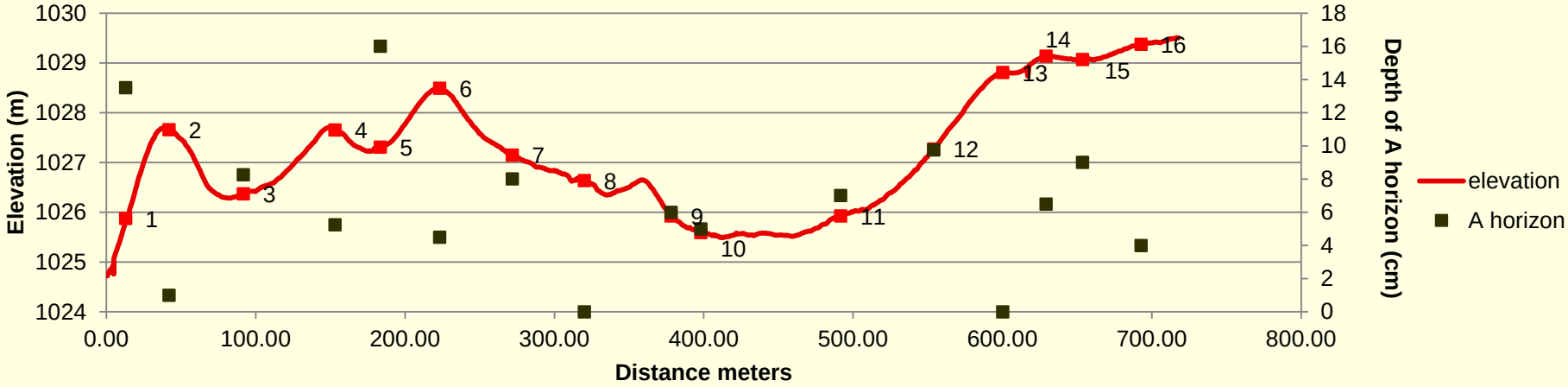
Elevation (m)
Depth of A horizon (cm)
Distance meters
elevation
A horizon
1030
1029
1028
1027
1026
1025
1024
18
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14
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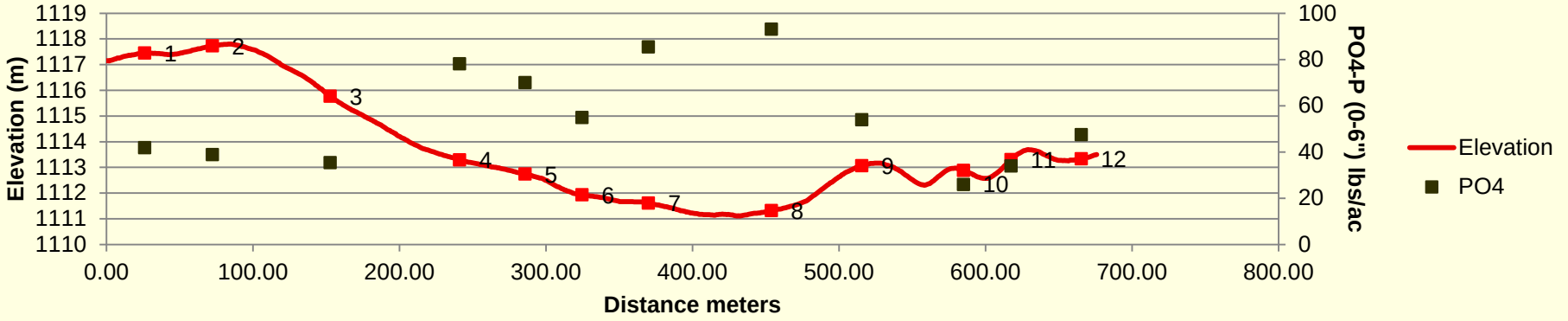
Magrath soil variability 2012

	Min	Median	Max
NO3	13	18	28
PO4	26	51	93
K	524	700	884
SO4	0	32	87
pH	5.2	6.0	7.6
OM	3.5	4.7	5.4


Elevation (m)
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Distance meters
PO4-P (0-6") lbs/ac
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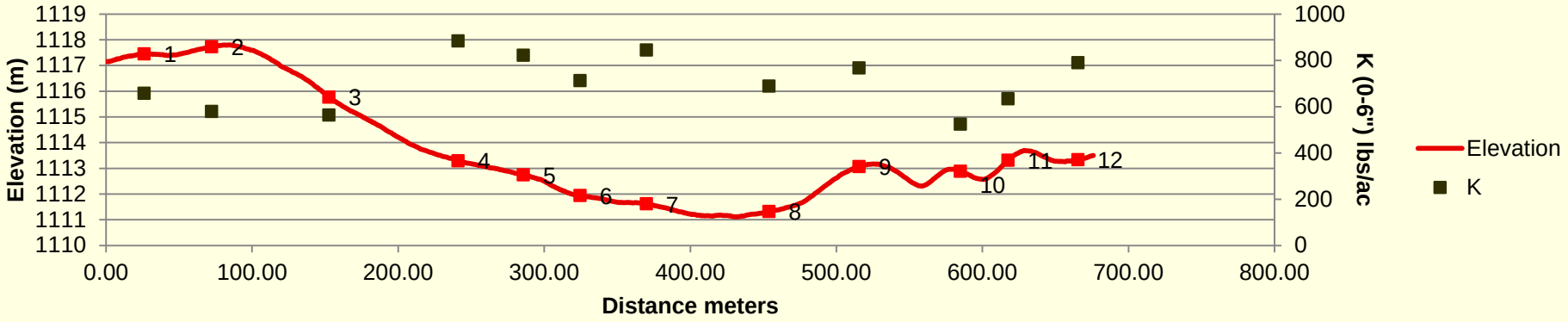
12
Elevation
PO4


Elevation (m)
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Distance meters
K (0-6") lbs/ac
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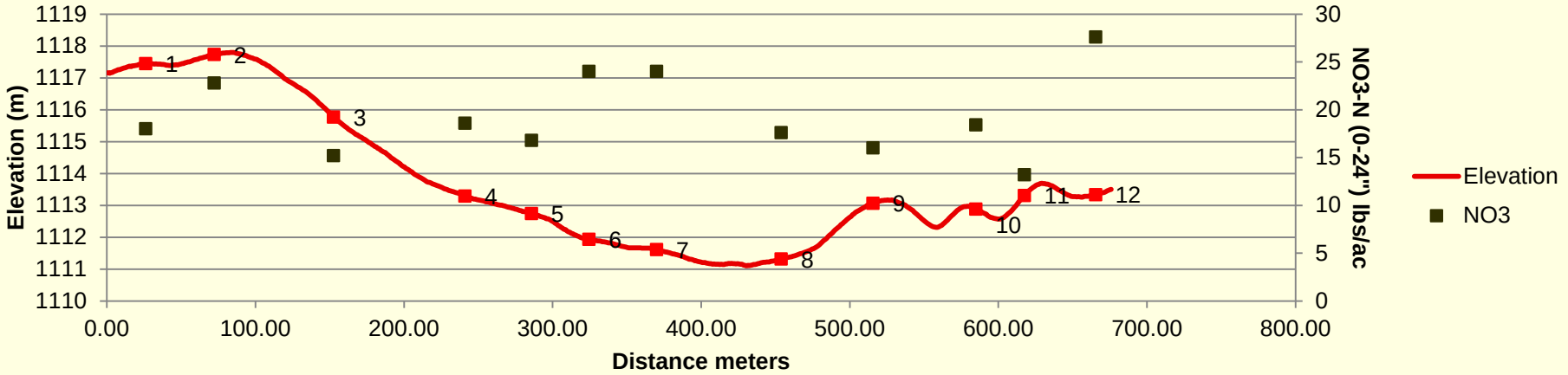
Elevation
K


Elevation (m)
NO3-N (0-24") lbs/ac
Distance meters
Elevation
NO3
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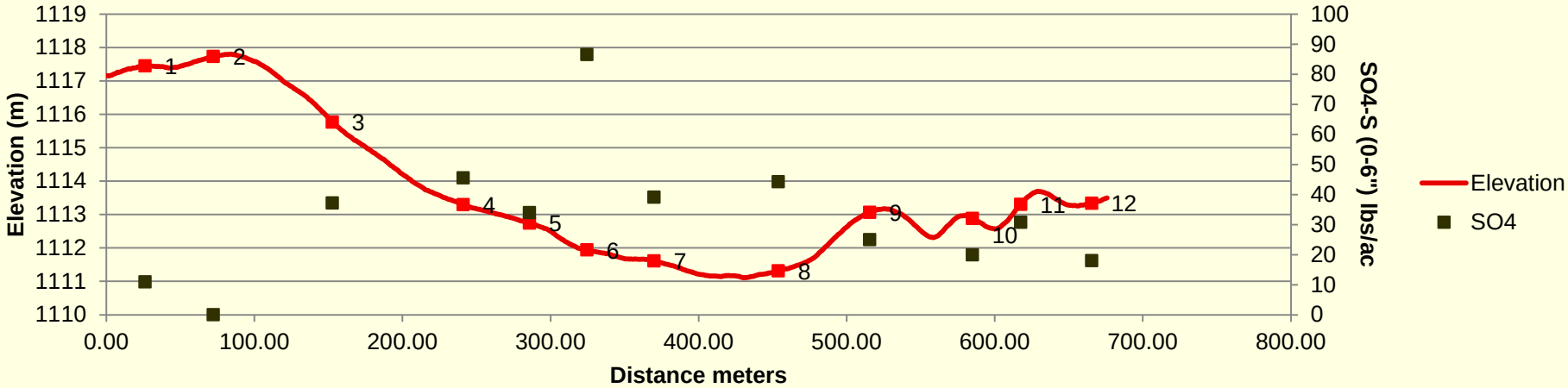
Elevation (m)
SO4-S (0-6") lbs/ac
Distance meters
Elevation
SO4
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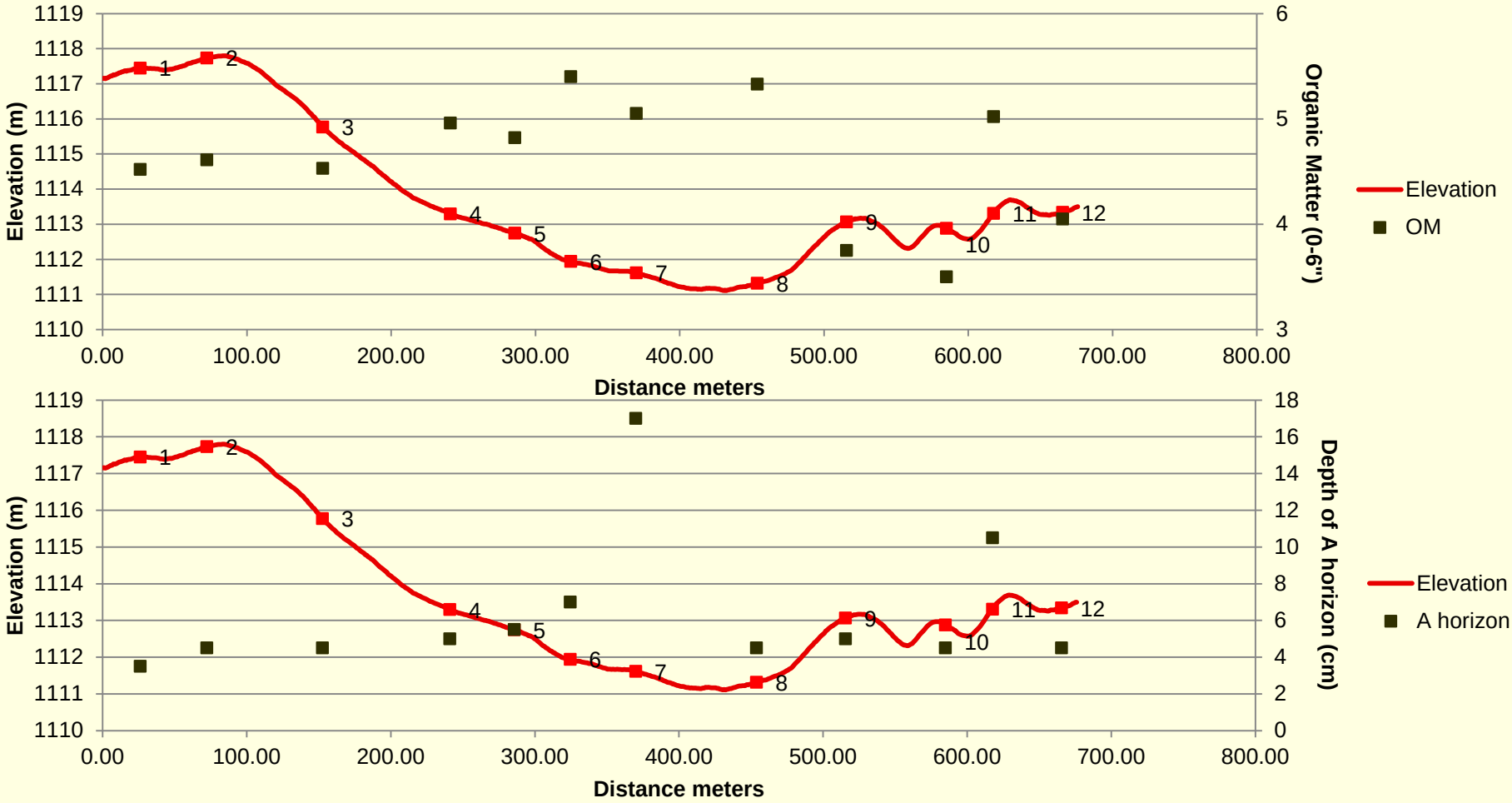
Elevation (m)
Organic Matter (0-6")
Distance meters
Elevation
OM
Elevation (m)
Depth of A horizon (cm)
Distance meters
Elevation
A horizon

Incomplete “Conclusions”

- P,K, pH, OM associated with topographic position
  - P,K, OM low on upper slopes
  - pH high on upper slope
- Not seeing strong variations in soil N across landscape positions
- Sulphur often quite low with an occasion high spike in low slope positions

Acknowledgements

- Alberta Crop Industry Development Fund
- Agrium
- Alberta Canola Producers Commission
- Alberta Innovates Bio-Solutions