Status of minerals of forages in coconut triangle, wet zone, and dry zone dairy production regions during southwest monsoon, in Sri Lanka
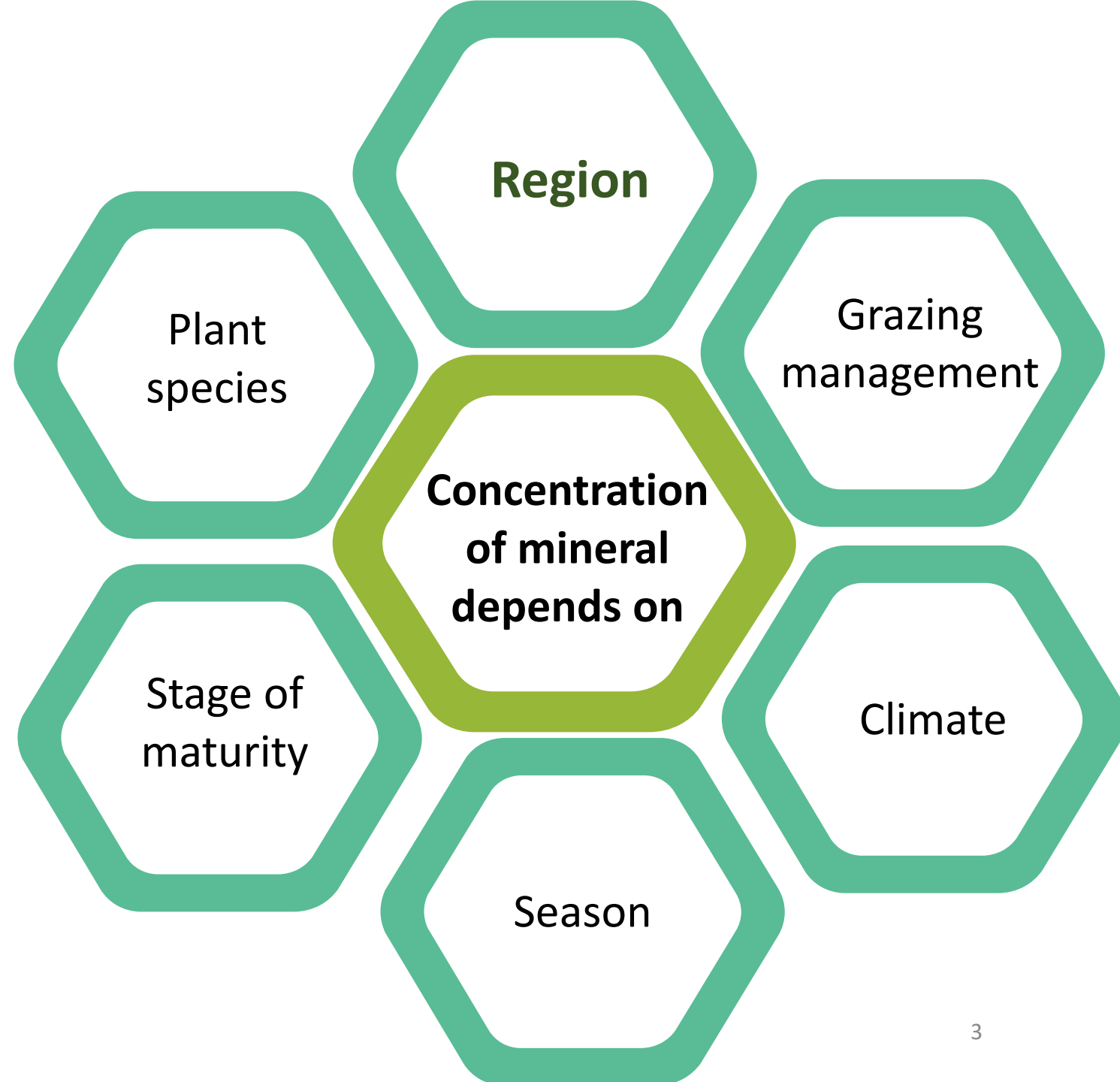
UReS

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DLAS

Do forages important as a source of mineral for livestock❓

Objectives

- To find out mineral profile of 20 different forage varieties

- To compare the avg.mineral status of forages based on dairy production regions

Region

Plant species

Grazing management

Concentration of mineral depends on

Stage of maturity

Season

Climate

Methodology

Define the study area

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- In 3 different dairy production regions
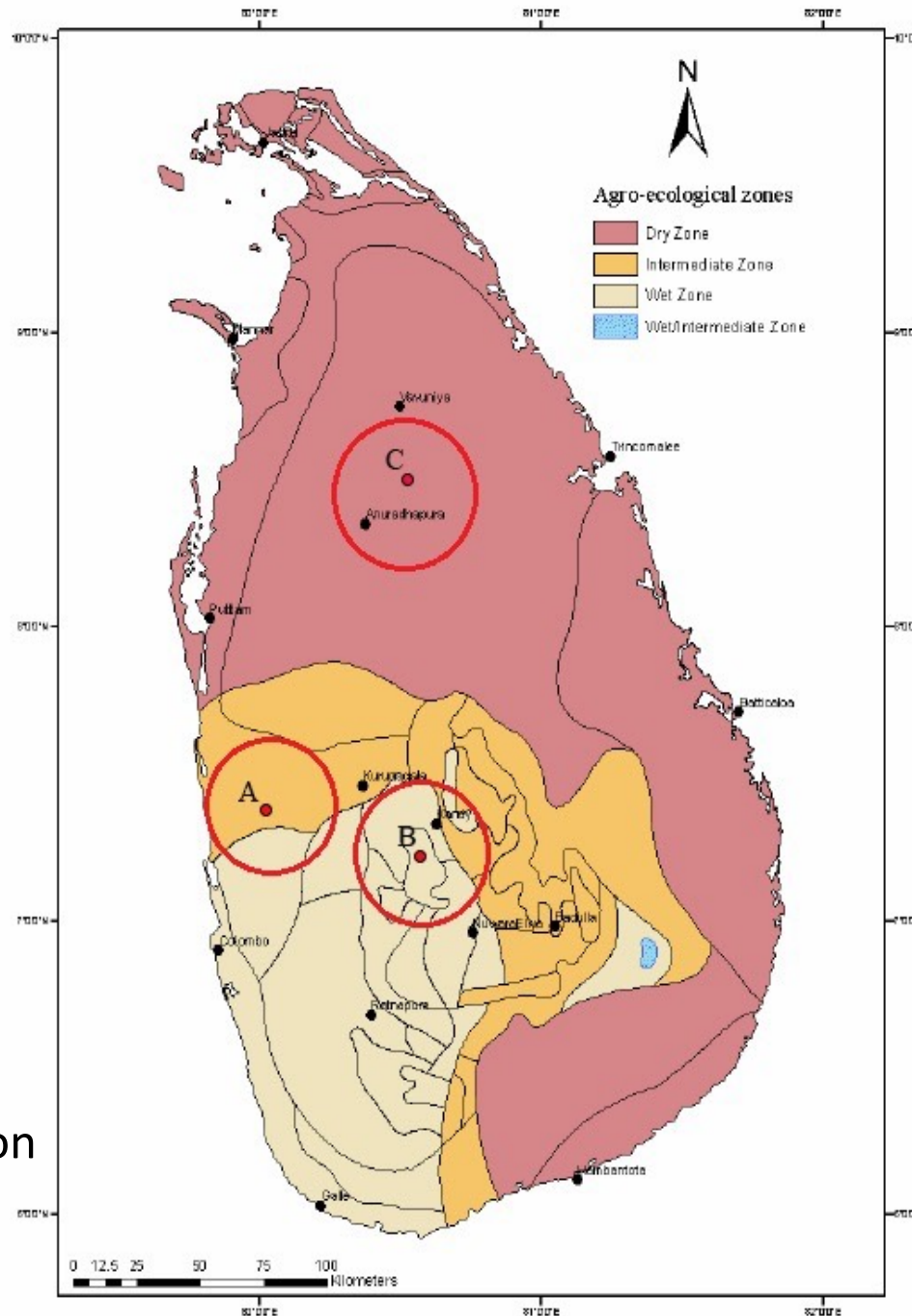 During southwest monsoon

Figure 1 – sample collected areas: A-Kotadeniyawa, B- Undugoda, C-Seeppukulama Source (Desilva and Diaz, 2011)
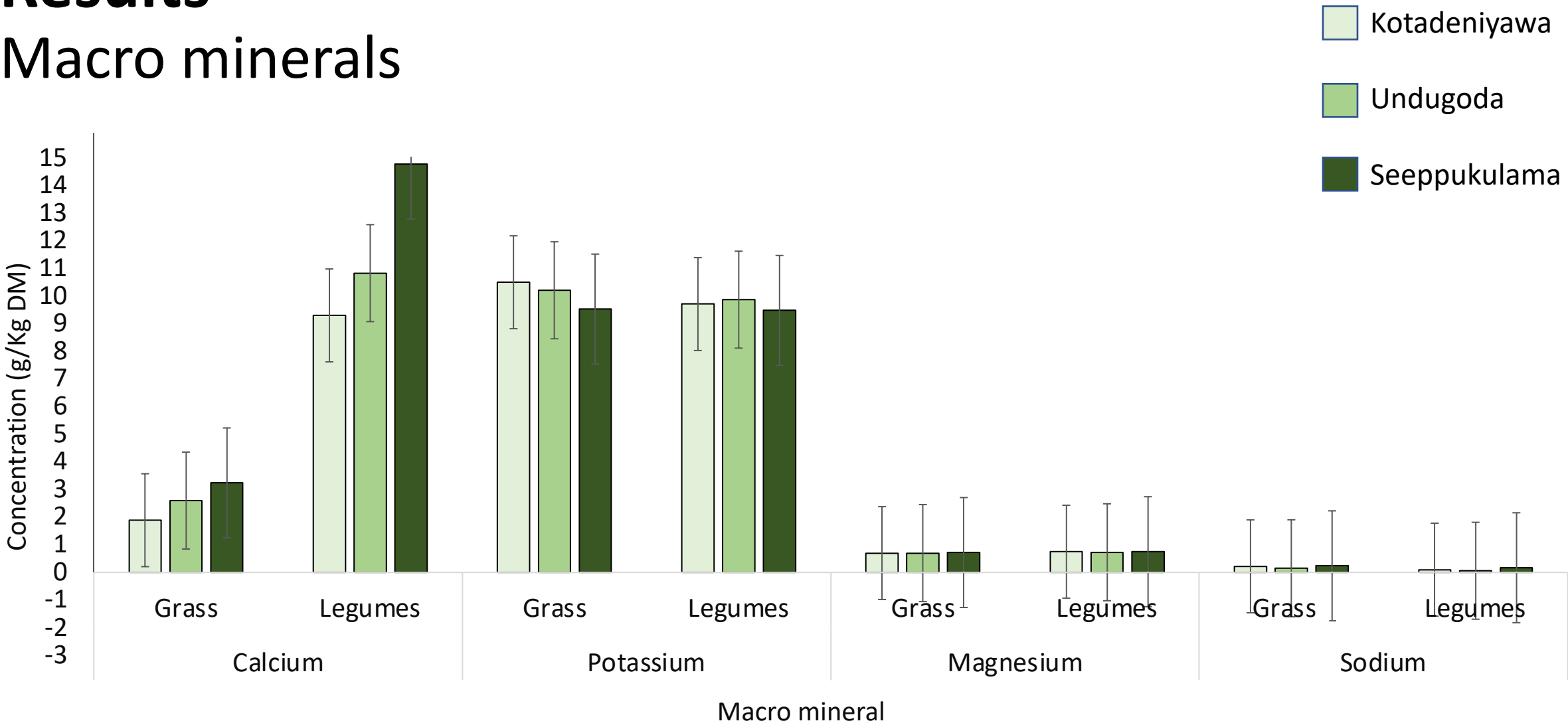
Results
Macro minerals

Figure 2- Mean macro mineral levels of grasses and legumes collected from Kotadeniyawa, Undugoda and Seeppukulama
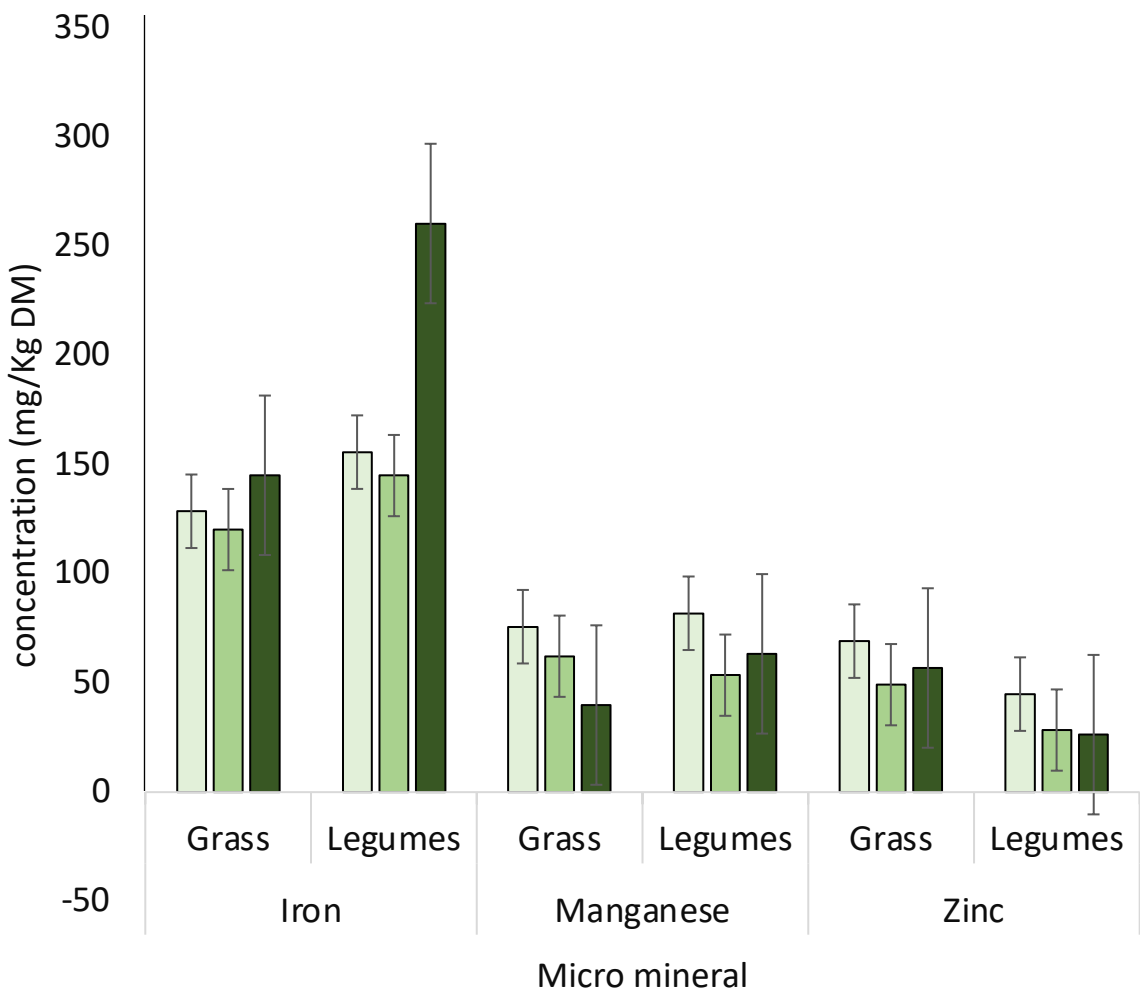
Micro minerals

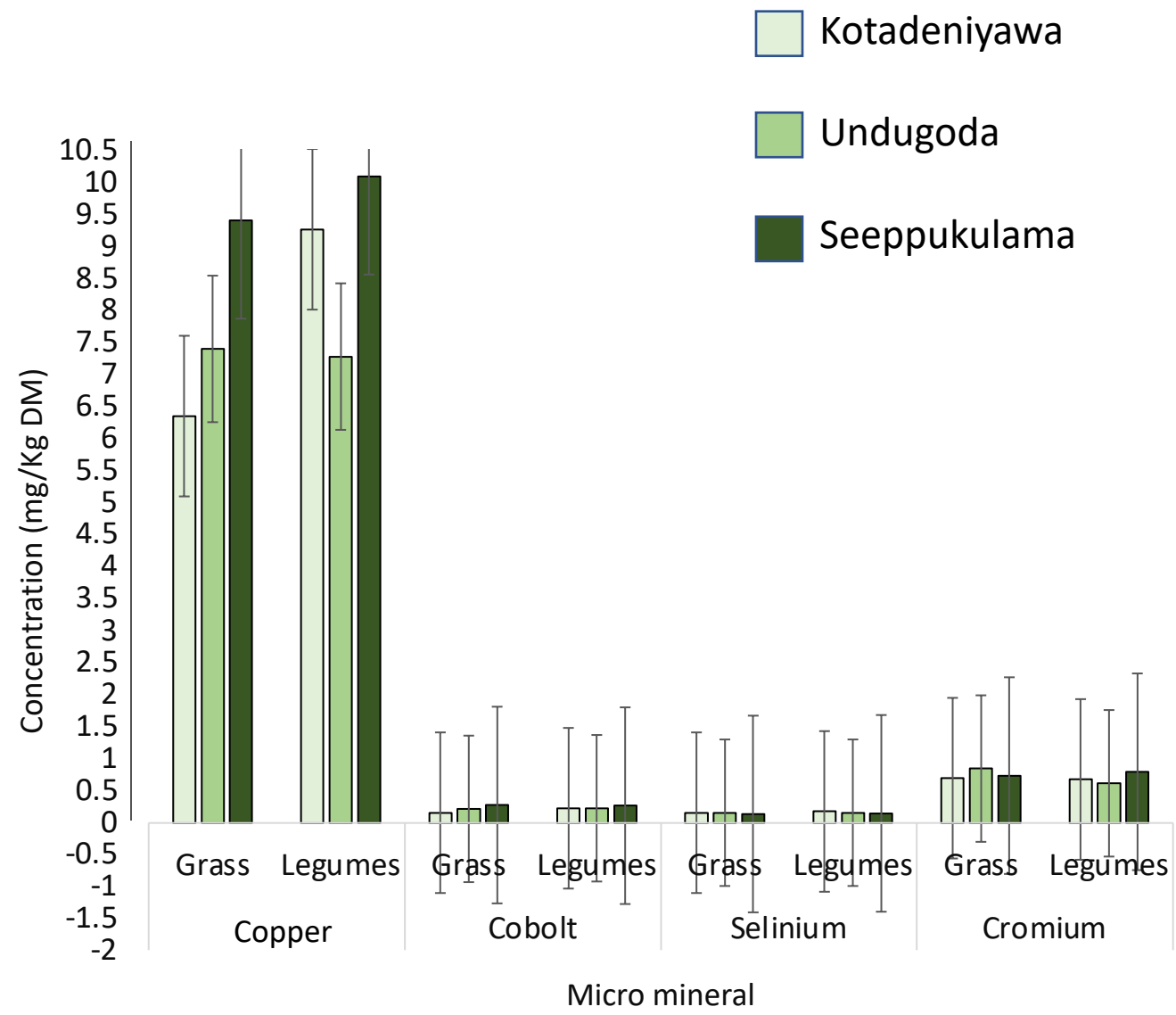Figure 3- Mean Fe, Mn, Zn levels of grasses and legumes

Figure 4- Mean Cu, Co, Se, Cr levels of grasses and legumes

Statistical significance of forage mineral levels in three different dairy production zones

H_o-There is no significant difference in " X " concentration, between tested 3 zones

H_α-At least " X" concentration in one zone is significantly different from others

X= Ca, K, Mg, Na, Fe, Mn, Cu, Co, Se, Zn, Cr

Table 1- P values obtained for forage mineral levels in tested zones

Mineral	P value (0.05)
Calcium	0.610
Potassium	**0.017**
Magnesium	0.204
Sodium	0.399
Iron	0.190
Manganese	0.155
Copper	0.063
Cobalt	**0.000**
Selenium	**0.003**
Zinc	0.794
Chromium	0.616

Mineral profile of the most common forages in SL

Table 2- Mineral levels of pasture grasses

Pasture grass	Zone	Macro minerals (g/Kg DM)				Micro minerals(mg/Kg DM)						
		Ca	K	Mg	Na	Fe	Mn	Cu	Co	Se	Zn	Cr
Water grass (*Brachiaria mutica*)	Ko	3.48[a] ±0.95	10.9[a] ±0.05	0.70 ±0.01	0.58[a] ±0.01	242 ±57.1	68.1[a] ±1.10	4.90[a] ±1.19	0.17[a] ±0.01	0.16 ±0.02	83.3[a] ±10.1	0.52[a] ±0.03
	U	4.44[b] ±0.01	10.6[a] ±0.01	0.67 ±0.01	0.38[b] ±0.01	175 ±20.6	43.7[b] ±0.33	3.71[b] ±0.42	0.25[b] ±0.01	0.14 ±0.01	60.3[b] ±1.95	1.08[b] ±0.05
	Sp	0.70[bc] ±0.15	9.62[b] ±0.03	0.69 ±0.03	0.55[a] ±0.01	146 ±25.8	49.5[c] ±2.21	2.97[c] ±1.58	0.27[bc] ±0.01	0.15 ±0.02	93.3[a] ±3.42	0.98[bc] ±0.07
Rusi grass (*Brachiariaruziziensis*)	Ko	1.78[a] ±0.13	10.6[a] ±0.01	0.71 ±0.01	0.15[a] ±0.01	116[a] ±9.16	60.3[a] ±2.29	6.24[a] ±0.37	0.17[a] ±0.02	0.16 ±0.02	84.6[a] ±7.06	0.54[a] ±0.02
	U	4.56[b] ±0.37	10.7[a] ±0.01	0.73 ±0.01	0.05[b] ±0.00	113[a] ±12.5	35.2[b] ±2.28	7.54[ab] ±0.33	0.21[b] ±0.01	0.18 ±0.01	93.2[a] ±4.00	0.70[bc] ±0.04
	Sp	2.42[c] ±0.12	9.26[b] ±0.04	0.73 ±0.04	0.07[c] ±0.01	390[b] ±81.6	79.9[c] ±4.77	8.34[b] ±1.00	0.28[c] ±0.02	0.13 ±0.03	61.3[b] ±3.34	0.76[c] ±0.03

Values expressed as mean ± standard deviation, Ko- Kotadeniyawa, U- Undugoda, Sp- Seeppukulama
Different letters in the same column indicate significant statistical difference (P< 0.05)

☐ Coconut triangle   ☐ Wet zone   ☐ Dry zone

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Table 3- Mineral levels of common fodders

Fodders	Zone	Macro minerals (g/Kg DM)				Micro minerals (mg/Kg DM)						
		Ca	K	Mg	Na	Fe	Mn	Cu	Co	Se	Zn	Cr
CO-3	Ko	1.72^{ab} ±0.13	10.5^{ab}±0.01	0.69^{a} ±0.00	0.13^{a} ±0.01	178^{a} ±9.55	207^{a} ±3.90	9.36^{a} ±0.30	0.35^{a} ±0.05	0.17 ±0.02	36.9 ±1.61	0.49^{a} ±0.06
	U	2.71^{a} ±0.66	10.9^{a} ±0.04	0.71^{ab} ±0.00	0.05^{bc} ±0.01	77.3^{bc} ±11.5	50.4^{b} ±5.27	8.81^{a} ±0.40	0.20^{b} ±0.01	0.16 ±0.02	34.7 ±2.69	0.54^{a} ±0.02
	Sp	1.05^{b} ±0.21	10.1^{b} ±0.03	0.71^{b} ±0.01	0.05^{c} ±0.01	86.7^{c} ±12.3	20.6^{c} ±2.60	13.3^{b} ±0.39	0.28^{ab} ±0.03	0.13 ±0.08	51.3 ±11.4	0.82^{b} ±0.07
Gliricedia (*Gliricidia sepium*)	Ko	11.1^{a} ±0.32	10.1^{a} ±0.01	0.73 ±0.01	0.25^{a} ±0.01	156^{a} ±6.36	31.8^{a} ±2.37	5.91^{a} ±0.77	0.17^{a} ±0.03	0.17 ±0.01	47.7^{a} ±4.04	0.47^{a} ±0.10
	U	13.9^{b} ±0.96	9.98^{a} ±0.01	0.75 ±0.02	0.02^{b} ±0.01	99.5^{b} ±9.05	34.9^{a} ±1.48	4.71^{b} ±0.06	0.24^{b} ±0.02	0.17 ±0.03	16.6^{b} ±0.11	0.61^{b} ±0.04
	Sp	15.7^{c} ±0.12	8.51^{b} ±0.01	0.76 ±0.01	0.28^{a} ±0.02	195^{c} ±13.6	55.1^{b} ±2.22	6.43^{a} ±0.25	0.26^{bc} ±0.01	0.14 ±0.01	16.4^{bc} ±0.97	0.83^{c} ±0.03

Values expressed as mean ± standard deviation, Ko- Kotadeniyawa, U- Undugoda, Sp- Seeppukulama
Different letters in the same column indicate significant statistical difference (P< 0.05)

☐ Coconut triangle   ▢ Wet zone   ▢ Dry zone

Conclusions

- **Legumes** - rich in **Ca, Fe, Mn** & **Cu**

- **Grasses** - rich in **Zn**

- **K, Co & Se** level of forage is **significantly different** (P<0.05) among tested 3 zones

- **Se concentration** in same plant variety, is not significantly different (P<0.05) among tested 3 zones

- Use of these values for mineral supplementation must be done with further investigations during different seasons in future

References

- De Silva, Christina & Rodríguez Díaz, Juan. (2011) 'Spatial impacts of climate change on major climatic factors in sri lanka',Sabragamuwa University Journal. Vol 10. 60-75.

- Perera, B. M. A. O. and Jayasuriya, M. C. N. (2008) 'The dairy industry in Sri Lanka: Current status and future directions for a greater role in national development', *Journal of the National Science Foundation of Sri Lanka*, 36(Special Issue), pp. 115–126. doi: 10.4038/jnsfsr.v36i0.8050.

- Ranaweera and Attapattu. (2006) cited in Ranaweera N.F.C., (2009) 'Sri Lanka: Opportunities for dairy sector growth', Smallholder dairy development: Lessons learned in Asia. Available at: http://www.fao.org/docrep/011/i0588e/I0588E08.htm (Accessed: 12 October 2020)

- Spears, J. W. (2015) 'Minerals in Forages', (January 2018), pp. 281–317. doi: 10.2134/1994.foragequality.c7.

- Suttle N.F (2010) *Mineral Nutrition of Livestock, 4th Edition*, MPG Book Group, UK.

- Underwood, E.J and Suttle, F. (1999) *The Mineral Nutrition of Livestock*. 3rd Edition CAB international, Wallingford.

- Weerasinghe, P. and Lanka, S. (2019) 'Livestock Feeds and Feeding Practices in Sri Lanka', *Livestock Feeds and Feeding Practices in South Asia*, (December), pp. 181–206.

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