

Chrysanthemum yield increased using targeted foliar fertiliser applications

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Summary

- Fertiliser has traditionally been applied to the soil, and plants obtained nutrients from the soil via their roots.
- Previous research has shown that foliar nutrition can work in tandem with soil fertilisation, or even replace it.
- This work looked at four liquid fertilisers: Albina containing calcium; Indra that promotes antioxidant production and contains nutrients to enable their production; Lono K containing nitrogen and potassium; and Lono Plus containing nitrogen and calcium (all products Levity Crop Science, UK).
- Albina and Indra were applied at 0.5, 0.75, 1 and 1.25 l/ha for three applications; Lono K and Lono Plus were applied at 1, 1.5, 2 and 2.5 l/ha for five applications.
- Stem length and diameter; number of stems and flowers; weight of stems; shelf life; and cost benefit were recorded and calculated.
- All products at all application rates gave significant improvements over the grower standard edaphic fertilisation (EF) program.
- Considering the return on investment of applying the products, the 1 l/ha Albina, 0.75 l/ha Indra and 1.5 l/ha Lono K and Lono Plus application rates were the best.

Introduction

- Good plant nutrition is key for good plant health and growth. Without good plant health and growth, farmers and growers will not be able to achieve full yields and profits.
- Fertiliser has to come from the right source and be applied at the right rate, time and place (IPNI [International Plant Nutrition Institute], 2016).
- Many growers just use basic edaphic fertilisation (EF) where the fertiliser is applied to the soil.
- This work aimed to evaluate the economic benefit to chrysanthemum growers of using four advanced fertilisers containing nitrogen, calcium, potassium and antioxidants to determine the impact on yield and profit.

Materials and methods

- Trials assessed four liquid fertilizers: Albina containing calcium (with LoCal an MCAS); Indra that promotes antioxidant production and contains nutrients to enable their production; Lono K containing nitrogen (as stabilized amine nitrogen, SAN) and potassium; and Lono Plus containing nitrogen (as SAN) and calcium (all products Levity Crop Science, UK).
- Each product was applied at four rates in addition to grower standard EF.
- Chrysanthemum (*Dendranthema grandiflorum*) were grown in glasshouses as part of commercial production in Columbia.
- Stem length and diameter; number of stems and flowers; weight of stems; shelf life; and cost benefit were recorded and calculated.

Results

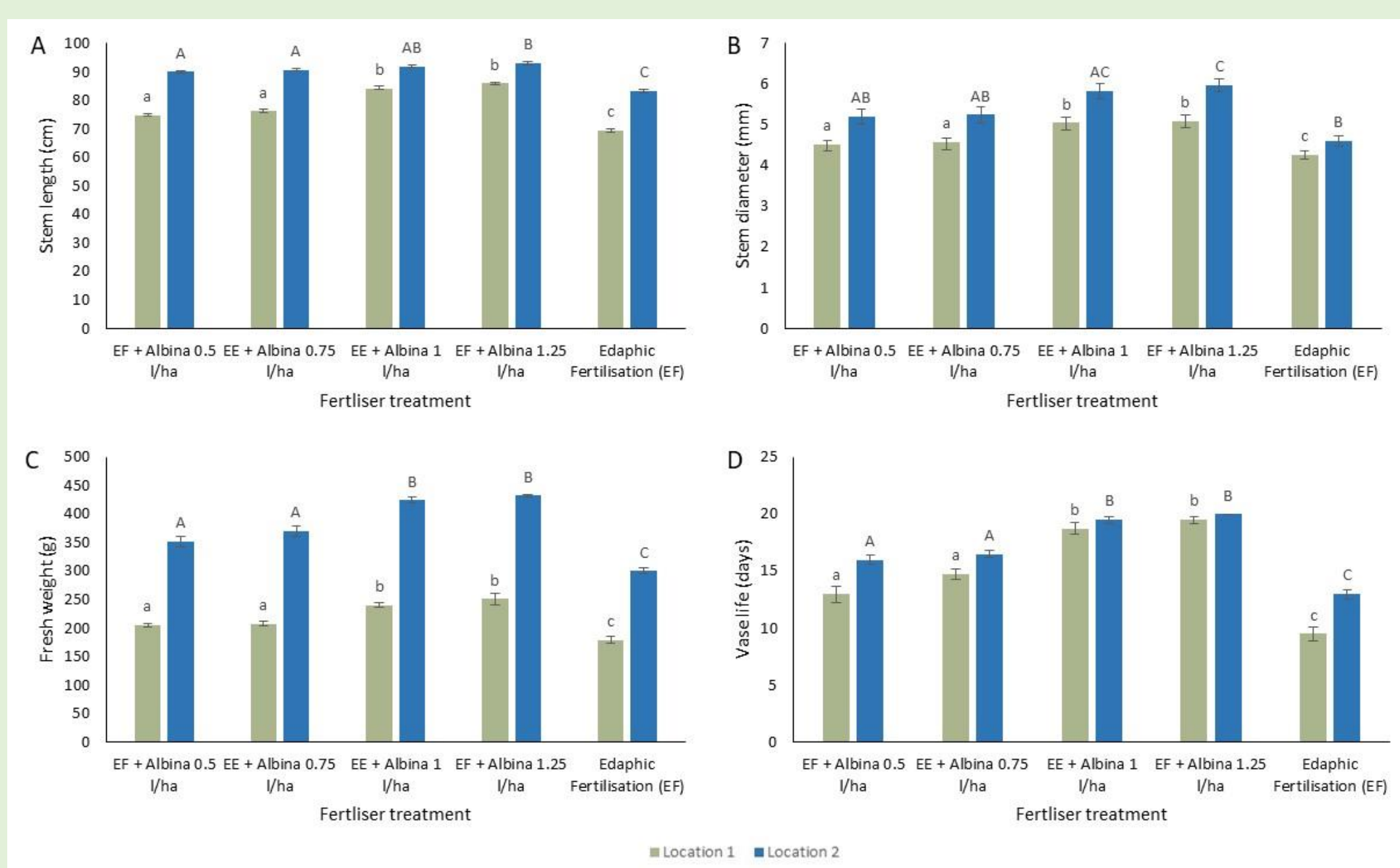


Figure 1. Stem length (A), stem diameter (B), fresh weight (C) and vase life (D) for chrysanthemum with Albina (Ca fertiliser). Sig. dif. by lower case letters location 1, capital letters location 2, $p < 0.05$ AVOVA, Tukey multiple range test ($n = 10$).

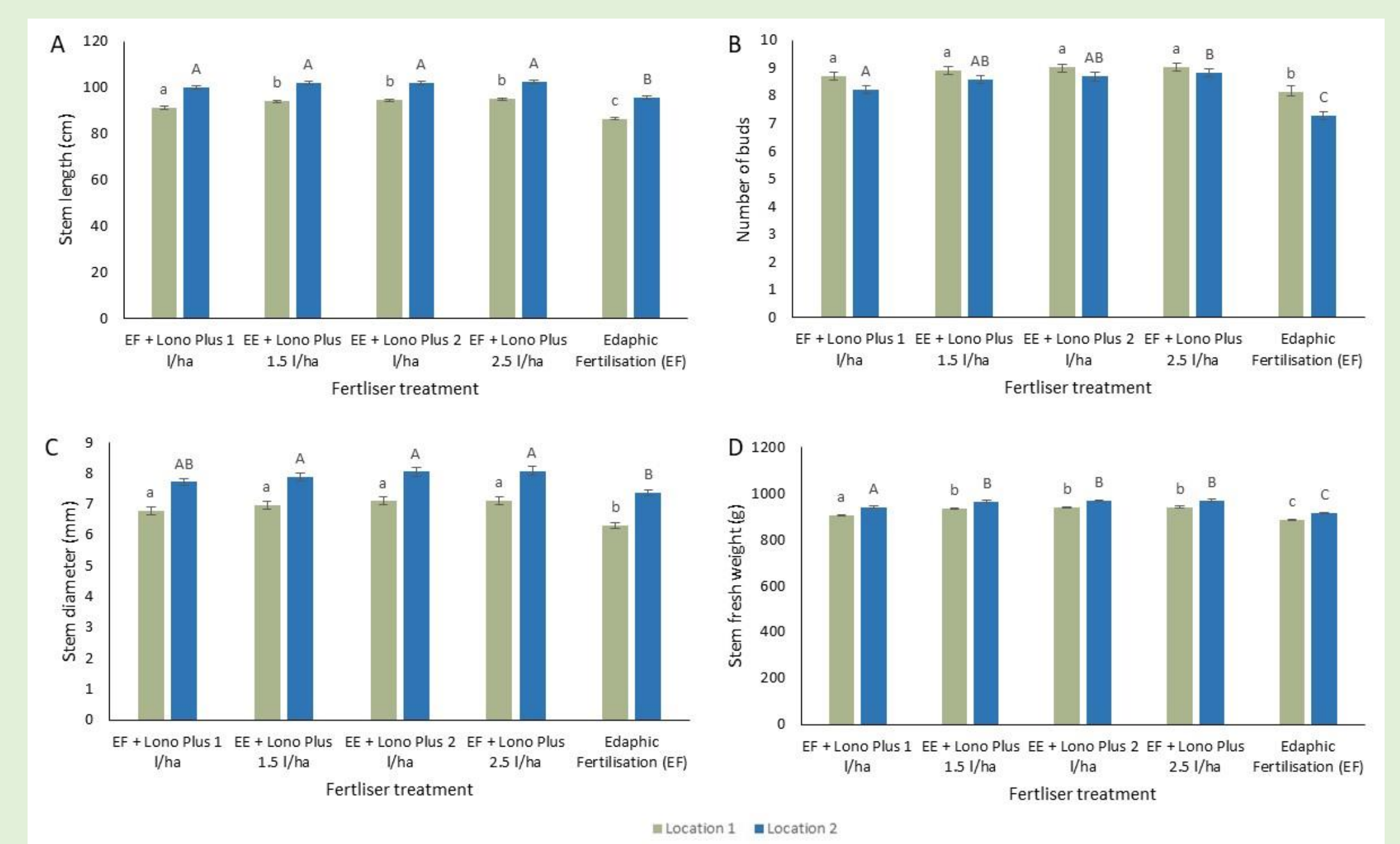


Figure 4. Stem length (A), no. of buds (B), stem diameter (C) and fresh stem weight (D) for chrysanthemum with Lono Plus (N+Ca fertiliser). Sig. dif. by lower case letters location 1, capital letters location 2, $p < 0.05$ AVOVA, Tukey multiple range test ($n = 10$).

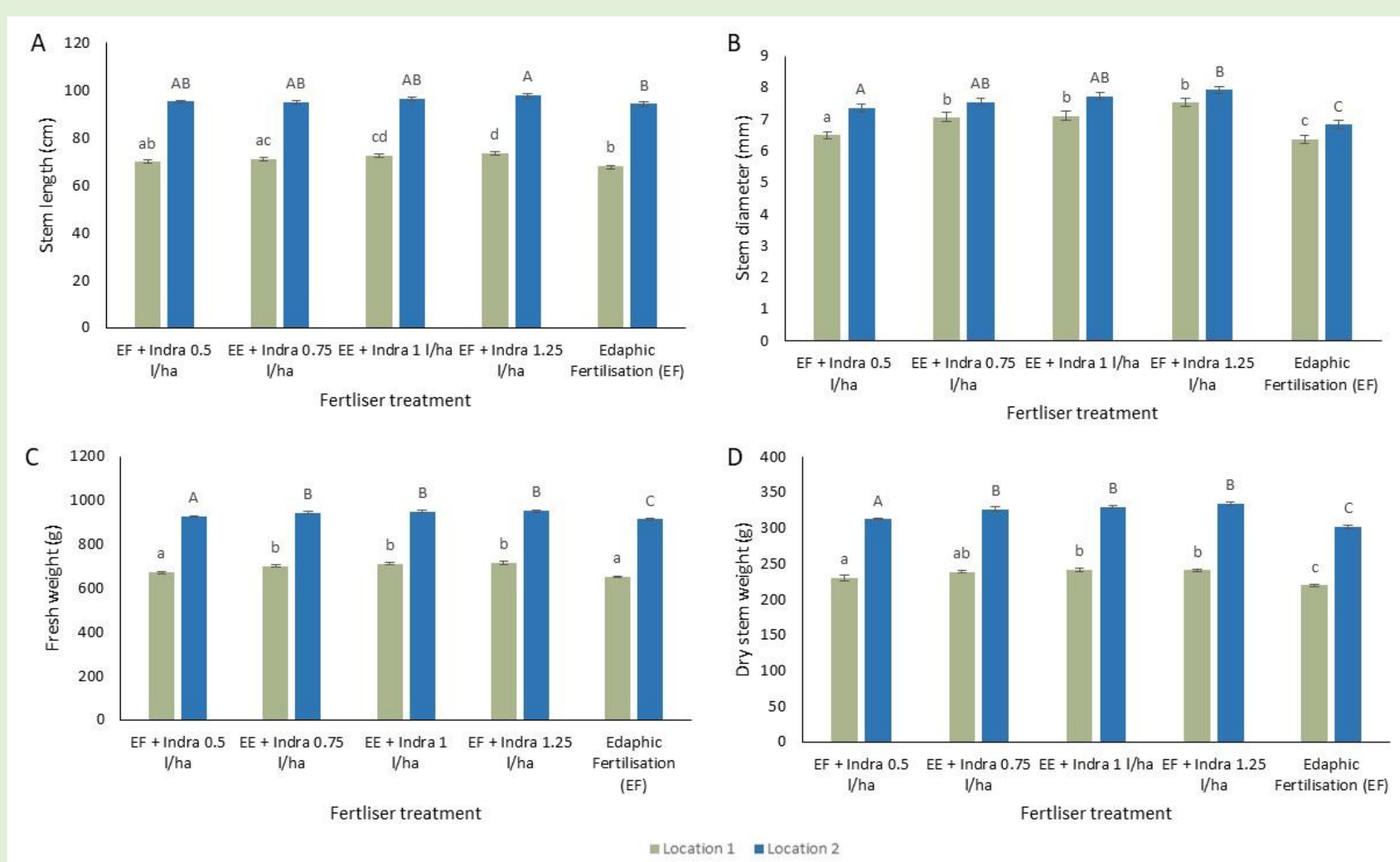


Figure 2. Stem length (A), stem diameter (B), fresh weight (C) and dry stem weight (D) for chrysanthemum with Indra (anti-stress product). Sig. dif. by lower case letters location 1, capital letters location 2, $p < 0.05$ AVOVA, Tukey multiple range test ($n = 10$).



Table 1. Benefit (increase in revenue over untreated (0 benefit)), cost (price of foliar fertiliser over untreated (0 cost)) and benefit/cost (b/c) ratio for each product and application rate for both locations. A positive number in B/C column shows economic benefit of using product at that rate. Prices and costs taken February 2022.

| Treatment | Location 1 | | | Location 2 | | |
|----------------|----------------------------|-------------------------|-----------|----------------------------|-------------------------|-----------|
| | Benefit (,000 Pesos) | Cost (,000 Pesos) | B/C ratio | Benefit (,000 Pesos) | Cost (,000 Pesos) | B/C ratio |
| EF + Albina | | | | | | |
| 0.5 l/ha | 27,090 | 172.5 | 157.04 | 34,310 | 172.5 | 198.90 |
| 0.75 l/ha | 43,175 | 258.75 | 166.86 | 55,145 | 258.75 | 213.12 |
| 1 l/ha | 82,235 | 345 | 238.36 | 107,230 | 345 | 310.81 |
| 1.25 l/ha | 106,275 | 431.25 | 246.43 | 140,370 | 431.25 | 325.50 |
| EF + Indra | | | | | | |
| 0.5 l/ha | 0 | 157.5 | 0.00 | 77,776 | 157.5 | 493.82 |
| 0.75 l/ha | 77,776 | 236.25 | 329.21 | 175,000 | 236.25 | 740.74 |
| 1 l/ha | 77,776 | 315 | 246.91 | 175,000 | 315 | 555.56 |
| 1.25 l/ha | 77,776 | 393.75 | 197.53 | 175,000 | 393.75 | 444.44 |
| EF + Lono K | | | | | | |
| 1 l/ha | 77,777 | 276 | 281.80 | 77,777 | 276 | 281.80 |
| 1.5 l/ha | 175,000 | 414 | 422.71 | 175,000 | 414 | 422.71 |
| 2 l/ha | 175,000 | 552 | 317.03 | 175,000 | 552 | 317.03 |
| 2.5 l/ha | 175,000 | 690 | 253.62 | 175,000 | 690 | 253.62 |
| EF + Lono Plus | | | | | | |
| 1 l/ha | 0 | 276 | 0.00 | 77,777 | 276 | 281.80 |
| 1.5 l/ha | 77,777 | 414 | 187.87 | 175,000 | 414 | 422.71 |
| 2 l/ha | 77,777 | 552 | 140.90 | 175,000 | 552 | 317.03 |
| 2.5 l/ha | 77,777 | 690 | 112.72 | 175,000 | 690 | 253.62 |

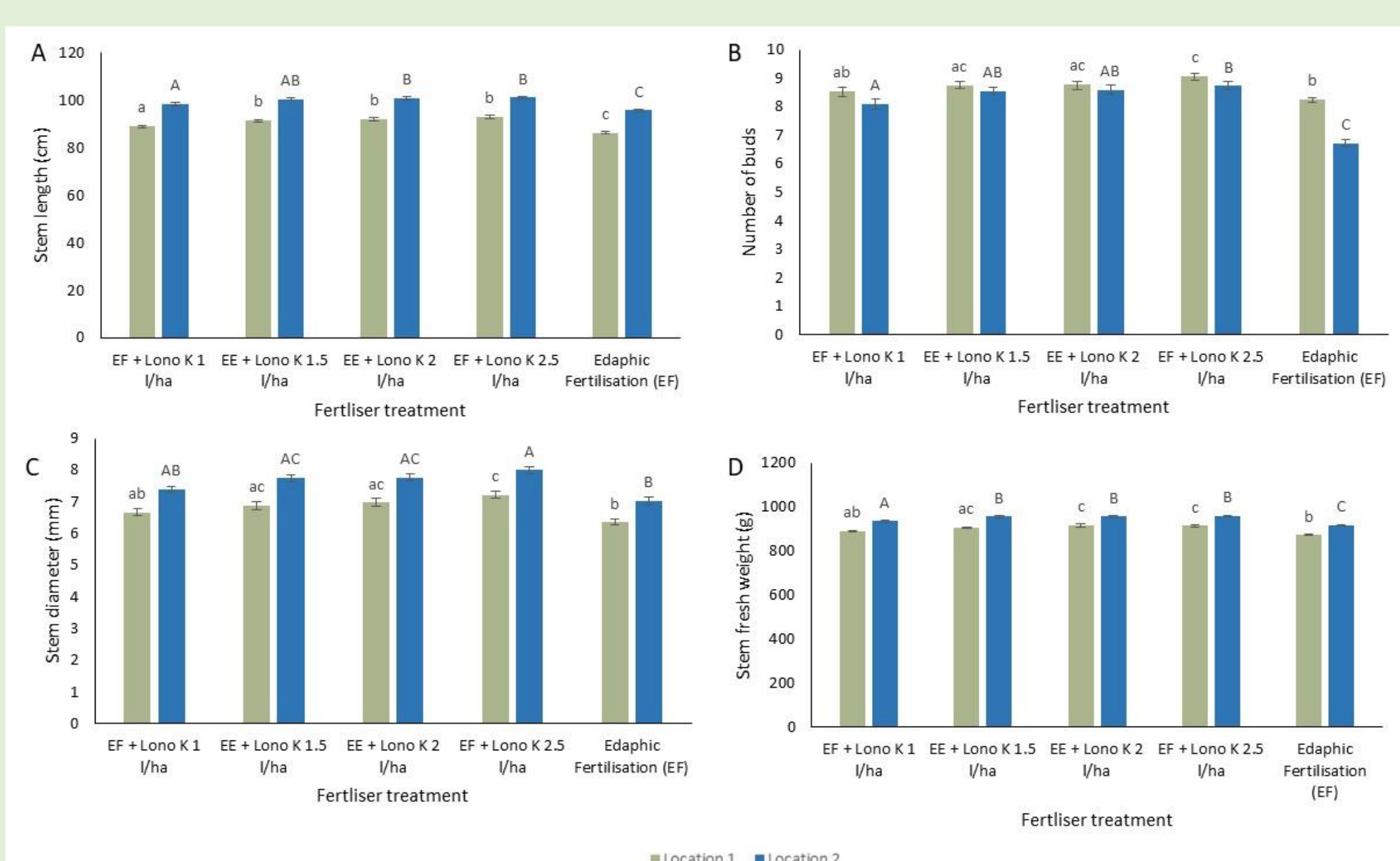
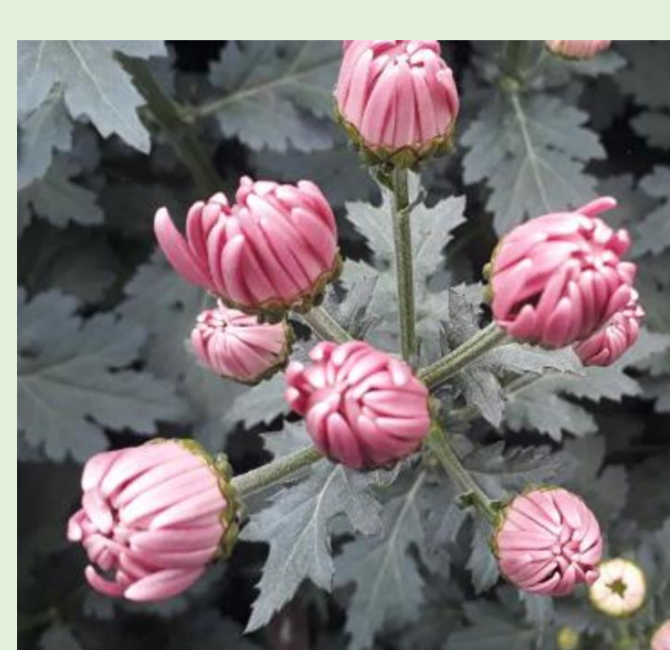


Figure 3. Stem length (A), no. of buds (B), stem diameter (C) and fresh stem weight (D) for chrysanthemum with Lono K (N+K fertiliser). Sig. dif. by lower case letters location 1, capital letters location 2, $p < 0.05$ AVOVA, Tukey multiple range test ($n = 10$).



Conclusions

- This work has shown the economic benefits, due to increased yields, of four foliar fertilisers applied individually to chrysanthemum at a range of rates in addition to EF.
- When considering the return on investment of applying the products, the 1 l/ha Albina, 0.75 l/ha Indra and 1.5 l/ha Lono K and Lono Plus application rates were the best for the growers to use.
- Future work should look at reducing the EF while maintaining the increased yield due to targeted foliar fertiliser applications.

Reference

IPNI [International Plant Nutrition Institute] (2016). Plant nutrition manual: A manual for improving the management of plant nutrition. IPNI, Norcross, GA, USA.