A lysimeter experiment and field trial to determine options for the beneficial reuse of wastewater from Duvauchelle and Akaroa, Banks Peninsula (November 2014 – June 2017)

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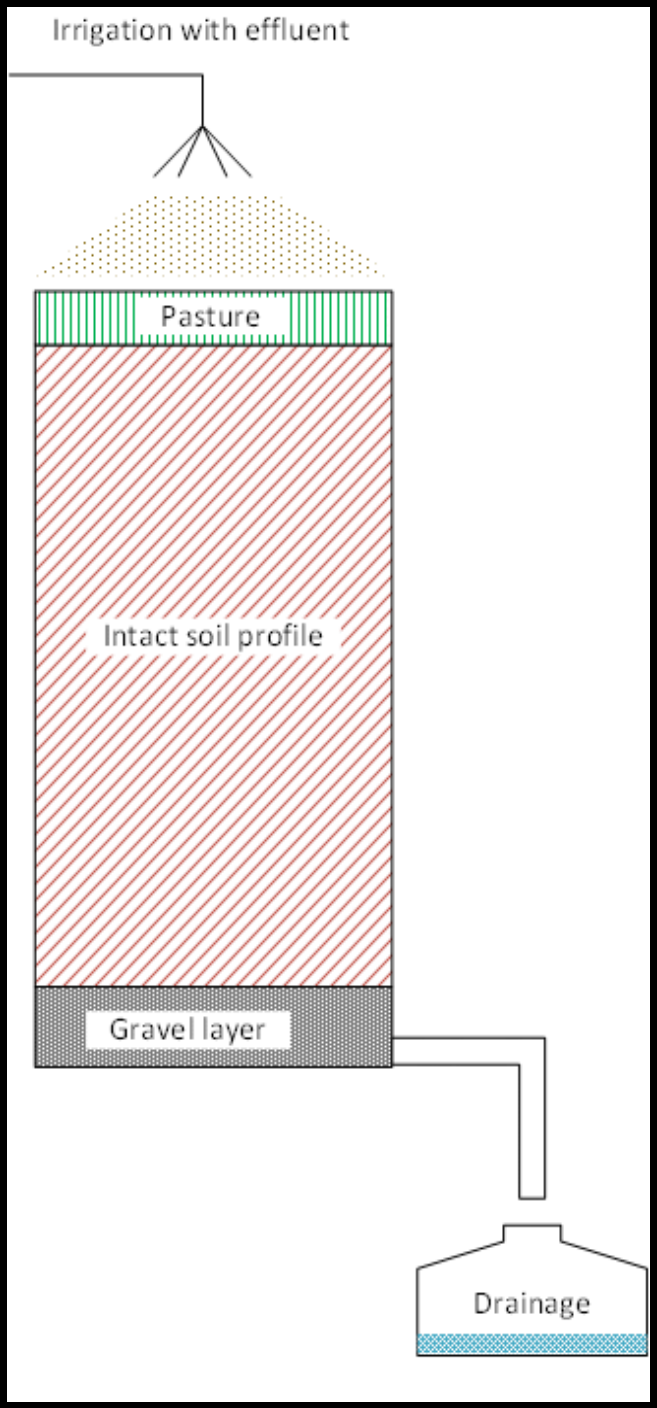
Barry soil (silt loam)
Pawson silt loam


2
1
3
3
2


Irrigation with effluent
Pasture
Intact soil profile
Gravel layer
Drainage


8

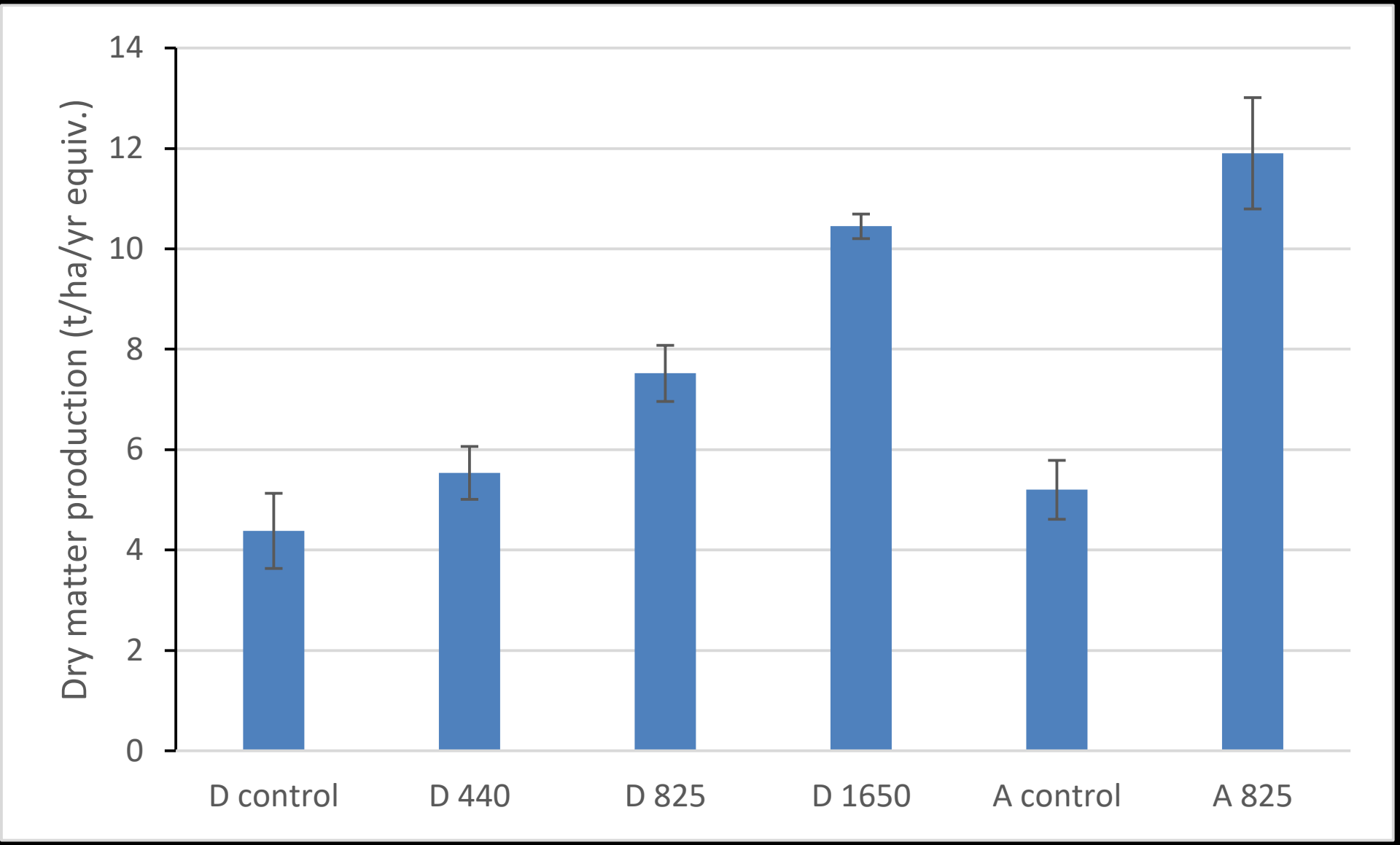
Control (no irrigation)

440 mm/yr

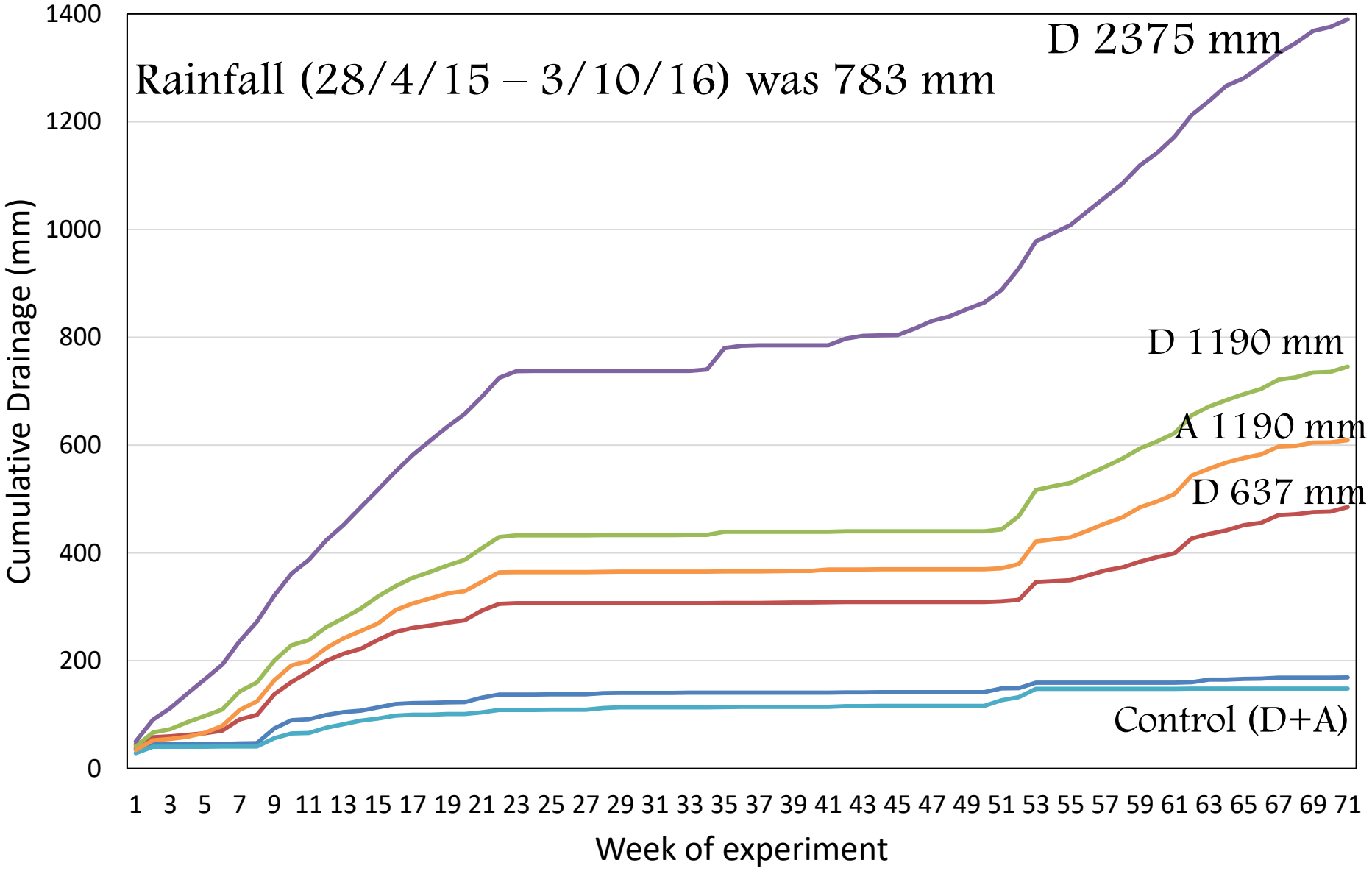
825 mm/yr

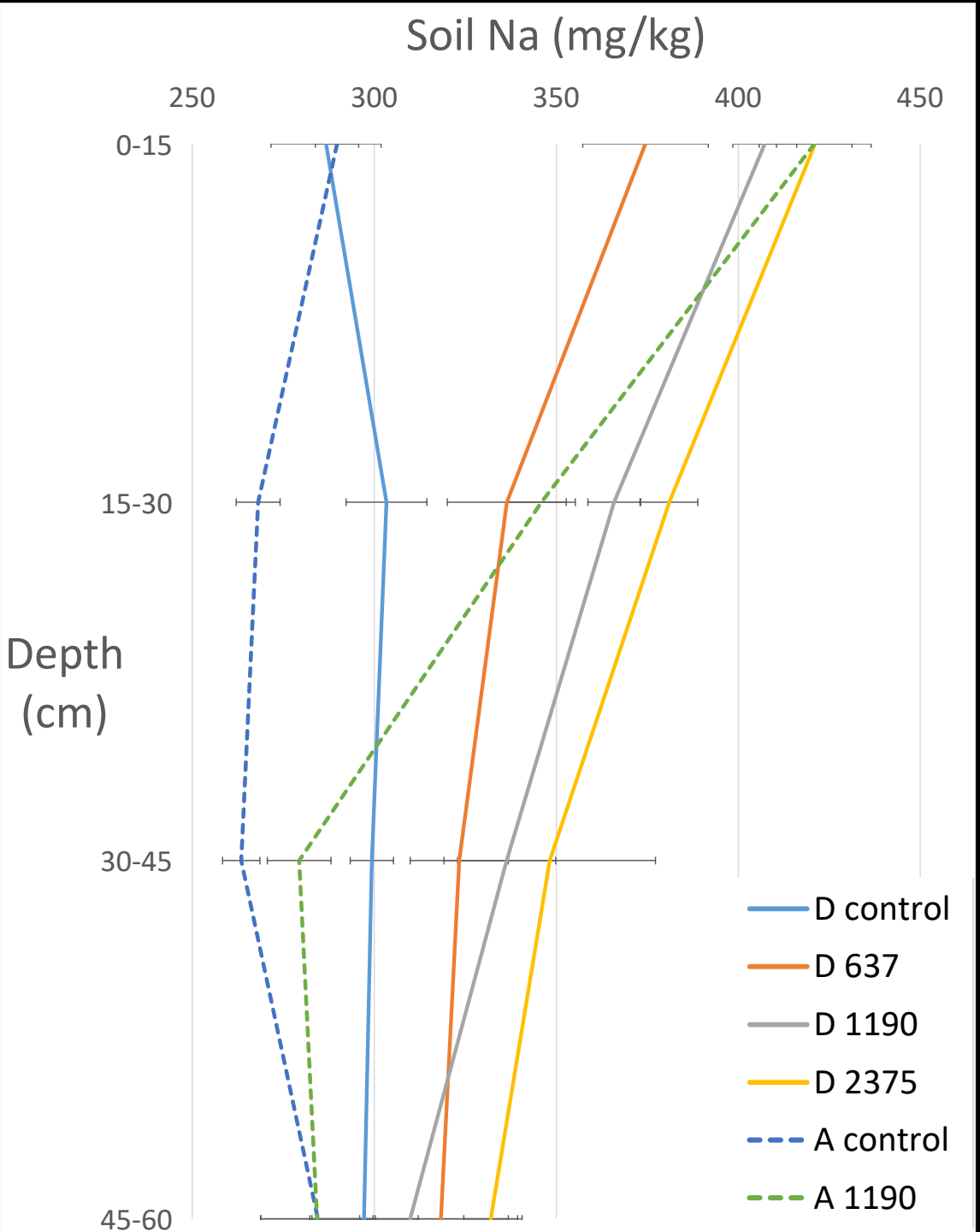
1650 mm/yr

Wastewater accelerates pasture growth



All soils drained freely with no ponding





Increased Na but no excessive accumulation

Na in irrigation water = 63 mg/L

No significant nitrate leaching

- Total N in treated wastewater ca. 30 mg/L
- Average nitrate-N concentration in drainage <0.3 mg/L
- Total nitrate-N leached <1 kg/ha/yr in all treatments

How does it compare grazed pasture?

- Effluent irrigated cut & carry N leaching:<1 kg/ha/yr
- Grazed pasture leaches 40 – 80 kg/ha/yr (Burkett, 2013)

- Effluent <150 mg Cd/kg P
- Superphosphate <280 mg Cd/ kg P

- Grazing: soil disturbance through trampling.

- Many more pathogens in bovine faeces than treated effluent

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Value

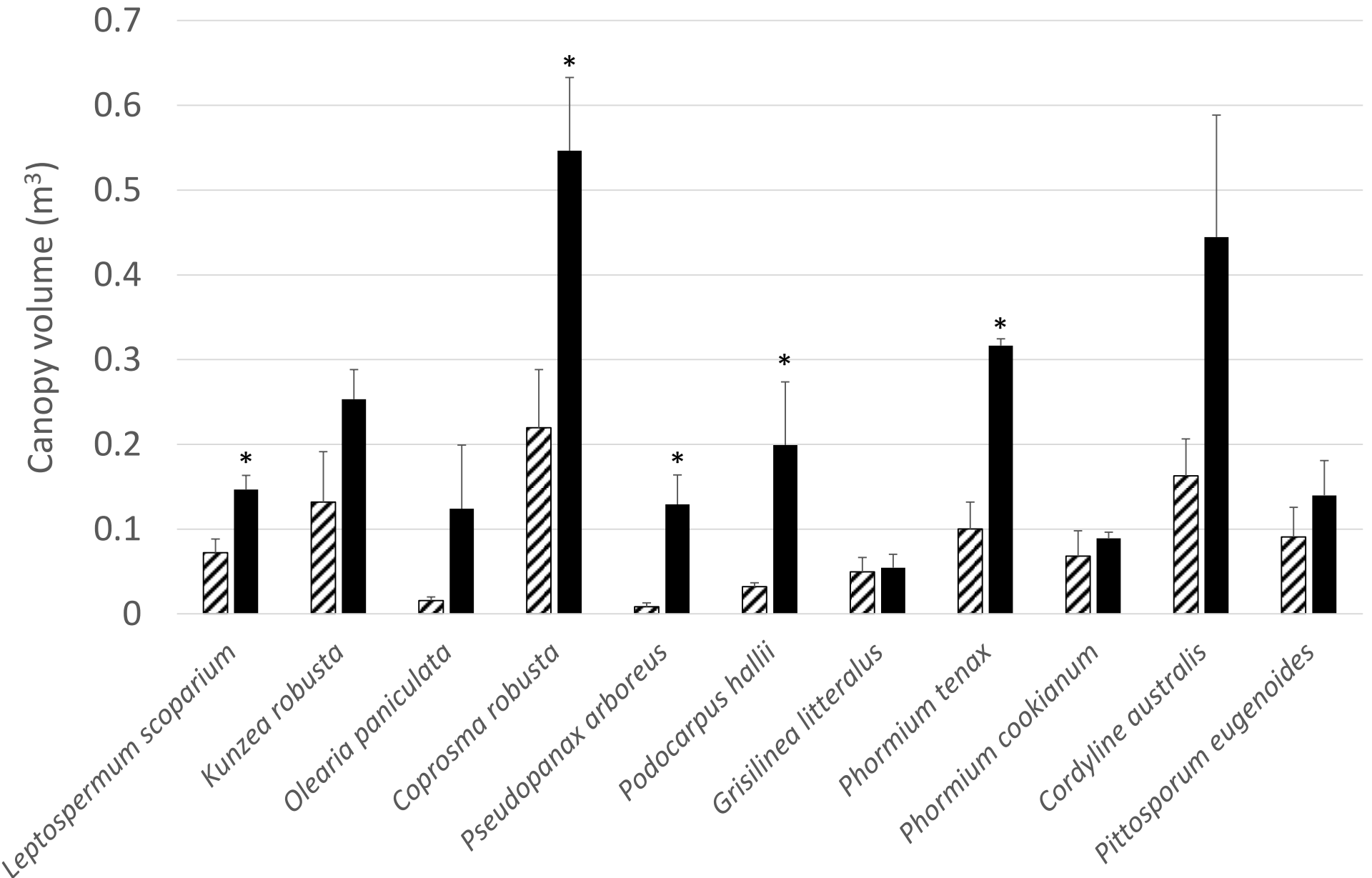
Irrigation of 500 mm/ha/yr

Element	Mass (kg/ha/yr)
N	120
P	30
K	70
S	55
Ca	140
Mg	60
Zn	0.28
Cu	0.035
Cd	<0.005

Value

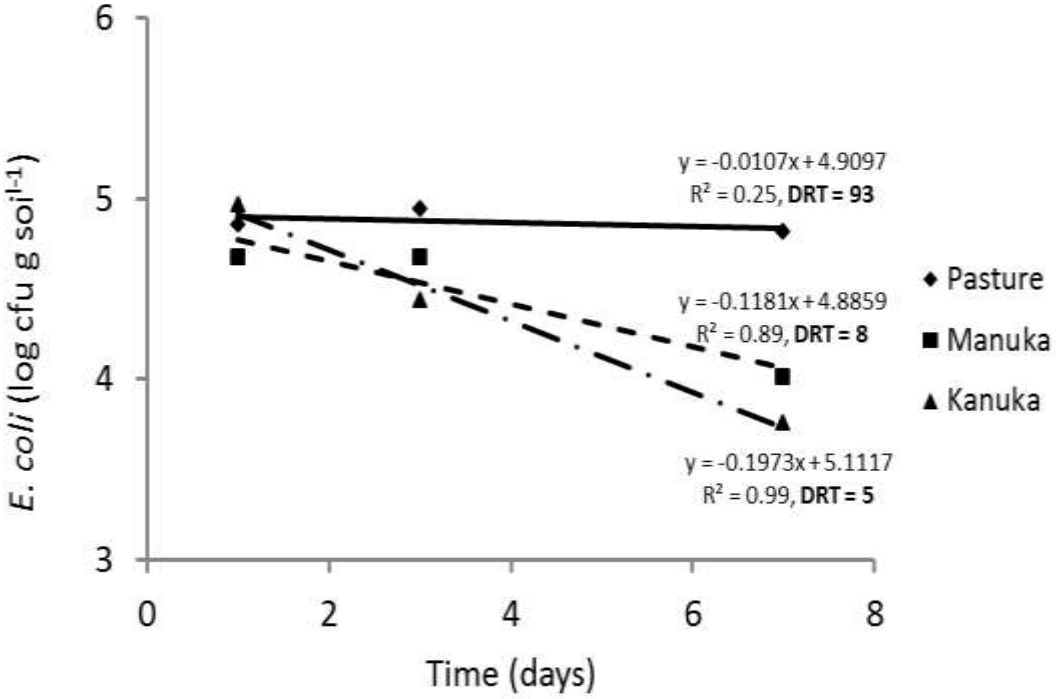
Element	Value ($/ha/yr)
N	$120
P	$105
K	$183
Water	($91 - $1470) av $770
TOTAL VALUE	**>$1178**

Effect of effluent on NZ native plants



Manuka kills pathogens in soil

Enhanced die-off of *E. coli* under manuka



Prosser et al. (2016) *Soil Biology and Biochemistry* 96, 1-3.

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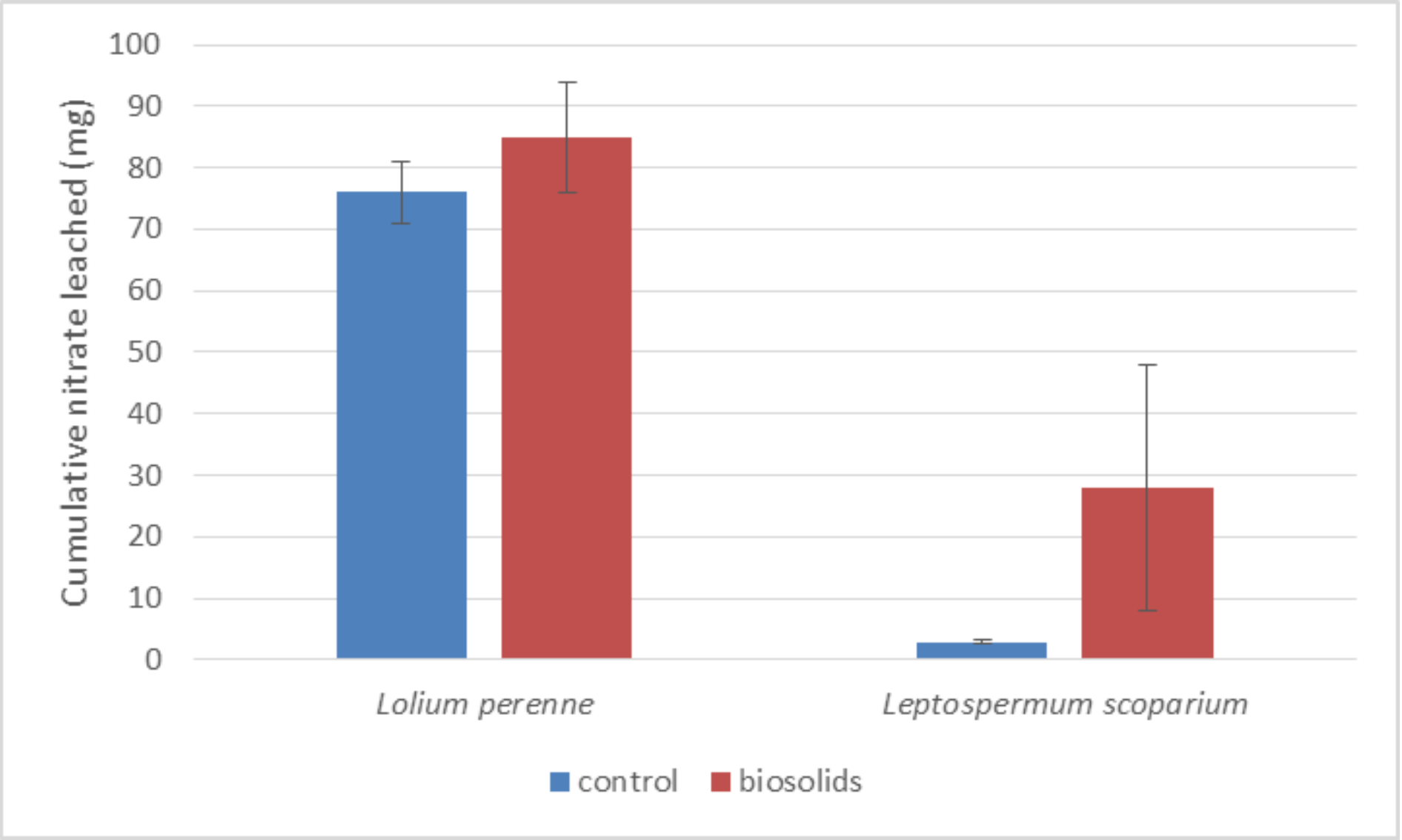
…and reduces nitrate leaching



Esperschuetz et al. (2017). *Environmental Pollution* 225, 12-19.


BARRIER
GOLD
100% PURE
MANUKA
ESSENTIAL
OIL
EXTERNAL USE ONLY 10mls
BARRIER
100% PURE
KANUKA
ESSENTIAL
OIL
EXTERNAL USE ONLY 10mls

Conclusions

- Disposal of the effluent into the harbor is a waste of a valuable resource.
- Irrigation of 500 – 800 mm/yr is recommended. Higher rates may be possible.
- Soil should be monitored for aggregate stability and gypsum, dolomite, or lime added as required.