Boxthorn trials

REPORT

Emiliano R. Veronesi

Hamish Gow

Clive Kaiser

Aims

Investigate the efficacy of *Buchananiella whitei*, *Orius vicinus*, and *Engytatus nicotianae* as biocontrol agents of TPP on Boxthorn edges through:

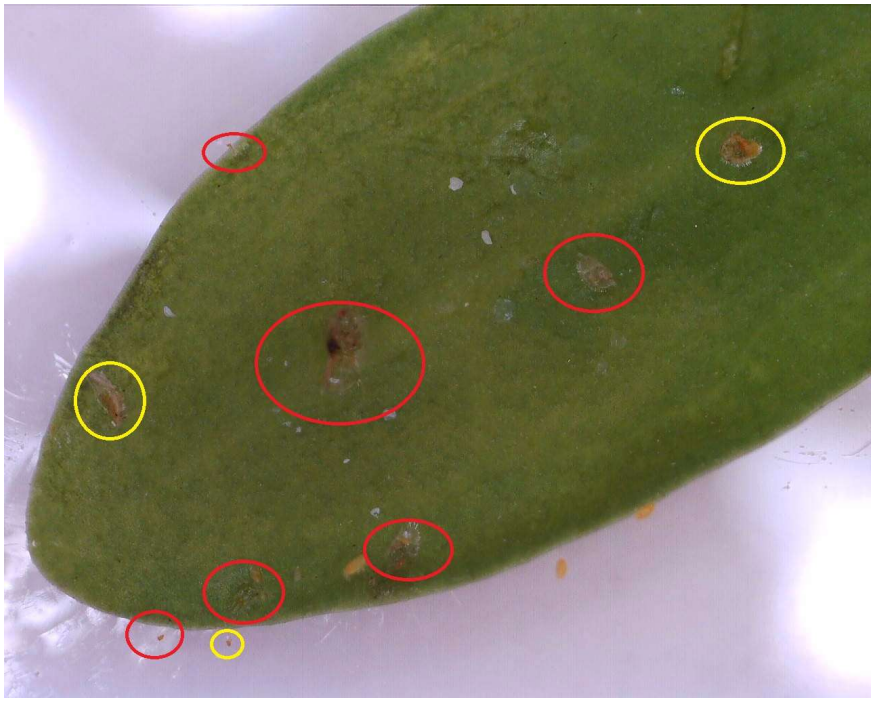
- **Petri dish trials** to assess consumption rates and preferences

- **Preliminary release trials** on boxthorn edges to check biocontrol agents' persistence and potential

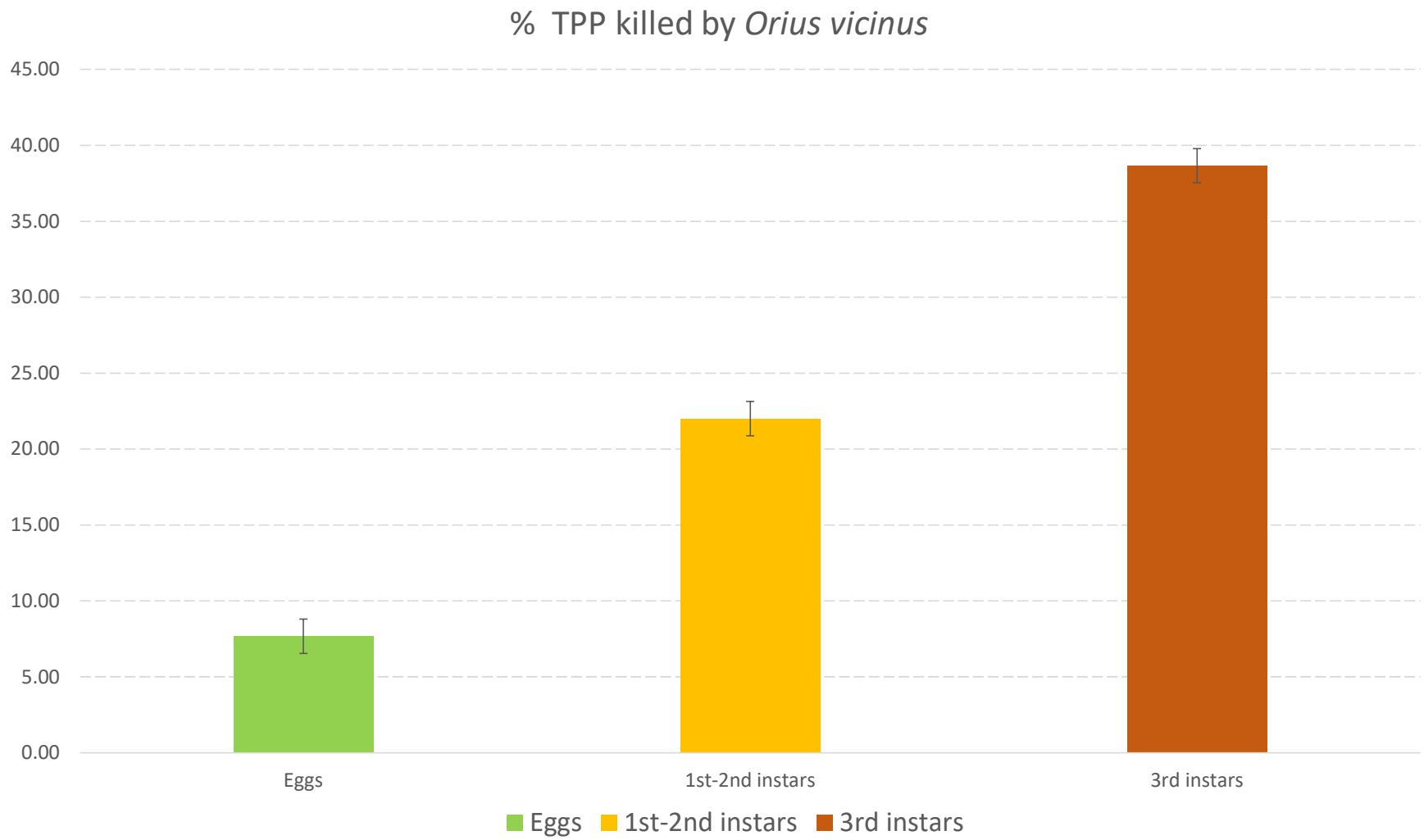
Buchananiella whitei - Choice test

This means that every single *B. whitei* killed an average of 4.3 eggs, 2.35 young nymphs **and** 2.95 stage 3 nymphs

Consumption or just killing?

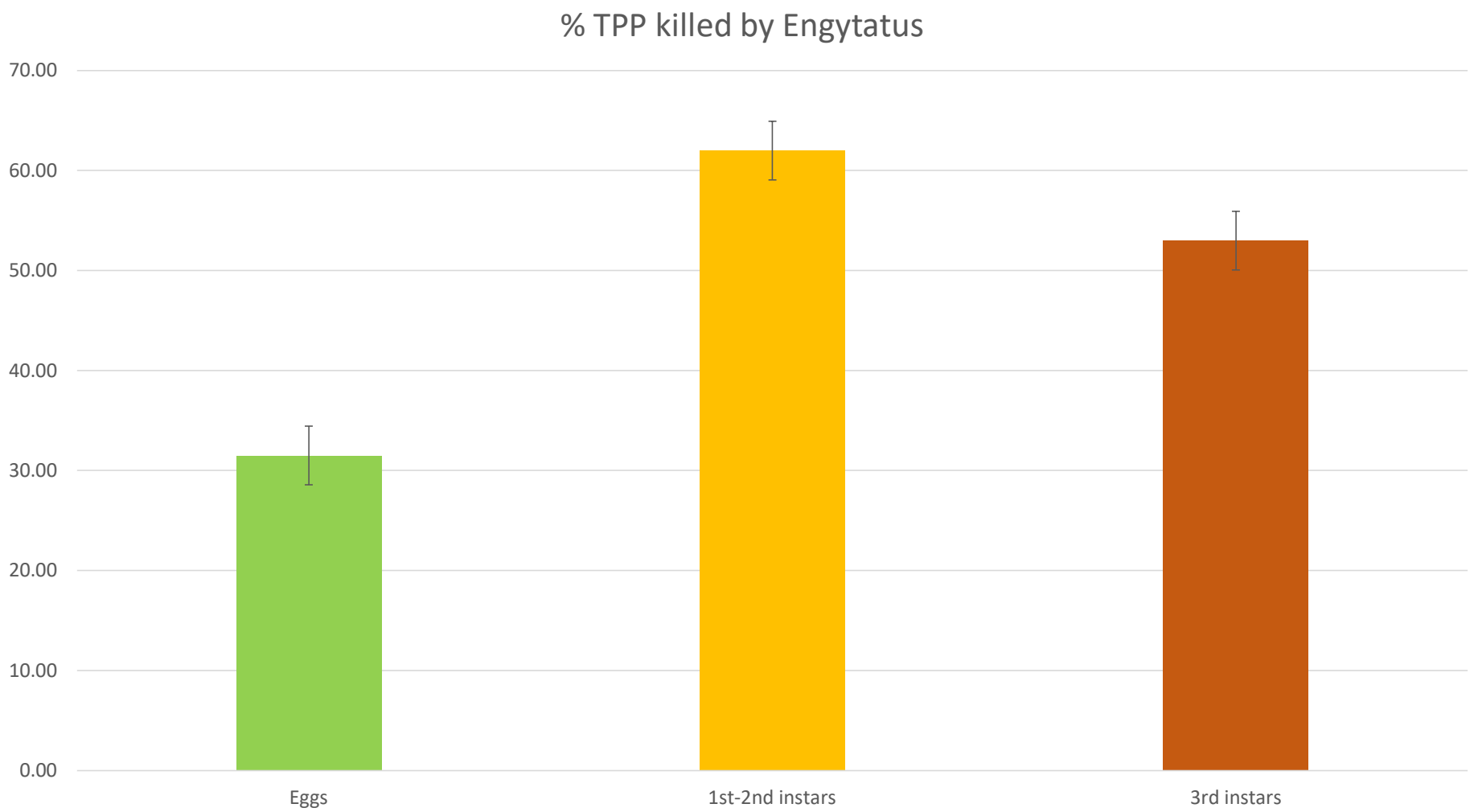


Orius vicinus - Choice test

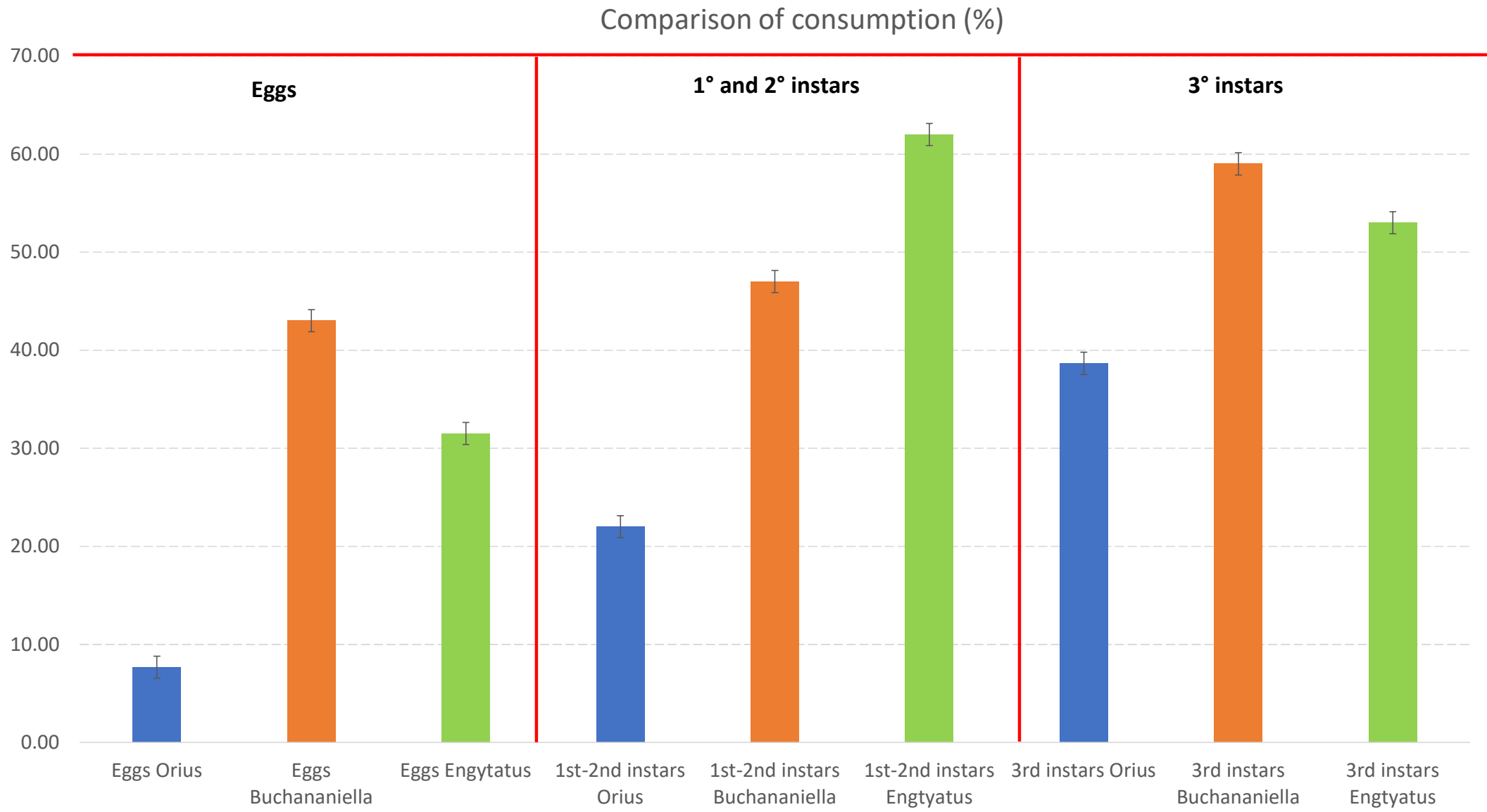


This means that every single *O. vicinus* killed an average of 0.77 eggs, 1.10 young nymphs **and** 1.93 stage 3 nymphs

Engytatus nicotianae - Choice test



This means that every single *E. nicotianae* killed an average of 3.15 eggs, 3.1 young nymphs **and** 3.65 stage 3 nymphs


Comparison of consumption (%)
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Eggs
1° and 2° instars
3° instars
Eggs Orius
Eggs Buchananiella
Eggs Engytatus
1st-2nd instars Orius
1st-2nd instars Buchananiella
1st-2nd instars Engtyatus
3rd instars Orius
3rd instars Buchananiella
3rd instars Engtyatus

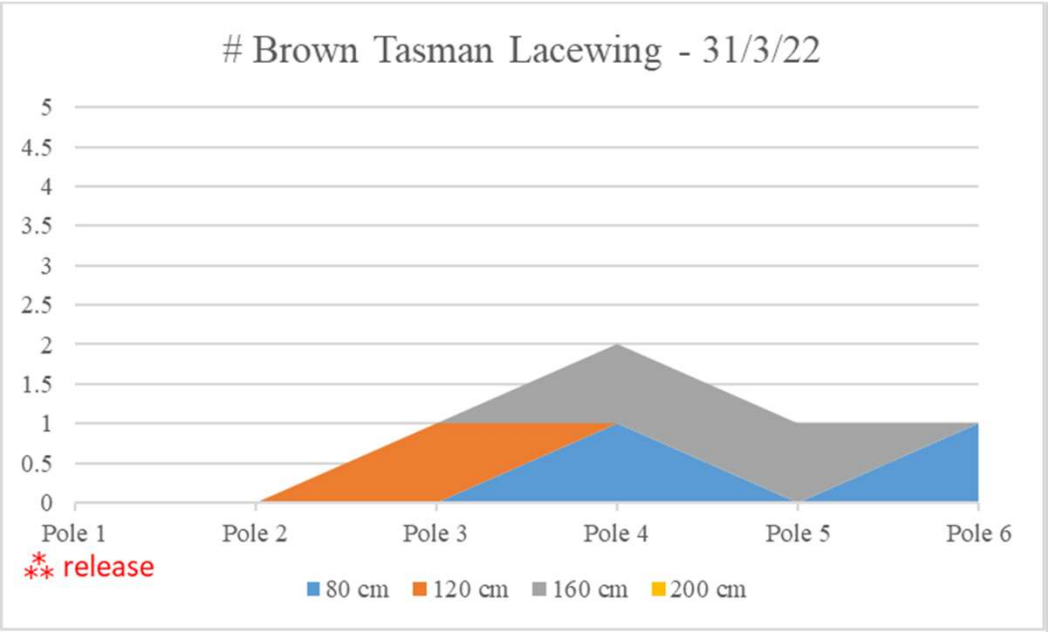
Trapping at Rakaiah Huts North Boxthorns

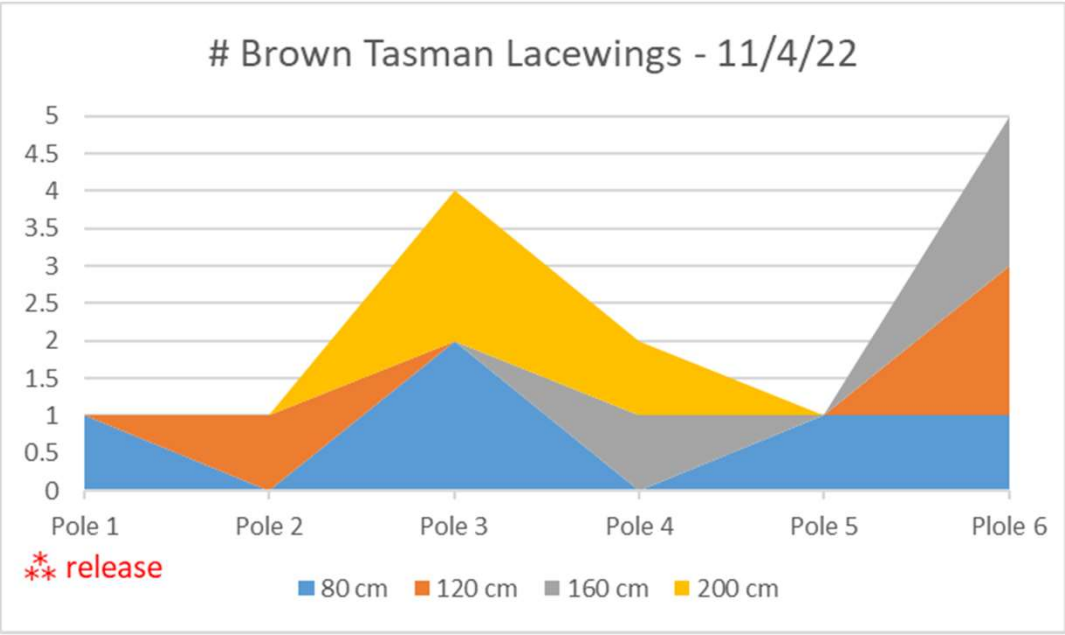
- On the 9th of February we have visited Rakaia Huts North to collect soil for our potato seeds, boxthorn cuttings and TPP
- On that occasion, we released 200 *O. vicinus*, 200 *B. whitei*, 100 *M. tasmaniae* and 100 *E. nicotianae* alongside a boxthorn hedge

Field preliminary trial

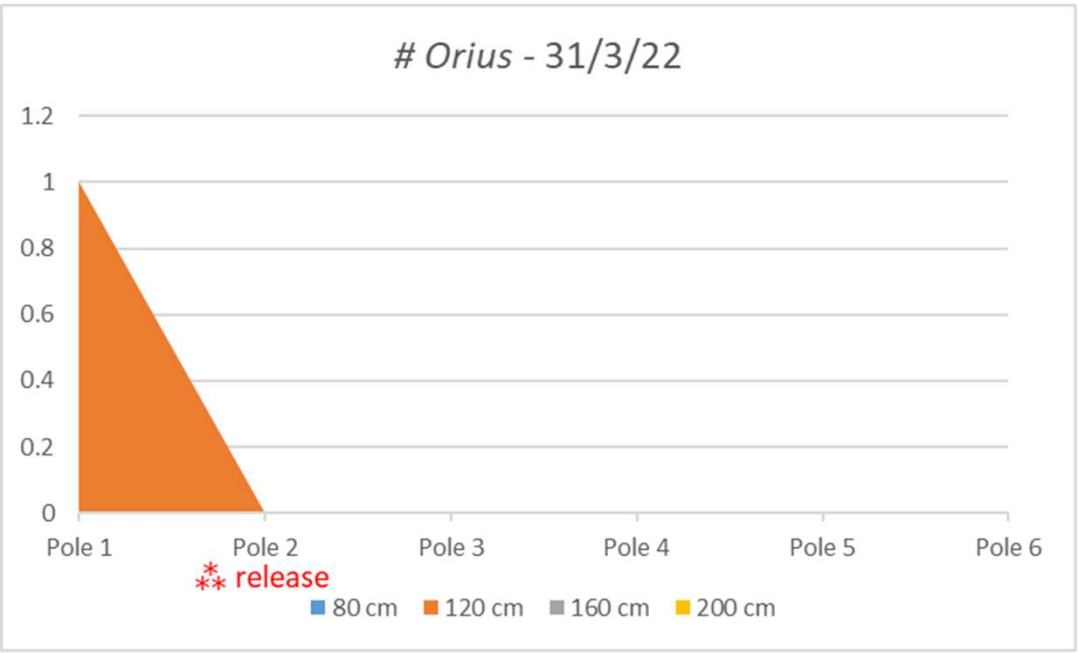
- The amount of **TPP** on boxthorn in the area where BCA's have been released has **decreased appreciably** compared to untreated parts of the same hedge
- To investigate further the situation, 5 weeks after BCAs release, we have placed six poles in the area, each of them holding 4 yellow **sticky-traps** at different heights.
- Our goal was to **monitor the presence of beneficials** and their possible dispersal and gather some preliminary information on adult TPP movements.

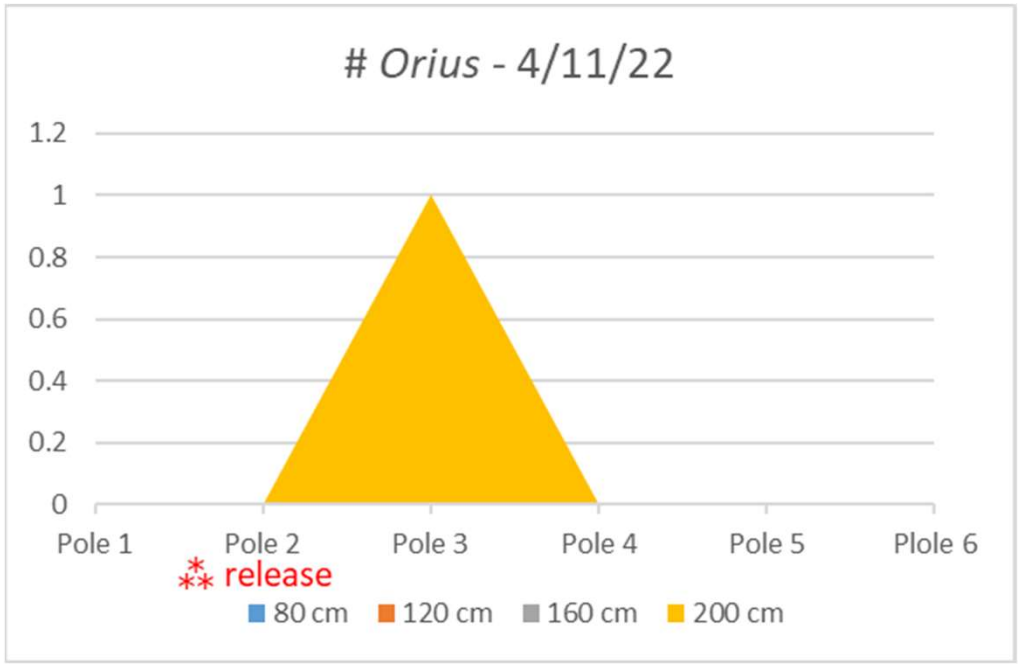
Brown lacewing


Brown Tasman Lacewing - 31/3/22
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Pole 1
Pole 2
Pole 3
Pole 4
Pole 5
Pole 6
release
80 cm
120 cm
160 cm
200 cm

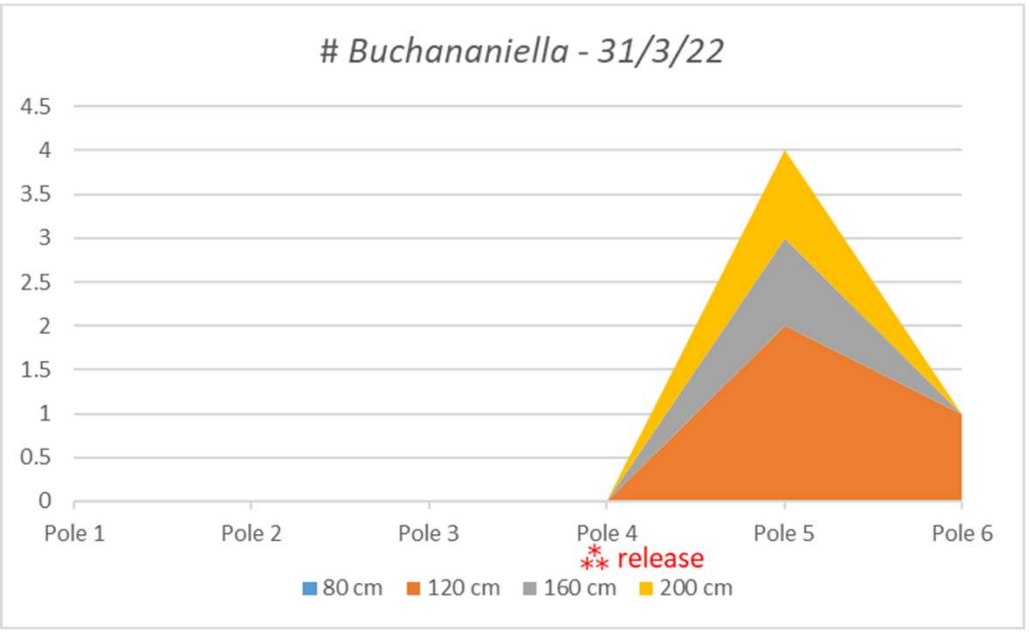

Brown Tasman Lacewings - 11/4/22
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Pole 1
Pole 2
Pole 3
Pole 4
Pole 5
Plole 6
release
80 cm
120 cm
160 cm
200 cm

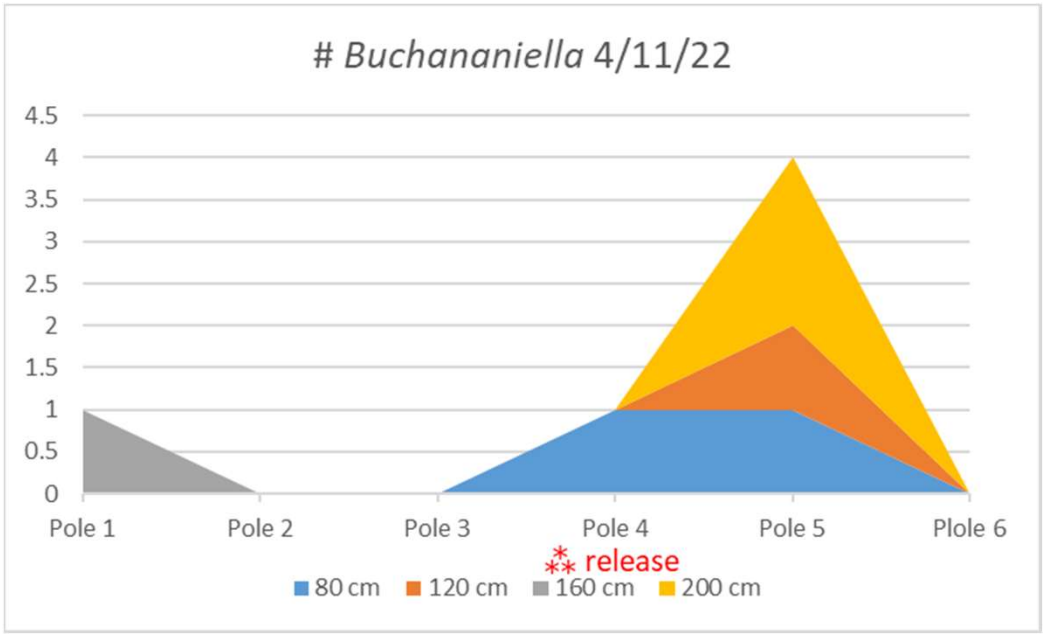
Orius vicinus

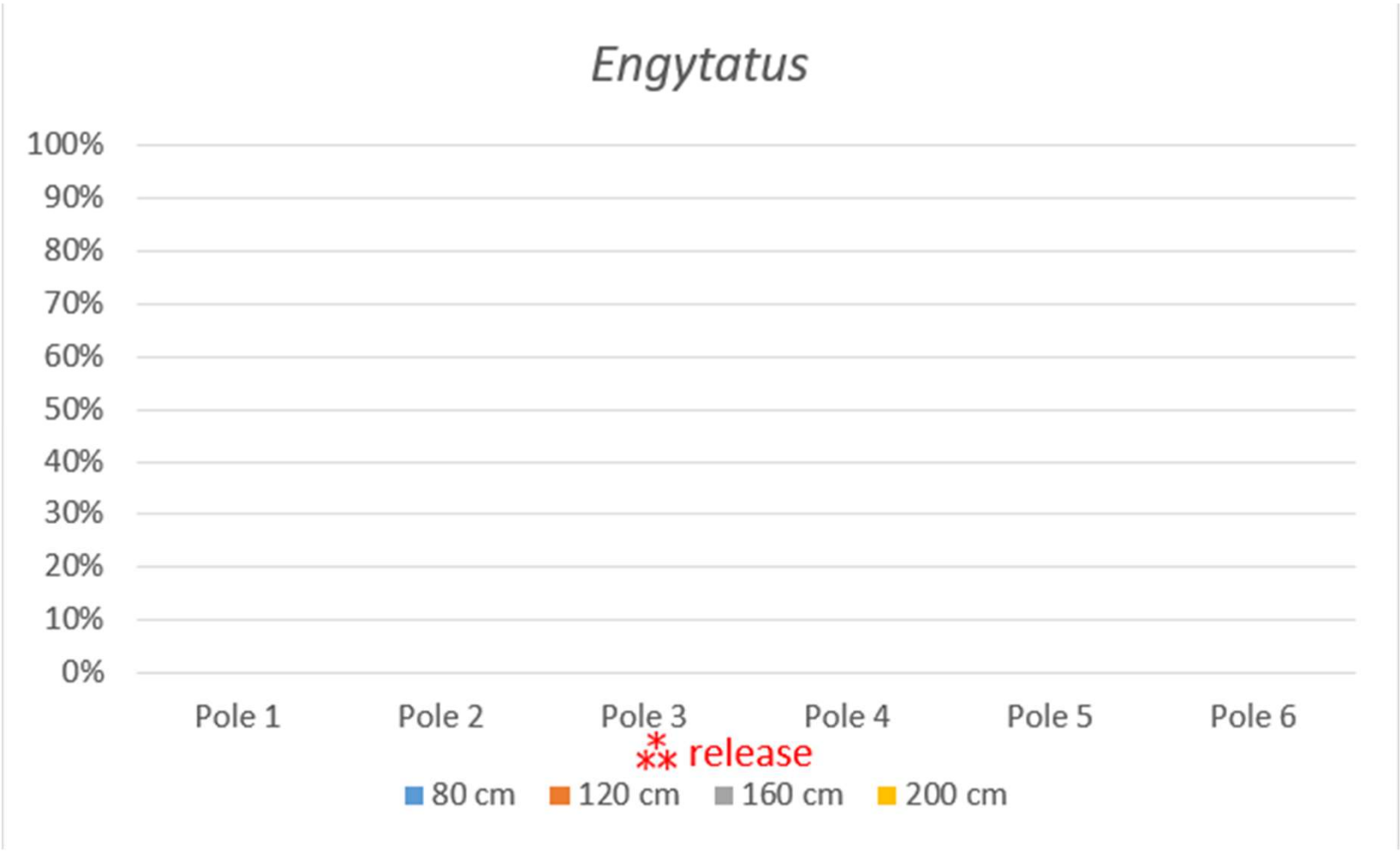

Orius - 31/3/22
1.2
1
0.8
0.6
0.4
0.2
0
Pole 1
Pole 2
Pole 3
Pole 4
Pole 5
Pole 6
release
80 cm
120 cm
160 cm
200 cm

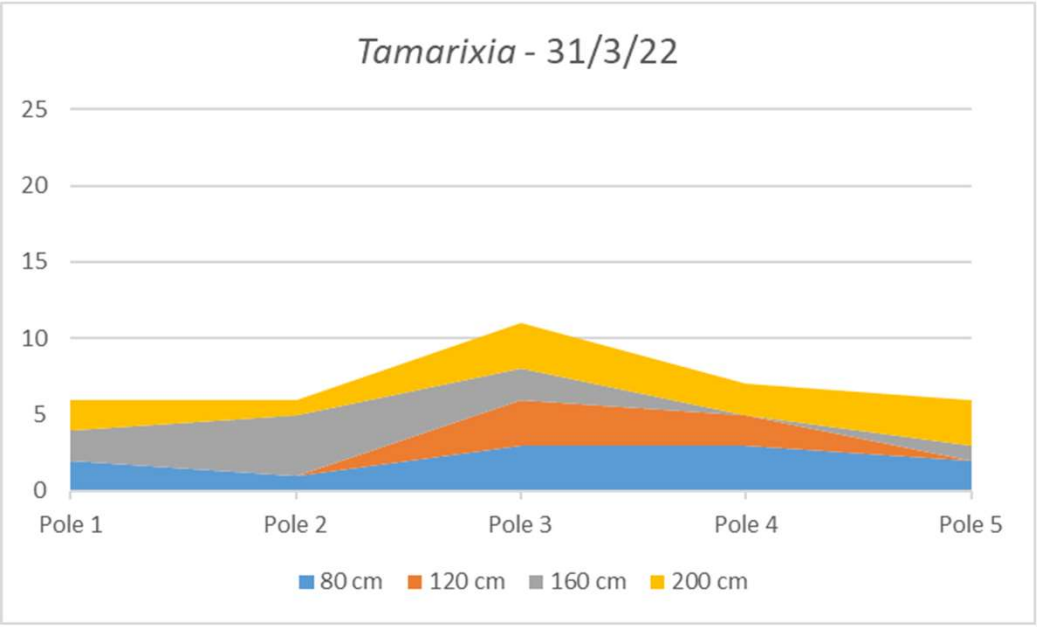

Orius - 4/11/22
1.2
1
0.8
0.6
0.4
0.2
0
Pole 1
Pole 2
Pole 3
Pole 4
Pole 5
Plole 6
release
80 cm
120 cm
160 cm
200 cm

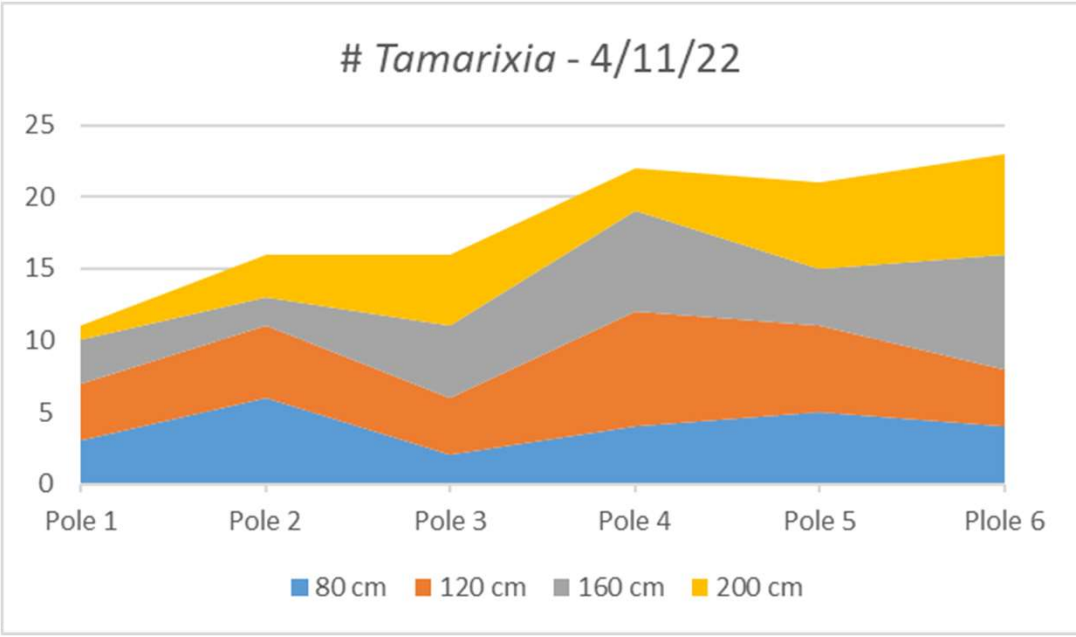
Buchananiella whitei

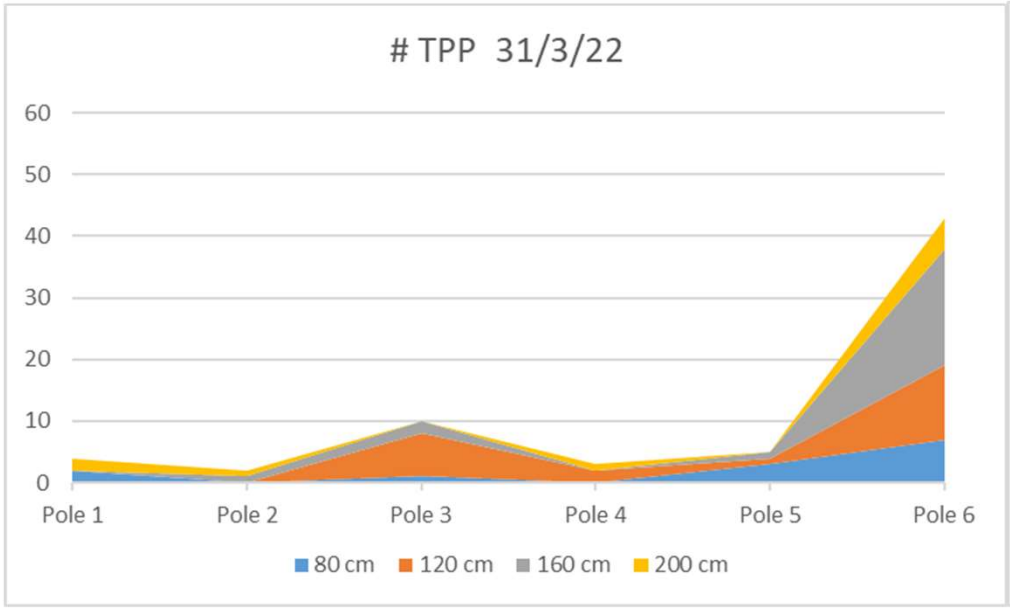

Buchananiella - 31/3/22
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Pole 1
Pole 2
Pole 3
Pole 4
Pole 5
Pole 6
release
80 cm
120 cm
160 cm
200 cm

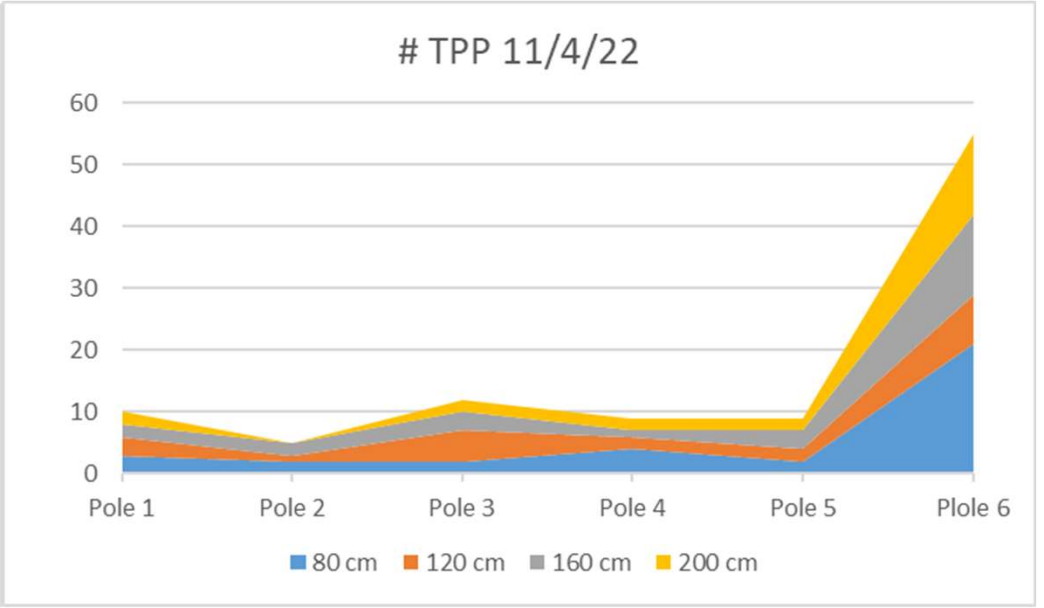

Buchananiella 4/11/22
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Pole 1
Pole 2
Pole 3
Pole 4
Pole 5
Plole 6
release
80 cm
120 cm
160 cm
200 cm

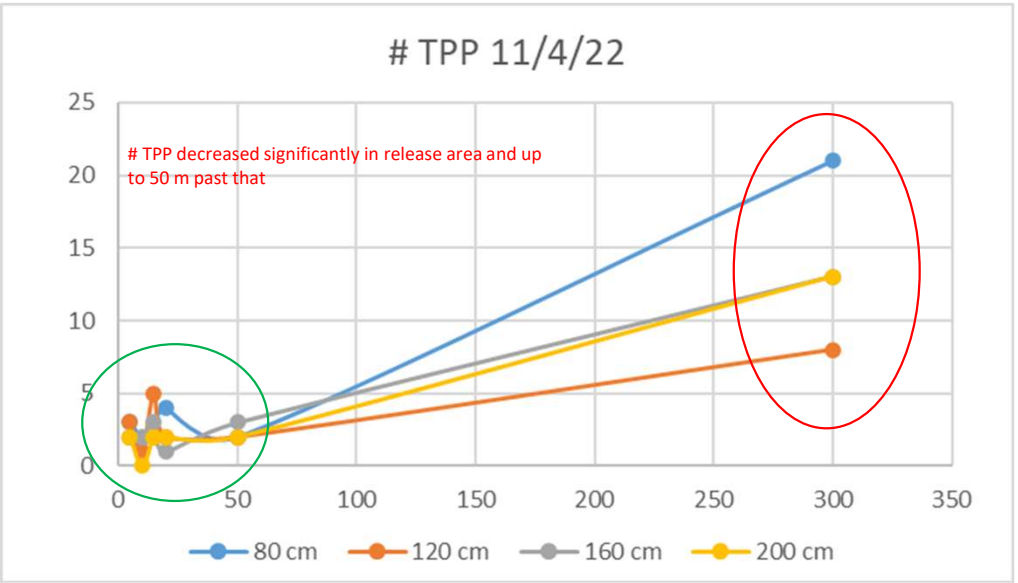

Engytatus
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Pole 1
Pole 2
Pole 3
Pole 4
Pole 5
Pole 6
release
80 cm
120 cm
160 cm
200 cm

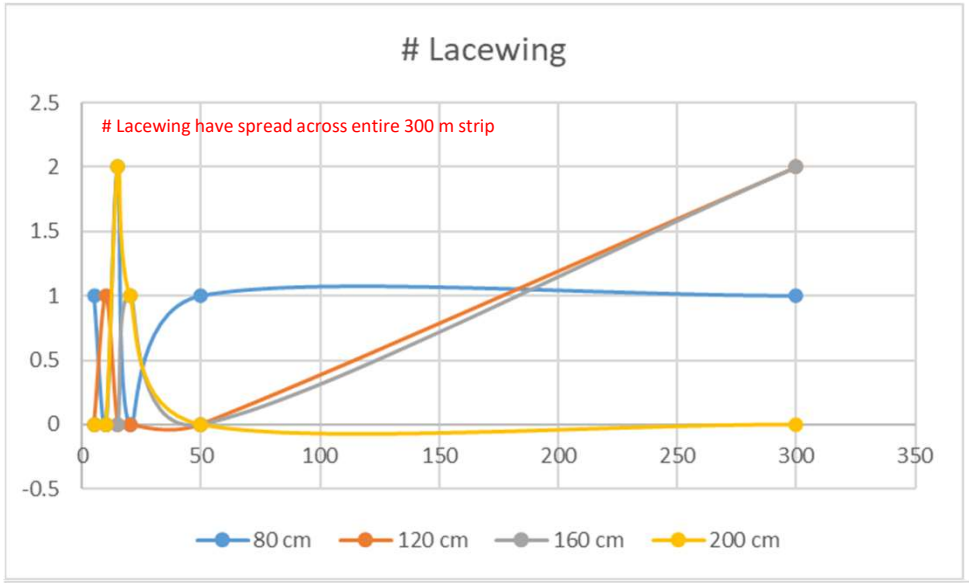

Tamarixia - 31/3/22
25
20
15
10
5
0
Pole 1
Pole 2
Pole 3
Pole 4
Pole 5
80 cm
120 cm
160 cm
200 cm

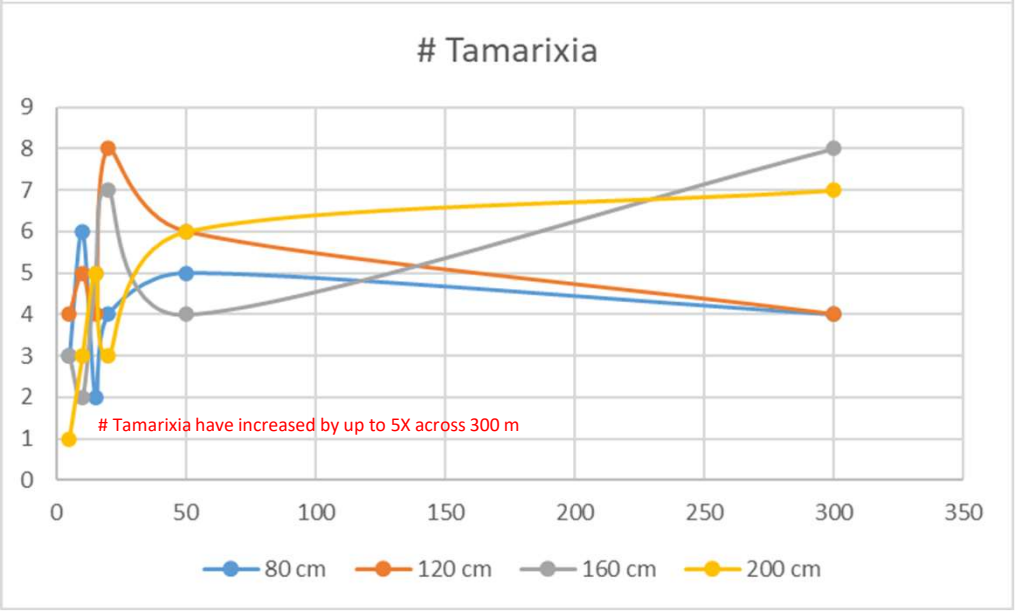

Tamarixia - 4/11/22
25
20
15
10
5
0
Pole 1
Pole 2
Pole 3
Pole 4
Pole 5
Plole 6
80 cm
120 cm
160 cm
200 cm

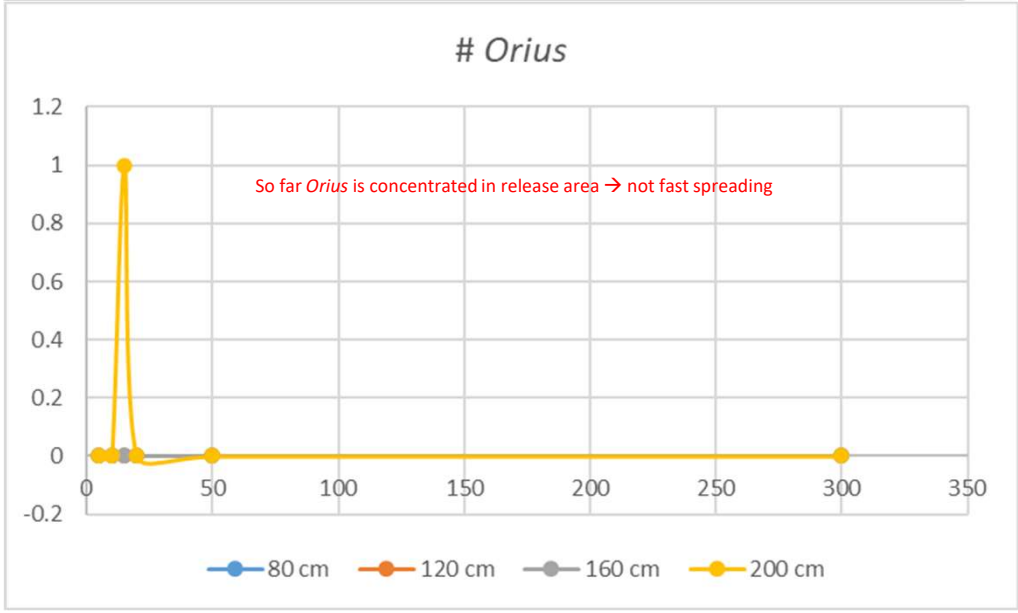

TPP 31/3/22
60
50
40
30
20
10
0
Pole 1
Pole 2
Pole 3
Pole 4
Pole 5
Pole 6
80 cm
120 cm
160 cm
200 cm

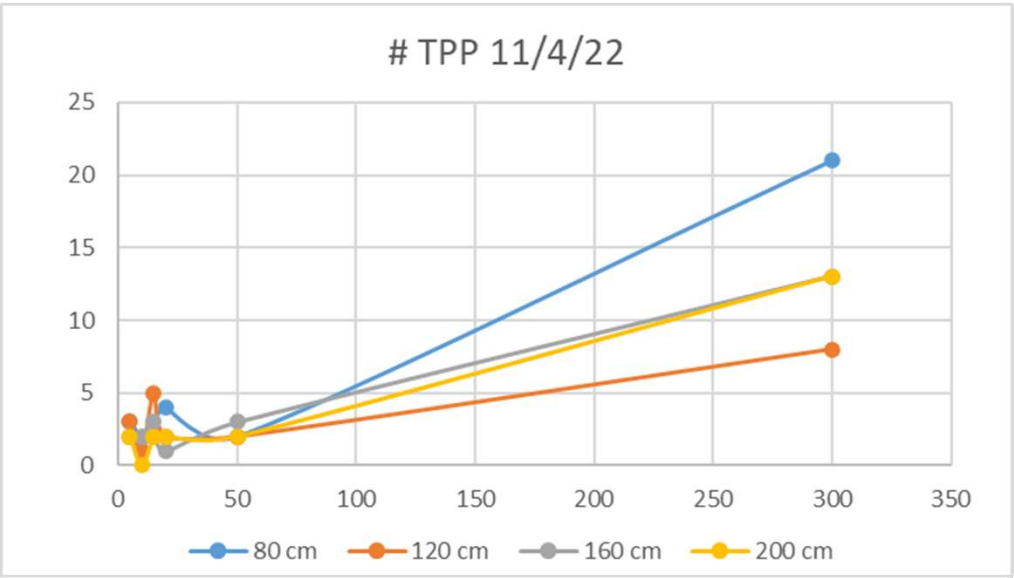

TPP 11/4/22
60
50
40
30
20
10
0
Pole 1
Pole 2
Pole 3
Pole 4
Pole 5
Plole 6
80 cm
120 cm
160 cm
200 cm

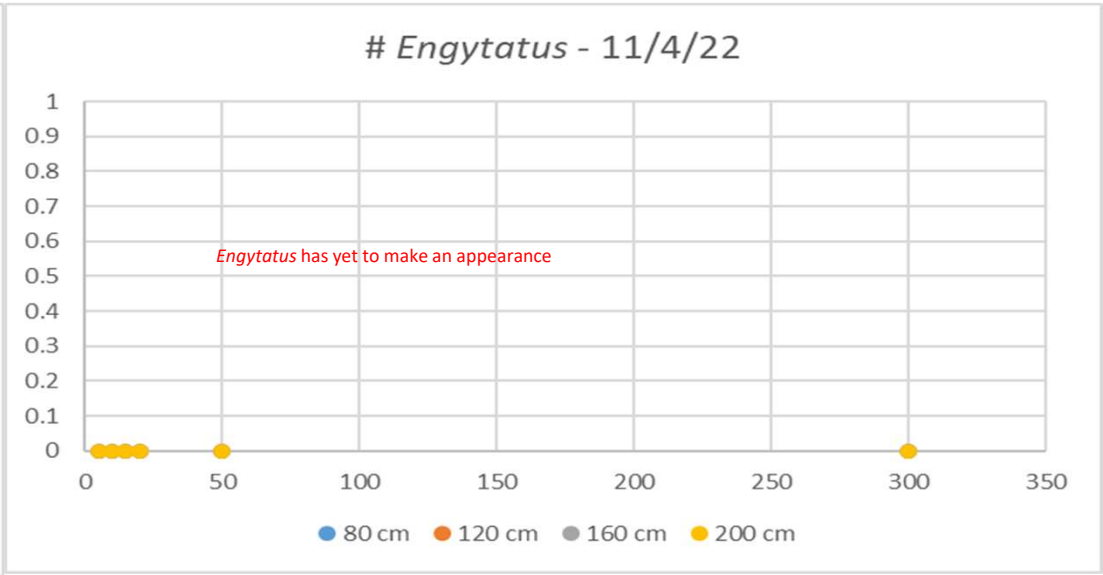

TPP 11/4/22
TPP decreased significantly in release area and up to 50 m past that
25
20
15
10
5
0
0
50
100
150
200
250
300
350
80 cm
120 cm
160 cm
200 cm

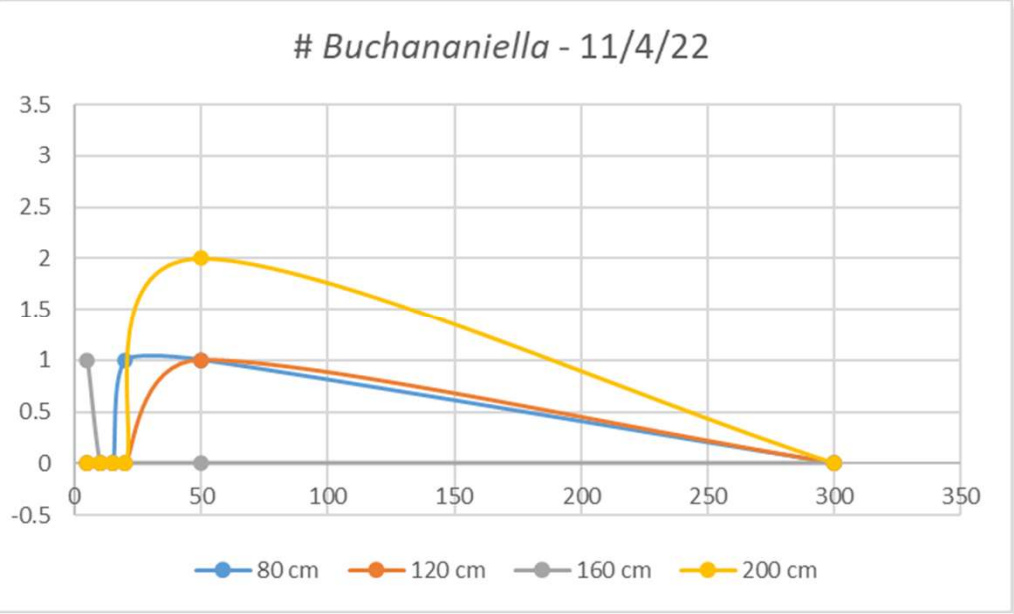

Lacewing
Lacewing have spread across entire 300 m strip
2.5
2
1.5
1
0.5
0
-0.5
0
50
100
150
200
250
300
350
80 cm
120 cm
160 cm
200 cm

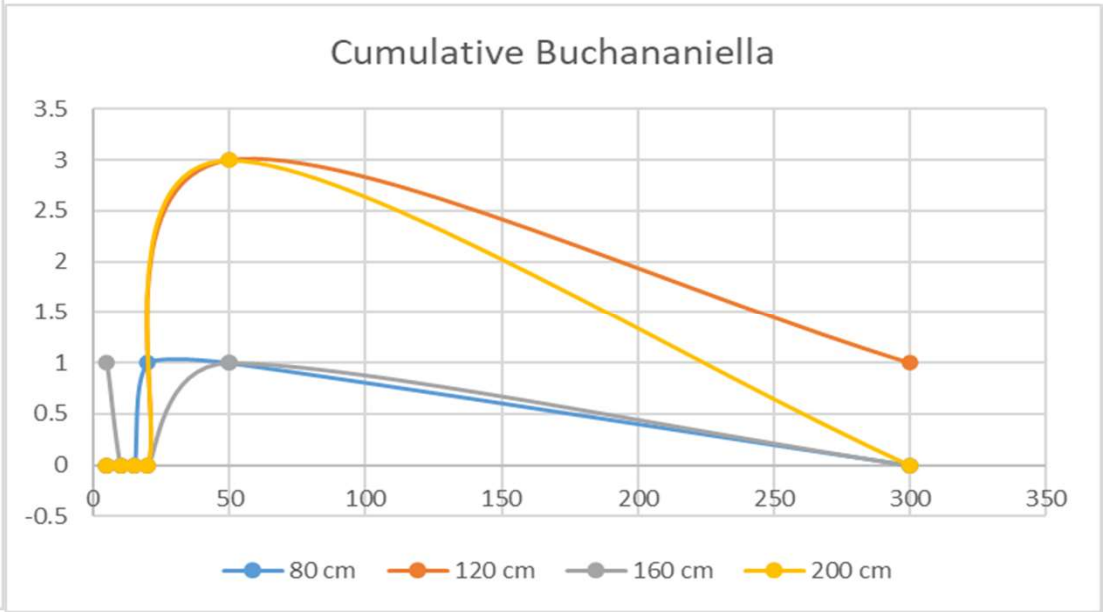

Tamarixia
Tamarixia have increased by up to 5X across 300 m
9
8
7
6
5
4
3
2
1
0
0
50
100
150
200
250
300
350
80 cm
120 cm
160 cm
200 cm


Orius
So far *Orius* is concentrated in release area → not fast spreading
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
0
50
100
150
200
250
300
350
80 cm
120 cm
160 cm
200 cm


TPP 11/4/22
25
20
15
10
5
0
0
50
100
150
200
250
300
350
80 cm
120 cm
160 cm
200 cm


Engytatus - 11/4/22
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Engytatus has yet to make an appearance
0
50
100
150
200
250
300
350
80 cm
120 cm
160 cm
200 cm


Buchananiella - 11/4/22
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
0
50
100
150
200
250
300
350
80 cm
120 cm
160 cm
200 cm


Cumulative Buchananiella
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
0
50
100
150
200
250
300
350
80 cm
120 cm
160 cm
200 cm

Conclusions to Date

Spreading of BCA's released

- Fastest → Brown Tasman Lacewing
- Intermediate → *Buchananiella*
- Slow → *Orius*
- ? – *Engytatus*
- → increased population #'s of *Tamarixia*

Suggestions for Future Research

- Blue Sticky Traps?
- PCR of all BCA's captured?
- PCR on TPP's gut content?

Acknowledgements:

- Thank you to Bioforce Ltd for supplying the Biocontrol Agents used in these studies.
- Thank you to Potatoes NZ for funding the trials.