# Supporting Information

## Tomasetto et al. 10.1073/pnas.1618416114

### Further Reading

List of studies comprising cases of *Microctonus hyperodae* and parasitism of *Listronotus bonariensis* from all of the sampled regions of New Zealand.


Barker GM (2013) Biology of the introduced biocontrol agent *Microctonus hyperodae* (Hymenoptera: Braconidae) and its host *Listronotus bonariensis* (Coleoptera: Curculionidae) in northern New Zealand. *Environ Entomol* 42(5):902–914.

Barker GM, Addison PJ (2006) Early impact of endoparasitoid *Microctonus hyperodae* (Hymenoptera: Braconidae) after its establishment in *Listronotus bonariensis* (Coleoptera: Curculionidae) populations of northern New Zealand pastures. *J Econ Entomol* 99(2):273–287.

Gerard PJ, Ferguson CM, Hardwick S, McNeill MR, Wilson DJ (2014) Update on weevil biocontrol research 2014/15. *Report prepared for DairyNZ* (AgResearch Ltd, Hamilton, New Zealand).

Gerard PJ, McNeill MR, Wilson DJ (2015) Progress on identifying, understanding and prioritising the main ecological processes contributing to the current Argentine stem weevil biocontrol failure. *Report prepared for DairyNZ* (AgResearch Ltd, Hamilton, New Zealand).

Goldson SL, Proffitt JR, McNeill MR (1990) Seasonal biology and ecology in New Zealand of *Microctonus aethiopoides* (Hymenoptera: Braconidae), a parasitoid of *Sitona* spp. (Coleoptera: Curculionidae), with special emphasis on atypical behaviour. *J Appl Ecol* 27(2):703–722.

Goldson SL, Proffitt JR, Baird DB (1998) Establishment and phenology of the parasitoid *Microctonus hyperodae* (Hymenoptera: Braconidae) in New Zealand. *Environ Entomol* 27(6):1386–1392.

Goldson SL, Barron MC, Kean JM, van Koten C (2011) Argentine stem weevil (*Listronotus bonariensis*, Coleoptera: Curculionidae) population dynamics in Canterbury, New Zealand dryland pasture. *Bull Entomol Res* 101(3):295–303.

McNeill MR, et al. (2007) Ryegrass production in Wairarapa, New Zealand: Is biological control of Argentine stem weevil important? *Proceedings of the Sixth International Symposium on Fungal Endophytes of Grasses*. Grassland Research and Practice Series, ed Prestidge RA (New Zealand Grassland Association, Wairakei, New Zealand), pp 301–306.


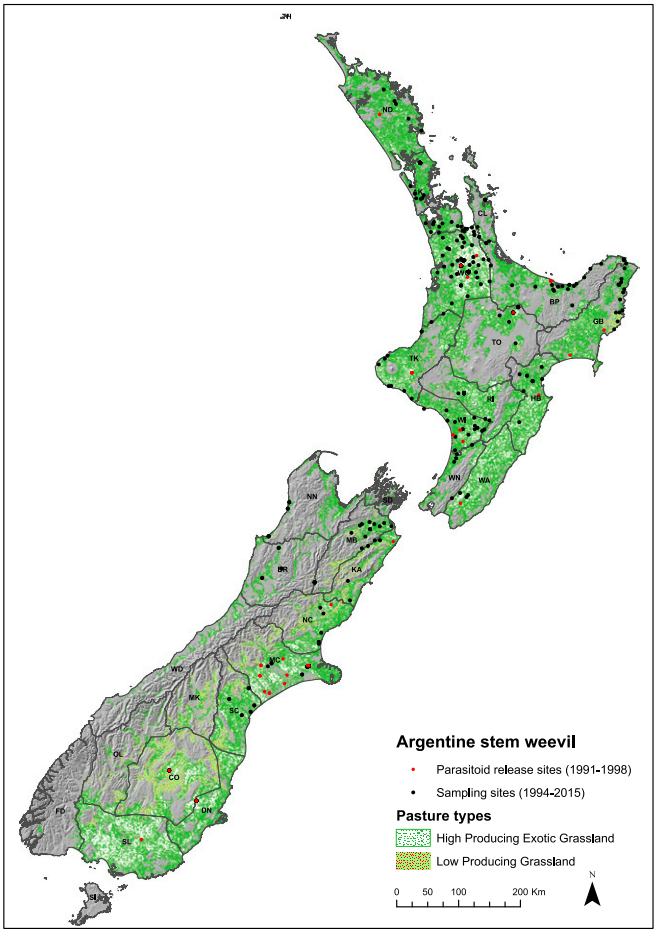


**Fig. S1.** Schematic map of New Zealand with details of the sampling data (i.e., black dots, $n = 196$), parasitoid release sites (i.e., red dots, $n = 40$) between 1991 and 1998, pasture types (63), and subregions in New Zealand (52).

**Table S1. Results of fitted overwinter parasitism rates recorded at each site with explanatory variables using different multiple regression models: GAMMs, GLMMs, and GAMs, which are compared using the AIC**

| | GAMMs | | GLMMs | | GAMs | |
|---|---|---|---|---|---|---|
| Variables | $GAMM_1$ | $GAMM_2$ | $GLMM_1$ | $GLMM_2$ | $GAM_1$ | $GAM_2$ |
| Intercept | **−1.1*** | −1.2 | −133032.1 | −137739.1 | **−0.1***** | **−1.3***** |
| Years after first parasitoid release | **−0.1***** | 6.4 | **−1.2**** | 73 | **−0.7***** | −0.4 |
| Year of sampling | −0.1 | 0.1 | −0.1 | −0.1 | **8.7***** | **6.1***** |
| First year of parasitoid released | **0.1***** | **0.1**** | **0.1**** | **0.1*** | **0.1***** | 0.1 |
| Years after first parasitoid release × first year of parasitoid release (1991) | — | — | — | −0.1 | — | 0.1 |
| Years after first parasitoid release × first year of parasitoid release (1993) | — | — | — | — | — | −0.1 |
| Years after first parasitoid release × first year of parasitoid release (1995) | — | — | — | — | — | −0.1 |
| Years after first parasitoid release × first year of parasitoid release (1996) | — | — | — | — | — | −0.1 |
| Years after first parasitoid release × first year of parasitoid release (1997) | — | — | — | — | — | 0.2 |
| Years after first parasitoid release × first year of parasitoid release (1998) | — | — | — | — | — | — |
| No. of parasitoids released | 0.1 | −0.1 | 0.1 | 0.1 | **0.1*** | 0.1 |
| Elevation, m | 0.1 | 0.1 | **−0.3*** | −0.1 | −0.1 | −0.1 |
| Mean annual precipitation, mm | −0.1 | −0.1 | **−0.3**** | **−0.3*** | −0.1 | −0.1 |
| Growing degree days | −0.1 | 0.1 | **−0.5*** | **−0.5*** | 0.1 | 0.1 |
| Spatial autocorrelation term | −0.1 | −0.1 | −0.5 | −3.1 | −0.1 | −0.1 |
| $R^2$ | — | — | — | — | **0.7** | **0.7** |
| AIC | **863.6** | 865.6 | 2361.5 | 2362.7 | 2498.6 | 2471.4 |

Comparison of the regression models with df = 309. Significant variables and the lowest AIC are shown in bold. Nonsignificant variables are shown unbolded. Asterisks refer to the statistical significance of the explanatory variable (***$P < 0.001$, **$P < 0.01$, *$P < 0.05$).