

A century of weed change in New Zealand's forage seed multiplication industry

Jesse Rubenstein¹, Philip Rolston², Philip Hulme³, Jennifer Bufford³, John Hampton¹

¹Department of Agricultural Sciences, Lincoln University, Lincoln, New Zealand,

²Foundation for Arable Research, Christchurch, New Zealand,

³Department of Pest Management and Conservation, Lincoln University, Lincoln, New Zealand

(jesse.rubenstein@lincolnuni.ac.nz)

Summary International seed trading provides a significant pathway for seed contaminants, and many globally established weeds originated as contaminants in agricultural seed lots. Management of these trade systems helps minimise agricultural losses and is an important means of preventing future biological incursions. New Zealand is essential within this seed for sowing system, providing one-third to half the world's supply of various forage and vegetable crop seeds. Using historical and current plant contaminant data, we examined the frequency, identity and temporal changes of weeds found within perennial ryegrass and white clover seed lots grown in New Zealand from 1909 to 2020. Over 95 species of contaminants were detected in perennial ryegrass, with the most common being soft brome (*Bromus hordeaceus*) and hair grass (*Vulpia bromoides*). Correlation analysis for ryegrass identified eight species of contaminants that significantly decreased over the 110-year study period and five that increased. Catsear (*Hypochaeris radicata*), hawkbit (*Leontodon* sp.) and sorrel (*Rumex acetosella*)

decreased the most over time, while annual poa (*Poa annua*), lesser canary grass (*Phalaris minor*) and wireweed (*Polygonum aviculare*) increased the most. There were 115 species of contaminants in white clover, with chickweed (*Stellaria media*) and field madder (*Sherardia arvensis*) being the most common. No contaminants in clover significantly increased over time, but cress (*Barbarea* sp.), dodder (*Cuscuta* sp.) and mouse-ear chickweed (*Cerastium* sp.) decreased the most. Considering New Zealand trades crop seed with approximately half of the world's countries and contributes substantially to the global supply of forage seed, our study provides a unique insight into changes in the weed spectrum in New Zealand and throughout the seed for sowing system over the last century. Information provided by this study is also useful for biosecurity agencies and land managers trying to identify problematic weed species on which to focus resources.

Keywords Biosecurity, agricultural weeds, ryegrass, clover, temporal changes