Appendix 1.

The analysis used the generalized linear mixed model of the form

log(*w*ijk) = µ + *r*i + *t*j + sk + tsjk (1)

where *w*ijk is the conditional mean of plant weights given the random effect for the nijk pots in run i that received treatment j applied to cogongrass population k, µ is the intercept, *r*i (i=1,2) is the run random effect (~ iid N(0,σr2)), *t*j is the treatment effect (i=1,…,5), sk is the population effect (k=1,…,12), and tsjk is the treatment x population interaction.

Tests of antagonism between glyphosate and aminocyclopyrachlor were performed to compare expected and actual tank mix response as defined by Colby (1967). Blouin et al. (2004) defined the contrast (difference) of interest as the mean response to herbicide in the mixture minus the product of the mean response to each herbicide used alone (accounting for the use of percent response in their formula). Tests of antagonism could be performed directly as linear combinations of mean differences using model (1).

Proportional treatment response for treatment i relative to the check is estimated by exp(*t*j – *t*c) where *t*c is the treatment effect for the untreated check in model (1) and, alternatively, percent reduction = 100 x (1-exp(*t*j – *t*c)). Treatment mean comparisons are essentially comparisons of proportional (or percent) response using model (1) because the *t*c term cancels in the differencing. The expected tank mix response (for 2 herbicides) was calculated as exp[(*t*h1 – *t*c) + (*t*h2 – *t*c)] where h1 and h2 denote treatments in which herbicides 1 and 2 are used alone. The contrast to test if the ratio (tank mix proportional response/expected proportional response) differs from 1, where (>1=antagonism, <1=synergy) is the test that (*t*h1h2 – *t*c) – [(*t*h1 – *t*c) + (*t*h2 – *t*c)] = *t*h1h2 – *t*h1 – *t*h2 + *t*c differs from zero (the interaction term) using the linear part of model (1).