Supplementary Material

# Supplementary tables

**Table S1**: Parameter estimates for weed suppression models (Equation 1), where weed biomass (*Wb*)is a function of soybean density at growth stage V1 (*Sd*): $W\_{b}=\frac{W\_{0}}{[1+\left(i × S\_{d}\right)]}$. The semi-reduced model allowed initial weed biomass (*W0*) to differ as a function of site or nitrogen treatment levels. The full model allowed both initial weed biomass (*W0*) and the shape parameter of the weed suppression curves (*i*) to vary across site or nitrogen treatment levels.

|  |  |  |  |
| --- | --- | --- | --- |
| Model | Variable | Parameter | Estimate |
| Reduced |  | *W0* | 150.5 |
|  |  | *i* | 5.06E-06 |
| Semi-reduced | Site | *W0\_Aur* | 166.0 |
|  |  | *W0\_Gen* | 133.8 |
|  |  | *i* | 4.96E-06 |
|  | Nitrogen | *W0\_0* | 93.4 |
|  |  | *W0\_63* | 155.0 |
|  |  | *W0\_125* | 196.7 |
|  |  | *i* | 4.44E-06 |
| Full | Site | *W0\_Aur* | 157.0 |
|  |  | *W0\_Gen* | 139.8 |
|  |  | *iAur* | 3.87E-06 |
|  |  | *iGen* | 5.88E-06 |
|  | Nitrogen | *W0\_0* | 105.2 |
|  |  | *W0\_63* | 175.2 |
|  |  | *W0\_125* | 174.4 |
|  |  | *i0* | 7.28E-06 |
|  |  | *i63* | 7.49E-06 |
|   |   | *i125* | 2.73E-06 |

**Table S2**: Parameter estimates for soybean yield models (Equation 2), which describe soybean yield (*Yc*) as a function of changing soybean density (*Sd*): $Y\_{c}=a[1-e^{\left(-e^{b}S\_{d}\right)}]$. The full model allowed maximum yield (*a*) to vary across site or nitrogen treatment levels.

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| --- | --- | --- | --- |
| Model | Variable | Parameter | Estimate |
| Reduced |  | *a* | 3360.1 |
|  |  | *b* | -11.8 |
| Full | Site | *aAur* | 3569.9 |
|  |  | *aGen* | 3152.7 |
|  |  | *b* | -11.8 |
|  | Nitrogen | *a0* | 3404.8 |
|  |  | *a63* | 3378.7 |
|  |  | *a125* | 3247.8 |
|   |   | *b* | -11.8 |

**Table S3**: Parameter estimates for the partial return models (Equation 4), which described partial return (*Pr*) as a function of increasing soybean seeding rates (*Sr*): $P\_{r}=(a × S\_{r}^{2}) +(b × S\_{r})$. The full model allowed partial return (*Pr*) to differ across site or nitrogen treatment levels.

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| --- | --- | --- | --- |
| Model | Variable | Parameter | Estimate |
| Reduced |  | *a* | -8.03E-09 |
|  |  | *b* | 8.48E-03 |
| Full | Site | *aAur* | -8.88E-09 |
|  |  | *aGen* | -7.19E-09 |
|  |  | *bAur* | 9.27E-03 |
|  |  | *bGen* | 7.69E-03 |
|  | Nitrogen | *a0* | -9.77E-09 |
|  |  | *a63* | -7.63E-09 |
|  |  | *a125* | -6.70E-09 |
|  |  | *b0* | 9.58E-03 |
|  |  | *b63* | 8.26E-03 |
|   |   | *b125* | 7.60E-03 |

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