The seed column before post-harvest tillage was transitioned from post-harvest tillage through spring tillage with the general form of by Caswell (2001).

### Write the top stratum of the newly shuffled seed columns (from fall tillage through spring tillage) into a dummy matrix  
# https://community.rstudio.com/t/extract-matrix-rows-from-list/19357/2  
#https://stackoverflow.com/questions/29511215/convert-row-names-into-first-column  
  
mean\_after\_spring\_tillage\_pop\_scenario1\_top\_stratum\_df <- mean\_after\_spring\_tillage\_pop\_scenario1 %>%  
 map(~.x[1, ]) %>%   
 unlist(use.names = TRUE) %>%  
 as.data.frame() %>%  
 rownames\_to\_column("matrix\_id") %>%   
 rename(top\_stratum\_density = ".") %>%  
 mutate(top\_stratum\_female\_density = top\_stratum\_density/2) #assume 1:1 male:female  
  
  
#mean\_after\_spring\_tillage\_pop\_scenario1\_dummy <- lapply(split(mean\_after\_spring\_tillage\_pop\_scenario1\_df, mean\_after\_spring\_tillage\_pop\_scenario1\_df$matrix\_id),  
# function(x)(matrix(x$top\_stratum\_density, nrow = 6)))  
  
mean\_after\_spring\_tillage\_pop\_scenario1\_bottom\_stratum\_df <- mean\_after\_spring\_tillage\_pop\_scenario1 %>%  
 map(~.x[2, ]) %>%   
 unlist(use.names = TRUE) %>%  
 as.data.frame() %>%  
 rownames\_to\_column("matrix\_id") %>%   
 rename(bottom\_stratum\_density = ".") %>%  
 mutate(bottom\_stratum\_female\_density = bottom\_stratum\_density/2)

Our empirically measured seedling emergence proportions with respect to the top 0 - 2 cm were deemed too low as compared with the literature (23% of 1 cm deep seedbank in Illinois, Schutte and Davis (2014) or 1% to 5% of a 5 cm deep seedbank in Iowa, Buhler and Hartzler (2001)), except for the C4 under low herbicide weed management and A4 that followed both corn weed management regimes. Seedling emergence proportions in the environments that were deemed too low were therefore adjusted to the equivalence 10% emergence from the 0 - 2 cm soil stratum. *did pre emergence herbicides affect emergence rate?* ::: {custom-style=“Table Caption”}

Table 1: Estimated and adjusted seedling emergence proportion with respect to the top 0 - 2 cm soil stratum and the whole seedbank (20 cm deep) using 2019 stratified soil seedbank densities and 2020 seedling emergence densities.

:::

|  |  | Estimated total emergence proportion with respect to | |  | Adjusted total emergence proportion with respect to | |
| --- | --- | --- | --- | --- | --- | --- |
| Crop ID | Corn weed management | top 0 - 2 cm | whole seedbank | adjuster | top 0 - 2 cm | whole seedbank |
| C2 | conventional | 0.0024 | 0.0008 | 41.3096 | 0.1000 | 0.0314 |
| C2 | low | 0.0109 | 0.0033 | 9.1380 | 0.1000 | 0.0303 |
| S2 | conventional | 0.0637 | 0.0179 | 1.5704 | 0.1000 | 0.0281 |
| S2 | low | 0.0248 | 0.0086 | 4.0351 | 0.1000 | 0.0348 |
| C3 | conventional | 0.0073 | 0.0017 | 13.6860 | 0.1000 | 0.0236 |
| C3 | low | 0.0298 | 0.0067 | 3.3584 | 0.1000 | 0.0224 |
| S3 | conventional | 0.0374 | 0.0063 | 2.6756 | 0.1000 | 0.0167 |
| S3 | low | 0.0234 | 0.0048 | 4.2751 | 0.1000 | 0.0207 |
| O3 | conventional | 0.0030 | 0.0005 | 33.1797 | 0.1000 | 0.0167 |
| O3 | low | 0.0033 | 0.0005 | 30.3782 | 0.1000 | 0.0165 |
| C4 | conventional | 0.0587 | 0.0121 | 1.7036 | 0.1000 | 0.0207 |
| C4 | low | 0.1997 | 0.0404 | 1.0000 | 0.1997 | 0.0404 |
| S4 | conventional | 0.0010 | 0.0002 | 96.4479 | 0.1000 | 0.0183 |
| S4 | low | 0.0011 | 0.0002 | 93.0563 | 0.1000 | 0.0187 |
| O4 | conventional | 0.0009 | 0.0004 | 110.0551 | 0.1000 | 0.0433 |
| O4 | low | 0.0009 | 0.0004 | 107.2800 | 0.1000 | 0.0474 |
| A4 | conventional | 0.3926 | 0.0126 | 1.0000 | 0.3926 | 0.0126 |
| A4 | low | 0.3517 | 0.0108 | 1.0000 | 0.3517 | 0.0108 |

# Multiply the raw with the adjuster  
female\_emerge\_prop\_20\_adjusted\_df <- female\_emerge\_prop\_20\_adjusted %>%  
 select(matrix\_id, adjuster\_,  
 cohort1\_mean\_prop\_wrt\_top : cohort6\_mean\_prop\_wrt\_top,  
 cohort1\_mean\_prop\_wrt\_whole : cohort6\_mean\_prop\_wrt\_whole) %>%  
 mutate(adjusted\_cohort1\_mean\_prop\_wrt\_top = adjuster\_\*cohort1\_mean\_prop\_wrt\_top,  
 adjusted\_cohort2\_mean\_prop\_wrt\_top = adjuster\_\*cohort2\_mean\_prop\_wrt\_top,  
 adjusted\_cohort3\_mean\_prop\_wrt\_top = adjuster\_\*cohort3\_mean\_prop\_wrt\_top,  
 adjusted\_cohort4\_mean\_prop\_wrt\_top = adjuster\_\*cohort4\_mean\_prop\_wrt\_top,  
 adjusted\_cohort5\_mean\_prop\_wrt\_top = adjuster\_\*cohort5\_mean\_prop\_wrt\_top,  
 adjusted\_cohort6\_mean\_prop\_wrt\_top = adjuster\_\*cohort6\_mean\_prop\_wrt\_top,  
 adjusted\_cohort1\_mean\_prop\_wrt\_whole = adjuster\_\*cohort1\_mean\_prop\_wrt\_whole,  
 adjusted\_cohort2\_mean\_prop\_wrt\_whole = adjuster\_\*cohort2\_mean\_prop\_wrt\_whole,  
 adjusted\_cohort3\_mean\_prop\_wrt\_whole = adjuster\_\*cohort3\_mean\_prop\_wrt\_whole,  
 adjusted\_cohort4\_mean\_prop\_wrt\_whole = adjuster\_\*cohort4\_mean\_prop\_wrt\_whole,  
 adjusted\_cohort5\_mean\_prop\_wrt\_whole = adjuster\_\*cohort5\_mean\_prop\_wrt\_whole,  
 adjusted\_cohort6\_mean\_prop\_wrt\_whole = adjuster\_\*cohort6\_mean\_prop\_wrt\_whole,  
 top\_mean\_remain\_prop = 1 - (adjusted\_cohort1\_mean\_prop\_wrt\_top +  
 adjusted\_cohort2\_mean\_prop\_wrt\_top +   
 adjusted\_cohort3\_mean\_prop\_wrt\_top +  
 adjusted\_cohort4\_mean\_prop\_wrt\_top +   
 adjusted\_cohort5\_mean\_prop\_wrt\_top +   
 adjusted\_cohort6\_mean\_prop\_wrt\_top))  
  
  
### Mean matrix list   
female\_emerge\_prop\_20\_adjusted\_df\_long <- female\_emerge\_prop\_20\_adjusted\_df %>%  
 select(matrix\_id, adjusted\_cohort1\_mean\_prop\_wrt\_top:adjusted\_cohort6\_mean\_prop\_wrt\_top) %>%  
 pivot\_longer(!matrix\_id, names\_to = "Cohort", values\_to = "adjusted\_mean\_emerge\_prop")  
  
  
  
female\_emerge\_prop\_20\_adjusted\_list <- lapply(split(female\_emerge\_prop\_20\_adjusted\_df\_long, female\_emerge\_prop\_20\_adjusted\_df\_long$matrix\_id),  
 function(x) rbind(cbind(matrix(c(1-sum(x$adjusted\_mean\_emerge\_prop), 0,0,1), nrow = 2, byrow = TRUE), matrix(0,nrow = 2, ncol = 6)),  
 cbind(matrix(x$adjusted\_mean\_emerge\_prop, nrow = 6, ncol = 1),matrix(0,nrow =6, ncol=7))))  
  
### Save adjusted emergence list   
saveRDS(female\_emerge\_prop\_20\_adjusted\_list, file="../2-Data/Clean/adjusted-mean-emergence-prop.RData")

Buhler, Douglas D., and Robert G. Hartzler. 2001. “Emergence and Persistence of Seed of Velvetleaf, Common Waterhemp, Woolly Cupgrass, and Giant Foxtail.” *Weed Science* 49 (2): 230–35. <https://doi.org/dmnt6f>.

Caswell, Hal. 2001. *Matrix Population Models: Construction, Analysis, and Interpretation*. Second. Sunderland, Mass.: Sunderland, Mass. : Sinauer Associates.

Schutte, Brian J., and Adam S. Davis. 2014. “Do Common Waterhemp (*Amaranthus* *Tuberculatus*) Seedling Emergence Patterns Meet Criteria for Herbicide Resistance Simulation Modeling?” *Weed Technology* 28 (2): 408–17. <https://doi.org/f54k2x>.