Grass at Airports – Not Just Any Old Species Will Do

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Progress to Date

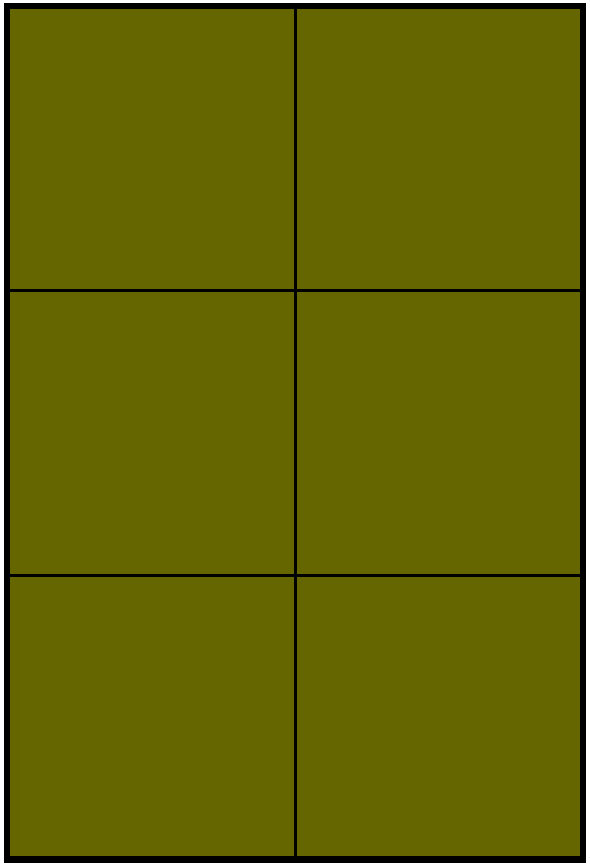
- Soil type Experiment
- Effects of Turf Species
- T-901 Validation
- Future Studies

Does Soil Quality Affect Wildlife Attraction

- Hypothesis – lower quality soil will support less soil biota – leading to less wildlife visits

Study Site and Design

Topsoil plots



Soil Quality

- Is there a difference between the intact topsoil plots and the subsoil plots?
- We determined soil texture using a particle size analysis
  - Topsoil = SILT LOAM (16% sand, 66% silt, 18% clay)
  - Subsoil = CLAY LOAM (21% sand, 52% silt, 27% clay)
- We removed 3 soil cores from each plot to determine bulk density and nutrient content

Soil Quality: Results

Soil	TEC[a]	pH	OM[b]	ENR[c]	SolubleSulfur	P_ppm
Topsoil	14.15	6.65	5.24	100.67	20.33	27.83
Subsoil	16.34	7.72	4.03	90	13.50	14
$F_{1,11}$=	27.23	341.33	11.07	19.41	13.56	9.84
p=	0.0008	<0.0001	0.0104	0.0023	0.0062	0.014

Soil	Ca_ppm	Mg_ppm	K_ppm	Na_ppm	B_ppm	Fe_ppm
Topsoil	1695.5	563.33	277	60.33	1.02	282.83
Subsoil	2019.5	651.83	208.83	62.67	1.40	164.17
$F_{1,11}$=	16.61	26.75	33.31	0.06	14.57	6.68
p=	0.00036	0.0009	0.0004	0.8077	0.0051	0.0323

Soil	Mn_ppm	Cu_ppm	Zn_ppm	Al_ppm	Bulk density
Topsoil	63.17	2.80	4.40	599	1.16
Subsoil	113	3.23	3.26	408.5	1.31
$F_{1,11}$=	40.31	2.02	5.05	151.33	41.44 $_{(1,35)}$
p=	0.0002	0.1932	0.0548	<0.0001	<0.0001

Bird Use: Conclusion

- Birds use topsoil plots more frequently than subsoil plots
- Both granivores and insectivores use topsoil plots more than subsoil plots

Soil Invertbrate Abundance

- Effects assessed:
  - Does invertebrate abundance differ on intact topsoil versus subsoil?

- Predictions:
  - If soil topsoil has a higher quality than subsoil, then there will be more soil invertebrates in the topsoil plots than the subsoil plots

Conclusions

- Topsoil plots had higher quality soil than subsoil plots
- Both granivorous and insectivorous birds used topsoil plots more frequently
- Topsoil plots supported higher invertebrate abundance, which likely contributed to higher bird use

Management Implications

Low-quality soil can improve airport habitat by reducing nuisance birds!

But…

- Soil removal is expensive - consider this practice during construction
- It is more difficult to establish desired vegetation on low-quality soil, so initial efforts need to be increased

Turf Species Study

- 3 blocks with 5 plots each, located around a pond on the south farms
- 5 turfgrass types compared: E+ tall fescue, E- tall fescue, E+ perennial ryegrass, Kentucky bluegrass, Zoysia grass
  - (Zenith Zoysia grass, Matador Tall Fescue (low or no endophytes), Tar Heel Tall Fescue (with endophytes), Paragon Perennial ryegrass, Alene Kentucky bluegrass)
- Observe presence of birds every 5 min. recording plots, species, and number

Effect of Turfgrass Species on Bird Visits

Turf Species	Mean birds/hr 9/07-11/08
Kentucky Bluegrass	11.53 A
E+ Tall Fescue	6.46 AB
Zoysia Grass	4.95 B
E- Tall Fescue	3.58 B
E+ Perennial Ryegrass	2.2 B

Effect of Turfgrass Species on Bird Visits

Turf Species	Mean birds/hr During highest strike rate times
Zoysia Grass	1.33 A
Kentucky Bluegrass	0.69 AB
E- Tall Fescue	0.42 B
E+ Perennial Ryegrass	0.42 B
E+ Tall Fescue	0.4 B

Effect of Turf Species on Relative Hazard Score (RHS)

Species	Overall RHS	Overall Rank	Fall 07	Winter 07	Spring 08	Summer 08	Fall 08
Kentucky Bluegrass	100	1	100	100	18	61	100
E+ Tall Fescue	54	2	24	57	35	33	19
Zoysia Grass	40	3	15	36	22	100	37
E- Tall Fescue	29	4	31	36	48	13	6
E+ Perennial Ryegrass	18	5	2	1	100	18	27

Grass Species – It does matter

- Both Perennial ryegrass and Tall fescue seem to be much better choices than Kentucky bluegrass.
- Establishment on airport properties poses some problems; however, including perennial ryegrass should make establishment easier.
- Zoysia is still an option, but difficulty in establishment would have to make zoysia head and shoulders above other species.

Studies in Progress

- T-901 Validation
  - 10 different seeding mixes, varying the percentage rye/tall fescue and the total amount of seed.
  - 3 seeding dates (9/15, 10/15, and 11/15)
  - Following 901 protocol

Future Studies

- New Pond study in Champaign
- Rerandomized plots around pond
- Sodded zoysia grass to achieve pure stand.
- Cool-season grasses are establishing nicely; data will begin collecting over the winter.

Future Studies

- Awaiting FAA approval of large format trial at O'Hare in cooperation with Brian Washburn at the USDA Research Center in Sandusky, OH.
- This will look at 1 acre plots with four treatments including a 50/50 PR/TF mix. Timely as treatments Brian has championed include a growth regulator and broadleaf herbicide treatment. I would like to include sodded zoysia grass in this trial, but cost may be prohibitive.

Future Studies

- Define an establishment protocol for poorer quality soils.
- What additional management may be necessary to get satisfactory turf establishment on poorer quality soils.
- How do we define a poorer quality soil?

Thank you!