Topdressing and Cultivation for Your Athletic Fields Part - 2

NICK CHRISTIANS AND ADAM THOMS
IOWA STATE UNIVERSITY

Background
B.S. Iowa State (2006)
Research Leader for Center for Athletic Field Safety
M.S. and Ph.D. from University of Tennessee (2008 and 2015)
Extension Specialist – Assistant Professor – Iowa State (2016)

DEEP LAYERS AND COMPACTION

Aerification Encourages Rooting

30 Years of Topdressing
Sand Topdressing Program

Material Selection

Sand source
- Match rootzone
- Layering
- Perched water
- Soil rootzone
- Well-graded sand
- Sub-angular sand
- Calcareous?

Rate and Frequency

Topdressing rate and frequency
- Codependent
- Light rate, high frequency best for turf
- Depends on rate of thatch accumulation
- Monitor growth rate of turf
- Seasonal, warm-season vs. cool-season
- USGA recommends 40-50 ft³/M annually to maintain OM < 4%

Hollow Tine Cultivation

How many passes?

% turf affected = hole area / spacing
- hole area = πr² (π = 3.14, r = tine radius)
- hole spacing = tine spacing x machine spacing

Example: turf cultivated with ½” diameter tine at a 2” by 2” spacing
- hole area = (3.14)x(0.25)² = 0.20
- hole spacing = 2 x 2 = 4
- % affected = 0.20 / 4 = 0.05 = 5%

Turf Area (%) Affected By Core Cultivation

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WASHING TO STATE UNIVERSITY
Current Research

Size of Topdressing Sand (Murphy, 2012)
- Avoiding bridging of sand and plant material
- Use dry sand
- Dry playing surface before topdressing
- Apply topdressing more frequently at lower rates

Topdressing at 0, 50 lbs, or 100 lbs per 1,000 ft²
- Topdressing improved quality (Greater rate best quality)
- Medium sized sand was better than coarse sand (Less on surface)
- Sand size has yet to consistently change surface firmness and soil water content
- Some disease has been less on bentgrass when topdressed

Hollow Tine Recycling Study

Sand is expensive so how can I save?

Core Recycling

Core Recycling

3.7 MPH max working speed
106 gallon or 400 lbs. payload
Dump bed into utility vehicles
47” working width
1800 lbs. max weight
40% less sand used
Testing Devices

- Water Infiltration
- Surface firmness
- VWC- water content
- Water Infiltration
- Organic Matter Samples

Digital Image Analysis to Determine Percent Green Cover

Light Box & Digital Camera
SimgaScan Pro 5 Software

Treatments

Topdressing
- Topdressed 1st then aerified
- Aerified then topdressed

Hollow Tine Cores were pulled
- ½” tines on 2 by 2 inch spacing

Core Treatments
- Recycled
- Cores were removed

Aerification & Core Removal

Post Treatment Comparison

First Year Results

Significant Date-by-Treatment Interactions:
- Organic matter
- Amount of sand in the clippings
- Recovery
  - As expected with time % Cover increased
Percent Green Cover by Date

Treatment Comparison for Percent Green Cover

Treatment Comparisons
- Traditional vs. Recycled
- Topdressed before Aerification vs. Topdressed after Aerification

No differences were determined between treatments for percent green cover on any rating date (0, 7, 14, 21 DAT)

Percent Organic Matter (21 DAT)

Higher amounts of organic matter were present in the soil after the treatments were healed in the Recycled plots vs. Traditional plots (<0.0001)

No differences in topdressing timing treatments

Other Data Results

Volumetric Water Content (%VWC)
- TDR results- 14 DAT Recycled plots had higher %VWC than Traditional Core removal plots (26.5% vs. 24%)
- No differences at 21 DAT

Water infiltration
- No differences between treatments (6 in./hr.)

Surface hardness remained similar

Keys to Success

- Lower soil moisture will work best
- Lower core removal success on higher cut turf
- Separation of organic matter did occur on native soil
- Brush height should be just off surface
Conclusions

- No negative results in year one

- Core recycler does remove organic matter and return sand

- Topdressing prior to aerification resulted in more sand on the surface

- Sand savings around 60%


Recycling Study

- All plots experienced a reduction of soil organic matter from aeration regardless of core or topdressing treatment

- No differences were present between treatments for soil organic matter

- Few differences were found between treatments for the variables measured

- This indicates that in year one the Wiedenmann Core Recycler or verticuting hollow tine cores can provide a way to return sand into the rootzone without negative effects of recycling on the rootzone characteristics and performance


Future work

- Repeated recycling & water infiltration?

- What happens with if pigments build up in profile and recycling?

- Does weed pressure build by recycling?

- How much sand was saved?


Paint and Rootzone


Topdressing & Athletic Field Paint

- What is the problem?

- What is it doing to the plant?

- What is happening to the rootzone?

- How do we limit negative effects?
What's in Athletic Paint?

**Paint**
- Pigment
  - Titanium dioxide
  - Clay
  - Calcium carbonate
- Glue (latex)
- Water
- Additives

Previous work

- Athletic field paint color impacts on transpiration and canopy temperature in bermudagrass
- Athletic field paint impacts light spectral quality and turfgrass photosynthesis
- More focus on paint color to above ground tissue

Previous work

- Extending the life of a painted line
  - Additions of plant growth regulators
  - Ratios of paint to water
- Improving the removability of synthetic turf paint
- Removable natural turf paints (Chalks)

Rootzone Research

- Greenhouse flats – trying to mimic USGA sand-based athletic field rootzones
- Perennial ryegrass and Kentucky bluegrass turfgrass at 100% cover to start
- 3 pant rates (1x, 2x, and 0 times per week)
- 6 months

Project Details

Data Collections:
- Digital Image Analysis (Percent Paint Coverage and Percent Green Cover)- weekly
- Soil physical analysis- Macro- and micro-porosity, water infiltration, soil organic matter changes- after 6 months
- Changes in Sand, Silt, and Clay- after 6 months
Compost Topdressing on Athletic Fields?

OUR RECOMMENDATION

- IF EXISTING PROGRAM WORKS, DON’T CHANGE
- IF YOU NEED TO CHANGE, REBUILD IF POSSIBLE
- ONCE YOU START, DON’T QUIT
- TIMING IS CRITICAL
  TOO SLOW, THATCH
  TOO FAST, LAYERS

Questions?

ATHOMS@IASTATE.EDU
515-294-1957 OFFICE
@THOMSTURF