

Background

An in-depth university field study was conducted from May to September 2009 evaluating putting green aeration techniques, including DryJect sand-injection and conventional hollow-tine coring. One green tested was a push-up style, one was a sand green.

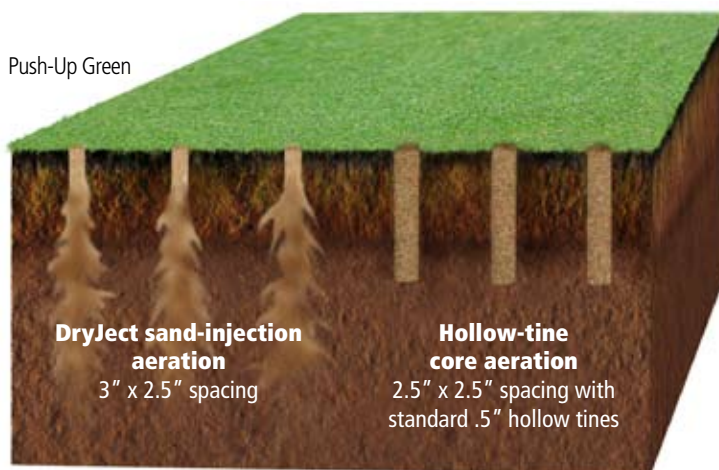
Within each green, the treatments were arranged in a randomized block design with 3 replications and plot dimensions of 15 by 4.25 feet. The same sand material was used for both aeration treatments.

Following treatment application on 18 May, 2009, a variety of physical, cultural and playability measures were collected approximately 1, 7, 14, 30, 60, and 90 days after treatment. Specific measurements included: soil organic matter and bulk density to a 3-inch depth, ponded water infiltration at the surface and at a 3-inch depth, degree of soil compaction as determined by a penetration resistance to 6 inches deep, soil O₂ and CO₂ measurements, green surface hardness, green speed, and ball roll trueness rating. For all measurements, treatment means and standard error values were calculated and subsequently graphed.

As a further note on conditions, the time frame of the research occurred during an unusually wet period, with local rainfall measured at 9.6 inches over the 90 day testing period.

KEY FINDINGS FOR PUSH-UP GREENS

- **No significant difference in organic matter control between DryJect and core aeration**
- **Firmer surface with less root zone compaction below 2" depth**



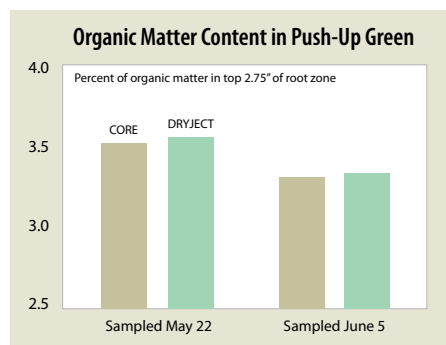
SUMMARY OF FINDINGS FOR PUSH-UP GREENS

Surface Infiltration

The highest infiltration was obtained with a combination of DryJect and core aeration. DryJect alone increased the infiltration rate more than core aeration alone. The aeration effect exceeded 30 days.

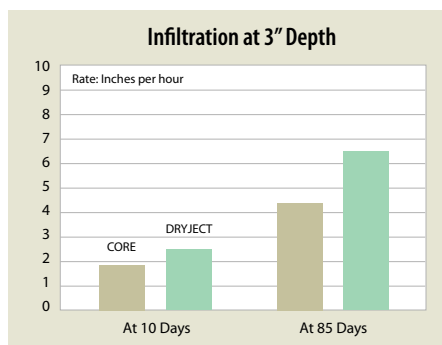
Surface Hardness

In the top 1" DryJect alone showed a firmer surface than hollow-tine coring alone. This effect exceeded 20 days while maintaining the infiltration rates and a less compacted root zone.



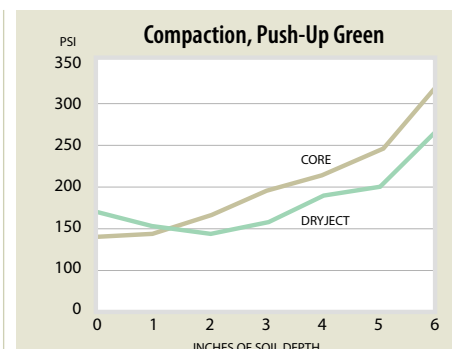
Organic Matter

There was no significant difference in organic matter control between DryJect and core aeration.



Infiltration at 3" Depth

The highest infiltration was obtained with DryJect aeration, and with DryJect in combination with core aeration. The effect lasted over 80 days. For the first 15 days the infiltration rate was approximately double the control.



Root Zone Compaction Below 2"

DryJect aeration, and DryJect with core aeration, showed a softer, less compacted soil with the effect exceeding 60 days while maintaining a firm surface.

Summary

The two greens examined in this study were seemingly well maintained as indicated by the low organic matter contents, reasonable water infiltration rates and high O₂ values of the control treatments. Consequently, the aeration treatments did not have a large effect on the physical property and playability measures of this study. Yet, differences due to the aeration treatments of this study did exist.

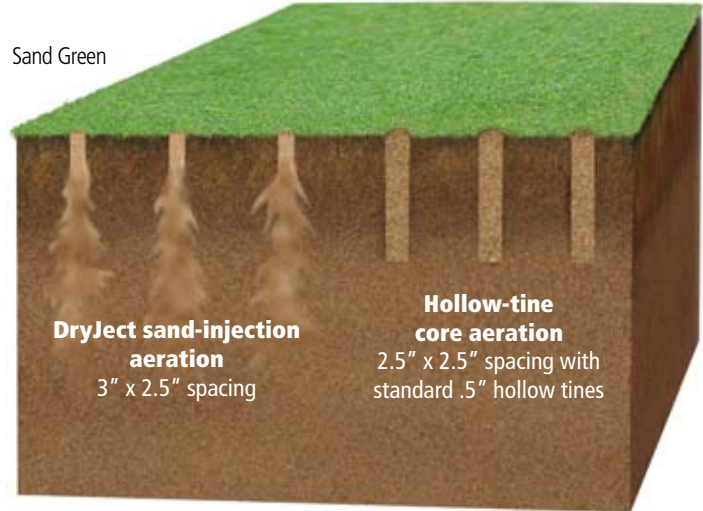
The aeration treatments created a denser surface layer for at least 2 weeks after treatment application, increased water infiltration for at least 1 month after treatment application, reduced subsurface compaction for at least 10 days after treatment application, and created a harder green surface for at least 15 (sand) to at least 30 days (push-up) after application.

The surface layer of both greens was slightly denser for the DryJect than the coring treatment on the first sampling date. On both greens and for at least 1 month after application, both treatments that contained a DryJect application yielded slightly greater surface infiltration rates than coring alone. This same treatment contrast was observed for the 3-inch depth infiltration measurement but for a longer period within the push-up green (at least 85 days) than the sand green (at least 16 days). Presumably the greater infiltration rates for treatments using DryJect was due to the deeper reach within the green of this method.

DryJect sand-injection aeration essentially yielded improved water infiltration due to deeper soil penetration and fractures in the soil created by the DryJect sand-injection technique.

KEY FINDINGS FOR SAND GREENS

- **No significant difference in organic matter control between DryJect and core aeration**
- **Firmer surface with less root zone compaction below 2" depth**



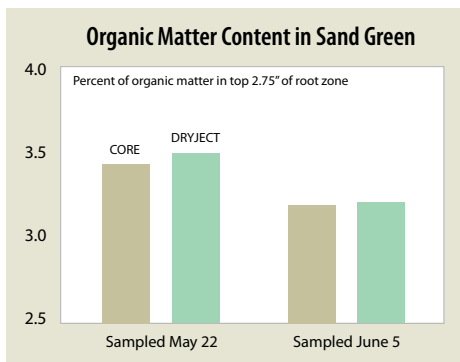
SUMMARY OF FINDINGS FOR SAND GREENS

Infiltration at 3" Depth

The highest infiltration was obtained with DryJect alone, and with DryJect combined with core aeration. At 16 days DryJect alone showed infiltration at 10" per hour, compared with 6.2" per hour with core aeration alone.

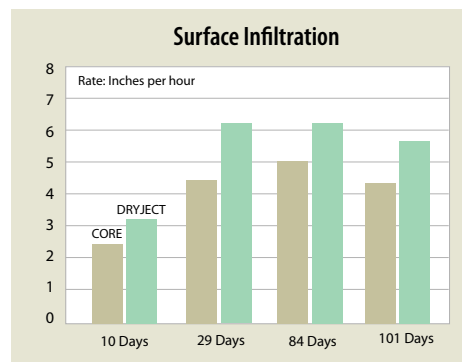
Surface Hardness

Compared to hollow-tine aeration, in the top 1" the combination of DryJect and core aeration showed the firmest surface with the effect exceeding 15 days, while maintaining less compaction in the root zone.



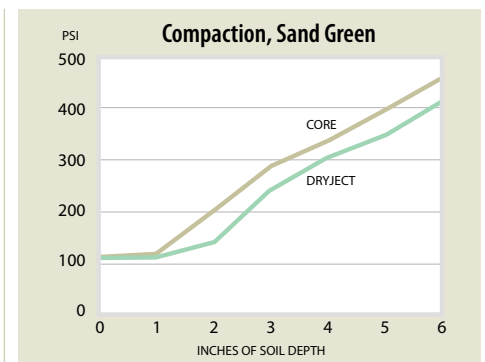
Organic Matter

There was no significant difference in organic matter control between DryJect and core aeration.



Surface Infiltration

The highest infiltration was obtained with a combination of DryJect and core aeration. DryJect alone increased infiltration more than core aeration. The aeration effect exceeded 30 days.



Root Zone Compaction Below 2"

The combination of DryJect and core aeration showed a softer, less compacted soil compared with other techniques tested, with this effect exceeding 15 days while maintaining a firm surface.