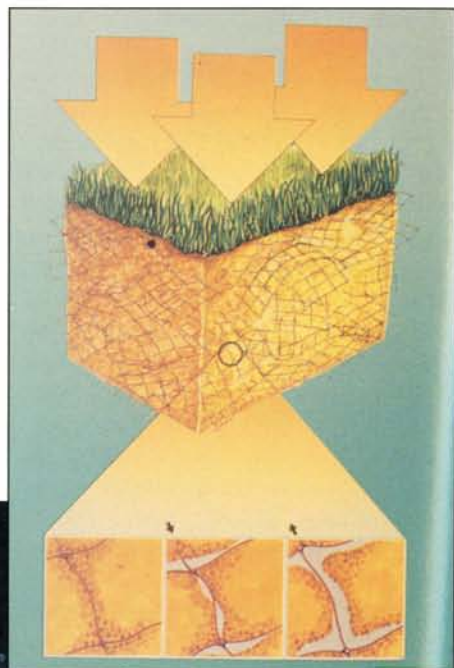


Self-Cultivation – An Alternative to Mechanical Aeration?



Rootzone section demonstrating the effect of traffic pressure. Inserts show, from left, rest state, compression and element flexing, release of pressure and element springing back to create the soil void and maintain the micro-aeration action.



Rugby match in progress at Melbourne Cricket Grounds.

By Stephen Guise

Establishment and maintenance of a thriving turf field for athletic activity requires the proper environment for optimum grass growth. Mechanical aeration has for years been a vital part of the maintenance regime implemented to stimulate development of deep, healthy roots; to increase pore space for water, air and nutrient movement through the soil profile; and to improve percolation rates.

Turf professionals have considered the time and labor that could be saved if these same benefits could be achieved

by the addition of a long-lasting material to the soil profile, rather than through repeated multiple aerations each year. Various combinations of many types of materials with differing properties and in a multitude of sizes have been tested within the soil profile to attain the desired conditions with less need for aeration.

Researchers at Texas A & M University conducted a series of tests on the stabilization of high-sand rootzones by incorporating interlocked, randomly-oriented polypropylene mesh elements. The improved health of the turfgrass in those plots with the mesh elements in the rootzone was

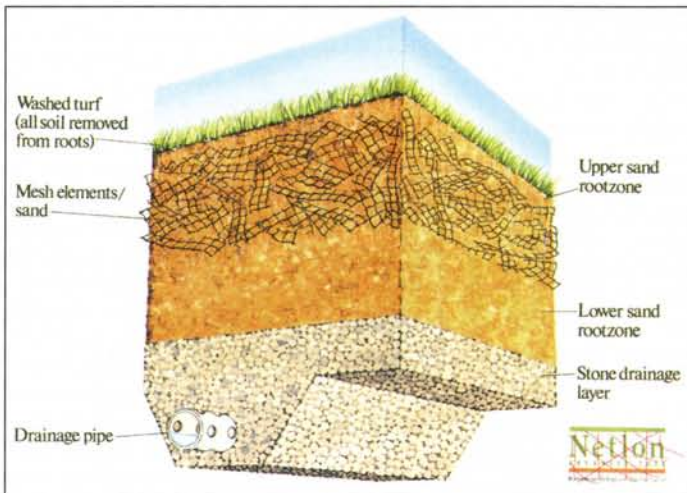
noted. To further examine the nature of the turf development and to assess the reasons for differing turf reactions, additional testing was conducted. Researchers undertook an objective assessment of the health of the turf in test plots with and without the mesh elements, and an assessment of the causes of the health through microscopic examination of the rootzone matrix.

Viewed through the microscope, undisturbed sections of the rootzone demonstrated the existence of minute voids associated with the mesh elements, which appeared to facilitate good aeration at the microscopic level. A hypothesis for the formation of these voids is that whenever the soil is subjected to traffic – from people or vehicles – the mesh element matrix may well be flexing slightly under the loads and causing a micro-cultivation effect in the rootzone.

Research had already fully-documented superior water infiltration rates, healthy deep rooting and an absence of “black layer” in rootzones containing mesh elements. Studies continued to assess whether the mesh elements might also be associated with the presence of these voids and micro-aeration of the soil.

Turfgrass Health

To conduct the testing, mesh elements had been mixed into a carefully-graded, high-sand rootzone mix to achieve a maximum dispersal through the rootzone when it was laid. The plots were planted with vegetative sprigs of Tifway bermudagrass which were broadcast at a rate of 14 bushels per 1,000 square feet. This was followed with a light topdressing and fertilization. The measurements of turf growth and health



Profile of rootzone containing Netlon.

were made over eight years after the plots were established. Control plots - without the inclusion of the mesh elements - were established and maintained in exactly the same manner as the mesh-containing plots.

Turfgrass health was measured in terms of the depth of the turf canopy and of the root depth within core samples taken from plots - both those with mesh inclusion in the rootzone and those control plots without mesh inclusion. Test comparisons included three 4-inch diameter by 8 1/2-inch-long cores,

continued on page 14

McCord delivers the tires you need for flotation and traction.



McCord Tire offers you an extensive lineup of tires. Choose from a wide selection of Goodyear tire types, sizes and light-footed traction for just about any driving surface. Everything from a 73-inch diameter Goodyear Terra-Tire,[®] to much smaller tires for ATVs, lawn and garden equipment; even ten-inch Goodyear tires for golf cars.

Whatever the equipment, whatever the surface, whatever the job, McCord has the tire and wheel—and the prompt delivery just for you. Give us a call today.

McCord

Replacement & Original Equipment Flotation Tires • Rims • Wheels • Service

INDIANA
219-583-4136 800-348-2396
Indiana Only Indiana

KANSAS
800-332-0122 800-255-0276
Kansas Only Out of State

MINNESOTA
800-622-6735

OUTREACHES THE PRETTY BOYS

That's The Beauty Of A National.

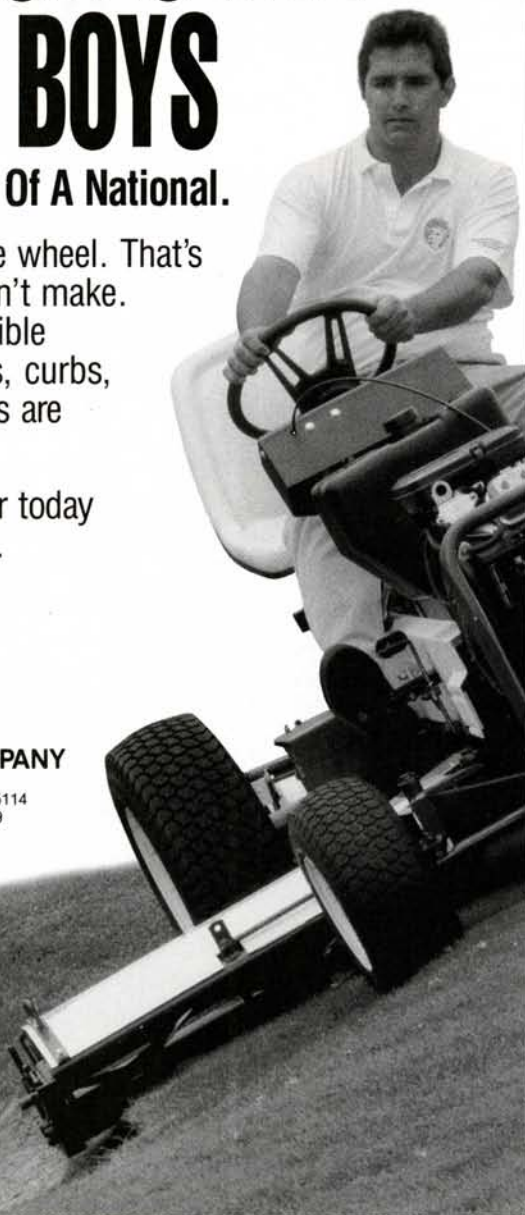
21" of reel outside the wheel. That's a claim the others can't make. With a National's flexible design, sand bunkers, curbs, or any trimming tasks are well within reach.

Call us, or your dealer today to try one on for size.



NATIONAL MOWER COMPANY
700 Raymond Avenue
St. Paul, Minnesota 55114
Phone: (612) 646-4079
FAX: (612) 646-2887

NATIONAL® is a registered trademark of National Mower Company.



Western Turf/San Diego
219 S. Andreasen Dr.
Escondido, CA 92029
Phone: (619) 737-9807
Fax: (619) 737-9913

Western Turf
281 Corporate Terrace
Corona, CA 91719
Phone: (909) 371-1888
Fax: (909) 371-1969

H.V. Carter/Sacramento
P.O. Box 15117, 95851
2309 Lexington St., 95815
Phone: (916) 927-3824
Fax: (916) 927-0635

Desert Turf
41-921 Beacon Hill
Palm Desert, CA 92260
Phone: (619) 776-8873
Fax: (619) 776-8877

H.V. Carter/Fresno
P.O. Box 9189, 93791
3366 W. Sussex Way 93722
Phone: (209) 224-7626
Fax: (209) 224-0476

H.V. Carter
4771 Arroyo Vista, #C
Livermore, CA 94550
Phone: (510) 443-5253
Fax: (510) 443-5250

Self-Cultivation

continued from page 13

from three replications of the two plot treatments.

As can be seen from Table 1, the measurements showed a striking difference between plots in terms of the depth of the turf canopy and thatch; the depth of the roots (which actually exceeded the depth of the core sample in the mesh-containing plots); and the viability of the roots (measured as the percentage of white, full, healthy roots in the core as opposed to black, spindly roots, which were especially apparent in the control plots below a depth of 3 inches).

Rootzone Studies

Micromorphology studies were conducted by Michael DePew, L. Wilding and James B. Beard to evaluate the physical and structural properties of paired rootzones — those with and without mesh inclusion — by several techniques, including thin soil-section micrographs.

Soil samples were collected in pairs from the no-mesh and mesh-inclusion turf plots. These cores were frozen in liquid nitrogen, cut to size and freeze-dried. The thin sections of the test-plot cores were then impregnated with epoxy, mounted, cut, ground and polished for the development of micrographs.

Using a cross-polarized light microscope, voids were revealed around the mesh-element strands in the sections from the mesh plots. No such voids were present in the no-mesh plots.

Aeration Through Micro-Cultivation

It is hypothesized that, when the pressure from traffic (e.g. athletes, other sports-related personnel, equipment, pedestrians, animals or vehicle traffic) is transmitted through the rootzone from the surface, the pressure causes the mesh to flex. When the small pieces of mesh (approximately 4 inches by 2 inches) are incorporated throughout the soil profile at a density great enough so that they become randomly interlocked, the pressure and the subsequent flexing also are transmitted between the pieces of mesh, thus helping to spread the area of load. As the load pressure is removed, the inherent stiffness of the mesh material causes it to spring back to its original shape. This movement can thus create the voids observed throughout the soil profile.

TABLE 1

A comparison of no-mesh versus a 4.2 pounds per cubic yard mesh density on Tifway bermudagrass grass after four years.

Plant Response	Rootzone Treatment	
	no-mesh	mesh inclusion
Depth of turf canopy and thatch (inches)	1.6	2.5
Root depth (inches)	5.9	8.5 plus
Root viability (%)	14	100

The conclusion is that grass plots with mesh elements included produced grass with a much greater production of vegetative matter, a greater canopy height, and a deeper, fully-healthy root system.

This micro-cultivation action could therefore be causing micro-aeration around the roots and contributing significantly to the very-evident root health. Having a permanent micro-aeration action incorporated within the rootzone in this fashion could greatly reduce or eliminate long-term needs for aeration on high-use sports turfs. This hypothesis is consistent with the superior level of turf growth and health of the mesh-containing trial plots over the no-mesh plots as observed over an eight-year testing period.

Clay Bridging and Black Layer

Scanning the root core sections with an electron microscope revealed the further interaction of the mesh with soil particles. In the sections from the no-mesh control plots, finely-textured clay could be seen extending continuously and bridging between the sand particles. In addition, iron oxide had accumulated in these layers, which corresponded to the observed black layer depth of between 3 3/4 inches and 5 inches below the soil surface on the no-mesh plots.

In contrast, at the same soil depth, sections from plots with mesh showed finely-textured clay coating the sand particles without bridging between them.

In the no-mesh control plots, this clay-bridged sand contributed to reduced soil-water infiltration and percolation, followed by the development of a micro-waterlogged zone above the clay-bridged zone. This created an anaerobic condition which inhibited healthy root development. This is certainly one potential cause of black layer in sand rootzones.

The presence of voids, maintained by the micro-cultivation and micro-aer-

ation of the mesh flexion as discussed above, would certainly assist in better water micro-percolation and the promotion of aerobic conditions favorable to vigorous root growth.

Use of mesh elements in athletic turf fields currently is being used with good success in the U.S. and overseas. Examples of such use include the Santa Anita Turf Racing Courses - where the "athletes" exert considerable force - the Melbourne Cricket Grounds in Melbourne, Australia, which is the world's largest

sports field, and Murrayfield, the world-renowned home of the Scottish Rugby Union. □

Editor's Note: Stephen Guise is National Sales Manager and Consultant for Netlon Limited, Fullerton, CA, Treasurer of the national Sports Turf Managers Association, and a founding member of the Southern California Chapter of STMA. This article was adapted from the British publication "Groundsman," Volume 47 # 5, May 1994.

TURF FOR ACHES & PAINS



The basis of Netlon Advanced Turf is a free-draining rootzone material stabilised with playing card sized pieces of springy mesh.

Relieve the headaches associated with hard, compacted sports fields by installing Netlon Advanced Turf. No other product or system can give you all its benefits.

- ✓ increases impact absorption
- ✓ reduces surface damage and accelerates recovery
- ✓ reduces soil compaction
- ✓ increases infiltration and aeration
- ✓ increases traction

Contact Steve Guise, Netlon's National Sales Manager, to receive a free brochure, design guidelines, copies of research bulletins or details of your regional distributor.

Netlon Limited
515W Commonwealth Avenue, #215
Fullerton
California 92632
Phone/fax: (714) 578 0215

Netlon
 ADVANCED TURF

Netlon is the registered trade mark of Netlon Limited in the USA, the UK and other countries.
 Netlon Advanced Turf is patented in the USA, the UK and other countries.