

unmowed, research indicates that a decrease in mowing frequency from 7 to 6 days a week will have a very minor long term effect on mowing speed and may encourage a healthier turf. Changing directions of cut each time also helps reduce undesirable surface grain and excessive wear patterns.

Light, frequent vertical mowing is one of the most beneficial grooming practices to maintain desirable mowing qualities. Weekly, lightly vertical mowing during the bermudagrass growing season should be performed for optimum putting quality. Vertical mower blades used on triplex mowers should be set just above the soil surface. This shallow setting encourages upright, vertical growth habit and is not intended to remove thatch from the soil surface. If the grooves from vertical mowing remain visible over four days, the vertical mowing heads are probably set slightly too deep.

One relatively new improvement in mower design is placing grooved (often referred to as 'Wiehle') rollers in front of the reels (Fig. 12). These grooved rollers have less surface area in contact with the grass, thus, do not lay the grass over before the reel has a chance to dip the ends as do traditional solid rollers. Grooved rollers also help reduce thatch accumulation since they do not float over the thatch surface, but rather, sink into it and allow thatch removal better. The use of grooved rollers varies between golf courses. For some, grooved rollers are used daily, almost on a year-round basis while for most courses, they are used once or twice weekly. If available, grooved rollers should be used starting several weeks prior to a major tournament.

## Nitrogen fertilization

Nitrogen is important for maintaining healthy, aesthetically pleasing greens. Two results of nitrogen application are increased bermudagrass shoot growth and wider leaf blade width. This growth increases the leaf surface that comes in contact with the ball, thus increases the resistance it must overcome, and therefore, decreases putting green speed. Enough nitrogen must be available to maintain a desirable cover of bermudagrass and enable it to recover from environmental stresses or physical damage. However, excess nitrogen application results in many adverse conditions including a significant reduction in putting speed. Research indicates that for each pound of actual nitrogen applied per 1000 square feet during the season,

approximately a 4 inch **decrease** in putting green speed will result.

Under normal conditions, nitrogen applications should cease at least two weeks prior to the start of a major tournament. This will result in the greens being slightly 'hungry' going into the tournament, therefore grow slower, without significant color loss. If unacceptable coloring of the putting surface does occur, liquid iron application approximately five days prior to the tournament will boost the desirable dark green color of the grass without stimulating excessive growth. Two ounces of iron sulfate in several gallons of water should be applied per 1000 sq.ft. Care must be taken not to apply this when temperatures are hot to minimize the potential of burn to the grass.

## Aerification and topdressing

Aerification and topdressing are two common and important practices necessary to maintain a satisfactory putting surface. Each practice, as expected, has a dramatic effect on putting green speed. Aerification not followed by topdressing has been shown to **decrease** putting speed an average of 5 inches for up to 28 days. Aerification followed by topdressing initially decreases putting speed, but after eight days, an **increase** of 6 to 15 inches can be expected for the next 21 days for light and heavy topdressings, respectively. Up to 8 days are required for topdressing material to be uniformly worked into the turf canopy and for excessive topdressing material to be picked-up or evenly distributed by mowing.

One of the most important benefits that aerification provides to the golfer is that it softens the playing surface, allowing the green to hold approaching shots better. Aggressive aerification is a must to maintain optimum bermudagrass putting surfaces. Timing is important prior to a major tournament. Smaller tines ( $\leq 3/8$  inch) should be used for the aerification prior to the tournament and should be timed at least 30 days prior to the tournament. This allows time for the bermudagrass to recover and fill in aerifying holes. Topdressing should also accompany this aerification.

Topdressing also provides many attributes for the golf green. One of its greatest is to provide a layer of soil to smooth the small irregularities that occur from traffic, machinery, and pest damage, and to firm the putting surface. Light, frequent topdressing should be applied in addition to the