

Autonomous or Robotic Mower Use on Florida Lawns¹

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Introduction

Mowing is one of the most important practices for maintaining a healthy lawn. This publication provides practical guidance for Florida homeowners, landscape professionals, and Extension agents on using autonomous (robotic) mowers. These technologies are becoming more common, can reduce labor and gas emissions, and improve mowing consistency and turfgrass quality.

How Autonomous Mowers Work

Autonomous mowers rely on a few key components to operate efficiently:

- a navigation system, such as a boundary wire or GPS/RTK, to define the mowing area
- a charging station where the mower docks automatically

Once installed, the mower works within its set boundary and returns to its charging station as needed. While it will mow wherever it's placed, simple adjustments can improve efficiency. Raised beds or borders often block access, leaving grass along edges to grow taller and require string trimming. Lowering these edges allows the mower to reach into these areas, reducing the need for additional trimming.

Mowing Strategies

Autonomous mowers typically use two mowing approaches (Sportelli et al. 2020, 2021):

- Random Trajectory**
 - Moves in random directions across the lawn
 - Works well in areas with obstacles
 - May result in overlapping and lower efficiency
- Systematic Trajectory**
 - Uses structured, pre-planned mowing such as straight lines or grid patterns
 - Is more efficient in open lawns
 - Reduces overlapping or repeated mowing in the same areas

Advantages of Autonomous Mowers

- Reduce labor requirements and operator fatigue (Grossi et al. 2016; Pirchio et al. 2018a)
- Lower noise compared to gasoline-powered mowers (Grossi et al. 2016; Pirchio et al. 2018a)
- Reduce fuel use (Grossi et al. 2016; Pirchio et al. 2018a)
- Improve mowing consistency due to frequent operation
- Reduce soil compaction by being lightweight (Luglio et al. 2023)
- Can improve turf density and overall lawn quality (Grossi et al. 2016; Pirchio et al. 2018a)

Limitations of Autonomous Mowers

- Can be high in initial cost
- Cut at a lower mowing height than what is favorable for some Florida grasses (e.g., bahiagrass)
- May struggle in complex landscapes with many obstacles
- Require regular maintenance (blade replacement [Figure 1], battery checks)
- May leave wear patterns near docking stations (Figure 2)



Figure 1. A close-up of three small, two-edged blades fixed to a spinning disk underneath an autonomous mower.

Credit: Natalia/stock.adobe.com



Figure 2. Elliptical wear patterns observed near the docking station.

Credit: J. Bryan Unruh, UF/IFAS

Weed Pressure

Research has shown that autonomous mowers can reduce overall weed coverage compared to rotary mowers (Grossi et al. 2016). However, creeping-type weeds, such as clover, may increase under frequent mowing (Pirchio et al. 2018a). This result could be considered positive if a mixed-species lawn is desired.

Quality of Cut

A general mowing guideline is to remove no more than one-third of the leaf blade at a time. These mowers use sharp blades attached to a spinning disk. These blades are small (<1.5") compared to traditional mowers (~20"), thereby producing clean and precise cuts. This can reduce leaf damage, yellowing, and turf stress (Pirchio et al. 2018a; Shaddox et al. 2020). Frequent mowing also promotes higher turf density and improved overall lawn quality (Grossi et al. 2016; Pirchio et al. 2018a).

Maintenance note: Blade sharpness declines with use, so blades should be replaced every six to eight weeks during the growing season to maintain good cut quality.

Experience with Warm-Season Grasses

Most autonomous mowers were designed for cool-season grasses, which are typically mowed below 2.5". In contrast, common Florida grasses, such as St. Augustinegrass, require higher mowing heights (2.5"–4"), which may exceed the limits of some robotic mower models.

UF research showed that St. Augustinegrass maintained with a robotic mower had more uniform turf and greater green cover compared to traditional mowing, especially during spring and fall (Boeri et al. 2023). It also resulted in delayed winter dormancy and earlier spring green-up

(Figure 2), likely due to the lower mowing height. The sharp blades of the autonomous mower provided better cut quality, reducing fraying and leaf browning in St. Augustinegrass (Figure 2).



Figure 3. Images showing a) winter dormancy differences in February 2019 and b) a quality of cut comparison between an autonomous mower (left) and a traditional mower (right) in 2018.

Credit: J. Bryan Unruh, UF/IFAS

In zoysiagrass, autonomous mowers produced higher turf quality and greater shoot density compared to traditional mowers. Although they took longer to mow, they used less energy and had slightly lower operating costs (Pirchio et al. 2018b).

Note: Limited research exists for bahiagrass, centipedegrass, and bermudagrass lawns.

Operational Considerations for Autonomous Mowers

- Possible operational disruption from irrigation heads, which may cause the mower to become unstable, stop operating, and get damaged
- Lightning risk to docking stations
- Fire ant activity near electrical components
- Potential for theft
- Need for routine maintenance

Is an Autonomous Mower Right for Your Lawn?

Best suited for the following:

- Small to medium-sized lawns
- Lawns with simple layouts and few obstacles
- Homeowners seeking reduced labor and quieter operation

Less suitable for the following:

- Very large or complex landscapes
- Lawns requiring higher mowing heights
- Areas with frequent debris or uneven terrain

Key Takeaways

- Robotic mowers can maintain turf quality comparable to traditional mowing.
- They reduce labor, noise, and emissions.
- Frequent mowing improves turf density, which may reduce some weeds but can allow low-growing species like clover to spread.
- Not all models are suitable for Florida grasses.
- Regular maintenance is required for optimal performance.

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