Robotic Lawn Mowers:

Can They Help Reduce Your Carbon Footprint While Keeping Your Lawn Looking Perfectly Manicured?

ENVR 395 Senior Thesis

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Introduction

Throughout the suburbs and countryside of the U.S. lawns are common sights. These lawns require a lot of maintenance, which mostly consists of keeping it cut to a desired length. Some people love mowing their lawns while others are forced to complete the task by either law or anxiety. When it comes to maintaining a lawn, a home owner has many options of lawn mowers. Each type has its own costs and benefits whether it is price, capabilities, user input, durability, or environmental impact. Robotic lawnmowers offer a unique option which can maintain different sizes of lawns and require less effort.

How does the robotic lawnmower work?

Robotic lawnmowers are actually not a new concept, they have been around for decades. Recently they have advanced to the point where they are a viable option for many homeowners. It drives forward in random patterns as it mows bouncing off the perimeter (Figure 2). This allows it to mow every square inch of grass within the boundaries. The perimeter is determined by a wire buried a couple inches beneath the lawn. If there is an obstacle in the lawn, such as a flower bed, the wire is brought out from the perimeter of the lawn and wrapped around the obstacle in what is called a lollypop formation. The wire is attached at each end at the robot's charging station which also acts as its home base (Figure 3). These robotic lawnmowers mow every day, or every other day depending on the custom settings determined by the homeowner. Because of this it only removes a few millimeters of the grass blade at a time.

Fig 2. Random mow path created by robotic lawnmower (Lawnbotts.com)

Fig. 3. Map of perimeter wire (Lawnbotts.com

Fig 1. Example of a ROBOMOW robotic lawnmower and its home base. (Robomow.com)

Methods

The robotic lawnmower was compared to various types of other common lawnmowers to determine its environmental impact as well as its practicality. For the purpose of this thesis five different types of lawnmowers were analyzed, including one riding lawnmower, one push mower, one hand wheel mower, and two types of robotic lawnmowers. These types were chosen in order to cover all types of lawns we see in America. Each mower was analyzed in terms of cost, lawn size capability, production impacts, emissions, life span, fuel/maintenance cost, noise pollution, and user involvement.

	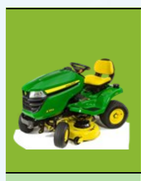 JD X345	 LB200EL	 Toro 22”	 RC306	 Non-motorized
Initial Cost	$3799	$3799	$319	$1,299	$140
Emissions While Operating	Yes	No	Yes	No	No
Production Impacts	Greatest	TBD	TBD	TBD	Least
Life Span	TBD	8-10 years	TBD	8-10 years	TBD
Annual Fuel Cost	$500 (gas)	$12 (electricity)	TBD (gas)	>$12 (electricity)	$0
Annual Maintenance	$80	~$55	TBD	~$55	Near $0
Noise Pollution	Yes	No	Yes	No	No
Labor Involved	Third Greatest	Least	Second Greatest	Least	Greatest
Acreage Capability	Greatest	1 acre	Third Greatest	1/8 acre	>1/8 acre
Live span	10 years	8-10 years	10 years	8-10 years	Potentially forever

Fig 4. Examples of robotic lawnmowers made by LawnBott and Robomow

Discussion

Each type of mower excels in different areas. In order to completely eliminate the harmful effects of lawn mowing we would have to eliminate the lawn all together. The next best option would be to use a hand operated wheel mower that produces zero emissions, does not cost very much, and lasts forever. Unfortunately this method is not very desirable as it eats up valuable time from the operator. When adding in ease of use to evaluation robotic mowers are able to reduce the environmental impacts of lawn mowing by eliminating emissions, reducing noise pollution, and by reducing fertilizer usage. They also require the least amount of user input once the unit is installed and fine tuned.