

Embracing technology and innovation at Spring Meadow Nursery[®]

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INTRODUCTION

Over the last 10 years, the team at Spring Meadow Nursery has put forth great effort to create a culture amongst our staff that embraces the use of technology, automation and new ideas to innovate and improve many aspects of our production process. The willingness to invest in new technology and automation is the first step towards achieving the goal of increased efficiencies, improved quality, and long-term profitability. Certain considerations and calculations must be made before one decides to invest time or money into a new piece of equipment in any production process.

- 1) Desire or necessity. Everyone desires the next new technology, but is it necessary? Would it result in a measurable improvement to particular production process? Or is it just a fancy show-piece for your friends? Any investment in a new technology must be targeted to a specific process that needs improvement.
- 2) Efficiency. Increasing efficiency in any process directly reduces labor costs, and increases profitability. Automation and new technologies are not always needed to increase efficiency. Significant gains in efficiency can often be achieved through simple changes in production practices, such as using “lean” principles to reduce waste, lower supply inventories, and diminish non-value added work.
- 3) Investment cost and payback. Investment cost must be considered along with calculated payback. Payback is the amount of time required for an investment expense to pay for itself through increased efficiency, or increased quality. Better efficiency results in reduced labor costs. Better quality results in the ability to reduce shrink and increase prices, thus sustaining or increasing profitability. A payback of 1 year or less should be an easy decision for any business. A payback of 2-5 years is still acceptable for most businesses. Gaining consensus on a payback period of 5-10 years requires more careful calculations, planning, and at least a 10-year plan for your business.
- 4) Maintenance. All equipment requires maintenance. It requires not only reactive (breakdown) maintenance, but preventative maintenance. Whenever maintenance hours interfere with operational hours, time and money are lost. When considering a new piece of automation, one should always try to witness a demonstration if possible, and calculate the expected maintenance involved, including preventative maintenance.

CONSIDERATIONS AND CALCULATIONS

Technology

Installing wireless internet (Wi-Fi) throughout the greenhouses has encouraged propagators, growers, shippers, and sales managers to communicate live from the field. Tablets and smart phones can be used to access desktop computers, or environmental computers. iPads allow growers to capture and send images, send/receive emails, and check voicemails. Growers can also monitor crop inventory, availability, order status, irrigation schedules, and environmental conditions (Figure 1).

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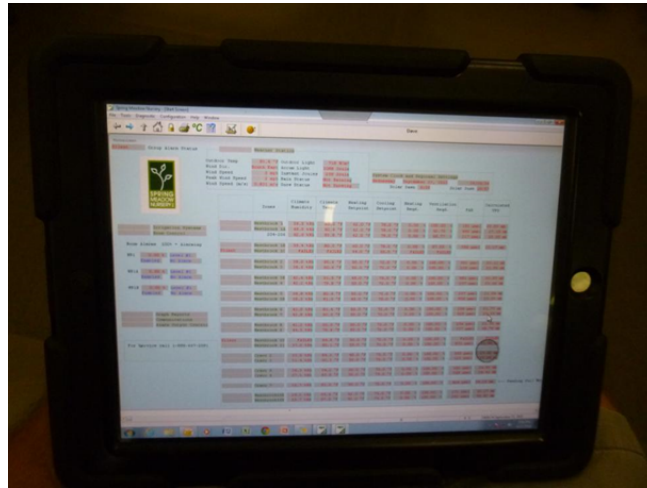


Figure 1. Wireless tablets for environmental and irrigation control.

Spring Meadow recently upgraded to Argus Controls® for environmental control of greenhouse climate and irrigation. Using VPD accumulation for propagation has proved better than time-based misting. Using tablets in the field in conjunction with Argus resulted in more accurate decision making in misting and irrigating.

Automation

In 2015 we installed a new medium mixer (Figure 2). This allowed production of a more stable, consistent medium mix with triple the output capacity of our old mixer. A stable growing medium is yielding better quality, faster finishing time, and more consistent crops.



Figure 2. AgriNomix automated soil mixer.

Many different recipes can be programmed into the machine and stored in its memory. A single push of a button (Figure 3) by the operator changes the mix for specialty crops requiring different proportions of the medium components.



Figure 3. Touch-screen control of AgriNomix soil mixer.

Grading machine

In 2007 we invested in a robotic grading machine (Figure 4) that sorts our liner trays into four possible grades based on size. Robotic gantries disassemble the trays after which each individual plant is photographed and then placed back into a tray based on its grade (Figure 5). This machine allows us to grade our plant material as it moves from propagation areas into finishing houses, as well as when plants are prepared for shipping.



Figure 4. Tuinbouw Technisch Atelier (TTA) Plugsorter grading machine.



Figure 5. Tuinbouw Technisch Atelier (TTA) Plugsorter showing final grades.

Innovation

Trimming, or pruning, is a common practice for any production nursery. In some cases it can be very labor intensive, while in others it can be automated. Trimming liners with hedge-trimmers is one method that has been used in the past at Spring Meadow Nursery (Figure 6). This was a labor intensive process where we could achieve 600 trays per man-hour.



Figure 6. Manual trimming with hedge-trimmers.

In 2008, an idea was hatched for a 24-foot wide trimming machine that could trim an entire bay of plants at once. A giant cutting blade was purchased and a prototype on wheels was constructed (Figure 7).



Figure 7. Prototype of 24-foot automatic trimming machine.

Successful tests of our prototype led to an overhead rail system designed to support heavy machinery. This rail system would ultimately be the transport method for our 24-ft wide trimming machine which was fully realized in 2010 (Figure 8). This new machine quickly proved its value by cutting over 10,000 trays per hour.



Figure 8. Completed 24-foot automatic trimming machine on rail system.

A series of rotating brushes sweep clippings across the cutting blade and onto a conveyor belt that dumps them to a sidewalk where they can be easily collected and disposed of (Figure 9).



Figure 9. Clean collection of clippings by automatic trimming machine.

A rail system designed specifically for our trimming machine soon opened the door to other opportunities for automation. Working with an outside company, Spring Meadow purchased a boom sprayer in 2014. This machine would also ride on the same rails (Figure 10). It is also 24-ft wide and travels down a bay while spraying at a 30° angle to lean plants over and contact the undersides of leaves. Once the sprayer reaches the end of a run, it automatically reverses direction and sprays again at a 30° angle from the opposite side, resulting in complete coverage of the crops and minimized exposure to applicators.



Figure 10. Automatic spraying machine using rail system.

Currently in 2015 we are trialing a 24-ft wide tray moving cart utilizing the same transport rails (Figure 11).



Figure 11. Powered moving cart using rail system.

Lean practices

Using lean manufacturing principles have helped to increase many of our efficiencies, often with little or no reliance on automation. Progressive sticking helped us to increase our sticking output by 20%. Progressive transplanting also resulted in a 20% increase in output. This occurred without any additional input, just a simple change in the process. In 2015 we looked at our rail system again and began using simple platforms suspended from the rails that would act as rolling tables. Using these platforms and with help from installation of concrete floors, we were able to reduce order packing and shipping labor by 50% (Figure 12).



Figure 12. Packing orders on rolling platforms.

The idea behind these simple platforms is to work smarter, not harder. Bringing the work up off of the floor makes it more comfortable for the worker. A comfortable worker is likely going to produce better quality work and do so more efficiently than an uncomfortable worker. We also now use these devices for hand sorting (Figure 13).



Figure 13. Manual grading on rolling platforms.

We are trialing them for cutting harvest (Figure 14).



Figure 14. Harvesting vegetative cuttings on rolling platforms.

We use them for maintenance of overhead irrigation systems, and we have even tried them for weeding (Figure 15).



Figure 15. Pulling weeds from rolling platforms.

In nearly all cases, we were able to improve our efficiencies, and increase productivity. These are just a few of the areas where we have been successful at innovating and implementing technology in the last 8 years at Spring Meadow Nursery.