

Automated Data Capture



FOR THE YOUNG PLANT PRODUCER, KEEPING TRACK OF INVENTORY IN THE GREENHOUSE IS NO SMALL TASK. In today's competitive environment the margin for error continues to shrink, so finding problems fast and keeping input costs as low as possible have never been more important. Using bar code technology, many top producers are efficiently and cost effectively tracking individual containers throughout the production chain. This article describes a system in which plug seedling or cutting trays are tracked throughout production.

How does it work?

Using the system designed by United States-based technology company Plantware, each tray is assigned a unique number or "license plate" which is printed as a bar code. The bar code is scanned every time something happens to the tray, allowing the user to see when, where and how that tray was grown as well as when, where and how the tray ultimately was dispensed.

Specialized software and a printer automatically generate labels and apply them to trays during the seeding or sticking process. The device is

1. After the flat is filled with media, it is labeled and scanned.

2. The tray then continues along the conveyor where it is immediately sown, with the printed barcode reflecting the precise seed lot used.

3. The tray is scanned once again after sowing and all data goes into the computer; the tracking process has begun.

located in the sowing line after the flat filler and before the seeder (Figure 1); it passes each print job to the printer assuring that the label will include that tray's unique identification number. Once the tray is

labeled, a conveyor moves it to the seeder (Figure 2), where it is sown with seed from a lot that has also been scanned. As the container moves through the seeder and emerges from under the cylinder, the bar code is scanned (Figure 3). The computer program then updates the database with the exact date and time it was sown, the operator carrying out the activity, as well as the seed lot used. If the seed hopper empties before all trays are sown, the new seed lot is scanned, enabling new trays to be associated with the correct lot. Even when using different tray sizes or types, or different types of labels, the system can efficiently process 1,200 trays per hour when operating at full capacity.

Radio Frequency Identification

The Plantware system relies on RFID, or Radio Frequency Identification, to harmonize the system of barcodes. A basic RFID system consists of an antenna, a transceiver and a transponder (or RF tag). The antenna emits radio signals that activate the tag, as well as read and write data to it. Antennas line the RF tag and the transceiver, which controls the system's data acquisition and communication.

Tracking tray location

Sown trays are placed on a bench. No matter whether this is a manual or automated process, the tray is scanned to identify the unique bench on which it is placed. Scanning the tray to a specific bench is currently a manual process, but equipment is in the works that will link all the trays' bar codes to their bench automatically. But because benches can move within the greenhouse, or even within different greenhouses, Plantware has devel-



4

4. Complete tracking with complete simplicity: the promise of bar codes.

5. Bench location data can be stored and transmitted via Palm Pilot.

6. Also using bar codes, donor trays used in plug patching are also scanned out of the system as loss due to maintenance.

Transplanting and losses

When it comes to transplanting, not only is it important to identify how many trays have been started

oped an automated bench location system that tracks bench movement throughout the facility. Manually tracking benches can also be accomplished with Palm hand-held computers that can be uploaded into the computer program. The uploaded data can then be used to generate reports that identify the location of trays requiring a specific production task, such as being moved into a new environment, chemical application or a replugging activity.



6

but also to remove from inventory the plug trays that were used as donors. This data can be automatically captured from the transplant line to keep inventory levels accurate without operator input.

Tracking losses is also easy to manage: Select a reason for the loss on an on-screen drop-down menu (such as "Lost to Maintenance" or "Plug Patching") and then scan the container. At the end of the season, it is possible to summarize the various

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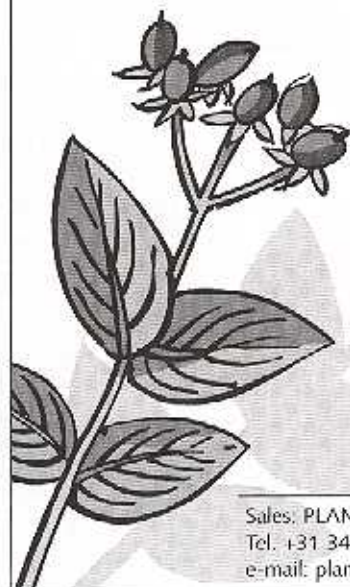
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7. Triple insurance against mistakes: trays are picked using a bar-coded report, scanned before packing and then scanned a third time before they are shipped.

8. An unlabeled box just before it passes by the print applicator, where its enclosed trays are associated with a corresponding order number and the information of the receiving customer will be printed.

reasons for loss at all points throughout the production process.

Picking and packing

Bar codes also simplify the picking process. A computer program generates a report that spells out the number of trays needed for an order, complete with a barcode containing the order number. This report is used to manually pick an order based upon bench location of the required trays. As the manual picking is completed, the filled carts can be rolled to the scanning station where the bar codes on picked trays are scanned against a bar code on the order print-out. Discrepancies between the manually picked trays and trays on the actual order are noted immediately by an error tone and will not scan.

Once picked and committed, the next step is packing. For automatically tracked shipments like FedEx, the trays are packed with bar codes pointing upward in the box, and the boxes pass by yet another camera-linked scanner to record any discrepancies prior to the box being sealed. Then, another print-and-apply station automatically labels the box for shipping based upon its actual contents.

Using Automated Data Capture technology for greenhouse production lines allows a new level of flexibility, efficiency and tracking that was previously not available for young plant producers and finished plant growers. By integrating data capture technology, growers can increase productivity and increase inventory accuracy. ■

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