

NURSERY PAPERS

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Barcodes – Beyond compliance

Barcodes are commonly used throughout the nursery industry to identify products in a retail setting, but what other opportunities do barcodes offer industry?

NGIA Policy and Technical Officer Chris O'Connor, takes a brief look at barcodes and the potential they have for the industry as well as what systems exist beyond barcodes.

Barcodes – Beyond compliance

The barcode has been in use in a retail setting for 40 years, having first been used on a packet of chewing gum in June 1974. Since this time the barcode has become integral in retail throughout the world and in fact the vast majority of retailers require suppliers to barcode their products.

But there are uses for barcodes beyond retail operations or complying with retailer's ranging requirements. In this nursery paper we will look at what growers can use barcodes for and how they can be used

to identify improvement opportunities, increase profitability and assist in managing biosecurity responsibilities.

The GS1 System

One aspect which can be quite confusing is the broad range of terms and acronyms used in relation to barcodes. In the first part of this paper we will look at some of the various terms used with barcodes as well as some of the types of barcodes utilised as well as the wider context in which they are used.

A barcode is essentially a visual depiction of data which is machine readable; in essence it is a data carrier. But not all barcodes are the same; in fact there are a number of different types of barcode symbology. Different barcode symbology's can carry different data types and are used in different applications. This point is essential as there is a difference between the barcode (visual representation) and the information that it carries.



Barcodes are a powerful tool which can be leveraged by both retailers and growers to reveal better data on a range of aspects, "streamline tasks such as ordering and increase profitability."



Barcodes can be used as an aid to traceability, not only in the production phase but through the entire supply chain

So before focusing on barcodes we have to consider the information that they contain first as this will dictate how we use the barcode and what barcode will be needed.

For data to be useful it needs to be understood and for it to be understood by many individuals there needs to be a system or a standard. This is where GS1 comes into play. GS1 is an international not for profit association with members organisations in over 100 countries. The role of GS1 is to administer and improve the system of standards which deal with supply chain information.

The standards which GS1 administers are built on three key areas of information management namely; identifying, capturing and sharing information.

Identify

For identification purposes the GS1 system uses a number of identification keys. The one which most growers and retailers would be familiar with is the Global Trade Item Number or GTIN. The GTIN is a unique number which provides a way to uniquely identify an item. This can then be used as a means of attributing information to a product such as pricing or production

instructions and retrieving that information when used in conjunction with a database. The uniqueness of the GTIN becomes more important when the product moves out into the supply chain as products from multiple producers can be easily identified without duplication.

The GTIN's found in the nursery industry are 13 digit numbers which are comprised of 3 elements;

- A **GS1 company prefix** which is allocated to the company
- An **Item Reference number** allocated by the company
- And a **Check Digit** which is calculated from the previous digits. This is a security feature which assists in ensuring that the code is read properly by the machine.

GS1 also has a number of other identification keys such as;

- **Global Location Numbers (GLN)** used to identify a physical location for example a business location, a propagation house or a shelf in a warehouse.
- **Global Returnable Asset Identifier (GRAI)** used to identify and track returnable assets for example pallets, trolleys or nursery trays.
- **Serial Shipping Container Code (SSCC)** used to track items throughout the supply chain, for example it could be applied to a trolley of mixed plants or a single box

Capture

Next we need a way in which we can capture that information for it to be useful. To do this GS1 administers a wide range of standards for data capture and encoding with perhaps the most recognisable being barcodes. The two barcode symbology's most common to the nursery industry are the **EAN - 13** barcode and the **GS1 - 128** barcode.

The EAN - 13 barcode symbology is used at the point of sale and it is the one which growers and retailers would be familiar with. Most major retailers require products to be barcoded with an EAN-13 and having a barcode is an essential criterion for having a product ranged. Having this barcode means a retailer can capture information; efficiently tracking sales, placing orders and speeding up the checkout process.

The EAN -13 barcode does have its limitations, the data which it can carry is limited to a GTIN. In contrast the GS1-128 barcode can carry a lot more information.



An example of an EAN-13 barcode encoding a GTIN

The GS1 -128 barcode cannot be used at the point of sale but it is powerful. It can cater for all identification keys (GTIN, GLN, GRAI, SSCC etc.) as well as additional information such as Batch/Lot Number, Production Date, Product Net Weight in Kg to name a few.

It does this by using Application Identifiers (AI) which acts as an indicator of what the data is when scanning. This enables other companies to also understand what the data is as well. The AI itself is a short 2 – 4 digit prefix which defines the meaning and format of the data.



An example of a GS1-128 barcode with a GTIN and a batch number. Note the Application Identifiers in brackets.

Share

GS1 administers standards data synchronisation through its Global Data Synchronisation Network which allows trading partner's access to the same up to date information on their products such as pricing information. This ability to synchronise data leads to a better trading environment with improved accuracy, reduced costs and increased speed.

GS1 also administers standards for Electronic Data Interchange (EDI) which essentially allows companies to send and interpret business messages including invoices and purchase orders.

Opportunities

So now that we have undertaken a quick overview of barcoding what are the opportunities available for production nursery business?

The first opportunity is through improved inventory management. Barcodes will facilitate the means to keep an accurate record of stock on the ground. This can be achieved in conjunction with the use of Global Location Numbers (GLN). Each location in the nursery can be given a location number. The locations will depend upon what level of detail is required by the business. As an example it could range from; Business – Site – Greenhouse - Bench.

At the operational level essentially as a product is moved into a location it is scanned in and as it leaves the location it is scanned out with both of these actions updating an inventory database. Apart from increasing recording accuracy this opens up the opportunity to have live inventory which is updated automatically as stock is moved. Live inventory will assist sales teams in knowing exactly what is available for sale without having to do a physical stock count. It also enables sales teams to sell to the last plant which in turn increases the profitability of the crop. This can be achieved through the facilitation of online stock availability which is accessible by your customers.

Live inventory can also be used to assist in identifying production quantity needs rapidly.

The next opportunity which barcoding offers production nurseries is through increased traceability. With increasing focus on biosecurity the ability to trace where your stock has come from and where it has gone to is becoming essential. For those businesses supplying the retail sector the ability to undertake a recall procedure is also becoming more important to limit risk and potential costs.

A business could use a GTIN to track product but this has its issues as there is no differentiation between product produced today, yesterday or even last year.

Traceability of product however can be enhanced through complimenting GTINs with a batch number. As noted previously this can be done using a GS1-128 barcode and an Application Identifier (AI). Incorporating batch numbers is a very useful tool as in the event of a recall one can limit the products being recalled to the batch rather than the entire product.

The ability to trace product using GTIN's and batch numbers also enhances the opportunity to track what has been done to the product during production. For example accurate data on watering, agrochemical applications (fertilisers, pesticides, and plant growth regulators) can be applied to a product batch. Likewise weather conditions and even which staff was involved in specific operations with the batch can be attributed and correlated.

This leads to two potent outcomes; firstly accurate production costs can be attributed to the batch and secondly causality can be determined.

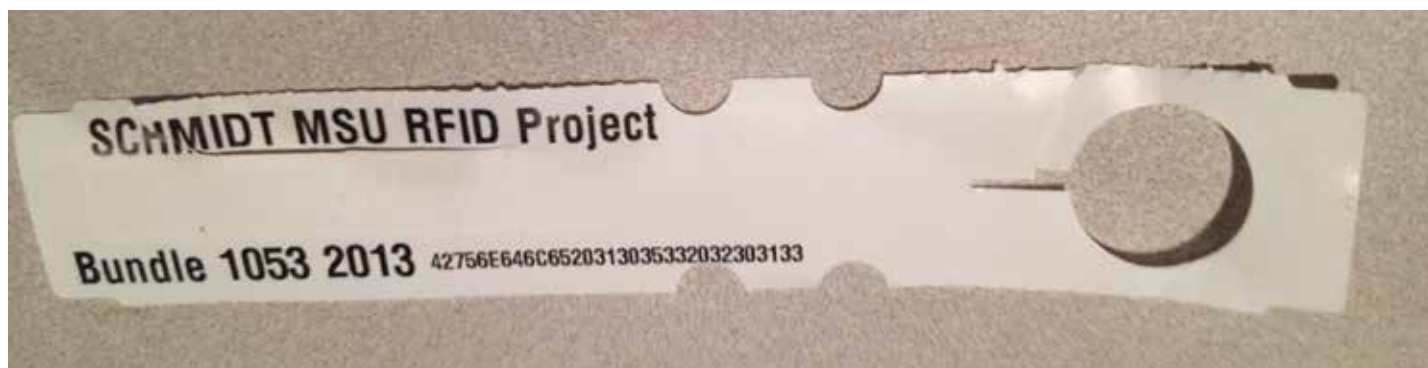
Accurate production costs mean that you have an increased awareness of what the plant costs to produce. This in turn will guide decision making processes such as; how much do you need to sell the plant for? Which plants will give the best dollar return for the work needed to produce them? When the best time to dispose of excess stock is? Is it ok to pot up a plant when there is no market for it?

Determining causality can be greatly assisted with increased traceability. If there has been a good crop what caused it? Likewise if there was a crop failure what was the root cause? Increasing the level of information associated with production will help show the causes of success or failure. This focus on data is much better than relying on memory or anecdotal evidence. The information gathered can be incorporated into future operations contributing towards ongoing improvement in production quality and speed along with improved profitability.

Each of the opportunities mentioned relate to the availability of better information and as commonly attributed to Peter Drucker "If you can't measure it you can't manage it". The higher quality of information you have the more informed your business decisions will be. However for this information to be accurate it must be used in the context of a well-designed system and a disciplined approach.

The future

In many respects the future is already here. In the past few years there has been a tremendous advance in the computing power and adaptability of both hardware and software. Computing has gone mobile and tablets and smart phones are able to



An example of an RFID tag which has been used in a nursery environment

be used in many roles and applications which have in part been facilitated by the introduction of cloud computing. Conversely the price of this technology has decreased considerably and what was once the domain of big business only is now certainly available to smaller operations.

There are some new data carriers which have gained in prominence over the last few years and offer an alternative to EAN-1 or GS1-128 Barcodes.

GS1- Databar

The GS1 Databar was introduced at the start of 2014 and is designed for use at the point of sale. It has 4 configurations which allow for the barcode to be stacked. This means that the barcode can be compressed in size allowing it to go onto smaller products. Specific configurations of the GS1-databar barcode are also able carry additional information such as batch numbers. This would be a boon for the nursery industry in managing traceability further through the supply chain.

In Australia it has been recently used on fruit for sale in supermarkets however at this stage it has not been adopted widely for use in the retail hardware sector.

RFID

Radio Frequency Identification (RFID) technology has been available for a number of years and is now becoming more cost effective. RFID essentially allows the identification of items without a line of sight. So rather than having to scan a barcode a tagged item just needs to pass within the range of a receiver antenna to be identified. RFID is used in many situations but most readers will be familiar with RFID tags through their roadway etags or through their use in clothing tags for theft prevention at retail stores.

RFID tags contain a small microchip which allows for the programming of information usually an Electronic Product Code (EPC) similar to a GTIN and an antenna. The antenna enables the tag to both transmit the information stored on the chip and access power for the chip. The power for the chip is received from the antennas electromagnetic energy.

RFID has a number of benefits in automating stock control and inventory processes in production nurseries and a number of nursery businesses are already utilising this technology.

Barcoding has enormous potential for producers beyond compliance with retailer requirements. If you are not leveraging this technology to its full advantage you are missing out on opportunities to maximise profits and streamline your production.

Industry is working closely with GS1 Australia through the Hardware GS1 Action Group to ensure that industry has access to knowledge and is kept current with solutions to supply chain information management.

For more information on how you can better use barcodes in your business please contact GS1 www.gs1au.org or if you would like to engage a consultant from GS1 to assist your business in leveraging your GS1 membership please visit http://www.gs1au.org/services/professional_services/

Further Information

Dr. Tom Fernandez, Michigan State University 17909 *Using RFID for Inventory Tracking in Container and Field Nursery Operations*, ASHS Conference Jul 2014 available from; <http://ashs.confex.com/ashs/2014/webprogram/Paper17909.html>

Nursery Paper Issue 10 Nov 2009 *Supply Chain Management holds the key to the viability of nursery enterprises* available from www.ngia.com.au

GS1 System: The Global Language of Business available from http://www.gs1au.org/assets/documents/info/brochures/GS1_System_Brochure_all.pdf