

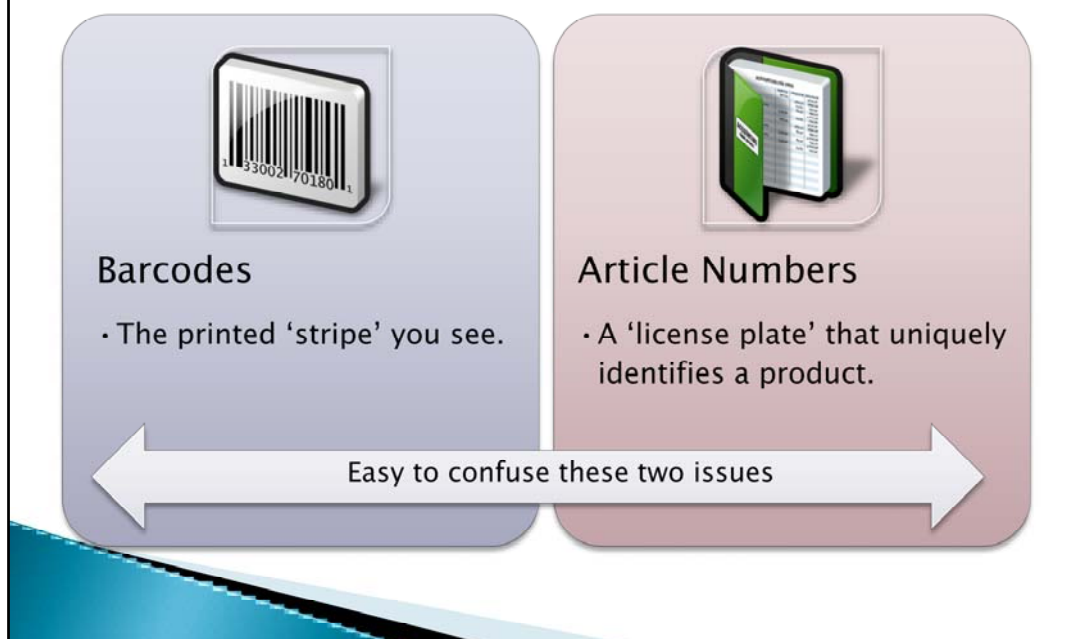
Horticultural Barcoding

Joseph Sweeney
IBRS, TyTags Australia

Barcodes! They can be the bane of a nurseryman's life, but they are increasingly becoming a requirement for selling to large retailers. In this article, Joseph Sweeney, technology and supply chain management advisor with IBRS, provides an introduction to barcodes.

Barcoding is a huge topic. Not only does barcoding involve some rather specialized technology, but there are also many different standards in the market and a lot of people will be trying to sell you pre-printed barcode labels, barcodes "numbers", printing systems, and even consulting. In order to make sense of all this, especially from a horticulturalist's point of view, it is a good idea to separate out the different aspects that make up the broad topic of barcoding and look at each separately.

Barcode Basics: Article Numbers



When most people think of barcodes, they think of that little striped 'thing' on the back of all our grocery packages. This printed barcode is nothing more than a way to let computers read information on a package. However, the printed barcode should not be confused with the "barcode number" it represents. Just as we humans have alphabets which we use to write down information, the world of computers has barcodes which are used to write down (or encode) information.

Barcode Numbers: More correctly called "article numbers," barcode numbers should not be confused with the printed barcode format. Barcode numbers are globally unique product codes that can be licensed off the international standards body GS1.

By having a single, internationally-accepted unique product code, your product can be identified by anyone, anywhere. More importantly, it cannot be confused with another product within a large retailer. Think of Big W: they carry millions of different products and if any two products shared the same product code, there would be chaos at the cash register!

Generally, you license sets of barcode numbers from GS1 (www.gs1institute.com). Once you pay your fees, GS1 grants you exclusive use to a range of numbers. Which products you assign those numbers to is up to you, but it is essential (and part of the agreement with GS1) that each number is used only with a single product. And therein lies a big problem for horticulturalists.

The idea that each and every product is static and unchanging is great for consumer goods, but we are dealing with living things that change. From a GS1 perspective, a 12" potted camellia would require a different barcode number from a 6" or 30" potted camellia. Worse, each and every hybrid of plant would require a different barcode number. This means that while manufactures of consumer goods – or even food products – need only a handful of numbers to cover one 'product line' of their business, horticulturalists may need dozens, if not hundreds. Since licensing barcode numbers is not cheap, this is going to become a bigger issue in future as the large retailers begin to exert pressure on the horticultural industry to procure their own barcode numbers and produce their own labelling. The good news is, at the moment, most of the large retailers are providing growers with the unique barcode number they want on the products. However, this is changing. In years past, the large retailers placed huge pressure on suppliers take full responsibility for labelling and barcoding. The fact that almost every product you buy in a supermarket has a pre-printed barcode and unique article number on it is testament to how much pressure was applied, and how successful it was. Put bluntly, smaller suppliers that could not meet the labelling demands of the large retailers either went out of business, or became suppliers to aggregators who could meet these demands. We are now seeing the exact same changes taking place in the horticultural industry in Australia. This represents very real challenges for the industry, as well as opportunities.

Selecting a Supplier

- ▶ Getting a unique *article number* for use with your barcoding initiatives can be tricky.
- ▶ GS1 is a monopoly
 - Big retailers mandate GS1 article numbers
 - Only 1 approved supplier
 - Only offered on annual rental model
- ▶ Competitors to GS1 offer
 - Unique article numbers that do not overlap with GS1 codes
 - One-off, perpetual purchase of article number
 - Rarely accepted by big retailers, but often fine for smaller retailers

When many people are asked to 'get a GS1 barcode' they typically think that this is about getting a printed barcode. It's not. It is actually about getting the rights to a unique article number from the global GS1 registry. It's like getting a licensing place for your car.

On the surface, it looks as if there are several different suppliers of barcodes in Australia... a quick Google search will turn up several suppliers. However, be careful! Only GS1 itself and one exclusive distributor have the rights to issues GS1 article numbers.

Barcode Basics: Formats

- ▶ Dozens of different 'formats.'
- ▶ Some can store any character, others only numbers.
- ▶ Some have length limitations.
- ▶ Choosing a format should be based on the information you want to 'store' in the barcode.



Code 128

- Any character, any length.



Interleaved 2 of 5

- Limited characters, any length



EAN13 and EAN8

- Numbers only. Fixed lengths.



EAN128

- Any character, any length.



PostNet

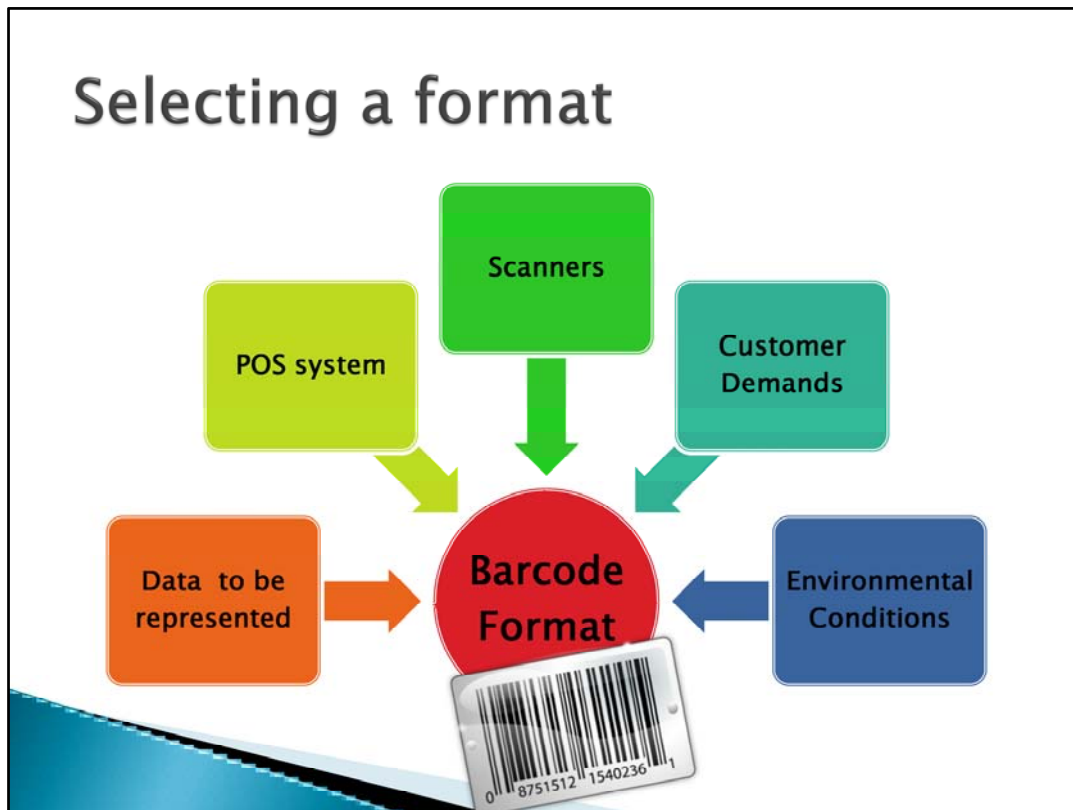
- Fixed structure & length.

Just as humans have many different languages with many different alphabets, so too are there many different barcode formats. Therefore, it is possible to have two barcodes that look completely different, but still contain the exact same information.

For example, these two barcodes both represent the product code "1234567" but each of them look totally different. This is because the first barcode is printed in the "CODE128 format" and the second is an "EAN8" format. It's a bit like writing the product code in two different languages, such as English and Chinese.

To make matters even more complex, different barcode formats have different limitations. For example, the popular EAN13 barcode format can only display 13 numbers – no more, no less and certainly no text! In contrast, the CODE128 barcode format can display any number of letters, numbers and even punctuation marks.

When planning for barcoding, you need to therefore need to think carefully about what barcode format you should use. If you are selling to large retailers, such as Kmart, Bunnings and Big W, then you will almost certainly be forced to use the EAN13 barcode format. However, if you are using barcodes to speed up your own retail processes and you plan to use your own product codes that include letters, then you'll need to look at a CODE128 barcode format.



Let's be honest here... the main driving force behind barcode use in horticulture is the rise of the large retailers and of 'home and garden centres.' These large operators benefit greatly from barcodes in terms of labour savings and greater accuracy of sales and inventory management. If you are looking to sell into the large retailers, then you will certainly need to address barcoding as a matter of priority. You should also note that many large retailers have different buying divisions (sometimes by product range, sometimes by State), each with their own needs and rules when it comes to barcodes and labels. Because of this, you need to double-check your barcoding requirements whenever dealing with someone new, even if they do work for the same large retailer. Some things to ask your buyers:

What barcode format do they need? Most of the larger retailers will insist on the EAN13 barcode format. However, don't take this for granted as some branches of larger retail chains use different formats.

What barcode numbers do they need? Try to get your retailer customers to give you the barcode numbers they want on each product. This will ensure that the barcode numbers you use will be in their point of sales (POS) systems well before your products reach them, and will save you the cost and trouble of purchasing and managing your own set of GS1 barcode numbers.

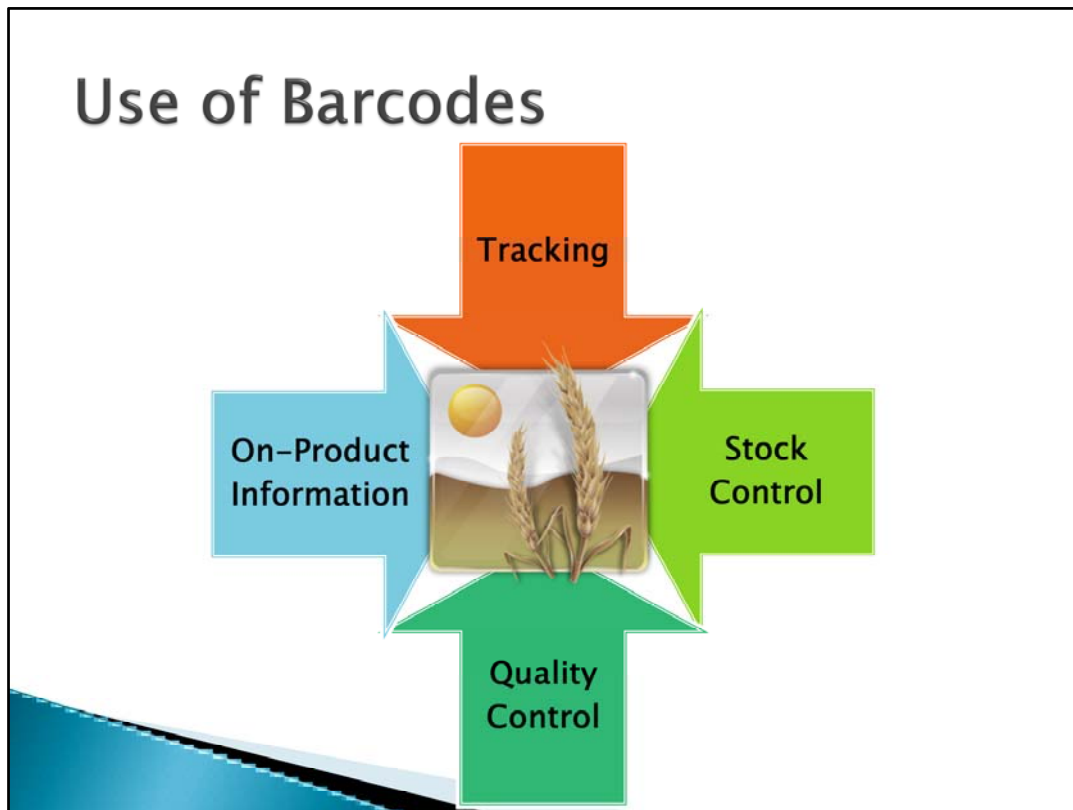
Do they have special barcode labelling requirements? Increasingly, retailers want specific information in addition to the barcode on their labels. This information includes price, product descriptions, product codes and even disclaimers or plant photos. On large retailer uses different coloured backgrounds on their barcode labels each week for aged stock tracking. If possible, get some samples of the labels they feel are best. Smaller retail nurseries may get some benefit from barcoding (even MYOB can be hooked up for use with a low-cost barcode scanner) but the cost and effort required versus the savings need to be carefully considered. Do the maths carefully. If you are looking to use barcodes yourself, then you have a completely different set of questions:

What information do you need to put into the barcode? Usually this will be a product code, but there is no reason why the barcode could not simply encode a price. The type of information you need to encode will greatly impact the barcode format you will use. If you product codes contain letters, then you will need to use an EAN128 or CODE128 barcode format.

What sort of barcode scanner will you use? The good news here is that you can get a functional handheld barcode scanner for less than \$50 on eBay. These are simple to connect to your computer (via a USB cable) and work quite well in most situations. However, you will need to make sure that the scanner you have purchased will read the format of barcode you have chosen. Almost all modern barcode scanners can read EAN, CODE128 and CODE39 formats.

What Point of Sales (POS) software are you using? Not all POS solutions can accept input from barcode scanners. Make sure yours does!

Where will the labelled products be placed? If you plan on barcoding plants that will be in wet, abrasive or sunny environments (and most will be), you must avoid printing on labels that are made of paper or many forms of vinyl and plastic. As these products break down in harsh environments, and can wrinkle and shrink the label, which changes the proportions of barcode stripes and results in poor-quality reads.



Barcodes can play a great many roles in horticulture. Typically we associate barcodes with their use at point of sale (POS), where they improve the speed and accuracy of the checkout process. However, they may also be used in other innovative ways. Even within the POS arena, barcodes may be used in different ways.

Broadly speaking, the benefits of barcodes fall into four main categories:

Tracking: where individually numbered barcodes can be placed on individual stock to track their entire life.

Stock Control: where stock can be automatically re-ordered electronically by the use of barcodes.

Storing information on-product: where important details are encoded into the barcode to make storing and retrieving relevant information quick and easy, without the need to access databases.

Quality Control: where barcodes are applied to verify that the correct products / chemicals are being used.

In the horticultural industry, the above benefits of barcodes are often blended to create innovative applications. Four examples of how barcodes are commonly used are listed below, along with tips on how to get started with each type of application. These tips assume you have a basic understanding of barcodes, as detailed in the two previous articles.

Research

- ▶ Tracking
 - Origin of product
 - Health, growth rates
 - Pest control
- ▶ On Product Information
 - Plant-level information in field
 - Improved quality of trials
 - Lessens need for real-time database, wireless access



Case studies

Diversity Arrays Technology – a tool for harnessing crop genetic diversity.

Research

Barcodes can play an important role in research and development and plant breeding programs. In such programs, it is vital to be able to *track* the origin of the plants involved. In the past, this was accomplished by labelling each and every plant with a batch number or serial number. However, as barcode readers and handheld devices have fallen in price, the use of barcodes in research has increased. In these environments, barcodes encode not only the basic batch number and /or serial number details of a plant, but also *store important information*, such as date of seeding, variables used in the experimental process (eg. watering requirements) and so forth. This means that a single scan of a plant's barcode label can provide a researcher with a complete snapshot of information relevant to the plant and research project *without the need to develop complex database software*. All of the important information can be encoded directly into the barcode and displayed by the barcode reader in the field.

This approach has many benefits, not the least of which is reduced cost and complexity of the information technology required to manage and track the results of research projects.

Tips to getting started: To take advantage of such an approach, you would need to adopt a barcode format that could store large amounts of information. The most likely candidate for would be the Code128 format, since this can store any 'ASCII' character (the standard characters on your keyboard) and supports variable amounts of data. For each research project undertaken, you would also need to determine what important information needs to be placed into the barcode. This can vary wildly from project to project. For example, for orchid growers, it may include the parent hybrids names, while genetic research projects it may include specific batch details. Once the information requirements have been set, you will need to create a spreadsheet (or database) with the pertinent information in each row. You can then use a specialty barcode labelling software package (see previous article) to print barcode labels for the project. It is important to note that you will need to select a long-life 'environmental' label that can last in the conditions and length of time of your project. If the label does not last, it's not just an inconvenience... it can actually impact the validity and reliability of the entire research project! Finally, you will also need to provide your staff with a hand-held scanning device with built-in computing capability and screen, such as the those from Symbol Technologies (<http://www.symbol.com.au>), Intermec (<http://www.intermec.com>) or alternatively, use a scanner than can wirelessly connect to a mobile phone or PDA like the POV from Microvision (<http://www.microvision.com>).

Case studies

Diversity Arrays Technology – a tool for harnessing crop genetic diversity. Barcode-facilitated sample tracking, data storage and data management, all built using open source software.

Stock Control & Production

- ▶ Speed up & improve stocktaking
- ▶ Better information on state of plants
- ▶ Wastage from propagation failure, weather, water or other factors can be more readily identified
- ▶ Ageing and planning future propagation requirements
- ▶ Staff workload control & planning
- ▶ Improved staff payment processes



Case Studies:

Adelaide
Mushrooms

ITC supporting
horticultural
business at Sadpol

Stock Control

Barcodes are fantastic for *stock control*, enabling a business to track pallets or even individual plants throughout their life within the nursery. Barcodes can dramatically speed up and improve the accuracy of stock-taking activities. The biggest benefit here is the quality of information a grower obtains about the state of plants in the nursery. Wastage through propagation failure, weather, watering or other factors can be quickly gauged, allowing for quick remedial action. It also allows you to more accurately track the age of stock and plan future planting requirements. *Tips for getting started:* Determine to what level you will label your plant stock. For example, retailers may decide to label every stock item, while large wholesalers may only label pallets of plants. Obviously less labelling means less work and expense, but it also runs the risk of less accuracy in the stock takes. In addition, decide which information will be placed into the barcode. This is not simply a matter of using generic product codes (which only works well if you have fast-moving goods). You need to consider how you will date and age the stock. This can be accomplished by creating 'batch numbers' for products or by placing the initial planting date into the barcode itself. In most situations, you will need to use a Code128 or EAN128 barcode format for this type of activity, since these formats can support all ASCII characters and variable data. You will also need to consider how you will link your nursery management software to your labelling software. Often this is simply a matter of knowing how your nursery management stores its data: common forms are dBase and Microsoft Access. You will need to talk the supplier of your nursery management software to get this information. You will also need to ensure that the stock labels you use will last in your nursery conditions. The good news is, failure of a label for stock control is not as big an issue as it would be in a research environment... it just makes the stock control process slower and less accurate. You will also need handheld barcode scanners that are either computerized (like those used for research) or that can store scanned data and 'dump' it back into your nursery management software.

Case Studies:

Adelaide Mushrooms. Produced 125,000 tons of fungi each week. Solution required setting up specific employee and location identifiers, use of barcoded labels and scanning systems. At the commencement of each shift team members log in to the system and produce labels to attach to the produce that they pick. As cartons are completed they are labelled, then they are weighed and scanned. The scanning records the weight of the carton against the employee, tracking quantity of cartons and overall productivity. Employees are then remunerated based upon the data collected via the system.

Point of Sale



- ▶ In Horticulture, POS automation is NOT about getting people out the door quickly...
- ▶ Use POS intelligence to differentiate nursery retail store from big retailers...
 - Recommend additional sales
 - Security and fraud control (barcodes with pictorials)
 - Reduce / streamline staff training requirements

Most people are familiar with the use of barcodes at the “point of sale.” The assumption is that the main reason for using barcodes at your point of sale system is to speed up getting people through the checkout. In supermarkets this may be the case, but it is not the case in nurseries. Instead of trying to push people out the door as quickly as possible, highly profitable retail nurseries use the customer contact at the checkout to recommend additional sales, with staff making suggestions for additional products and purchases.

This means that the use of barcodes in nursery retail should be more about accuracy and stopping fraud, than speed. For example, barcoded stock can be scanned and a plant description, price and even photograph displayed to the checkout staff to ensure that the correct amount is charged for each plant.

Since it is not uncommon for unscrupulous shoppers to switch plant labels (it happens more than you would think), the ability to have the barcode scan bring up plant descriptions assists staff in spotting such fraud... if the plant in question does not match the description from the POS, then it's clear something fishy is going on.

To make it less likely that shoppers will try to swap barcode labels, some retailers have begun combining barcode, pricing, plant care and *pictorial* information on a self-adhesive label that is then placed on the plant pot. Such an approach dramatically reduces the temptation (and ease) for unscrupulous shoppers to switch pricing labels.

Tips for getting started: The first thing that you need to consider is if your point of sale system can accept entry from barcode scanners. Most can... even the popular MYOB package can do it! Next, you will need to set up product codes for all of your stock.

Since point of sale barcode scans only need one bit of information – the product code – you have a lot of flexibility in selecting what barcode format you will use. If your product codes follow “universal product coding” standards, you will have either 8 or 13 number codes for each product. In this case, you would probably use an EAN8 or EAN13 barcode format respectively. If you are using product codes with letters and numbers, then you will need to use either the Code128 or EAN128 barcode formats.

Next, you will need to consider the types of barcode labels you will be using. When most nurseries think of point of sale barcode labels, they only think of small self-adhesive labels. However, you can expand your options! Barcodes can be printed on almost any type of label: a pictorial hangtag, large-format pictorial self-adhesives, push-in pot tags and even self-tying loop tags. The most cost-effective thing to do here is to combine the barcode with other labelling requirements wherever possible.

Supply Chain Management (SCM)

- ▶ Mainly for wholesale to big retailers: Bunnings, Aldi, Big W, etc.
- ▶ For these stores, the barcode IS the product.
 - Not just interested in 'best plant'
 - Interested in how stock can be managed in store
 - How fast stock can be moved
- ▶ Barcoding in these situations is considered a 'cost' of sales. Can this cost be integrated with others – eg. pots, general labelling & marketing?

Probably the biggest driver of barcode use in the nursery industry is the growing power of the super-stores. Bunnings, Aldi, Big W and the home supply supercenters are all demanding that stock supplied to them be barcoded in order to simplify their *supply chain management*. These large retailers use barcodes for more than point of sale – they use them to track the location and age of stock, sales success of specific product lines and wastage. For these folks, a product's barcode *is* the product!

The good news is that most of these big players have similar demands for barcodes – all must comply with GS1 (www.gs1.com.au) product numbering standards and the barcode formats must be either EAN8 or EAN13.

The bad news is, these suppliers each have their own special quirks for what other information they wish on a barcode label. For example, one large retailer requires that barcode labels are colour coded, based on the week a product is provided to them. This colour coding is used by staff to quickly recognise aging products. Another requires labels that cannot be easily removed from the plant.

When supplying stock to any of these retailers, keep in mind that they are not just interested in what is the most beautiful or hardy plant... they are just as, if not more interested in how that plant can be managed within their stores.

Tips for getting started: When providing stock to large retailers, it is important to fully understand their barcode labelling requirements. Make sure you ask them to confirm the barcode format (usually EAN8 or EAN13) and check if there are any special requirements, such as colour, size or even adding their logo to the label. In addition, you will need to check what additional information is needed on the label. For example, some retailers insist that a price be printed on each barcode label, while others insist that no price be printed. Some retailers wish product or store codes to be printed on the labels. Because large retailers are so particular about barcode labels, it will be best to appoint someone from your nursery to deal directly with each retailer and take responsibility for ensuring that all labelling for that retailer meets their needs. It should be noted that these large retailers are actually very open to suggestions on how to improve their labelling and product sales (while reducing costs.) For example, one large production nursery in NSW suggested combining pictorial and barcode information on large-format adhesive pot labels for one of the large retailers and as a result secured a significant on-going supply contract. The secret to success is to open a dialog with the retailers and work to meet their supply chain management objectives. Because large retailers cannot afford to have labels that do not scan well, it is also a very good idea to purchase a cheap barcode scanner to quickly check any barcode labels you produce, or have printed, before you place them on the stock. A great place to buy a low-end barcode scanner is eBay (www.ebay.com.) A scanner that you can easily connect to your PC and use for checking labels should cost you less than \$50 (including postage). Given that a bad barcode label can result in returned stock and, worse, being black-banned as a supplier, this will be \$50 well spent!

Useful Contacts

- ▶ Fresh Produce Industry Workgroup
 - Rachel Kairuz. rkairuz@gs1au.org ph 1 300 366 033
 - http://www.gs1au.org/industry/fresh_produce.asp
- ▶ Australian Barcodes
 - Ph 1 300 667 226
 - <http://australianbarcodes.com.au>
- ▶ Barcode Express (GS1 Australia)
 - Ph 1 300 366 033
 - <http://www.gs1express.com.au/barcodes>
- ▶ Joseph Sweeney (me!)
 - jsweeney@ibrs.com.au ph 0408885810

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There are many other uses for barcodes in the horticultural industry, and every week we see some nursery or retailer using barcodes in innovative ways. The secret is to think of barcodes as a flexible tool that can help store information, improve efficiency and quality control, track stock and help you secure new business.

- Long term growth
- long-sales cycle purchase
- facilities management