

## **Managing Production Risks in the Nursery<sup>©</sup>**

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**Plant production in nurseries is subject to different risks including finances, marketing, weather, and human resources. There are a number of tools for nursery business owners to manage the different risks. Issues related to the labor pool, human resource management, and turnover of labor and staff affects labor intensive businesses like nurseries. Considering mechanization or automation can assist in managing some labor issues. Production costs of individual items in the nursery affect pricing and decisions of which products are profitable and should remain in a nursery's product mix. A spreadsheet tool is available to calculate costs of individual products or groups of similar products in the complex production scheme of a business carrying hundreds of different products. Nursery operations can choose among different insurance products to cover production risks related to weather and marketing. A brief introduction to nursery insurance, adjusted gross revenue (AGR), and AGR-Lite outlines similarities and differences between the products.**

### **INTRODUCTION**

Nurseries, like all businesses, are subject to different areas of risk including financial, marketing, human resource, legal, and production risk. The different risks are not isolated but are interrelated. Production risk refers not only to the units of plants produced, but is interconnected to all the other areas of risk. How can nurseries and specifically propagation units, manage risks most efficiently?

### **RISK IDENTIFICATION**

The first step in managing risks is to identify the ones most relevant to an operation. In a strong economy, access to a labor pool and to skilled labor can be a challenge. Expansion of production at a rapid pace brings with it possible problems in product quality, inadequate infrastructure, or expansion at a rate greater than the needed capacity. In a weak economy, marketing, declining plant quality, and access to credit can be problems. Regardless of the economic conditions, natural disasters have impacted states in the western United States on a regular basis. Flooding, hail, fire, and drought can severely impact plants and infrastructure in a nursery.

### **TOOLS FOR RISK MANAGEMENT**

#### **Human Resources**

The nursery industry is labor intensive and workers are a valuable asset. Labor costs account for 40% or more of production costs in nurseries (Mathers et al., 2010). Workers in a nursery are often cross-trained for a number of different tasks. In propagation, skill and practice are involved in achieving the desired results. Attention to detail is important and it often takes experience to become proficient in special skills like grafting. A trained worker who understands plants, the environment, and the whole production system of a nursery is very valuable and can be difficult to replace.

Replacing a worker is expensive. There are costs for lost productivity until the position can be refilled, co-workers taking on part of the responsibilities of the vacant position, costs for advertising and recruitment, and costs for training a new employee. Managers of nurseries should examine the rate of employee turnover to determine if they can better manage human

resources to avoid these costs. A study by the University of California found that it takes on average 2 months for non-professionals to achieve full productivity (Dube et al., 2010). The average replacement cost in 2003 dollars for manual labor workers was \$2,000, ranging between \$1,000 and \$3,000. Cost for professional and managerial worker replacement was \$7,000. An example calculation of the tangible costs for the termination and replacement cost of an employee with an hourly wage of \$9.50 yielded a turnover cost of \$2,288 (Pinkovitz et al., 2012). This website contains an online employee turnover calculator to calculate the cost of turnover and to decide how much should be invested in retaining an employee.

The workforce in the nursery industry is diverse. A recent survey of nursery workers in nine states found that, on average, 70% of the workforce is Hispanic (Mathers et al., 2010). Survey responses indicated that less than a quarter of the workers understood English and almost two-thirds were not trained in their work although they expressed interest in training. Of the laborers, about half left after 5 years and only 5% stayed with the same company after 10 years. Workers who improved their English fluency were more likely to change jobs, leading to even greater turnover of valuable trained employees.

Training can improve worker retention. A previous survey found that Hispanic employee training in nurseries improved relationships between workers and managers, and led to greater company loyalty (Mathers, 2003). In the nine-state survey, workers identified lack of benefits, low salary, and job accidents as the leading work related issues (Mathers et al., 2010). This was followed by bad relations with the supervisor or co-workers. There are many tools for nursery managers to assist in human resource management. A complete resource for this topic is the publication “Ag Help Wanted, Guidelines for Managing Agricultural Labor” (Rosenberg et al., 2002). Tools and tips for dealing with staffing, supervising, managing employee performance, and improving communication and problem solving are covered.

### **Mechanization**

One way to possibly reduce the risks associated with training and managing a large labor force is to analyze which tasks can be mechanized or automated. Mechanization replaces humans with machines to complete a task. Automation makes use of several mechanized systems to replace human labor to increase efficiency on a larger scale.

Several studies in the southeastern United States investigated how to enhance labor performance in the green industry (<http://coastal.msstate.edu/nurseryautomation.html>). Researchers at Mississippi State University first examined current production practices and systems in field and container nurseries and greenhouses. Surveys of the northern Gulf of Mexico states in 2004-2005 queried wholesale operations for their level of mechanization. Results showed that more mechanization was implemented in greenhouse only operations compared to nurseries, in larger acreage versus smaller acreage nurseries, in operations with annual gross sales more than \$250,000 compared to those with lower gross sales, and in nurseries using computers to schedule production (Posadas et al., 2009).

Surveys in seven southern states were conducted between 2003 and 2008. Operators of nurseries and combined nursery and greenhouse businesses were asked about the type of automation and mechanization they used for different tasks routinely performed by workers (Coker et al., 2009). Growers from 137 operations were interviewed. Containers were filled manually in 47% of the operations and plants were placed manually in containers in 69% of the businesses. Sixty-one percent of companies moved containers from the potting area to transport vehicles by hand. Some used conveyors, a rail system, mobile pot-filling stations, and trailers to mechanize this task. Of the firms surveyed, 36% transported containers to the field manually, 75% placed containers in the field manually, and 80% spaced containers manually.

Cultural practices such as plant pruning and pesticide application relied on 40% manual labor. Fertilizer was applied manually in 69% of the operations. Irrigation was applied manually in 22% of the operations surveyed and a combination of timers and controllers and valves for drip, overhead, and sprinklers were used as well. These results show ample opportunity to implement available automation and mechanization technology to improve processes in the nursery (Coker et al., 2009).

Significant time savings and reduction of repetitive motions for workers can be realized by mechanizing tasks such as fertilizer application to individual pots by using a mechanized dispenser, electric pruners, or equipment to reduce handling of individual pots. Combinations of automated potting machines, continuous medium mixing, and watering tunnels can optimize potting operation. Computerized nursery wide irrigation systems with feedback from existing moisture conditions or demand can apply irrigation more precisely. Robots to space, collect, and re-space various size pots have been developed. They can move 200-300 containers per hour 24-h a day, but they can also work in teams with human workers. The manufacturer estimates that the cost of one robot can be recouped within 1 to 2 years. Each business needs to evaluate which tasks can be most easily automated as well as the payback period for mechanization.

### **Nursery Production Costs**

Production costs have a great effect on profitability of a nursery business. Recording all expenses in appropriate categories shows where money is spent in production. Cost analysis can compare expenses over time periods but also for individual products. This supports decision making on pricing and which products to keep producing to maintain profitability. Other factors influence the composition of product mix as well and include trends in plant materials, product demand, and competition.

Production costs consist of direct and indirect costs. Direct costs include expenses for seed, cuttings, rooted liners, containers, growing substrate, fertilizer, chemicals, and labor if it can be directly accounted for a specific type of plant. Expenses for irrigation, weed control, and other maintenance are often difficult to determine for individual products and are added to the general overhead costs. Allocating actual overhead costs for outdoor growing areas, greenhouse or hoop-house space represents more accurately the true costs of maintaining expensive structures such as a climate-controlled greenhouse. Cost estimates increase in precision as more direct expenses can be allocated to a product.

Overhead cost per square foot and weeks for a product is the amount of money each plant needs to be charged to occupy production space for a certain amount of time. This is calculated as the sum of annual unallocated costs in the nursery divided by the square footage of production space and then divided by 52, the number of weeks per year.

A spreadsheet has been developed by faculty from the University of Arizona and the University of Hawaii to calculate the total cost of individual products based on the space and time they grow in the nursery. The spreadsheet requires input in the categories capital and investment, materials, machinery and equipment, and overhead. Production costs for individual species or group products, such as all #1, #5, and #15 containers growing the same length of time at the same spacing until marketing can be calculated. For example, rooted liners of a shrub will be transplanted into #1 containers (6-in. diameter) and will be grown can tight for 20 weeks. Total production costs are the overhead rate of 0.25 square ft times 20 weeks plus the direct cost. Plants will then be shifted to #5 containers and will be grown at a spacing of 2 ft on center for 40 weeks. At that stage production expenses will be 4 ft<sup>2</sup> times 40 weeks for overhead plus direct costs. The finished expenses for this plant will be the sum of the two production stages.

The spreadsheet can calculate whether a plant will make a profit or result in a net loss by using production costs and projected high or low sales prices. Using the spreadsheet tool, growers can estimate how much it costs for a plant to take 3 months longer than planned to marketing. This can help determine how long marketable plants can be held in the nursery without loss until they should be discarded. The spreadsheet can also assist in evaluating alternative products such as chemicals by using the price of the new chemical and comparing it to the currently used chemical. Different products may shorten production time or decrease the percentage of loss during production which can also be assessed with the spreadsheet. Calculations can determine which container size yields the highest profit for a species or cultivar and for how long the plant will remain profitable at that size.

A projected profit comparison of growing plants in the nursery versus buying stock of different sizes from other nurseries is also included. For propagators there is a sheet for

calculating production costs of cuttings from in-house stock plants which then can be compared to buying them in. All calculations are useful for estimating costs and profits of individual products or groups of similar products. The spreadsheet is not replacing accounting software, but intended to support decisions on pricing, product mix, and increasing efficiency in production.

### Nursery Insurance

Nursery insurance is one of several tools to manage risks in production nurseries where perishable goods are exposed to weather, marketing, and production risks. For growers in California and other western states two types of federal insurance products underwritten by the Risk Management Agency (RMA) are available covering nursery and floriculture products (<http://www.rma.usda.gov>). Both cover growing products, but one uses a whole operation revenue based approach (adjusted gross revenue or AGR and AGR-Lite) and the other uses an inventory value approach (nursery crop insurance). Table 1 lists some features of the two insurance products. The products can work together or independently. Adjusted gross revenue and AGR-Lite are available to growers in western states except California which only has AGR in selected counties. Crop insurance agents can be found on the RMA website to assist with specific estimates for an operation (<http://www3.rma.usda.gov/apps/agents/>).

A first step can be to evaluate whether the insured causes of loss are a threat in your area. Are adverse weather conditions such as freeze, wind, hurricane, fire, wildlife or failure of irrigation supply due to drought a risk for your operation? The insurance does not give operators carte blanche to neglect best practices for growing and adequately protecting plants from such hazards, but requires that good practices are followed. If your nursery is potentially affected by any of the insurable losses, the next step is to evaluate whether only container plants, field grown plants, or both should be insured. The next step is to consult the eligible plant list and the plant price schedule at: <http://www.rma.usda.gov/tools/eplpps>. Creating a crop inventory valuation report is the most time-consuming task which is required to calculate the plant inventory value. It requires that each plant species and cultivar be listed by botanical and common name, container size and number of plants in the inventory at the time when insurance is purchased. A wholesale catalog of the nursery is required to accompany the crop inventory valuation report.

Table 1. Characteristics of the two types of federal crop insurance available to nursery and floriculture business operators.

	Insurance product	
	Nursery crop insurance	Adjusted gross revenue (AGR) and AGR-Lite
Operations eligible	More than 50% of the operation's income is from wholesale nursery revenue	No more than 35% of expected allowable income is from animals or animal products
Plant types eligible	Nursery plants in container or field production (some exceptions)	Nursery and greenhouse products incl. cut flowers and Christmas trees
Insurance criteria	Crop inventory valuation list	5-year historical farm average revenue reported in 1040 Schedule F tax form
Time	June 1 - May 31 the following year	January 1 - December 31
Insurable causes of loss	Adverse weather, fire, wildlife, earthquakes	Yield loss (due to natural causes), price drop (due to market fluctuations)
Maximum coverage claim	-	\$6.5 million (AGR)
Average annual adjusted gross revenue	-	Less than \$2 million (AGR-Lite)

Coverage levels between 50-75% of the plant inventory value can be purchased with premium subsidies. The most basic coverage is the catastrophic coverage level which is available for a flat administrative fee of \$300, the premium fully subsidized, and covers 27.5% of the plant inventory value. At a coverage level of 50% of the plant inventory value the premium is subsidized by two-thirds and one-third is paid by the nursery. Under the highest coverage level of 75% the premium subsidy is 55% and the nursery pays 45% of the premium.

Adjusted gross revenue and AGR-Lite are whole-farm revenue-protection plans of insurance and provides insurance coverage for multiple agricultural commodities in one product. They are available for nearly all agricultural crops grown in the western United States. For example, an operation that produces nursery plants in containers, cut flowers, and citrus fruit in an orchard can use AGR or AGR-Lite insurance to cover all three commodities. The plan provides protection against low revenue due to unavoidable natural disasters and market fluctuations that affect income during the insurance year. Adjusted gross revenue and AGR-Lite insurance eligibility requires that farms have five consecutive years of 1040 Schedule F tax records or comparable information and that no more than 35% of the expected allowable income is from animals and animal products. The period of a 1-year insurance coverage is for the tax year starting from January 1 and insurance can be purchased until January 31. Crop insurance agents for AGR can be located at: <<http://www3.rma.usda.gov/tools/agents/companies/>>.

Coverage levels between 65% to less than 80% of revenue are available and payment rates and subsidies vary by the number of commodities covered. A premium calculator is available at: <<http://www.rma.usda.gov/tools/premcalc.html>>.

While there is some overlap between the two main nursery insurance products discussed, AGR and AGR-Lite cover cut flowers, Christmas trees, and lost revenue from market fluctuations. Both products cover a portion of loss due to adverse weather and other natural disasters. Businesses that produce a number of different crops and have some income from animals or animal products may find the AGR products more flexible because they cover a range of commodities compared to nursery insurance.

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