De Klerk, G.-J., W. Van Der Krieken, and **J.C. De Jong.** 1999. The formation of adventitious roots: New concepts, new possibilities. In Vitro Cell. Dev. Biol. – Plant 35:189-199.

Dua, R.S., S.K. Mitra, S.K. Sen, and **T.K. Bose.** 1983. Changes in endogenous growth substances, cofactors and metabolites in rooting of mango cuttings. Acta Hort. 134:147-161.

Haissig, B.E. 1982. Carbohydrate and amino acid concentrations during adventitious root primordium development in *Pinus banksiana* Lamb. cuttings. For. Sci. 289:813-821.

Haissig, B.E. 1986. Metabolic processes in adventitious rooting of cuttings. pp.150-152. In: M.B. Jackson (ed). Martinus Nijhoff Pub., New root formation in plants and cuttings. Dordrecht/Boston/Lancaster.

Hartman, H.T, D.E. Kester, and **F.T. Davies, Jr.** 1990. Plant propagation: Principles and practices. pp199-304. Prentice Hall. Englewood Cliffs, New Jersey.

Kevers, C., J.F. Hausman, O. Faivre-Rampant, D. Evers, and **T. Gaspar.** 1997. Hormonal control of adventitious rooting: Progress and questions. J. Appl. Bot. 71:71-79.

Nanda, K.K., M.K. Jain, and **N.C. Bhattacharya.** 1973. Rooting response of etiolated stem segments of *Populus nigra* to antimetabolites in relation to auxin and nutrition. Biol. Plant. 15:412-418.

Making the Numbers for Production

Kerrie Aoki
Euro American Propagators, P.O. Box 289, Bonsall, CA 92003-0289

The first step is to set the sales goal. After setting the sales goal for each variety, we calculate: the total number of trays needed, the total number of pots to produce cuttings for the trays, and the curve of production relative to minimum/maximum ship weeks to meet availability for our sales goal.

ESTABLISHED PLANT

Our sales goal for each established plant is based on the previous year's sales, plus or minus, depending on the plant's past sales performance. The following percentages are applied to actual sales figures to determine our sales goal.

■ Sales greatly exceed previous Sales Goal	50% +
■ Sales exceed previous Sales Goal	50%
■ Sales meet or minimally exceed previous Sales Goal	30 to 35%
■ Sales minimally meet previous Sales Goal	10 to 20 %
■ Sales below previous Sales Goal	0-10%
■ Sales repeatedly decrease	Discontinue plant

Additional factors for consideration would be the overall increase in sales for your organization. This accounts for our decision to increase production over last year's actual sales on a plant that had sales below our sales goal. The plant could actually be increasing in total sales, but just not meeting our projection. Therefore, our sales goal actually declines, but production increases against previous years' sales.

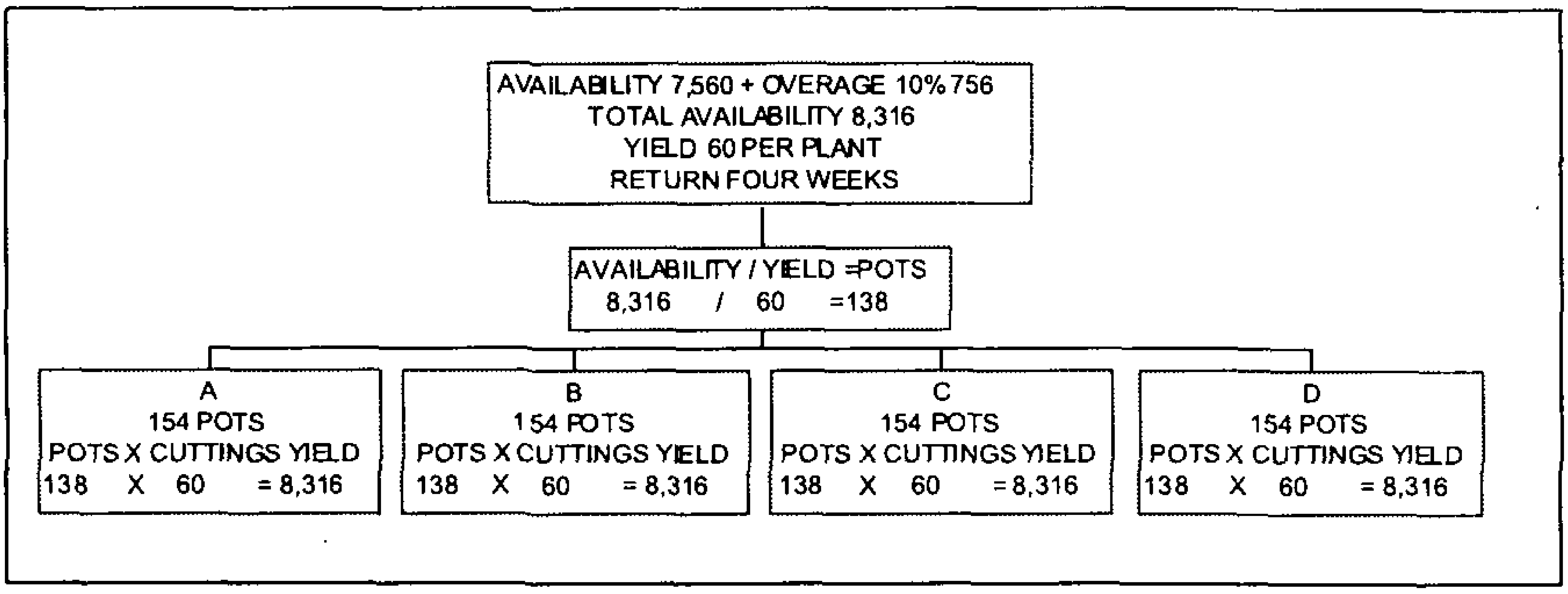

Figure 1. Calculations for an 84-cell tray with one cutting per cell.

NEW INTRODUCTIONS

Where no sales data is available, we rely heavily on the order processing and marketing teams, who consider the reactions to promotions, trade shows and pack trials. We also review early sales and if time allows, increase our availability where sales indicate a demand greater than our original sales goal.

Example (see Fig. 1). If our 1998-99 season availability for a given plant was 60 trays per weekand we sold 70 trays in the peak weeks of the season. We would consider an increase of 30% to our availability for the 1999-2000 season. The number of trays available per week would increase to approximately 90 trays, plus 10%, which covers any loss of cuttings (usually 3% to 5%). The final target availability for cuttings would be 100 trays.

RESEARCH CRITERIA

When we know the total availability needed, we are ready to determine the number of stock plants required to meet the demand. The two factors used are the "yield per pot" and the "return time". The yield per pot is the number of cuttings a plant can produce in a given period of time (return time).

During the research phase, we monitor plant health and count the cuttings per pot, harvesting at 2-, 4-, and 6-week intervals over several months to find the plant's return time and average yield per pot. Divide the total availability by yield per pot and plant one group of pots for each week of return.

PLANT DATES/YIELD

To determine the optimum plant date, we review the data we recorded at the time of each harvest during the research period. After a number of pinches, each plant's yield will reach a maximum yield and will produce this number of cuttings consistently through the season. This reflects the plant's "maturity." By counting the weeks from plant date, we see the weeks to maturity. Our greatest success is when we have plants reach maturity during peak sales. To determine the optimum date to plant potted stock, identify the week or weeks when sales are the greatest and subtract the number of weeks to maturity.

A plant's yield will generally decline after a period of time. This usually occurs approximately 8 months from the plant date. Because peak sales are over an extended time, we plant most varieties in three groups, first planting - 40%, second planting - 30%, and third planting - 30%. The three groups are staggered, but are targeted for availability during peak sales weeks. The first group provides most of the cuttings for early sales and through peak weeks and then is discarded when sales begin to decline. The second group to reach maturity at the peak shipping weeks and the third group maturing later and providing the cuttings for peak through final weeks of the season. Peak weeks are determined by the variety and sales history.

DO RIGHT BY THE PLANTS

As with a many other things, timing is everything. Finding the return time that will allow the plants to remain healthy is critical. Early return or heavy harvest puts extra stress on the plants, weakens cuttings, and lowers strike rates. Healthy plants produce healthy cuttings, reduce insect and disease problems, increase strike rates, and reduce labor requirements. By accurately determining a plant's ability to produce you can maximize production per square foot and meet the demands of an increasing market.

Germination and Growth of Acer Species

Mark E. Krautmann
Heritage Seedlings, Inc., 4199 75th Ave., SE, Salem, Oregon 97301-9242

BACKGROUND

Heritage Seedlings seed propagates more than 30 *Acer* species from Asia and North America. We focus on the more unusual, difficult-to-germinate species, but we also grow more easily germinated species, such as *A. palmatum*. This paper describes some of our experiences with maple seed, especially the effect of drying seed after collection. Selected maples are grouped by germination pre-treatments. Specific techniques to enhance germination results with difficult species are described.

SEED COLLECTION

Importance of Collecting Sound, Fresh Seed. Successful seed propagation depends first on acquiring fertile seed. Fertile maple seeds develop only after successful flower pollination and our experience is that highest seed quality is achieved when a genetically diverse, mixed population of stock plants is used in a seed orchard. For example, solitary landscape or arboretum specimens of *A. griseum* may produce a heavy crop of fruit, but it is normally of such low fertility (4% to 5%) that it is costly to collect or impractical to use for propagation. In our seedling block of 50, 15-year-old *A. griseum* trees, we harvest 95% fertile seeds annually.

Even when a relatively large population of stock plants is established, as in nursery culture, if the block is of one genotype, such as *A. palmatum* 'Bloodgood', regular fertile seed crops are unpredictable. On the other hand, it is possible to get over 90% fertile seeds, and annual, abundant amounts of seed if you set out a well cared for stock block of drip-irrigated, seedling-grown maple trees. If clonally propagated maple trees are used in a seed orchard, we find that mixing superior seedlings into the mother block (at least 20% of the total) can give dramatic improvements in the yield of fertile seed.