PRODUCTION LABOR SAVING DEVICES AND METHODS

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The production of ornamental plants is highly labor intensive. Up to 50 percent of the cost of production of some plants can be classified as labor. Good employees are hard to find, expecially those with training to do the great variety of jobs found in a greenhouse or nursery operation.

Mechanization in the greenhouse and nursery industry has been slow to develop because of the lack of standard growing methods, the variability of the physical arrangement of the growing facilities and the large variety of crops grown. Recently several companies have started production of a wide range of equipment. Many growers can increase the efficiency of their operations by applying some of this equipment and the basic principles that apply to many other industries. This paper will review some of these principles and indicate how to best use the equipment.

Locate Materials Where They Are Easily Accessible

Storage is a necessary part of a plant growing business. In most operations a considerable amount of time and labor is spent moving materials and supplies from one location to another. Several basic guidelines should be followed when developing your layout.

1. Try to keep the distance materials are moved as short as possible.

2. Keep delivery and shipping traffic out of the work area.

3. Store materials in units that are convenient to move--pallets, bins, boxes, bundles, and bags.

4. Materials stored outside should be in an area with good drainage and equipment access.

5. Store labels, seeds, hardware, etc. in bins or racks for inventory control.

6. Move materials as close to the next operation as possible.

Keep Materials Clearly Marked or Labeled

With the hundreds of varieties of plants and many types of supplies used, this is an important time consideration. For plants, use printed labels in pots or flats. Plants located in beds or blocks in the field can be marked with water repellant signs.

Tags and seeds should be located in one area and clearly labeled. Racks or bins work well for this.

Continuous Material Movement is Most Economical

Efficiency in handling materials is greatest where they travel in a straight line with minimum interruptions and minimum backtracking. This concept works well in the potting and transplanting areas. Use belt or chain conveyors to connect pot/flat fillers, dibble machine, potting operation. Roller conveyors or carousels can be used as accumulating sections.

Timing of the equipment to the rate of the people doing the planting is important. Variable speed motors can be used to vary the speed of the conveyors. This type of operation can be used to pace the workers and increase output.

Specialization Increases the Effectiveness of Mechanization

Greater efficiency can be obtained where only one crop is grown, for instance 4 inch chrysanthemums or 1 gallon rhododendrons. Equipment set up to handle one size container year around eliminates the time and problems related with adjusting machines for different container sizes and rates. It is also less expensive to install.

Specialization can also be effective in your labor force. Training of individuals to do specific jobs or operate particular pieces of equipment will increase their output.

Eliminate or Combine Tasks

When reviewing existing growing operations, look first for tasks or jobs that can be eliminated. Examples of these include frequent spacing of containers, double handling of materials and dudding (the replanting of vacant cells in cell packs). An evaluation of the cost of doing these jobs can determine whether it will pay to change your growing method.

Sometimes tasks can be combined to increase labor efficiency; the use of a screen attachment to a shredder will eliminate an extra handling or adding a steam line to a con-

crete mixer to pasteurize and mix the soil in one operation. Each handling of the materials that you eliminate will save money.

Even Out the Work Load

The work load in both the greenhouse and nursery business usually peaks during the spring. Planting, growing and shipping are all taking place at the same time. Extra help is hired to handle the extra work. At other times of the year, usually during the winter, work is slack and help is either let go or kept busy with clean-up or maintenance chores.

Some growers in the greenhouse business have shifted some of their work load by mixing soil, filling pots or flats and even dry seeding during the winter slack period. Nurserymen growing deciduous trees, dig these in the fall, store them in a controlled environment building and ball and burlap or containerize them during the winter so that they are ready for an early spring shipment.

Standardize Containers, Mixes and Methods

Many sizes of flats and pots are used in the bedding plant industry. Most sizes are made by several manufacturers using slightly different materials and molds. Because of the large selection, the development of equipment for the industry has been slow coming. Several of the trade associations and the Nursery-Greenhouse Mechanization Committee of the American Society of Agricultural Engineers are attempting to develop some standard container sizes in hopes that they will be adopted by the industry. This should also make pricing of plants more uniform.

Growers should try to limit the number of sizes and types of containers they use. This reduces the inventory that has to be carried and saves in time needed to make changes in equipment to accomodate different size containers.

Where possible limit the number of growing mixes used. Bin shapes and construction and conveyor equipment may have to be changed to get materials to move freely. Each mix has its own angle of repose. Bridging of the mix in bins is more common where materials such as peat, sawdust and wood chips are used. Vibrators or agitators may be needed to get the mix to flow.

Use an Assembly Line for Planting

An assembly conveyor, where the materials or plants to be worked on are carried on a conveyor belt, is often used in potting, transplanting and panning operations. Filled con-

tainers are fed onto one end of a slow moving conveyor and workers standing or sitting alongside the belt stock plants in as the container moves by. Variable speed motors should be used to adjust the belt speed for different conditions. Worker production is usually greater than with other methods because 1) workers do not have to work to get materials and 2) the belt keeps a constant rate of materials coming.

Let Gravity Move Your Materials

The application of gravity can be applied to growing plants in many ways. This type equipment is usually less expensive than power equipment. Operating costs are less in that motors are not needed.

Bulk materials can be fed by gravity from bins or hoppers to potting and panning machines. Proper design and construction are needed to keep the materials flowing freely.

Containers of plants can also be moved to and from the growing area using gravity conveyors if proper elevation differences exist. Several greenhouse operations in the U.S. and Europe have been built on hillsides with the potting operation located at the top and the shipping at the bottom of the slope. Gravity conveyors carry the plants from the headhouse to the growing area. When they are sold they are placed on conveyors that carry them to the shipping area located at the lower level. Plants in smaller containers are usually placed in flats or on pallets to make movement easier. This concept has also been applied to smaller outdoor container nurseries.

Purchase Mechanized Equipment to Do the Heavy Tasks

Lifting and carrying heavy objects is tiring and reduces productivity rapidly. Where possible materials heavier than 50 pounds should be moved mechanically. Equipment to do this if it can be used frequently or for a number of jobs will be economic to own.

Examples include: 1) using a fork lift to load and unload bagged fertilizer, lime, peat-lite mixes; 2) using a conveyor to lift plants being shipped from the ground to truck height; 3) using carts or wagons to move containers in the growing area.

Expensive Equipment Should be Kept Busy

Investment in materials handling and labor saving equipment is expensive to purchase and own. Before purchasing a piece of equipment consider whether it has multiple uses either alone or with accessories. This gives it greater value to you and reduces its hourly cost.

Purchase equipment for container filling that can handle several sizes so that it can serve most of your needs. Tractors that pull trailers to move flats to and from the greenhouse should be disconnected while being loaded or unloaded and used to move another trailer.

Update Old Equipment

With new technological advances being made and new methods developed some types of equipment depreciate and become obsolete rapidly. Evaluate present machinery to see if it should be replaced. New equipment can increase output per man hour, increase quality or your product, reduce maintenance costs and the amount of down time.

Purchase Equipment That is Suited to The Job

Many times you have to choose between several pieces of equipment which can perform the same operation. Review the conditions under which it has to operate. These may include distances, ramp slopes, ceiling heights, door openings and type of floor or driveway. In relation to the material to be handled, the size, shape, weight and flow rate will affect your choice. A combination of equipment can sometimes do the job better than a single piece of equipment.

Select Equipment With High Output Performance

Review each piece of equipment being evaluated for purchase on its output, energy costs, resale value, maintenance costs and other factors that relate to its overall performance. Some of this data is available from the manufacturer or from the distributor. Other data can be obtained by consulting someone who owns the equipment. Some factors will have to be evaluated based on the intended use you plan to give it under your own conditions.

Design System to Prevent Bottlenecks

In the development of materials handling systems, especially those using a continuous flow, an effort should be made to see that bottlenecks don't develop. The rate that materials are fed into the system must be matched with the rate that they are used and the rate of removal.

When pieces of automated equipment are part of an assembly line such as a potting or packing operation, the conveyors, bin feeders and pot separators must be timed to keep an even flow. This is usually done with variable speed motors.

Even in a manual system such as hand panning from a pile of soil, the removal of the planted containers should be at the same rate as they are being planted to reduce the time that may be wasted waiting for materials to be received or removed.

A Good Working Environment Increases Efficiency and Safety

Increased productivity can be obtained by providing a work area where materials and supplies are conveniently located. Adequate lighting should be provided. Minimum standards should be met and can be measured with an inexpensive light meter.

Work areas should be clean of debris, waste and hazards. Electrical equipment should be grounded and ground fault interruptors used on portable equipment unless so indicated by the manufacturer. Safety equipment such as eye glasses, ear plugs and gloves should be available to employees.

Covered areas should be provided for operations such as potting, panning and maintenance. Heat should also be provided to maintain a minimum of 60°F in the work area. Unit heaters or infrared heaters work well for this application.

Keep Materials Handling Equipment in Good Repair

With the high cost of equipment and repairs, it pays to use a preventive maintenance program. Responsibility for this should be assigned to one person and good records kept of when pieces of equipment need to be checked and what was done. Before equipment is placed into storage at the end of the season, it should be cleaned, lubricated and work parts replaced. Equipment should be stored under cover if possible.