

NURSERY EQUIPMENT—PAST, PRESENT, AND FUTURE

RICHARD W. WILSON

*Colorama Wholesale Nursery
1025 N. Todd Avenue
Azusa, California 91702*

This presentation is on equipment. What has been used in the past, what is being used presently, and a peek into the future. Colorama is a color grower and therefore this presentation will be slighted toward such but, nevertheless, will give you food for thought when and if you decide to mechanize/automate.

PAST

In the past we have seen many types of greenhouses—some make-shift—but mostly wood-framed with glass. Seeding was done in any type of container available. Soil mixing was done by hand until loader buckets for tractors came out. Potting was all by hand as was fertilization until later studies indicated the benefits of soil incorporation of fertilizers. Material transport within the nursery was mostly by hand, again with help from push cars, wagons with horses, or wheelbarrows. The transplanting of seedlings was definitely by hand, a tender touch being needed. Spraying was by hand sprayers; a lot of times weed hoeing was pursued. Product delivery was by any means available.

PRESENT

As our industry progressed further, greenhouses are presently being manufactured out of durable lightweight materials, with coverings of plastics of various forms lasting for many years. Glass and aluminum houses are being constructed over the world using better glass, and are becoming more and more popular due to the ultimate longevity of the materials. Automatic shading systems are currently being used along with automated blackout curtains for daylength sensitive crops. Computerized climate controls are becoming popular, but the big push on automatics has not started as of yet. HID-lites are coming into their own now, allowing growers to maximize daily growth. Seeding is definitely moving towards plugs, aided by the use of automatic seeders capable of sowing over 140,000 seeds per hour on manifold type seeders and over 500,000 seeds per hour on rotary drum type seeders. Soil mixing will stay at the present time with tractor type mixing, cement drum mixers with a move towards complete systems that start out with raw ingredients at one end and at the other end comes a complete,

chemically correct mix. Potting presently is still done manually, but some growers are utilizing pot filling machines, flat fillers, automatic potting machines that have the capacity to singulate, fill, dibble 6,000 4 in. pots per hour. Fertilizers will remain presently with soil incorporation and injectors, both electronic hybrid type and piston type injectors. Slow release fertilizers are coming back strong due to nitrate runoff problems.

Material transport within the nursery now is by electric carts with racks, small tractors with wagons. Some nurseries utilize trailers that accommodate the actual shipping racks, loaded directly onto the trucks—less handling of product. More and more moving belt type conveyors are being used, faster, reliable, less labor.

Transplanting now is still done by hand in some nurseries, in others the use of robotic transplanters is coming in. Additionally, moving belt transplant stations are being utilized. Machines that set the pace, cut labor costs.

Spraying presently is still done by hand, using current equipment. The improvement I see here is in the chemicals themselves, not necessarily the equipment. Although, electrostatic sprayers, foggers, and low volume mist (LVM) units are being tried as we speak.

Product delivery I touched upon briefly on material transport with a more concentrated effort being pursued with rolling racks and lift gates. These eliminate the need for a helper to go with the driver, plus the driver does not work as hard.

FUTURE: *THESE ARE THE EXCITING TIMES!!*

Greenhouses will be totally climate-automated, computer-controlled, ebb and flow irrigated. Longer lasting glazings will become available.

Seeders will be faster, more precise placement of seed. A move toward direct seeding in finished product size. More growers converting to plugs, either purchased or self-produced. Soil mixing will head towards self-contained full line mixing units. Potting will see improvements on the present machines via electronic scanners coupled to robots.

Fertilizing will be coupled with recycling systems, all being run by computers that will adjust all chemicals, pH, and EC levels, also sanitizing the water with heat or ultraviolet tunnels.

Material transport within the nursery will be improved by more moving tables, more conveyors, and trolley systems plus robots to go directly into the beds to retrieve an order—all computer aided.

Futuristic transplanting is here now. These automatic/robotic transplanters take the plug (seedling) out of the plug tray and plant directly into finished product size. The only improvements seen are

the addition of electronic scanners to sort transplants and to give faster operation.

As far as spraying equipment, more interest and movement towards electrostatics and low volume mist (LVM), although there are concerns of air pollution with the LVM units.

Lastly, product delivery will be improved by use of computers to route shipment, especially in high traffic areas. The times of known congestion can be programmed into memory, then the computer can route accordingly, giving time and fuel savings.

In conclusion, our industry has grown by leaps and bounds; it is time we ask ourselves how a certain piece of equipment can save us money. The right equipment can do a uniform job and save money on labor, thereby keeping costs down. The flip side to any piece of equipment is who is going to run it, who is going to service it? How long will this machine run until repairs are necessary, to name just a few. Ultimately, do I really need this particular piece of equipment and will I always have a plentiful supply of labor available? But remember, just because you have automated, does not mean you do not have to periodically check everything.

VOICE: This is to Richard Vollebregt. I would like to know if there are any differences in the light transmission qualities among the different greenhouse covering materials you discussed.

RICHARD VOLLEBREGT: The light transmission of Dynaglas is 92%. All of these materials have been tested in light chambers, but the real test is after they have been on the greenhouse roof for many years. Dynaglas has been on greenhouses for about 5 years in California with excellent results. The twin-wall polycarbonate has 89% light transmission. It has a warranty for 10 years, but I believe you will see 20 years useful life from it, but dropping to 72% light transmission in its later years. Polycarbonate is flame retardant with self-extinguishing properties.

LOREN OKI: Question for Richard Wilson. On your fog applicators for pest control substances in greenhouses, are you able to use them for general applications or only for specific substances?

RICHARD WILSON: We do not have that system as yet. But in that particular unit you can run both powders and liquids but the

powders become very abrasive. Basically any emulsifiable concentrate can be used, but I would not buy one yet until the EPA considers this system for a while due to air pollution possibilities.

VOICE: Question for Richard Vollebregt. Would you clarify the situation you mentioned in how moveable shade cloth controls the temperature in large shade houses?

RICHARD VOLLEBREGT: I am talking about a 1, 2, or 3 acre shadehouse. With open side walls and a fixed-roof you tend to get hot spots in the center. The cooling effect from the sidewalls will only go so far before the temperature increases, but by having retractable shade on the roof, you can expose all the plants in the entire shade house to exactly the same environment, so you get uniformity throughout the entire shadehouse range.

VOICE: Question for Richard McMann. On the new clear plastic, what is its life expectancy? Not the double wall material.

RICHARD McMANN: They are both polycarbonate materials, and both have ultraviolet inhibitors. They both have a condensation control built on the lower side of each panel. Both should last about the same length of time, at least 10 years.

RICHARD CRILEY: All speakers have touched upon the advantages and positive aspects of these shading systems. What kind of problems have arisen with them?

RICHARD VOLLEBREGT: Problems encountered are: (1) How does the system treat the fabric when the curtains are opening and closing. (2) Limit switches that stop the travel in either direction. The latest type is one that counts revolutions of the drive shaft and starts or stops by this method rather than by contacting something at the end of the run. (3) Problems with chain drives or cables that stretch over time. But, today, with well designed and engineered equipment, the curtain shade systems are very reliable, and all can be controlled by computers.

MIKE POYNTER: Could one of the speakers cover some of the considerations for using retractable exterior systems for heat retention and frost control, particularly the height of the posts?

RICHARD VOLLEBREGT: The closer the curtain system is to crop the better the heat is held to the plant, but the system must be high enough so as not to be hit by fork lifts, trucks, etc. The higher the

curtain the better the summer cooling, but the lower the curtain the better the heat retention in winter.

STEVE McCULLOCH: We are interested in automatic transplanting machines. How many are now available and what are the inherent problems?

RICHARD WILSON: There are only two that I know of in the U.S. and they are just coming into production. There is one model in Holland, but you have to buy all the related equipment—plug trays, etc. Someone in your organization must be knowledgeable of the equipment adjustments. It sells for \$40,000 but will pay for itself in 5 months, replacing 10 workers.

VOICE: Can these machines tell the difference between a cell with a plant in it and an empty cell?

RICHARD WILSON: No, they cannot, but in a year or two scanners will be added to give this capability, but it will slow down the pace.