Crop Records For Greenhouse Problem Solving

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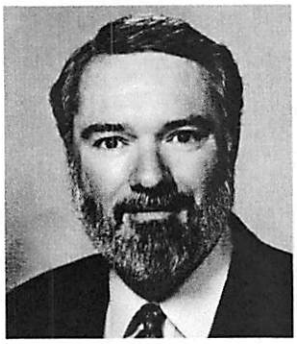

In the greenhouse industry, growers are dealing primarily with a product that is a living organism. Like all living organisms, the growth and development of plants are subject to a multitude of factors in the environment which may modify the duration and magnitude of growth. Some of the factors imposed by the greenhouse environment may be a natural response to light, temperature, photoperiod, water, and nutrition. Others may not normally be encountered in the natural environment such as applications of pesticides and plant growth retardants. However, plants react to these factors to varying degrees, and the total effect governs final crop quality.

Greenhouse crop production is composed of a series of procedural steps that when carried out with an acceptable degree of precision and timeliness are designed to control plant growth in a way that results in a crop with the characteristics we perceive as quality. These procedural steps, often referred to as "cultural practices", have been developed over time based on scientific research, experience, and trial-and-error. However, when cultural practices are not followed with the precision required or when outside or unexpected factors intervene, problems can arise which may reduce crop quality or modify crop timing.

Because a multitude of factors may interact when a crop either turns out correctly or is less than expected, the grower is often left perplexed concerning what was done right or wrong. The goal should be to identify and *repeat* those cultural practices that resulted in an above average crop or identify and *correct* those practices which resulted in a substandard crop. With all the different crops and production times a grower faces, it's no wonder that one individual cannot remember all the details necessary to identify those factors involved in success or failure.

One useful planning and problem-solving tool that growers often overlook or may consider too much effort is to develop a system of crop record-keeping. A well-designed record-keeping system can provide meaningful clues when things go right or wrong and provide a temporal history for crop scheduling. These records may be as simple as a crop diary in a notebook, a structured form with fields to fill-in, or as sophisticated as a computer database. Some growers prefer to keep records outside the greenhouse in a notebook or filing cabinet while others use large plastic cards or labels that follow a crop through the greenhouse from planting to finish. Each system has its advantages and disadvantages. For example, it's easy to forget to record important items if records are far away in an office. Records that follow a crop in the greenhouse are readily available when a task is completed. However, records that follow a crop are easily lost when a crop is moved and must be gathered-up and filed when the crop is ready for shipping. In addition, records kept in the greenhouse must be water-proof in one way or another.

Whatever the medium chosen for crop record-keeping, the information chosen to be recorded should have some future value as a "check' for standard cultural practice, as a reminder of unexpected events that may re-occur, and as a timetable for the progress of a particular crop at a certain time of the year and greenhouse location. It is easy to say, simply record everything you do to a crop with the date, but this information is more useful in a form that is easily collated and understood. Forms can be developed for each crop species which might start with the crop schedule and contain fields for pertinent information such as fertilizer rates, growth retardant, and pesticide applications. Certain kinds of information may be more easily visualized in graphical form, such as substrate soluble salts and pH readings during the crop. Finishing times for crops that are influenced by the time of year and are grown over consecutive periods, such as many bedding plants in the spring, may be collated in graphical form as a future scheduling tool.

The generic form provided below illustrates some of the information that may be important to record for greenhouse crops. This form is not intended for a particular crop, and would require modification for a specific crop and situation. The form is also probably

not all-inclusive. However, four groups of information may be identified:

Section 1: Information in this section identifies the crop and location. The information on location would require extending if the crop is to be moved to different greenhouses during production. A crop identification number may be assigned if an inventory system is used.

Section 2: This section outlines the crop schedule and provides entries for actual completion of key production steps. The number and types of steps would vary depending on the crop. Counts of "quantity sold" and "dumpage" are important to determine the profitability of the crop. Information from this section can be collated to provide actual production times.

Section 3: Information in this section could be highly variable, but is intended to provide a check for cultural procedures and as a diagnostic tool should something go wrong. Entries in this section might include growing substrates, fertilizer regimes, photoperiod manipulation, set-point temperatures, growth retardant, and pesticide applications. In addition, entries might be provided to record light and temperature conditions for growth retardant and pesticide applications.

Section 4: This is a general comment section to record important, and maybe unexpected events not covered by the other sections. Some indication of final crop quality might be appropriate here.

In addition to a general form for specific crops, separate records for several "mixing" procedures can be useful as a problem diagnostic tool and as a check for standard practices. These might include records of fertilizer concentrate mixing, substrate mixing, and growth retardant and pesticide mixing and application. These are especially appropriate where an individual other than the grower in charge of the crop performs the tasks.

Records of plant height during the crop can be very helpful for those crops in which height is a major quality concern such as Poinsettias and Easter Lilies. The average of height measurements from a representative sample of plants each week can be graphed over time, and several years of data can be used to predict where crop height should be for the current crop. Growers practicing graphical tracking use this kind of data to adjust crop height using temperature and growth retardants.

Photographs are another kind of useful record especially for crops targeted for specific holidays such as Poinsettias and Easter Lilies. These crops generally must reach certain stages of development with respect to the target sales date in order to finish on time. Weekly photographs of a representative plant from crops over several years can help the grower judge if a current crop is progressing on schedule or if corrective action should be taken. Some indication of relative size should be considered such as a ruler in each photograph or standardizing the distance between plant and camera.

Reviewing the suggestions outline above, it would seem that crop record-keeping requires some time. However, the payoff is long-term improvement in growing precision and crop quality.

CROP PRODUCTION SHEET

Section 1

Crop ID#: _____ Location: _____
Crop Name: _____ Cultivar: _____

Section 2

Week sown/propagated: _____ Flat Number: _____ Week transplanted: _____
Number transplanted: _____ Container Size: _____ Plants/container: _____
Week Pinched: _____ Week Spaced: _____ Visible color: _____
Week Finish: _____ Number sold: _____ Dumpage: _____

Section 3

Propagation substrate: _____
Growing substrate: _____

Weeks Lighted: Begin: _____ End: _____
Black Cloth: Begin: _____ End: _____

Set-point Temperature:
Date: _____ Night: _____ Day: _____ Note: _____
Date: _____ Night: _____ Day: _____ Note: _____
Date: _____ Night: _____ Day: _____ Note: _____

Growth Regulator:
Type: _____ Rate: _____ Date: _____ Conditions: _____
Type: _____ Rate: _____ Date: _____ Conditions: _____

Fungicide:
Type: _____ Rate: _____ Date: _____ Method: _____
Type: _____ Rate: _____ Date: _____ Method: _____

Pesticide:
Type: _____ Rate: _____ Date: _____ Time: _____ Temp.: _____
Type: _____ Rate: _____ Date: _____ Time: _____ Temp.: _____
Type: _____ Rate: _____ Date: _____ Time: _____ Temp.: _____

Section 4

Comments:

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