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evaporation from the crop was greatly reduced at high humidity. The weight loss and Piche evaporimeter findings support the view that transpiration rates are reduced at high humidity, and consequently less nutrients, but especially Ca, would be taken up by the plant in the transpiration stream.

Calcium uptake and transport around the plant was measured in three ways:

1. by analysis of nutrient solutions at the beginning and end of each week to assess how much Ca had been taken up by the plants
2. by analysis of sap collected from cut stems to assess the amount of CA transported around the plant in the xylem vessels
3. by analysis of leaf dry material to assess how much Ca had reached the leaves.

These samples are still being analysed for Ca content, but the results should enable us to quantify the relationship between the reduction of transpiration rate and Ca uptake and distribution to the leaves of plants at high humidity.

PC/12

Development of interrupted lighting schedules for AYR spray chrysanthemum cultivars

Project Co-ordinator: J Phillips
Project Leader : A Langton
Location : IHR Littlehampton and Efford EHS
Start Date : 1.1.87

INTRODUCTION

Although final reports on the project were submitted in 1988 and are available from the HDC in Petersfield, some extra work was done during the winter of 1988/89 to clarify timings of interruption under extreme low-light conditions.

RESULTS

Refinements to the relationships between the average daily light integral during short days (SD) and the number of SD required before interruption can safely begin are summarised in the Table.

TOTAL NUMBERS OF SHORT DAYS BEFORE INTERRUPTION CAN SAFELY BEGIN,
DETERMINED BY OUTSIDE LIGHT INTEGRALS, FOR 60% AND 50% LIGHT
TRANSMISSION INTO THE GLASSHOUSE

Average daily light integral (total radiation outside, MJ/m ² /day)		Snowdon		Pink Gin		Delta		Daymark	
		60%	50%	60%	50%	60%	50%	60%	50%
6.8	Av October*	11	11	12	12	13	13	10	10
5.0	Av February	11	11	12	12	13	14	10	10
3.7	Av November	11	12	12	12	14	15	10	11
2.9	Av January	12	13	13	13	15	17	11	12
2.4	Av December	13	15	13	15	17	19	12	13
2.0	Poor light period	15	16	15	17	19	22	13	14
1.6	Very poor light	16	18	18	21	22	25	14	16

* Averages are for Efford

COMMENT ON RESULTS

(a) Light integrals: The relationships are based on the average daily light receipt (integral) during the SD phase of growing. Examples given in the Table are for average daily integrals (out of doors) during the months of October to February collected over a 15 year period at Efford EHS on the south coast. It should be remembered, however, that actual light receipt over a short period of time can differ considerably from the long-term average. The numbers of short days required before interruption are, therefore, presently merely as guides to response. For greater accuracy, ADAS runs an advisory telephone service based on actual light receipt at Efford and Littlehampton.

(b) Light transmission into glasshouses: The integrals in the Table use total solar radiation (not PAR) as measured using a Kipp solarimeter out-of-doors. However, plant response depends on the light received in the glasshouse and transmission losses need to be taken into account. As a guide, plants in C block at Efford receive c 60% of light measured outside. Modern, newly erected glasshouses should have lower light losses, but many older (and dirtier) houses will give only 50% transmission. Hence the Table shows SD periods assuming both 60% and 50% transmission. The difference in the number of SD required for 50% as opposed to 60% transmission can be as high as 3 days under very low light conditions.

(c) Plant responses: The number of SD for initiation remains reasonably constant for light integrals above 3.5-4.0 MJ/m²/day (total, outside). For Daymark the constant is 10 days, for Delta it is 13, and for Snowdon and Pink Gin it is 11 and 12 days respectively. As the light integral falls below this level, so the number of SD required before interruption increases. In

practice this means extensions to the SD period during November, December and January and for lower than average light periods at the end of October and during February. Numbers of SD will also tend to be higher away from the south coast.

There are large cultivar differences with Daymark requiring fewer SD than Delta; the difference is likely to be c 5 days during December. Snowdon and Pink Gin are intermediate and similar except under the worst light conditions when Pink Gin can require 2 extra SD. Snapper (not shown) is a moderately fast cultivar until a light integral of c 1.5-2.0 MJ/m²/day is experienced, when very large delays in initiation are shown and vegetative laterals develop.

It has sometimes been suggested that relationships might be based on accumulated light sums rather than on average daily integrals. The problem with this approach is that whilst it takes longer to initiate flower buds in winter, far less light is received during the period of initiation than in summer. Ten times more light in the summer does not mean that flowering is achieved in one tenth of the time taken in winter!

(d) Glasshouse environment: The relationships shown assume 'mature' plants, CO₂ enrichment to c 1000 ppm and a 24 hour average temperature of 17C. SD periods need to be extended when lower temperatures are used. As a best estimate, add one extra SD for each decrease of 1C below the 17C average.

PC/13

Winter quality of pot chrysanthemums

Project Co-ordinator:	A Findon
Project Leader :	RF Potter
Location :	Lee Valley EHS and IHR Littlehampton
Start Date :	1.11.86

The final report on this project is now available from HDC, Petersfield.

OBJECTIVE

To study the development of variation in chrysanthemums grown five to a pot and to determine at which stage or stages of growth cultural practices might best be applied or modified to reduce final variation, which can seriously reduce the quality and value of the product.

SUMMARY

Initial variation within batches of cuttings, measured as the variance, can be considerable with individual cutting weights typically varying by a factor of c x 3. Heavy cuttings tended to