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THE THIRD INTERNATIONAL CARNATION SYMPOSIUM A PICTORIAL TOUR

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Over 160 participants met at Noordwijkerhout, The Netherlands, for the conference on carnations. More than 80 percent were from other countries. The Dutch contribution is always impressive. The fourth carnation symposium is scheduled for Colombia in 1991.

One of the most successful symposia was held May 17 to 23, 1987, in The Netherlands, dealing with carnations. There were a number of items that kept my attention: 1) Work on disease resistance to *Fusarium oxysporum f. dianthi* is being carried on vigorously by three groups in Holland, France, and Italy; 2) Considerable effort is being spent on new types and cultivars, especially in Holland and Israel. Breeders were well represented at the conference; 3) Although competition is rigorous, there are still 850 acres of commercial carnation production in The Netherlands; and 4) Carnations remain the biggest cut flower crop in the world.

There are several investigators in Holland working on disease resistance with standardized testing methods. One of the most fascinating basic research papers was presented by R.B. Baayen, from the Phytopathological Laboratory, which showed how Fusarium entered the root system and the manner in which resistant varieties responded by walling in colonized vessels with gel and suberization, with the final result of actually "casting" the infection site out of the root. There was some discussion on the difference between "tolerance" and "resistance" to the disease. Apparently, some tolerant species will have the fungus in the vessels, but damage does not occur. On the other hand, resistance appears to be the ability of the carnation to contain the infection through suitable response and recover. At least eight races of *F. oxysporum* have been identified, and continuous testing is being carried out.

Another good paper, presented by D. Rymon and coworkers from Israel, dealt with the "product life cycle" of spray carnations. The work by marketing specialists to predict the future course of a product mathematically is well-known for other products such as appliances, etc. This is the first, to my knowledge, of an application in commercial floriculture. By following the latest market information, the start, increase, plateau, and decline in numbers of a product can be followed. From this, one may estimate where he is in terms of the life cycle of the product and gain some idea of the time required to bring a new product (read cultivar) to the market, and when a new product should be introduced in order to remain ahead of the cycle at its most profitable period. We can expect additional work from the Europeans on this subject that may have considerable significance for U.S. producers.

Although Spanish carnation production has increased rapidly to the point where some suggestions were made of a future carnation glut, Colombia maintains its position in the market as leading exporter, actually increasing its share. Dutch producers have managed to remain fairly profitable by making maximum use of the latest technology. Production in inert substrates (rockwool) (120 acres) is increasing with a significant portion in cubed rockwool. Based upon this year's observations, together with a similar visit last year, the majority of North European greenhouses are single layer glass with extensive use of thermal and shade screens. The Venlo design is practically standard, fitted with computer controls and CO_2 injection. No fan-and-pad cooling was noted. In general, carnation producers plant in the late fall for early spring flowering. Coming into the market early can often make the difference in profitability. Yields for standards appears to be in the range of 35 to 40 flowers per sq.ft. per year. Although the Dutch are reputed to have the highest paid labor in the world, I did note some foreign laborers at one range. Specific questions on their

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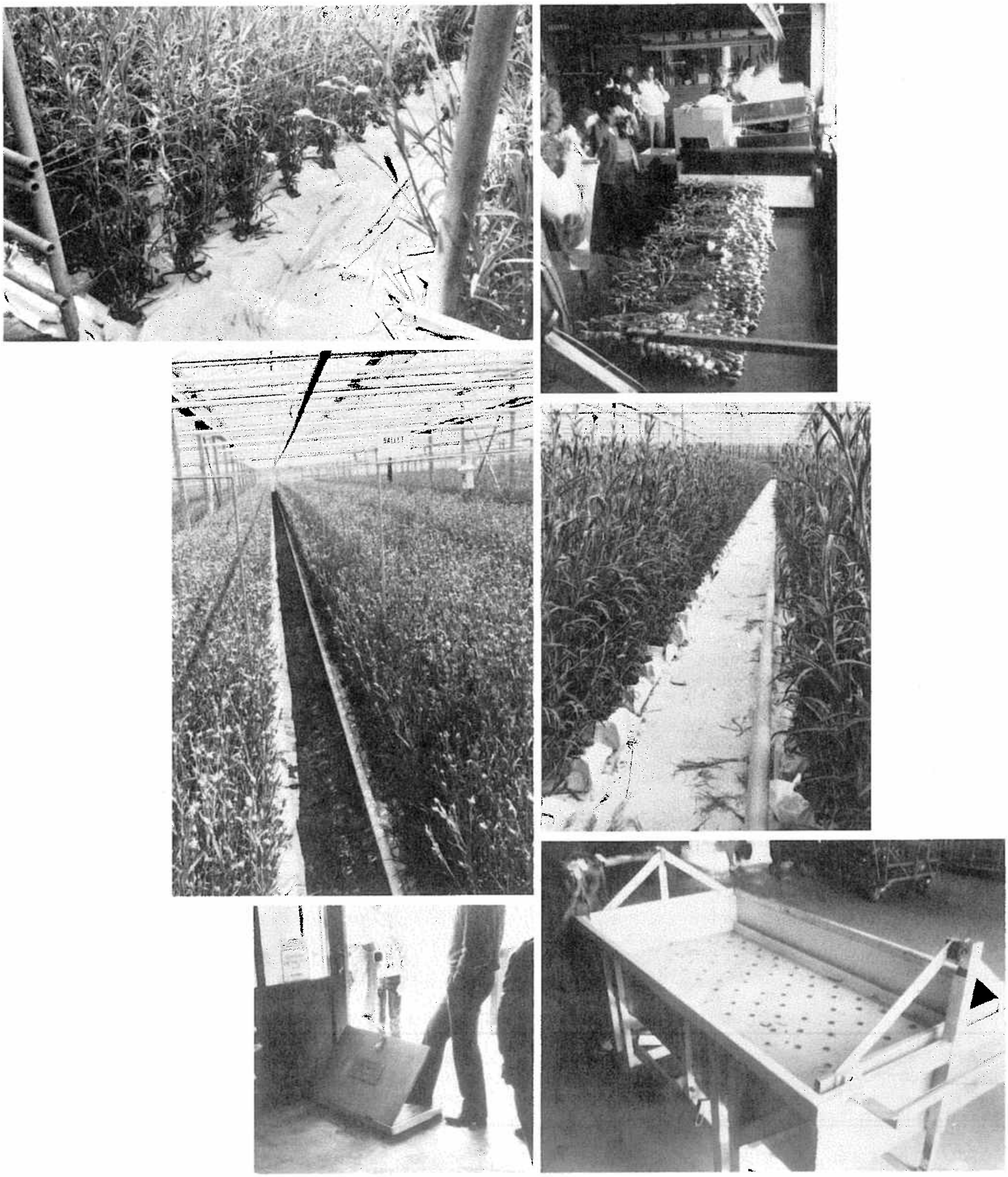

Fig. 1: Two commercial carnation ranges in The Netherlands. Note the extensive use of white plastic as a ground cover. The middle left picture shows an installation of rockwool blocks, irrigated by a drip system. Where grown in the ground, growers attempt to steam as deep as 60 cm (24 inches) placing a vacuum on drainage lines under each bench. In the lower left-hand corner, disinfecting foot baths were noted at each commercial range visited. An automatic grading and bunching machine in use at one range at the upper right. Flowers were placed immediately into an STS solution at the ends of the benches (lower right-hand photograph). The false bottom of the tank can be raised to drain the solution. Dutch investigators are looking at other chemicals to replace silver in the STS solution due to its environmental toxicity. In the center pictures, hook-like hangers will be noted above the aisles. During ground preparation, the metal heating pipes are raised out of the way on these hooks. All ranges were single glass with screens installed.

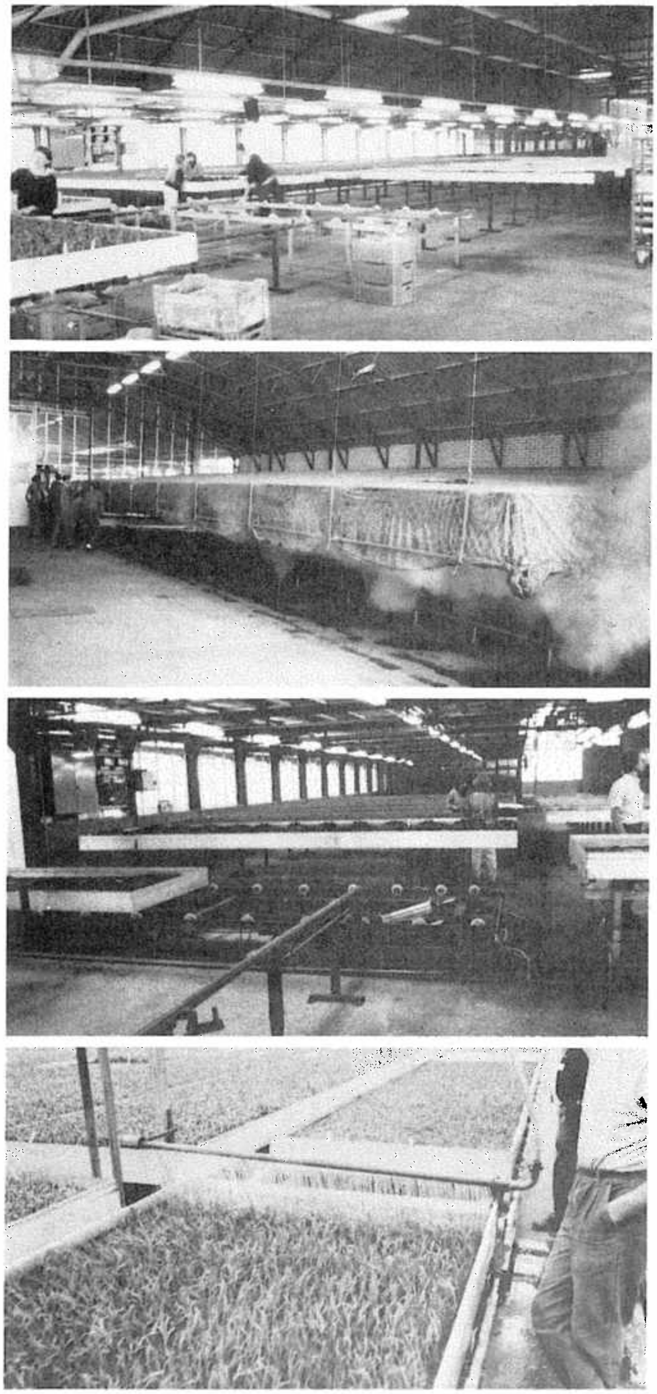

Fig. 2: A high-class, mechanized, carnation propagation facility. No work is done in the greenhouse — there is not room. Benches ready for pulling and packaging are rolled into the warehouse (top picture) and cuttings removed. Rooting medium in each tray is replenished and several run into a separate room (2nd from top photograph) where a cover is lowered over the trays for steaming. The trays then move overhead back to the opposite end of the warehouse where they are lowered to the ground and new cuttings stuck. The completed trays are then rolled out of the warehouse (3rd photograph), and the newly stuck cuttings watered in automatically in the center aisle as the trays pass on their way to their destination in the greenhouse (bottom picture).

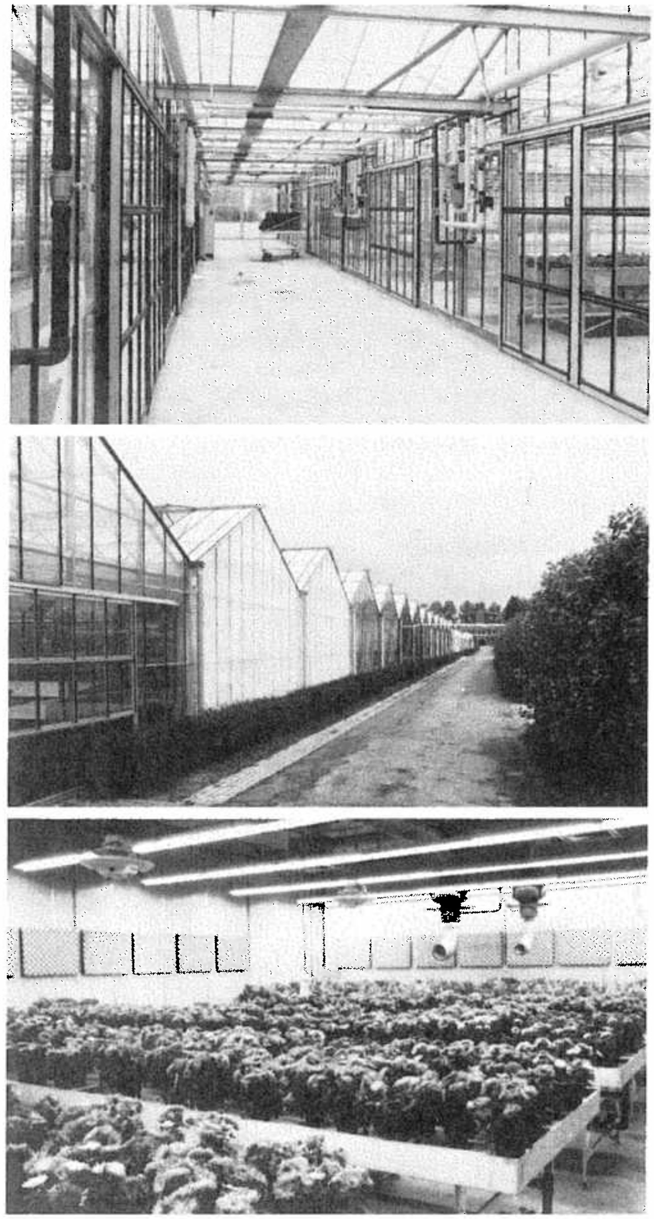

Fig. 3: Research facilities and support. Interior and outside of research greenhouses at the Plant Breeding Institute, Wageningen. All single glass, uniform installations, hot water heated, computer controlled. The total area in research glass in Holland probably exceeds the total available in these United States. The lower picture shows one of the large, post-harvest, controlled climate rooms at Aalsmeer. The waffle boards on the walls reduce the noise level.

pay rate were not asked. Drip systems for irrigation are universal. The small volumes required means that the growers can apply water several times daily, as required by rockwool substrates.

A good water supply is universally required. Inert substrates will not substitute for low quality water. White plastic on the ground, below plants, is very common. This not only increases available energy, but reduces evaporation from the soil. Humidity inside the greenhouse is also reduced. Salt accumulation will be less, and the number of

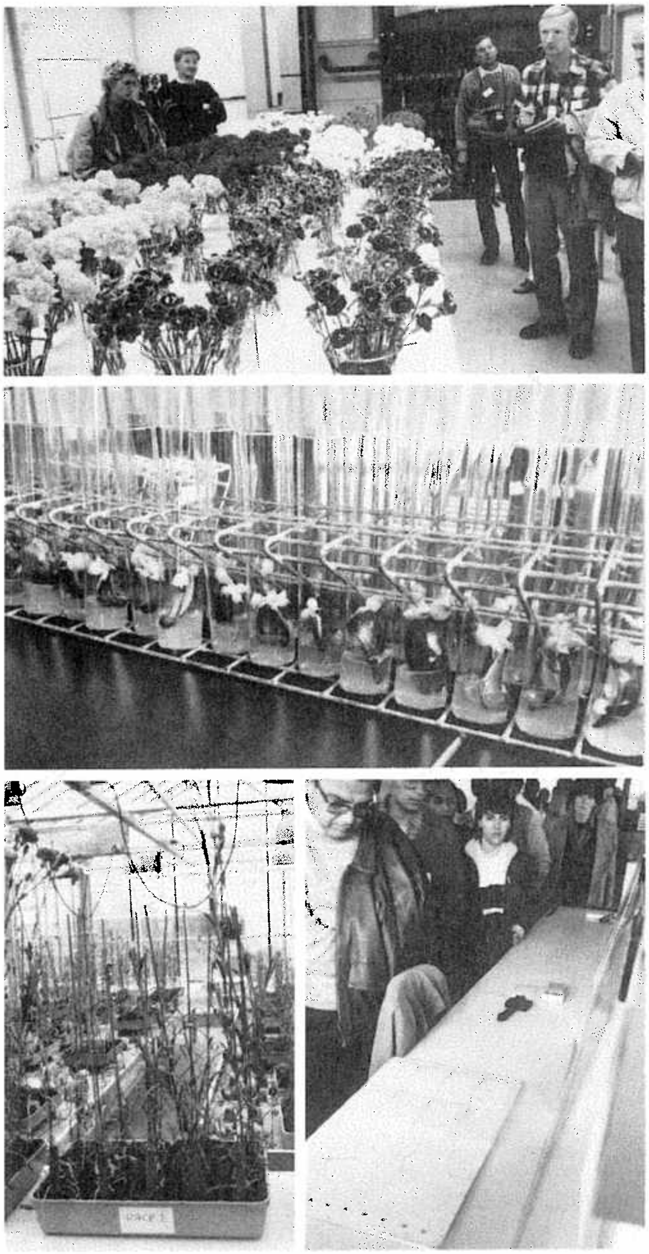

Fig. 4: More research and support. The top picture is a keeping room at the Sprenger Research Institute, Wageningen, which is heavily involved in marketing and packaging research, with particular emphasis on air pollutants such as ethylene. The flowers are trials in long-term storage (four or more weeks). The middle picture shows bulb scales in culture for growing new bulblets at the Laboratory for *in-vitro* culture. New carnation selections also come to this laboratory for culture and heat-treatment, and then are sent next door to the Laboratory of the General Netherlands Inspection Service (NAK-S) where selections are tested for virus, mainly etched ring spot and mottle. The lower right-hand photograph shows the tour group looking at reaction plates for the LISA serological test program. In the lower left-hand corner is an example for testing five cultivars for resistance to Race 2, *Fusarium oxysporum* at the Plant Breeding Institute. Up to eight races have been identified, and procedures standardized for looking at resistance in *Dianthus*.

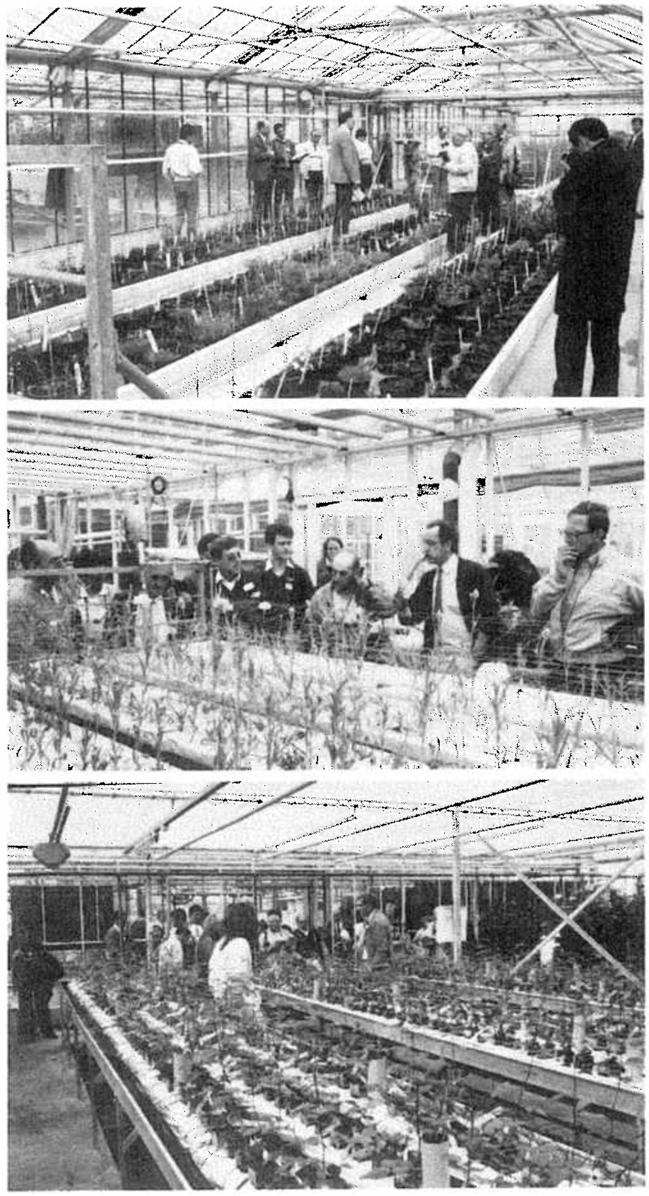

Fig. 5: Individuals active in cut flower research, The Netherlands. In the top picture, Dr. Leo Sparnaaij, Plant Breeding Institute (in sport coat, center), discusses *Dianthus* collection at Wageningen. This is probably one of the most complete species collections in the world. In the middle picture, Mr. Henk Rattink, covenor of the symposium (2nd from right) explains his research on biological disease control to tour participants at the Aalsmeer research station. Carnations are being grown in re-circulating solution. Dr. Peter van der Pol, principal floriculturist at the Agricultural University, Wageningen, provides touring members with some light relief in the form of a rose project testing simultaneous rooting and grafting, or "stenting." Plants are in rockwool. Dr. Pol is probably the most knowledgeable rose rootstock specialist in the Western Hemisphere.

drip lines required can be reduced. The Dutch have been very active in using boiler flue gas to supplement CO_2. Of course, they have acknowledged that if the day is clear, boilers may not be in use, not to mention the good possibility of flue gas damage (ethylene, SO_2, nitrous oxides, etc.).

Apparently, proper boiler controls with the use of a "heat buffer" can produce "enormous" improvements in CO_2 utilization efficiency.

Although the Dutch contingent were the most numerous, there were 19 participants from Australia, 15 from Colombia, 18 from Italy, and 16 from the U.S. All of the latter were from California, with Hanan, Goldsberry, and Jake Kroes representing Colorado. There was considerable participation by commercial growers, which helped to make this a very successful and informative conference. Other information will be presented in future bulletins.

FEW BENEFITS FROM HYDROPHILICS

INTERNATIONAL ROUNDUP From *The Grower* 107(18), 1987

When hydrophilic gels were introduced into horticulture they were thought to have potential as substrate additives. They were supposed to increase the water-holding capacity of the compost without allowing waterlogging. A number of trials assessed their usefulness and it seems that they have very little effect at all.

Four proprietary hydrophilic gel materials were tested with a number of peat and peat/clay composts. A wide range of plants were grown in each mix including pelargoniums, fuchsias and impatiens, using window boxes, tubs and pots.

In only one case — impatiens grown in a substrate amended with Aquaprotect — was there a marginal positive result. When the plants were left unwatered for ten weeks, only 37.5% of those in the treated compost died, compared with 68.8% in the untreated control substrate. In all the other treatments the hydrophilic gel gave no recordable benefit.

FORT COLLINS GREENHOUSE CLIMATOLOGICAL SUMMARY FOR FIVE WEEKS, BEGINNING MAY 31, 1987 (See Bulletin 426 for details.)

	Week beginning									
	May 31		June 7		June 14		June 21		June 28	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Average outside temperature (°F)	69	56	74	61	77	63	75	61	71	60
Maximum outside temperature (°F)	87	70	92	75	94	76	94	87	88	78
Minimum outside temperature (°F)	51	45	56	50	60	53	58	54	55	53
Degree-days of heating	—	63	—	28	—	14	—	28	—	35
Accumulated total solar radiation (MJ/sq.m.)	139	1	137	1	207	1	147	1	118	1
Average relative humidity (%)	35	55	47	69	38	60	41	65	57	76
Maximum relative humidity (%)	71	86	100	100	83	89	76	95	100	100
Minimum relative humidity (%)	18	33	12	28	9	17	14	33	24	28
*Average absolute vapor pressure (mb)	8	8	12	12	11	11	11	11	14	13
Average wind speed (mph)	2	1	2	2	2	1	2	1	2	1
Maximum wind speed (mph)	15	12	30	15	23	14	23	14	23	14
Average CO_2 concentration (Pascal)	25	—	24	—	24	—	24	—	24	—
Maximum CO_2 concentration (Pascal)	29	—	32	—	29	—	30	—	33	—
Accumulated gas consumption (cu.ft./sq.ft.)	—*	—	—	—	—	—	—	—	—	—

*Greenhouse being modified

cgga

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