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Glasshouse crops research: growing need for a co-operative approach

E. Kooistra

Director of the Glasshouse Crops Research Station, P.O. Box 8, NL 2670 AA Naaldwijk, Netherlands

The present issue is entirely devoted to research on glasshouse crops at the Proefstation voor Tuinbouw onder Glas (PTG) — i.e. the Glasshouse Crops Research Station — at Naaldwijk, Netherlands. The inauguration of new buildings at our research station was considered to be a suitable occasion to offer readers special information on the research carried out at the PTG for the benefit of the glasshouse industry and society at large in its connection with this industry. We are grateful to the Editorial Board that they agreed to our suggestion in this respect.

The research carried out at our station is a reflection of the problems encountered in commercial growing practice, in trade channels or in society in connection with the production of glasshouse crops. It seems appropriate, therefore, to trace briefly the developments and changes in the industry during the last two decades, from the affluent 1960s through the energy crisis period to the era of information engineering in the late 1980s.

In the 1960s, growers' interest primarily focused on yield levels, on external quality and on the amount of labour required. It was the period that the market, both at home and abroad, was insatiable an foreign production areas were no real threat to the Dutch trade. The relative importance of cut flowers increased tremendously, the grower's income was at an acceptable level and many investments were made to improve production facilities at growers' holdings. Applied research at our station concentrated on crop husbandry, nutrition, disease control and, on a modest scale, on labour use (Kooistra, 1975).

This situation changed dramatically when the worldwide increase of oil prices began to affect the glasshouse industry in the Netherlands. The Dutch government was compelled by the European Community to raise the price of natural gas delivered to the glasshouse growers. Between 1973 and 1984 the price of natural gas for growers increased by a factor 9 and the relative proportion of energy in the total production costs per holding increased from 15 to 25%. This increase occurred despite the fact that the amount of energy consumed per unit of glasshouse area decreased in the same period by at least 25% as a result of energy saving measures. Basic and applied research projects on energy conservation were begun in 1974.

Apart from research in the biological disciplines mentioned above, much attention was paid to the economic consequences of managerial decisions in the field of energy saving and technical improvements. All efforts concentrated on the cost

price per unit of product. This meant that increase of production per square metre was as important as decrease of production costs (energy, labour, etc.). Increase of production required a more accurate control of growing conditions to the optimum level indicated by research results. This requirement could be best met by automation of such control measures. The most economic use of energy and available labour also led to the need for more automation. Consequently the effects of the energy crisis on research included an increased emphasis on all aspects of automation.

The subsequent period in research, which started in the early 1980s and is in full swing at present, is characterized by information engineering and by increased competition on the world market. It is felt that automation of managerial decisions reduces the instantaneous flexibility of such decisions unless the algorithm used takes into account literally all possible alternatives for all possible conditions. This implies the necessity of a sound knowledge of the nature and interrelationships of all processes concerning plants, crops, holdings, managers, co-workers and consumers. This approach, by necessity holistic, requires the greater part of our research capacity, while much well-documented, detailed, basic information is needed from fundamental-research organizations, such as research institutes and university departments. Much more than in the past, a piece of research is tentatively fitted into an adequate holistic system that shows the relationships of the research topic with the most relevant aspects within society and industry. Thus, the experimental results described in this issue often form the basis for subsequent fundamental research.

Another important item of applied research at the present time concerns produce quality, of which the internal quality has become more important than before. Improving and maintaining produce quality during the growing phase and the trade phase is necessary because of:

— the rising standards of consumers;
— the increasing production levels in many countries;
— the policy of the Netherlands to defend its market share by offering consumers the quality they require.

The taste, the keeping quality and the complete emergence of all buds on a cut flower all depend on the effects of external conditions during the growing and post-harvest period on the internal physiological processes in the plant and/or its produce. Applied research in this field is in great need of basic physiological knowledge which is provided by institutes for fundamental physiological research and by universities.

Finally, research on the quality of the environment deserves attention. New growing systems and methods are in demand to obtain an ecologically sound production. The development of cropping methods on artificial substrates (water culture and rockwool) in which the nutrient solution is being recirculated and loss of fertilizers to the environment is prevented, is an important research item. The same is true for crop protection methods (new spraying techniques, biological control, integrated control), in which the use of chemical compounds is reduced to an absolute

minimum. Once again, applied research requires the support of fundamental research.

In conclusion, the need for a close cooperation between universities, basic research institutes, applied research stations, experimental gardens and the industry is evident. This leads more and more to the establishment of research programmes by cooperating research organizations, each link in this chain being supposed to be sufficiently strong in its field of knowledge and to fit in well with the next link. The requirements of society and the glasshouse industry have thus strongly increased the interdependency between research organizations, a process the necessity of which is not recognized unanimously in research.

The new research facilities of PTG, which have been opened officially by Her Royal Highness Queen Beatrix on 9 September 1988, form an important asset in the improvement of the execution of such joint research programmes as indicated above. Laboratory and library facilities have been greatly expanded and working conditions have been incomparably improved. Production of heat, CO_2, water, etc. have been centralized and optimized. In short, the PTG has been installed in buildings which will undoubtedly improve research results, enable specialization, in concert with other research stations — especially the Research Station for Floriculture at Aalsmeer — and offer facilities for guest-workers who wish to do research for some time on glasshouse problems in the Netherlands.

We wish to express our sincere thanks to the Government and the glasshouse industry, who enabled the construction of the excellent buildings.

Reference

Kooistra, E., 1975. Seventy-five years research at Naaldwijk. *Netherlands Journal of Agricultural Science* 23: 179-180.