

the different variables and information available in the database for better management and control of the flowers production.

In the greenhouses the automation systems to be implemented in the areas of irrigation, fertilization and indoor climate control can directly influence the quality of production and increase owner's profit.

5. Conclusion

This research aimed to increase energy and environmental efficiency, as well as to visualize in real time, the main parameters that imply the operation of a greenhouse complex. The reduction of energy consumption and a system of supervision and data management were the two areas that had the greatest focus in the conception of this project. In order to maximize the energy efficiency, an audit of the greenhouse case study was carried out to obtain the consumptions made during the sampling period, which were used to calculate the annual consumption, considering already a future expansion of the installations and later development of the areas presented in the new energy model. This will allow to achieve the objective of reducing production costs and to increase the efficiency and management, with the consequent lower emissions. Tests were carried out in this case study with results that support the desired improvements and that will lead in the short term, to the promotion of this model within several types of greenhouses, whether they are used for intensive production of decorative plants or for human consumption in large scale, supported by the digitalization and interconnection among systems and with the IoT concept.

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