How Are the Timings of Flower Opening and Closing Controlled in Nymphaea tetragona?

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If the timings of flower opening and closing could be controlled or predicted, it is worth applying to agronomical uses, such as artificial pollination. It is reported that the flower opening of Nymphaea alba depends on light. However, flowers of Nymphaea tetragona in my school pond open early in the morning but close in the daytime, suggesting the involvement of other factors. To establish an experimental system, it was proved firstly that cut-flowers of N. tetragona placed in the pond opened and closed properly as is the case of intact plants. Then, a response to light was tested in cut-flowers in the laboratory. Finally, correlations between the timings of flower opening and closing and environmental factors, such as the timing of sunrise and sunset, temperature changes, etc. were analyzed using 51 flowers in the pond. Flower behavior was recorded continually by time-lapse photography every 10 minutes. In the laboratory condition, the timing of cut-flower opening was not influenced by light. Interestingly however, in the pond, the higher the ambient temperature 24 hours before, the sooner the flowers opened. In addition, the flowers closed 3.7 hours earlier when shaded than the control flowers did in the light. Furthermore, the higher the ambient temperature immediately before closing, the sooner the flowers closed. These data suggest that the timing of N. tetragona flower opening and closing can be predicted, or even controlled, based on the ambient temperature. Proving that the previous day`s temperature actually controls flowering timing might be the next challenging theme.

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