CHAPTER 3

The potential of *Clivia miniata* (Lindley) Regel as a cut flower

3.1 Summary

Clivia miniata Regel is widely cultivated as a garden ornamental and a pot plant. It occurs in many attractive shades of orange, red, yellow and pink but little information exists regarding its use as a cut flower. The possibility of picking cut flowers when all the flowers on the inflorescence were still closed and forcing flowers to open in distilled water and in Chrysal AKC™ (CHRYS) was examined. A forcing temperature of 21 ± 2 °C and an irradiance of 22 ± 3.10^{-6} mol photons m^2s^{-1} was used. After 190 hours, in both distilled water and CHRYS, more than 90% of flowers had opened and developed normal colouration. However, after 96 hours, 90% of inflorescences held in distilled water and 10% of those in CHRYS had developed peduncle splitting. The mechanism involved in the prevention of splitting is unknown but it is suspected that sucrose in CHRYS may have caused this.

3.2 Introduction

Clivia miniata is widely cultivated as a garden plant in South Africa and has been cultivated as a pot plant in Europe for many years. Many attractive forms exist in shades of pink, orange, (Glover, 1985), yellow (Morris, 1990) and near white (McNeil, 1985) but few reports on *Clivia* cut flowers could be found (Drysdale, 1990, Nowak & Rudnicki, 1990). Furthermore, it appears that the flowering period of *Clivia miniata* can be manipulated to some extent by regulating growing temperature (Mori & Sakanishi 1974, De Smedt, Van Huylenbroeck & Debergh, 1996, Chapter 2 of this dissertation) and lighting (Vissers & Haleydt, 1994). Therefore, it was felt that the subject of *Clivia* cut flowers warranted further attention and that picking stage and the occurrence of peduncle splitting should be investigated. The recommended cutting stage for *Clivia* (Nowak & Rudnicki, 1990) is when 25% of the flowers on the inflorescence have already opened. In order to facilitate handling, packaging and longer vase life it was felt that it was important to determine whether flowers could be picked at a more closed stage.

3.3 Materials and methods

Flowers were picked from a suburban garden during late afternoon and transported dry to the laboratory within an hour. It follows then that the effect of extended periods of dry storage of flowers such as may occur, for example, if flowers are transported by airfreight, was not investigated. The prevailing air temperature in the laboratory was 21 ± 2 °C and the irradiance at a height of 25 cm above the inflorescences was 22 ± 3.10^{-6} mol photons m^2s^{-1}, provided by Osram™ cool white fluorescent tubes. Figure 3.1 shows the developmental stage of the inflorescences when picked; all flowers were closed but some colouration could be seen in the perianth. Ten inflorescences were placed in CHRYS (40g CHRYS / litre distilled water) and 10 in distilled water. The Chrysal product was chosen because it is used to enhance opening of carnations and other flowers cut in the bud stage. The number of open flowers was recorded as a percentage of the total number of flowers on each inflorescence over a period of 190 hours. Furthermore, the number of split peduncles which occurred in each treatment was recorded. Longitudinal sections of split peduncles which had been embedded in paraffin wax were examined. A meaningful statistical analysis was not possible due to scarcity of material and the short natural flowering period.

3.4 Results and discussion

After 190 hours (8 days), 99% of flowers kept in CHRYS and 95% of those in distilled water had opened (Table 3.1). In addition, colour development in the open flowers was normal (Figure 3.2). It was also observed that 90% of the inflorescences held in distilled water had developed peduncle splitting after 96 hours. This only occurred in 10% of stems held in CHRYS over the same period. In addition, the degree of splitting was much less severe when using CHRYS and was restricted to the tip of the peduncle. It appeared that equal numbers of flowers opened on inflorescences with split and unsplit peduncles. Figure 3.3 shows split and unsplit peduncles kept in distilled water and CHRYS, respectively. The mechanism by which splitting was prevented is unclear. However, the same problem occurs in *Hippeastrum* cut flowers due to extensive expansion of the inner parenchyma tissues. Splitting could be prevented by pulsing *Hippeastrum* stems in a 0.125 *M* sucrose or KNO_3 (potassium nitrate) solution which was thought to have conditioned the parenchyma in the basal portion of peduncles to withstand rapid expansion (Halevy & Kofranek, 1984). From sections of split *Clivia* peduncles, a difference in the size of inner and outer parenchyma cells could be seen (Figure 3.4). The chemical composition of CHRYS is a trade secret and is therefore not known.

However, it is suspected that sucrose is an ingredient and that it may have reduced the incidence of splitting.

Table 3.1 Mean number of open flowers (x) with standard deviation (s) on inflorescences held in 40g / l Chrysal AKC™ and distilled water (dH_2O) over a period of 190 hours at 21 ± 2 °C and an irradiance of 22 ± 3.10^{-6} mol photons m^2s^{-1}. The number of open flowers is expressed as a percentage of the total number of flowers on the inflorescence. n = 20

Hours		0	29	63	113	190
Chrysal	x	0	27	65	93	99
	s		7	15	8	1
dH_2O	x	0	23	48	78	95
	s		13	15	14	12

From the investigation it is concluded that it is possible to harvest *Clivia* cut flowers at a stage when all flowers are still closed and that a large proportion of the flowers will open with normal colour development under the conditions described. It seems that the problem of stem splitting can also be overcome by placing stems in CHRYS. Further work can be done to establish whether flowers will successfully open under conditions of lower irradiance than used in this experiment and to clarify the processes which cause and prevent stem splitting. The optimum treatment time and the possibility of using pulse treatments for prevention of stem splitting could also be determined. In addition, the effect of commercially available pretreatment products on the rate of flower opening and longevity could also be examined. Furthermore, the effect of dry storage of flowers on vase life, flower opening and stem splitting should be investigated.

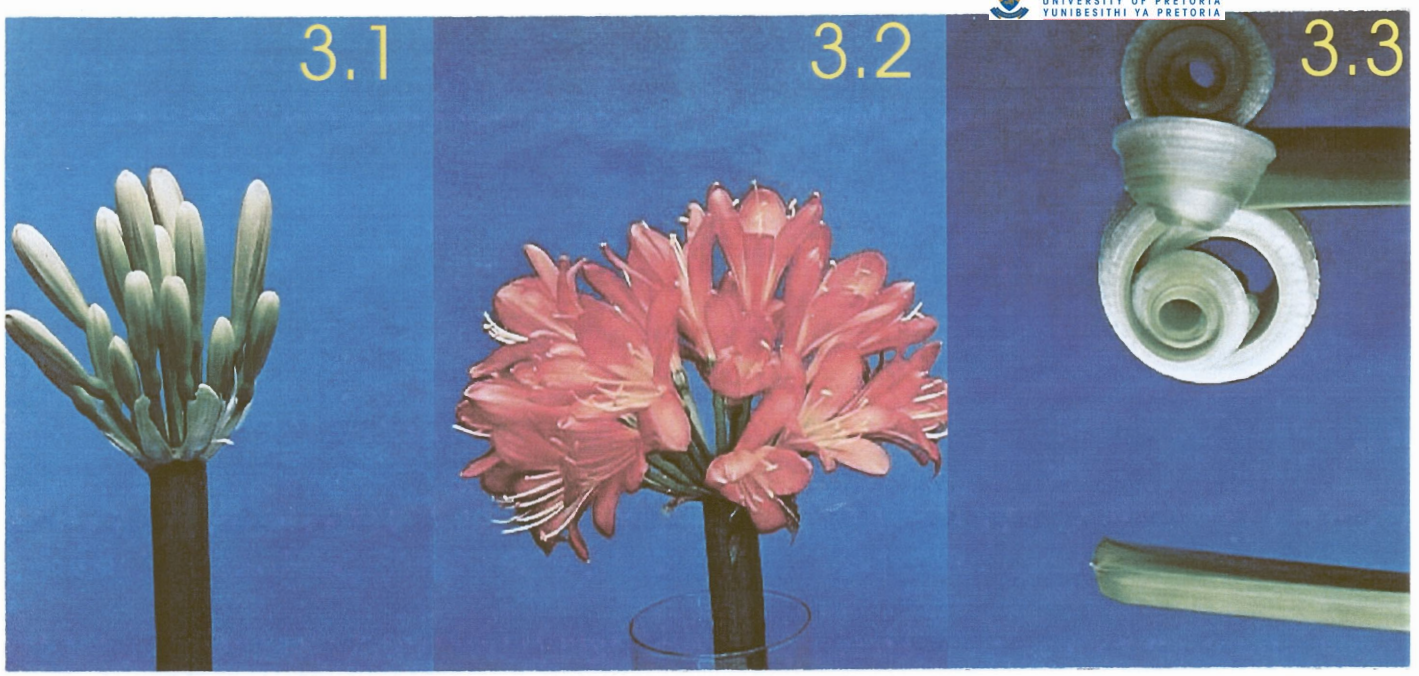

Figure 3.1 Developmental stage of *Clivia miniata* inflorescences at picking.

Figure 3.2 Colour development in *Clivia miniata* flowers on an inflorescence picked at the stage when all flowers were unopened and kept in distilled water for 6 days at 21 ± 2 °C and an irradiance of 22 ± 3.10^{-6}mol photons m^2s^{-1}.

Figure 3.3 Split (top) and unsplit (bottom) peduncles of *Clivia miniata* held in distilled water and 40g / l Chrysal AKC™, respectively.

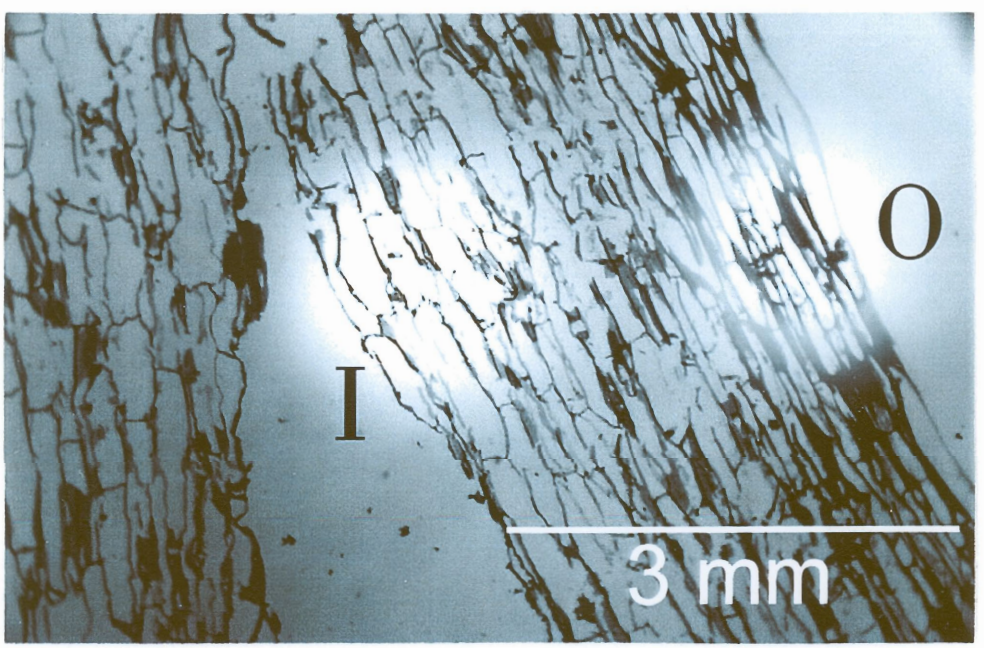

Figure 3.4 Longitudinal section of a split peduncle, showing inner (I) and outer (O) parenchyma tissues.

3.5 References

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