

CHAPTER 1

Introduction

1.1 Literature review

1.1.1 Botany and history

The genus *Clivia* Lindl. belongs to the family Amaryllidaceae and comprises 4 species; *C. miniata* (Lindley) Regel, *C. nobilis* Lindl., *C. caulescens* R. A. Dyer and *C. gardenii* Hook. f. Interspecific hybrids have been created (Lötter, 2000) but no reliable reports of successful intergeneric hybrids involving *Clivia* could be found, despite attempts at such crosses having been made (Niederwieser, 2000). The earliest report of an interspecific cross in *Clivia* dates from the nineteenth century (Groenland, 1859). The most recent report on chromosome number indicates that $2n = 22$ in all four species of *Clivia* (Ran, Murray & Hammet, 1999). *Clivia* spp. are indigenous to the eastern regions of southern Africa with a climatically varied habitat which includes coastal forest, secondary coastal dunes, inland forests and tree trunks (Winter, 2000). Many cultivated forms exist in shades of pink, orange (Glover, 1985), apricot (Smith, 1999), yellow (Morris, 1990), red (Lötter, 1998) and near white (McNeil, 1985). *Clivia* has a modular, sympodial growth form and inflorescences are produced terminally on modules. This pattern is similar to that seen in other amaryllids such as *Hippeastrum* sp. (Rees, 1985) and *Cyrtanthus* sp. (Slabbert, 1997).

Clivia has been in cultivation in Belgium for approximately 150 years where it is still grown today (De Koster, 1998a). It also enjoys popularity in China (Nakamura, 2000), Japan (Nakamura, 1998), Australia (Smith & Henry, 1998) and North America (Koopowitz, 2000).

1.1.2 Cultivation

Investigation of optimal growing conditions for *Clivia* with respect to lighting and temperature have been undertaken in Japan (Mori & Sakanishi, 1974), and Europe (Vissers & Haleydt, 1994, De Smedt, Van Huylenbroeck & Debergh, 1996). An outline of growing conditions and stages of *Clivia* production in Belgium has also been described (De Koster, 1998b). In South Africa, however, *Clivia* production is often undertaken without control of growing temperature and flowering occurs mainly from August to September. Propagation of *Clivia* occurs largely

through seed which results in heterogeneous offspring. However, amongst certain groups or strains, elucidation of the mechanism of inheritance of flower colour makes this characteristic predictable (Morris, 1990, Lötter, 1998, Tarr, 2000). Commercial tissue culture methods for clonal propagation have been developed (Smithers, 2000, Chapman, 1999) but these protocols have not been published. No reports could be found on commercial *Clivia* cut flower production and few reports exist on postharvest treatment of cut flowers (Nowak & Rudnicki, 1990, Zhang *et al.*, 1991).

1.1.3 Biochemistry and physiology

Various biochemical and physiological studies have been conducted on *Clivia*, for example an investigation of the chemical composition of endodermal and hypodermal cell walls (Schreiber *et al.*, 1999) and water relations of the hypodermis (Casado & Heredia, 1998). The structure and function of leaf cuticles has also been studied (Dominguez & Heredia, 1999) and various secondary metabolites have been isolated (Evidente *et al.*, 1999).

1.2 Aims

The aim of this project was to determine whether manipulation of growing temperature as used in Europe could be applied under South African conditions to extend the short natural flowering period of *C. miniata*. It was then felt that if better control of the flowering period could be achieved, more attention might be given to the possibility of *Clivia* as a cut flower crop. Therefore, peduncle splitting and picking stage of *Clivia* cut flowers was investigated. Cut flower cultivation or accurately programmed cultivation requires having large quantities of clonal material available. However, the success gained by following published sources of information on *Clivia* tissue culture is limited. No reports could be found on the use of paclobutrazol to stimulate *in vitro* shoot formation and this was investigated. Nevertheless, tissue culture is not always available to growers and *Clivia* collectors may be reluctant to sacrifice plant material of superior clones. As a result, another alternative was sought. The use of foliar sprays of plant growth regulators to promote shoot formation was investigated. It was felt that an understanding of plant architecture was necessary and an investigation thereof was undertaken.

1.3 References

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