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VASE LIFE STUDIES ON *VANDA* `JOHN CLUBB' INFLORESCENCES

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Freshly cut inflorescences of the orchid hybird, Vanda 'John Clubb', after a conditioning treatment were used to study their post-harvest vase life. Solutions containing silver nitrate significantly increased vase life. The hypothesis that ethylene production is the cause of the reduced vase life of Vanda 'John Clubb' is discussed.

Keywork : Ethylene inhibitor; silver nitrate; Vanda `John Clubb.

One of the main limitations of the floriculture industry is the post harvest loss during the transit from the field to the market. The use of floral preservatives is recommended during the entire marketing chain to preserve the quality of cut flowers after harvest[1]. Cut flowers are often held in holding/vase solutions containing carbohydrate as a source of energy and a biocide to inhibit the growth of *micro-organisms*[2]. Sucrose is the commonly used carbohydrate, being an excellent osmoticum and respiratory substrate[3].

The major chemical pollutant affecting the senescence of cut flowers is ethylene[4]. Orchid blossoms including those of *Vanda* hyrids are extremely sensitive to ethylene[5]. A perusal of literature revealed that very few reports are available on the use of holding solutions to increase the vase life of hybrid Vandas. Hence the present study was undertaken.

Vanda 'John Clubb' *(V. Cooperi x tessellata var. rufescens)* is an attractive free flowering Sri Lankan orchid hybrid with mauve - pink flowers, having bright crimson spotted lip[6].

Inflorescences of *Vanda* `John Clubb' having all opened flowers except the terminal bud were randomly harvested in the morning (8 am), from the Orchidarium of the Institute. They were subjected to a conditioning treatment immediately after harvest by placing the lower end of the inflorescence stalk in tap water (pH 3.0) for 2 h as reported elsewhere[7].

The conditioned inflorescences were trimmed (0.5 cm from the base) and subjected to the vase solution treatments. The vase solution (50 ml) was held in 250 ml boiling tubes. It contained 0.05% of the commerical fungicide, Dithane M-45 (Indofil Chemical Company, Mumbai) and 2% sucrose in distilled water, in addition to varying concentrations of silver nitrate ($AgNO_3$ - 10, 25 and 40 mg/l). Inflorescences, evaluated in a solution of 2% sucrose in distilled water served as control. The holding solution was replaced on every other day after trimming off 0.5 cm of the *inflorescence* stalk base, till the end of the experiment. All vase life evaluations were conducted at 28 - 30 ± 2^0 C and a relative humidity of 70 ± 10% in the laboratory. There were 5 replicates to each treatment. The average number of days taken for the appearance of wilting of the first flower (from below) was defined as the vase life of the *inflorescence.*

The longevity of the inflorescence was increased almost 3 - fold over the control by holding in vase solution containing 25 mg/l $AgNO_3$. At the lower concentration used (10 mg/1), the vase life was only twice that observed in control. With higher concentration of $AgNO_3$ (40 mg/l), the vase life did not show further increase (Table 1).

The aims of post - harvest handling methods should be to reduce physico-chemical changes responsible for deterioration of the aesthetic value of the inflorescences. The visual changes during the post-harvest period are related to the age of the flowers, upsurge in ethylene (C_2H_4) evolution and accumulation of the ethylene precursor, 1-amino-cyclo-propane carboxylic acid (ACC)[8]. The major chemical pollutant affecting senescence is ethylene. Orchid flowers[5] are particularly sensitive to ethylene which regulates the ageing[5,9,10] and

Table 1. Effect of silver nitrate ($AgNO_3$) on the vase life of *Vanda* 'John Clubb' inflorescences.

Treatment	Mean Vase Life (Days)
DW + sucrose (2%) + Dithane M-45 (0.05%)	5.2 ± 0.1
DW + sucrose (2%) + Dithane M-45 (0.05%) + AgNO3 (10mg/1*l*)	10.1 ± 0.2**
DW + sucrose (2%) + Dithane M-45 (0.05%) + AgNO3 (10mg/1*l*)	15.0 ± 2.0**
DW + sucrose (2%) + Dithane M-45 (0.05%) + AgNO3 (10mg/1*l*)	15.1 ± 2.2**

Values are the mean ± SD, n = 5, **P ≤ 0.001

senescing flowers produce their own ethylene[11]. In the orchid inflorescence, the peak in ethylene evolution coincides with the end of its decorative role. For success in the orchid cut flower industry therefore, proper management of ethylene - like pollutants in the environment of flowers and regulation of C_2H_4 biosynthesis within the flowers is cogent to gear up their keeping quality.

Significant C_2H_4 biosynthesis has been reported from *Vanda* blossoms[11]. In the present study, the significant increase in vase life of the *Vanda* inflorescences, held in vase solution containing $AgNO_3$ (25 mg/l) is perhaps due to the capacity of $AgNO_3$ to inhibit ethylene biosynthesis in flower tissue as has been reported elsewhere[12] and also because this concentration of $AgNO_3$ was optimal for C_2H_4 inhibition. Silver is known to delay the senescence of flowers including orchids[8]. Silver inhibits ethylene biosynthesis, possibly by binding to sulphydryl groups or by acting competitively[8]. Silver thiosulphate has been reported to increase the vase life of *Dendrobium* 'Jacquelin Thomas' and *D.* 'Pompadour'. Perhaps, the carbohydrate used, sucrose was at the optimal concentration (2%) and helped to prolong the flower quality as reported elsewhere[13]. However very high concentrations of sugars in flowers do not necessarily prevent senescence. Similar studies with other ethylene inhibitors like aminoethoxyacetic acid (AOA) also gave concomitant results with other orchid blossoms[14]. The mild concentration of the fungicide, Dithane M - 45 used in the study (0.05%) did not hinder the keeping quality of the flowers. At the same time, it helped to check growth of micro-organisms in the holding solution, Silver nitrate is also reported to have *microbicidal* properties in holding solutions[15] and may also have contributed to check growth of micro-organisms in the present study.

The present study thus revealed the importance of using ethylene inhibiting chemicals in the holding solution to increase the vase life of the orchid cut flower, *Vanda* 'John Clubb'

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