An Investigation Into The Economic Potential of Hypericum Production in Northern Natal.

By

Ian de Jager

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Graduate School of Business, Faculty of Management
University of Natal (Durban)

Supervisor Professor Elza Thomson

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CONFIDENTIALITY CLAUSE

1 September 2003

TO WHOM IT MAY CONCERN

RE: CONFIDENTIALITY CLAUSE

Due to the strategic importance of this research it would be appreciated if the contents remain confidential and not be circulated for a period of ten years.

Sincerely

096289

I. de Jager

DECLARATION

This research has not been previously accepted for any degree and is not being currently submitted in candidature for any degree.

Signed……

1 September 2003

STATEMENT

ACKNOWLEDGEMENTS

To my family who have stood in the gap when I have been away on study schools and during exams. Ensuring the continued smooth running of the business. Your support and encouragement is greatly appreciated.

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ABSTRACT

Hypericum is a most useful and versatile cut flower which within the last ten years has gained significant economic importance, recently having been included in the top fifty cut flowers on the Dutch Auctions. This study has investigateD the cultural requirements of the crop, focusing on the following ; propagation, insect and disease control, fertilisation, crop manipulation, marketing of the finished product, business theory and the interpretation of business theory. Propagation and multiplication techniques were investigated in order to reduce the reliance of external seedling growers and in so doing reducing the start up costs of the project. Insect and disease control were investigated as the import requirements for many countries are stringent. Contamination of the finished product results in the cargo being rejected at the port of entry. Insect and disease infestation reduce the quality and subsequently the return that is generated from the project. Fertilisation plays an important role in producing high quality stems. Failure to fertilise the crop at the correct stage results in quality degradation, or additional expenditure on labour to groom the plants. Crop manipulation was investigated for the purpose of supplying crop into the market place on a sustained basis, ensuring optimal utilisation of resources whilst building customer loyalty. Product marketing plays an integral role in determining the success of a venture. Markets were evaluated in order to determine which markets would yield the greatest return on investment. Chapter three deals with various business theories that may be applied to the data and observations. Chapter four integrates business theory with the data and observations in an attempt to gain a meaningful picture of the economic potential of this proposed venture. The last chapter deals with a proposed strategy that the company should follow, having evaluated and integrated the business theory, data and observations.

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1.1 Introduction

Growth and development of the South African floricultural export industry has not kept pace with other African countries such as Kenya and Zimbabwe, nor with developing nations in South American such as Colombia and Ecuador. A possible explanation for this is that South Africa has a large domestic market for fresh cut flowers. Petitjean (2002) notes that the highveld area around Johannesburg and Pretoria produces traditional crops such as roses, chrysanthemums and carnations in an area covering 190 hectares. The domestic market accounts for 74 percent of the sales with more than half of the production being marketed through the Multiflora Flower Auctions located in Johannesburg and Pretoria.

Pizana (2003) reports that Colombia is the world's second largest exporter after the Netherlands with exports of cut flowers totalling US$672.6 million during 2002 which is a 10 percent increase from the 2001 levels. The floriculture industry in Colombia employs 90 000 people in direct jobs.

Petitjean (2002) places Zimbabwe as the second largest exporter of cut flowers in Africa after Kenya, with 20 000 tons exported to the European Union in 2000 which is up 17 percent. Data is not available regarding the effect that President Robert Mugabe's land reform has had on the floriculture industry. Wolton (2003) indicates that a number of flower operations are still in existence but Van Niekerk (2003) stated that floriculture operations in Zimbabwe were doing well with average wage rates of around one US$ per day per labourer. Anon(a) (2003) indicates that Kenya accounts for 25 percent of all the flowers imported into the European union, valued at US$ 110 million to the Kenyan economy. According to Sayila (2002) the Kenyan floriculture industry has been expanding by 35 percent per annum since 1995 and generates eight percent of the countrys export earnings.

Anon(b) places South Africa's total horticultural exports at US$19.3 million during 2000, showing a growth of 60 percent from 1995. Table 1.1 indicates a relative market share of some of the flower growing countries. South Africa has a number of

different climatic regions ranging from subtropical to alpine. Kwa Zulu Natal (KZN) has several bioclimatic regions making it possible to grow virtually any crop known to man within the province. It is felt that the South African floriculture industry has great potential for expansion given its diverse bioclimates.

	1998 volume	share	1999 volume	share	2000 volume	share
Kenya	20.461	25	25.650	30	28.897	32
Israel	32.687	40	24.930	29	19.288	22
Zimbabwe	12.837	16	15.471	18	18.458	21
Ecuador	4.737	6	5.981	7	7.192	8
Colombia	2.052	3	2.533	3	2.921	3
Zambia	2.491	3	2.901	3	2.984	3
Tanzania	942	1	1.594	2	1.704	2
Uganda	1.056	1	1.184	2	2.135	2
Turkey	1.295	2	1.479	2	624	1
India	735	1	602	1	544	1
South Africa	786	1	868	1	879	1
Thailand	325	0	312	0	266	0
Costa Rica	321	0	320	0	243	0

Table 1.1 Dutch Imports from non EU Countries volume (x 1000kg) and share in percent (de Bruin 2002).

1.2 Background of The Research.

The Southern Hemisphere is well-positioned regarding a number of production factors important to the cultivation of floriculture crops for export (Larson 1992).

According to the United States International Trade Comission (2003) the following factors give the Southern Hemisphere countries a comparative advantage:

- Labour
- Reversed seasons
- Favourable climate
- Availability of land
- Weak currencies

Labour plays an integral part in the production of cut flowers (Hamrick 2001). One hectare of roses requires between 20 - 25 labourers, depending on the type of rose grown, with the small budded roses requiring the greater number of labourers. Most of the countries located on the African and South American continents are developing countries with an abundance of cheap, unskilled labour ideally suited to floriculture production. Armitage (1995) is in agreement. The United States International Trade Commission (2003) reports that floriculture operations in Africa have been encouraged by their governments as a mechanism to employ a large number of semi- skilled labourers, in addition to attracting US dollars to their economies. One of the key components for the success of Ecuador's cut flower industry is the low wage component of the production process. The minimum wage in Ecuador is $100.00 per month (Armstrong 2000). Anon(c) indicates that wages paid to Kenyan flower growers is more than US$50 per month, with some employers providing health and medical benefits. Most farm labour in South Africa is remunerated at between R650,00 - R1,500,00 per month as opposed to a minimum wage in the USA in excess of $5,00 per hour and a wage of more than 4,00 pounds per hour in the UK. Cheap labour is an important factor in floriculture production The Israeli floriculture sector has suffered severe strain as a result of labour shortages. Most of the workers in Israel are Palestinians but the escalation in violence has limited the free movement of labourers which negatively affects the floriculture industry (Susman 2002).

Winter in the Northern Hemisphere means that summer prevails in the Southern Hemisphere. Most plants grow actively during the summer months but become dormant or experience a drastic slowdown in growth rates during the winter months which offers excellent opportunities for export of produce to the Northern Hemisphere Nations. Floriculture production during the Northern Hemisphere is

limited during winter months due to harsh climatic conditions (Ball 1998). Vissers (2003) indicated that there is a definite gap in the market for fresh flower products such as lilies and summer flowers (also known as bouquet flowers) during the months of November through to February in Europe as the production costs and quality supplied by European growers during this time period affects the volumes on the markets. In Europe products are grown in greenhouses. However, heating and lighting costs to maintain an environment conducive to plant growth are high, limiting the variety of crops that may be grown economically (Hamrick(b) 2001).

Flower Council Holland (a)(2003) indicates that the European nations and North America are generally high consumers of fresh flowers. During their summer months they are able to meet much of their own demand pertaining to floriculture products and not relying excessively on imports to any great extent to satisfy their consumption demands. This high consumption of floral products offers an opportunity to satisfy their consumption demands during their winter months when their local supply is not able to meet their domestic demand. Table 1.2 gives the value of floriculture imports into some of the first world countries. Table 1.3 gives per capita consumption of flowers in some countries.

Pertwee (b)(2001) reports that the demand for cut flowers is increasing worldwide, especially during peak holiday demand times, so much so that the market has changed from a buyer's market to a seller's market. It is also indicated that the prices on the Dutch Auctions have risen to such an extent that domestic producers are again producing not only the traditional crops such as roses and chrysanthemums but also the summer crops, more accurately described as the bouquet flowers.

IMPORTING COUNTRY	US$(1000s) 1999	US$(1000s) 1998	US$(1000s) 1997	US$(1000s) 1996
1.GERMANY	793.776	1.058.375	1034.493	1.138.693
2.USA	734.859	761.510	749.508	696.579
3.UK	531.460	531.117	486.481	398.109
4.FRANCE	415.826	414.843	381.619	398.920
5.HOLLAND	392.256	397.326	385.385	386.038
6.JAPAN	153.040	137.395	144.046	170.844
7.SWITZERLAND /LICHTENSTEIN	142.584	145.552	148.129	171.706
8.ITALY	146.278	137.278	125.237	127.096
9.BELGIUM/ LUXEMBORG	110.010	106.418	103.183	101.415
10.AUSTRIA	97.941	97.309	103.025	102.587
11.OTHERS	507.394	516.809	526.529	504.558
TOTAL	4.025.424	4.304.581	4.188.108	4.178.545

Table 1.2. Worlds leading floriculture importers (Laws 2001).

Country	Value in Euro	Country	Value in Euro
Belgium	40.7	Norway	57.4
Holland	59.8	Austria	43.8
Denmark	39.5	Poland	7.4
Germany	39.4	Portugal	16
Finland	35.7	Russia	2.8
France	32.6	Slovenia	29.7
Greece	14.3	Slovakia	6.4
Hungary	10.7	Spain	10.7
Ireland	28.4	UK	35.7
Italy	33.1	USA	28.3
Japan	34.1	Sweden	33.8
Croatia	5.9	Switzerland	91.4

Table 1.3. Per capita consumption 2001 of flowers in Euro (Flower Council Holland (a) 2003).

Climatic conditions in most of the Southern Hemisphere nations are excellent for the production of floriculture crops. Most crops require continuous high light intensities accompanied by warm temperatures in order to grow well. These characteristics are common to most of the summer months experienced on the African and South American continents.

The cost of land in Europe is significantly higher than it is in most of the developing countries. Land is not as freely available and one only needs to look at Holland to understand why land trades at a premium. Most export cut flower projects need at least one and a half hectares of land, which in itself is a marginal operation, but most operations are in excess of two hectares. The availability of suitable land in developing countries is not a limiting factor as it is in developed countries such as Holland.

Most of the developing countries have currencies that are weaker than the First World countries to which they export. This enables them to export profitably as their input costs are significantly lower than the remuneration they receive for their products in overseas markets.

South Africa has not enjoyed the same export success as other African countries when it comes to exporting flowers into Europe. Table 1.4 gives the top exporting countries into Holland, including the value in millions of Euro. There is enormous potential for growth in exports into the European Union and the United States of America. If South Africa were to double the export of foliage , indigenous flora and fynbos , the demand would hardly be met and we would then only stand at one percent of imports into the European Union (de Bruin 2001) . The American market is also an untapped market.

Country	E Million	Country	E Million
Kenya	99	Germany	9
Israel	64	France	8
Zimbabwe	59	Belgium	8
Ecuador	35	UK	7
Zambia	16	Italy	5
Colombia	13	Spain	3
Uganda	10	South Africa	3
Tanzania	6		

Table 1.4. Principal countries exporting into the Netherlands (Pertwee (a)2001).

South Africa lags behind all of the African countries exporting into Holland including some of the European countries . Holland may be considered the centre of world floral trade .

1.3 Motivation For The Research.

Verde Auro Farming (Pty)Ltd, is a private company established in 1998 for the purpose of floriculture production, in an effort to diversify the business activities of the de Jager family, who are principally stock farmers specialising in the production of pork, beef and mutton. It was felt that in order to better withstand the turbulent cycles of meat commodity prices, diversification into a branch of agriculture that was not affected by production costs associated with food production would be a good strategy.

The company grows cut roses for the domestic market, supplying retail florists, supermarkets and flower wholesalers located in KZN and occasionally sends roses to the Multiflora Flower Auction in Johannesburg when environmental conditions result in more stems being produced than existing clients are able to absorb. Over the last year the monthly market reports indicate that the supply of roses to the Multiflora Flower Market are up with the average prices being lower than the corresponding time last year. The February (2003) Multiflora Market report reads: "Rose production was well up this February with over six million stems sold this month. Demand in general was reasonably good in particular for red roses in the period leading up to Valentine's Day but then declined for the rest of the month."

In addition, Gold Fields, the gold mining company launched a 100 hectare rose growing project at the Gardenex - Grotech exhibition 2003, Reekie (2003) indicates the first 10 hectares will come into production during the 2003/2004 growing season. It is estimated that the project will export 70 percent of its production with the balance being sold on the local market This poses a grave threat to the small scale rose grower. When in full operation, the project will grow in excess of 100 million stems per year. Assuming the production is spread evenly over the whole year this will result in 2,500,000 additional stems coming onto the local market monthly.
With the data in the above paragraphs at the company's disposal, strategies need to be implemented in order to ensure the company's survival.

Floriculture in South Africa is a relatively new branch of Agriculture as opposed to the traditional forms of agriculture such as raising beef, dairy and maize. Growing flowers and foliage offers alternative methods of utilising agricultural resources. An investigation into the factors involved in the production and marketing of ***Hypericum*** would result in an understanding being gained of the economic potential of the crop, as opposed to traditional farm products. Demand for the product appears to remain strong, with apparently good returns, hence the choice of study.

According to Flower Council Holland (b)(2003), supplies of ***Hypericum*** to the Dutch auctions has greatly increased from 57 million stems in 1995 to 199 million stems in

2000, with an average price increase during the period from 37 Guilder cents to 39 Guilder cents The resultant sales of 77 million Guilders translates into sales of 35 million Euro. This rise in numbers has resulted in ***Hypericum*** occupying eleventh spot in the top 50 cut flowers.

According to Flower Council Holland (b)(2003), the demand for ***Hypericum*** has risen due to the versatility of the product in mixed bouquets and the growing colour assortment found in the new hybrids furthering the utility of this product.

1.4 Value of The Research

Collected, processed data pertaining to floriculture crops is not readily available in South Africa. As it is a "new" field, it is hoped that having completed the study, a way forward will be found for the profitable production and marketing of ***Hypericum.*** Verde Auro Farming (Pty) Ltd in light of the mentioned threats is looking for a crop to cultivate and market profitably and is hoping that the research conducted will enable the company to exploit this crop commercially.

On the social front, the coal belt area comprising the municipalities of Dundee, Glencoe and Dannhauser suffer from unemployment in excess of 50 percent. Floriculture projects are generally large employers of labour, as the production process requires the product to be man-handled, as automation is not possible during most of the production and harvesting stages. Establishing a successful project would contribute to the social and economic upliftment of the area in which the project is located.

1.5 Problem Statement

As ***Hypericum x hybrid*** is a crop that is in demand, commanding good returns on foreign markets, would it be feasible to grow this crop in Northern Natal for the export and domestic markets?

1.6 Objectives

- On completion of this study it is hoped to identify and quantify cost components involved in the production and marketing of ***Hypericum x hybrid***.
- To determine and assess the value and potential of the ***Hypericum*** cultivars available in South Africa relative to market demands.
- The evaluation and identification of potential markets for the finished product.

1.7 Research Methodology

Literature pertaining to non traditional horticultural crops is limited, even more so for ***Hypericum.*** The authoritative book Specialty Cut Flowers (1995) by Dr A M Armitage does not even list ***Hypericum*** as a potential cut flower crop. Where possible, secondary data sources will be consulted. The internet has a limited amount of information pertaining to ***Hypericum***, with most of the hits being for sales of finished products. Primary data will be collected from persons involved in the production and marketing of the crop. It is hoped to collate this data into a meaningful format.
It is felt that this study will result in the utilisation of a number of modules from the MBA course. Where applicable, this material will be incorporated into the study.

1.8 Limitations of The Study

Where possible data will be collected on all aspects pertaining to the propagation, cultivation and marketing of the crop, time constraints imposed by the University has resulted in some of the trials not being concluded. As has been noted, data is not

readily available for the crop. Where data is inconsistent or unavailable this will be indicated in the text, as will any subsequent assumptions that are made.

1.9 Structure of The Study

Chapter two entails data collection and observations of trials and field days. Factors which would have a bearing on the economic potential are discussed, included are the following: cultivars, propagation, disease control, fertilisation and crop manipulation.

Chapter deals with business theories which it is felt are relevant to the study.

Chapter four integrates the material in chapter two with the theory in chapter three to arrive at a meaningful understanding of the data and observations contained in chapter two.

Chapter five recommends a plan of action that the company should follow having integrated business theories and principles with the relevant data .

1.10 Project and Trial Location

The project would be located on the farm "The Willows" situated in the Glencoe Magisterial district and is 10 kilometres from the nearest town Dundee which has an altitude of 1325m above sea level. See Appendix one for map location. Located in the summer rainfall area, annual precipitation is around 850mm with the last effective precipitation falling in April. September usually heralds the start of the rainy season with cool, overcast spells which may last a week. This weather usually persists into October and may extend into November. Severe thunderstorms usually occur during the months of November through to early March. Hail is a common occurrence with the possibility of a crop being written off as a result of hail damage. Severe frosts occur, with occasional snow storms. First mild frosts may be expected during the early part of May with the heaviest frosts being towards the end of May, continuing into early July. August is usually characterised by strong berg winds.

CHAPTER TWO

2.1Introduction

This chapter deals with data assimilation and is concerned with the most pertinent aspects involved with ***Hypericum*** cultivation and marketing.

Traditional floriculture projects generally require large capital outlays and a one hectare greenhouse project costing in excess of one million Rand. Table 2.1 gives the costs of setting up flower projects of some of the traditional flower crops. Barney Israelis from Veg-Tech Greenhouse Suppliers was contacted for prices on greenhouses and Halmar Taschner from Ludwig's Roses was contacted for rose plant material costs. The plant material costs for roses includes royalties at 0.85 Euro, payable six months after delivery. Wim van der End from Safropa, who are suppliers of chrysanthemum plants, indicated what the cost of plant the material would be. This cost includes royalties of R45.00 per 1000 plants. Andrew Braithwaite, who is the Hillverdia agent in South Africa supplied the cost of the Carnation plant material cuttings at one Rand each and includes the royalty fee. The amounts listed in the table do not include VAT at 14 percent.

ITEM	ROSES	CHRYSANTHEMUMS	CARNATIONS
GREENHOUSE	1600000	1400000	1400000
PLANT MATERIAL	754000	126720	200000
TOTAL	2300000	1526720	1600000

Table 2.1. Greenhouse and plant material costs of three traditional crops.

As can be seen from the table, start up costs are in excess of R1.500.000.00 per hectare. Heating, cooling, blackout and lighting costs have not been included - these will add to the cost of setting up an operation. As a result of the high set up costs involved with the traditional crops, it was decided to look for an alternative crop that would give acceptable returns whilst not being reliant on excessive borrowed capital.

Choices would have to be made between annual or perennial, non-traditional flower or foliage crops.

The following factors contributed to the decision of evaluating alternative floriculture crops other than the traditional ones:

- High capital cost with the interest rate at 15.5 percent
- Financial institutions' general unwillingness to finance floriculture projects
- Financial institutions' high requirements for collateral
- The unwillingness to supply the needs of the high collateral requirements
- Niche marketing

Annual field crops were evaluated and based on the expected returns, it was decided against for the following reasons:

- Possible oversupply of the market at time of cropping brought about as a result of the generally low input costs required to produce the crops
- Poor climatic conditions in the form of precipitation at harvest time would result in the crop being spoiled, lowering the grade and subsequent price, or rendering it totally unmarketable due to the crop being written off due to the blossoms being infected by ***Botrytis cinerea***
- Changes in consumers' tastes, as what is popular this season may not be so during the next season
- Unpredictable germination levels of sown seed resulting in land not being fully planted. Prior to sowing, the crop is generally marketed and a poor stand would result in non delivery of product to clients, causing client dissatisfaction

Hypericum spp. is a large genus composed of approximately 300 herbaceous plants, trees and shrubs some of which are evergreen, although mostly deciduous (Pienaar 1996). These plants are usually found growing in the temperate regions of the world, with South Africa having one indigenous variety, ***Hypericum revolutum*** (Pienaar

1987). Most noticeable of the genus are the bright yellow sepals and the masses of yellow stamens which characterise the blossoms. See Figure 2.1.

Hypericum perforatum has featured extensively in folklore over a number of centuries. Superstitions such as gathering it on St John's Eve with the dew still on it in order to find a husband, or as a childless wife gathering it whilst naked to ensure speedy conception. More importantly, this species has been found to have antidepressant qualities without the side effects experienced with conventional medication. In Germany, a medical licence has been granted where it is widely prescribed for depressive states, outselling Prozac eight times over (Bird and Houdret 2000).

Figure 2.1. Floral detail of *Hypericum spp.*

Of interest to the cut flower industry are ***Hypericum androsaemum, Hypericum inodorum*** and their hybrids. According to the Flower Council Holland these two varieties are closely related, with ***Hypericum androsaemum*** having round fleshy red berries and ***Hypericum inodorum*** having elliptical orange/red berries. In hybrids

produced using these two varieties, berry shape and colour tend to blur. Flower Council Holland indicates that the ***Hypericum spp.*** used in horticulture originated in Western Asia (Bulgaria, Turkey) and was first cultivated in the Netherlands in 1594.

2.2 Climatic Requirements

Hypericum is a versatile crop and according to Ball (1998) is hardy down to zone 5 on the International Plant Hardiness Zone Map, indicating that the crop is able to withstand temperatures in the range of -6 to -12°C, according to Pienaar 1998 the project location falls in zone 9 which has as its lowest average annual minimum temperatures -1 to -7°C Celsius. This temperature range is well within the required temperature range required for ***Hypericum x hybrid*** crop production. Mature leaves do not suffer from damage as a result of hoarfrost, leaves below the apex showed signs of slight withering after hoarfrost conditions, with the growth tip being killed off. See Figure 2.2 for hoarfrost damage.

Figure 2.2 Hoarfrost Damage to *Hypericum*, note the blackening of the growth tip, signalling the death of the shoot.

Mature berries are not able to tolerate heavy frost they shhrivel and turn brown making them unsaleable. The harvest period at project location would thus have to be complete by the end of May before heavy frosts occur. See Figure 2.3 for frost damage to mature berries.

Figure 2.3. Frost damage to mature berries.

2.3 Protective Structures

The project location being in a hail belt would necessitate the erection of a suitable structure to keep hail off the developing crop. Treated timber poles, shade cloth, and wire structures work well, these are relatively inexpensive structures to erect. Table 6 gives the costs associated with erecting a one hectare project.

Item	Cost
Shade Cloth	R30.000.00
3.15mm Wire	R5.000.00
Cement/Stone/Sand	R6.000.00
Treated Poles	R6.000.00
Labour	R20.000.00
Steel Anchor Rods	R500000
Total	R82.000.00

Table 2.2. Shade house Costs.

2.4 Propagation

Planting stock to fill commercial fields is one of the largest costs that is associated with floriculture projects. Seedlings cost from R0.40 to R3.50 depending on the crop being grown. ***Hypericum*** seedlings were quoted at R0.40 per seedling from various propagating companies within South Africa. A one hectare ***Hypericum*** project would require 166.750 seedlings to fill the projected planting area, assuming that the net area planted is 6.670m^2 allowing for paths and walking space. At a cost of R0.40 per plant, material would cost R66.700.00.

Table 2.3 indicates the costs incurred should one decide to propagate ones own seedlings in a 300m^2 propagating house which would enable one to raise enough seedlings in order to complete the planting of the field in one manoeuvre.

ITEM	**COST**
40% shade cloth	R3000.00
Creosote Poles	R500.00
Wire	R280.00
Labour for structure construction	R1000.00
Propagating Mixture	R2000.00
Pump, piping and microjets	R5000.00
Labour to prepare and stick cuttings	R6000.00
Fungicides for drenching	R5000.00
Plant material	R15.000.00
Total	R40.000.00

Table 2.3. Showing the costs associated with propagating cuttings for a one hectare project.

Being hybrids, cultivars are propagated vegetatively. Vigorously growing shoots should be selected that have not yet begun to lignify. Trials conducted on various types of plant material indicated that the middle sections of the stems (Figure 2.4) consistently provided the best material for propagating, using a very simple propagating unit. Lower stem portions that showed signs of lignification proved to be the most unsatisfactory material for propagation as this material was reluctant to callus with subsequent poor root formation. Figure 2.5. shows lignified stems.

It was noted that cuttings taken from lower stem portions did not produce roots at the bottom cut portion of the stem furthest away from the leaves. Instead they produced roots along the stem and at the juncture of the leaves to the stem. Roots produced along the stem were few in number and lacked the vigour of the roots that were produced from the callus formed at the base of the cutting.

Figure 2.4. Mid sections of stems providing the best cuttings.

Figure 2.5. Lignified stem portions producing cuttings that rooted poorly.

Plants resulting from lignified cuttings, as a result of delayed rooting and accompanied by the lack of vigour of the roots, did not grow as quickly as the plants grown from younger material taken from the upper two-thirds of the stem. It was noted that bud development in the leaf axils on the lignified cuttings were also slow to develop.

Retarded bud development accompanied by poor root development resulted in the developing plants from lignified portions of stems being shaded over by the more vigorously growing cuttings produced from the upper two-thirds of the stem. As a consequence, poor quality seedlings were produced which, when transplanted into the field, lagged behind or died. When planting beds, one strives to plant a homogenous stand as the subsequent crop development is more even. Cuttings produced from the lower third of the stems resulted in time and labour being wasted in an attempt to sort seedlings into well-developed and less well-developed seedlings.

Cuttings taken from the two nodes below the tip as well as the tip cuttings, did not perform well under the conditions provided by the simple propagation structure employed. These cuttings were found to wilt and dry up when placed into the propagating beds, as the leaves were soft and had not yet hardened sufficiently. It was also found that these cuttings did not penetrate the rooting medium when inserted as the stems were too soft and subsequently snapped or failed to make adequate contact with the rooting medium. According to Margariet Kroon, from Kroon Konsulteringen, softer types of cuttings perform well under conditions of a mist propagation unit. According to Van Niekerk(2003) Mist propagation units cost between R60.00 and R80.00 per square metre, and are only feasible if commercial propagation is undertaken with the view of supplying rooted plants to other growers.

Healthy cuttings from the mid section of the stems having been placed into the propagating beds at a density of approximately 1000 cuttings per square metre, callused after seven days with the first adventitious roots being visible after 10 days. At around 14 days auxillary buds in the leaf axils began developing, with plants ready to transplant into the field at six weeks after having been stuck.

Transplanting into the field involves removing the rooted cuttings from the rooting beds using a spade and then dividing them into individual plants. During this process, severe stress is placed on the seedling as many of the roots are severed during the separation process. Chrysanthemum netting was placed on the prepared beds, into order to get an even planting spacing of 25 plants per net square metre. Holes are dug in the soil which was has been irrigated to field capacity in order to reduce the moisture stress experienced by the transplants. It is important to dig the holes deeply enough so that the roots of the transplant hang down into the hole and are not bent upwards when the seedling is transplanted. Planting seedlings with the roots bent upwards is called "J" rooting and results in the poor development of the transplanted seedling. Seedlings are then watered in ensuring that no air pockets remain around the roots which would inhibit the roots making contact with the soil, resulting in the retarded growth or death of the seedling, due to reduced water and nutrient absorption.

An alternative method of propagating would be to stick the cuttings into seedling trays filled with a suitable growing medium. Seedlings produced in this manner would have their root balls intact at time of transplanting reducing the stress on the transplanted seedling. This is a costly propagation method as propagating trays are expensive.

The first batch of cuttings were not treated with any fungicides and grew well for a period of four weeks, then damping off spots began to develop. Plants were treated with an array of fungicides in an attempt to curtail the development of the disease. Once established ***Rhizoctonia spp.*** was found to be difficult to control. The benzamidazoles proved to be satisfactory in halting the spread of disease. 50% of the first batch of cuttings was lost due to ***Rhizoctonia spp.*** Plants transplanted into the field appeared to take well and it appeared as though the ***Rhizoctonia spp.*** was no longer a factor. After a four week period it was noted that seedlings transplanted into field positions began developing anthocyanin pigmentation, indicating that the ***Rhizoctonia spp.*** infection had returned. Plants were drenched with Topsinflo® which curtailed the development of the disease. Figure 2.6. Shows ***Rhizoctonia spp.*** infection.

Figure 2.6. *Rhizoctonia spp infection* in a seedling bed.

An alternative method of propagation was demonstrated at Thokoza Flower Farm located in the Albert Falls area of KZN. This method involved the selection of plant material as described in the preceding paragraphs. Cuttings consisting of two nodes were made, with the lower pair of leaves removed. See Figure 2.7. These cuttings were then stuck into the field and covered with a light layer of hay. Overhead sprinklers were used to keep the cuttings watered. Excellent growth was obtained Figure 2.8 shows a plant produced from cuttings stuck in this manner. The plant produced is from a cutting which was stuck during the second week of May 2003.

Figure 2.7. Cuttings consisting of two nodes for direct sticking.

Figure 2.8. Plants propagated from cuttings stuck directly in the field.

Direct sticking has a number of advantages and it is believed that it is a technique that needs to be exploited. By sticking directly, labour costs are reduced due to less handling involved during the seedling production stage using conventional seedling beds. Sticking cuttings directly reduces the need to transplant seedlings into the field.

Plant development is enhanced when direct sticking methods are employed. Rooting takes place directly into the final growing medium, resulting in a healthy root system colonising the final growing medium at an early stage. As a result of not having to transplant seedlings into the field from propagating beds, root damage of the seedling is reduced to nil. Consequently, no stress is placed on the seedling at any stage of the seedlings' actively growing stage. Reduced stress on the seedling promotes faster growth as the seedling does not have to regenerate a new adventitious root system to compensate for the root mass that was lost during the transplanting stage.

Plants grown by the direct stick method will come into production faster than plants transplanted from seedling production beds. Shoots that develop from direct stuck cuttings do not have to go through the stress that shoots from transplanted shoots have to go through, and consequently remain in a vigorous vegetative state. The two to three week stress period of having to settle down into the new environment is thus eliminated. Plants produced from direct stuck cuttings results in the developing shoots being the primary stems that are cut during the first harvest. It would appear as though less thinning of adventitious shoots needs to take place as apical dominance remains in place at all times. Trials would have to be conducted to verify this observation. Direct sticking is almost 28 percent cheaper than using seedling beds. Table 2.4 compares the cost of direct sticking versus production in a cutting bed.

ITEM PER 10 000 CUTTINGS	SEEDLING BEDS	DIRECTL STUCK
Plant Material	R900.00	R1.800.00
Labour	R300.00	R300.00
Propagating structure	R1.500.00	
Growing medium	R200.00	
Total	R2.900.00	R2.100.00

Table 2.4. Cost comparisons of direct sticking versus seedling beds.

The first batch of cuttings were transplanted to the field position when 15-20cm tall. This proved to be an unsatisfactory length as severe strain was placed on the transplanted cutting as the damaged root system resulting from the transplanting process had to support a large number of transpiring leaves. Tall cuttings, it was found, lost most of the lower leaves resulting in an unbalanced "feather duster" plant with the stems lignifying. Should these stems be left to flower, the finished product would have bent stems lowering the grade of the product. Consequently, the tall plants needed to be pinched. Pinching was carried out by removing the top two pairs of leaves and a bud. This action resulted in the loss of apical dominance leading to the development of adventitious buds. This adventitious bud development it was noticed occurs primarily near the apex of the plant. Figure 2.9 indicates the effect of pinching. Pinching is an additional cost.

Figure 2.9. The effect of pinching a tall plant, note the development of auxillary shoots.

Seedlings transplanted at the correct stage during the growing season in an area experiencing severe frost or an area experiencing mild winters, are able to give a quality, single-stemmed crop if they are not pinched. This would result in a quicker return on investment. Subsequently the plant will be at full production stage. Figures 2.10 and 2.11 show plants transplanted at the correct stage and the development of plants transplanted at the correct stage.

Figure 2.10. The correct stage of transplanting seedlings from seedling beds.

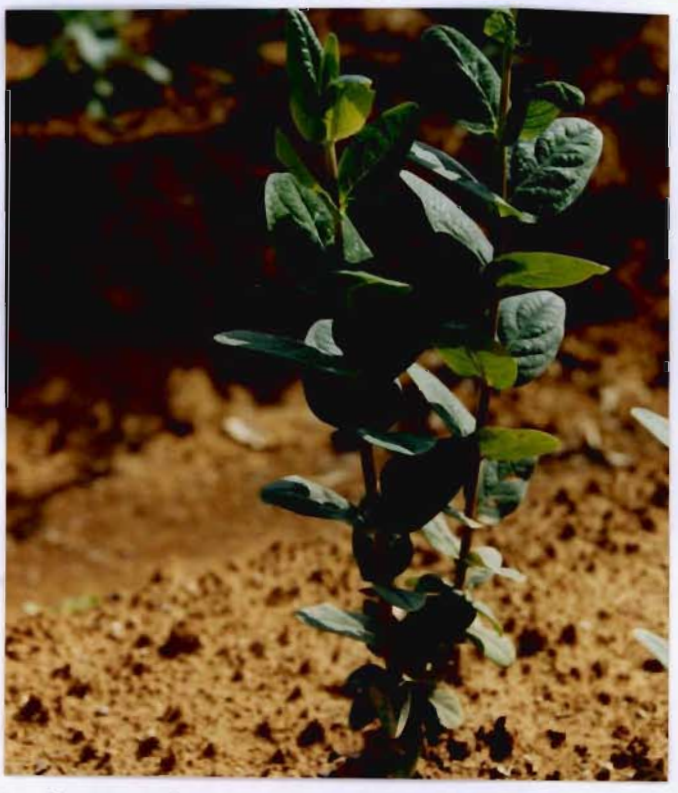

Figure 2.11. Plant development from a seedling transplanted at the correct stage.

Pinching a crop gives rise to several stems, which need to be thinned, leaving at the most, three stems per vigorously growing plant. Two stems being left on plants with less vigour. A four to six week delay in harvesting may be experienced with pinched plants. accompanied by the delay, is the additional cost of thinning the stems to the required number. Figure 2.12 shows plants before and after a thinning.

Figure 2.12. Plants on right hand side thinned, plants on left hand side before thinning.

Plants on the project location were pinched during the last week of April, with the result that subsequent bud development was considerably slower due to the lower temperatures associated with the advent of winter. During the second week of July it was noted that strong basal shoots emanating from below the ground were being produced by the pinched plants. See Figure 2.13. Due to time constraints placed on the completion of the dissertation the performance of these basal shoots can not be evaluated for production purposes. From appearances, these basal shoots have the potential of producing extremely high quality stems, which would make pinching transplanted seedlings in an area experiencing severe frosts a viable option.

Figure 2.13. Strong basal shoots emanating from below ground.

Subsequent to the infection of the first batch of cuttings, beds were drenched immediately after sticking with a fungicide cocktail. Rooting beds were thereafter drenched every week with a mixture of fungicides. This treatment resulted in no new infections in the rooting beds. Plants produced using the fungicidal drench routine did not develop ***Rhizoctonia spp.*** infections in the field. After the initial batch of seedlings was transplanted, it became standard practice to apply Topsinflo® to the planting hole prior to the seedling being planted, resulting in "puddle" planting of the seedlings. Transplanted seedlings were drenched after planting with the same solution. Mortality rate using this method of planting resulted in a less than one percent loss as opposed to a 15 percent loss when seedlings were not treated. Apart from the loss of the seedlings to ***Rhizoctonia spp.***, the spread of disease through the soil to healthy plants appeared to have been curtailed.

Adriaan Conradie of Thokhoza Flower Farm experienced similar problems with ***Rhizoctonia spp***. Instead of applying conventional fungicides, biological alternatives

were tried. ***Trichoderma spp.*** was applied and this is a beneficial organism which colonises the root system making it more difficult for harmful pathogens to colonise and attack the root system, leading to the death of the plant. Adriaan reports that treatments with ***Trichoderma spp.*** resulted in effective control of the disease. Having pulled up plants that were infected prior to treatment, masses of brown roots were observed, instead of the healthy creamy white roots that should have been present. Having been treated with ***Trichoderma spp.***, more plants were pulled up. These plants showed excellent adventitious root growth indicating that the ***Trichoderma spp.*** treatment was successful. Table 2.5 gives the cost of conventional fungicides as opposed to biological alternatives.

	BIOLOGICAL	**CONVENTIONAL**
Topsinflo		R1370.00
Trichoderma spp.	R172.00	

Table 2.5. Cost comparisons of conventional versus biological control agents.

2.5 Lighting

Light is necessary for plant cell growth, primarily in the photosynthetic process whereby light energy is transformed into carbohydrate energy through the action of chlorophyll and enzymes. Light also has an influence on the physiognomy of some plants, causing them to change from a vegetative growth stage to a generative growth stage. Vegetative growth results in the accumulation of plant biomas as a result of stem lengthening and thickening with the subsequent addition of new leaves on the stems. Generative growth results in the cessation of meristem elongation through the formation of flower buds which halt stem elongation. Stems may continue to elongate should a bud in the leaf axil below the inflorescence commence with growth. Changing from a generative to a vegetative growth stage or vice a versa is dependent on the total number of hours of light and darkness to which a plant is exposed during a 24 hour cycle.

Plants may be classified into three categories :

- Long day plants eg ***Hypericum spp.***
- Short day plants eg ***Euphorbia pulcherrima***
- Day neutral plants eg ***Zea mays***

According to Raven, Evert and Eichhorn (1996) plants contain a pigment which is interconvertible and exists in two forms. This pigment is called phytochrome: the two forms being P_r and P_{fr}. These pigments are primarily responsible for the regulation of the plant's response to light. When P_r absorbs a photon of red light of 660 nanometres it is converted into P_{fr} in a matter of milliseconds. Similarly when P_{fr} absorbs a photon of far red light of 730 nanometres it is very quickly converted into the P_r form. P_{fr} is the biologically active form and the presence of P_{fr} will determine wether a long or short day plant will blossom or not.

Raven, Evert and Eichhorn (1996) intimate that natural light results in a ratio of P_r : P_{fr} of 40:60. At the end of a day, the P_{fr} steadily declines over a period of several hours. For ***Hypericum spp.*** to flower, P_{fr} needs to be present. The only way of ensuring that P_{fr} is present is to illuminate the crop, ensuring that P_{fr} levels remain elevated for the greater part of the day. According to the company Bartelsstek, who are experts in the field of floriculture, 18 hours of illumination per day will result in the crop flowering . Ball (1998) suggests that 20 hours of light be given to the crop until flowering is complete. ***Hypericum*** growers in Zimbabwe and South Africa have found that a light period of 18 hours is sufficient to get the crop flowering during the summer months.

Temperature has an influence on the time period from commencement of illumination until flower set. This observation is as a result of an apparent quicker flowering response during the months of December, January and February (Symondson 2003). No scientific data as yet exists to corroborate this observation.

2.6 Advantages of Lighting

Hypericum x hybrid when grown as a commercial crop, will produce only one flush per season if additional lighting is not supplied. Areas experiencing zero or light frost may produce 2.5 to 2.8 crops per year. Where severe frost occurs, two flushes per year may be harvested should additional lighting be supplied. Lighting a ***Hypericum*** crop has the following advantages:

- More stems per square metre per year
- Sustained production
- Better prices for the product
- Optimal utilisation of facilities and resources
- Less wastage

2.6.1 More Stems Per Square Metre Per Year

Hypericum commences with active growth during the middle of July, reaching a height of 20 -30cm at the end of August. Ball (1998) suggests that the crop should receive additional light when it reaches a height of 30 - 40cm. Lighting the crop at this stage will result in the crop flowering six to eight weeks later, with the berries ready for harvest three to four weeks later. This will result in the crop being harvested during November/ December. Harvesting persists for approximately three weeks. Once the crop has been harvested, the plants are cut back and allowed to shoot again.

Five to six weeks later, the crop is ready to be given lighting as the shoots will have reached the required length. The cycle is then repeated. Areas experiencing severe frost will aim to complete harvesting during the last week of May as the berries are scorched by frost rendering them unsaleable. Table 2.6 gives a comparison of stems produced per square metre when given additional lighting, as opposed to flowering naturally in an area experiencing severe frost. From the second year onwards, production remains constant. Plants are pulled up at the end of year three. Production

is 100 percent greater using lights, thus from a production point of view it is more favourable to light the crop as production is significantly greater.

YEAR 1	STEMS PER m^2 WITH LIGHTS	STEMS PER m^2 WITH NO LIGHTS
First flush	50	50
Second flush	100	0
YEAR 2		
First flush	100	100
Second flush	100	0
YEAR 3		
First flush	100	100
Second flush	100	0
TOTAL	550	250

Table 2.6. Comparison of stems produced with lights and with no lights.

2.6.2 Sustained Production

Consistency plays an important role in the marketing of floricultural products. Wholesalers tend to pay a slightly higher premium for growers' products that consistently appear on the market, especially if the crop is marketed via an auction. By lighting a ***Hypericum*** crop in sequential stages, berry production is ensured over a long period of time. Should the crop be broken up into blocks, with the lighting of additional blocks every three weeks, harvesting will be sustained ensuring the constant availability of the product to one's clients, resulting in a higher premium being paid for the product.

2.6.3 Better Prices For The Product

As has been mentioned in the above paragraph, a premium is generally paid for consistency. Apart from this, the floriculture industry is affected by public holidays and national celebrations with which flowers are traditionally associated, Valentine's Day and Christmas are two prime examples. During Valentine's Day, floral products are generally purchased by people who do not regularly purchase floral products, thus driving up the demand. As an illustration, the wholesale price of flowers during the week preceding Valentine's Day are between 100 percent and 400 percent higher than the average prices paid. From a marketing point of view, it would make sense to capitalise on this increased demand by supplying a product into the market when prices are at a premium.

Allowing for environmental influences, an ***Hypericum*** crop which is lighted during the last week of November will be on time for Valentine's Day. Alternatively, a crop which is lighted at the end of February will be ready for Mother's Day, another time when floral products are in peak demand.

2.6.4 Optimal Utilisation of Human Resources, Facilities and Resources

Floriculture operations generally require staff that are more highly trained than other agricultural operations. As a result of the sequential lighting of an ***Hypericum*** crop an operation would be able to best utilise the trained staff members it has at its disposal. The most critical part of any floriculture operation is from the time the crop is ready to be picked until the crop is boxed and ready to be dispatched to the market or client.

Floriculture crops generally are delicate commodities that suffer readily from breakages and bruising. Standing in the field, the crop may be of choice grade, (the highest grade possible). However through poor picking and handling practices in the field, the quality may be reduced to first grade. Arriving at the packing shed, if the crop is again poorly handled, this could result in the grade being dropped to second grade. There is generally a price premium of 40-50 percent between first grade and choice grade and a

price premium in excess of 100 percent between choice and second grade. As a result of scheduling the crop using sequential lighting regimes, one should not have the problem of staff who are not used to handling the crop through the various stages through which it passes. A one hectare ***Hypericum*** being allowed to flush naturally would produce in excess of 600 000 stems, which would need harvesting during a three week period. This is clearly a challenge.

Transport and storage would pose an additional problem. Assuming the crop was successfully harvested with no loss of quality, storage space in the packing and grading shed for the harvested product would not be available. Assuming a work week of six days for the three weeks during which the natural crop would be harvested, would require cold room space $68m^2$, assuming each bucket holds 100 stems and that five buckets occupy $1m^2$.

Flower boxes are 1.5m x 0.5m x 0.3m and have the ability to hold 600 stems of ***Hypericum.*** A natural crop would result in $75m^3$ of transport per week being required to transport the boxed crop to point of sale. Table 2.7 compares some of the more important factors that need to be taken into account when deciding on weather to add extra lighting for a ***Hypericum*** crop as opposed to picking a lighted crop cycled over a 12 week cycle.

The following assumptions are relevant to the table:

- 20 Labourers per hectare of ***Hypericum*** - Industry norm, extrapolated for non lighted crop
- 600 packed stems per box
- 50 percent of the staff are involved in picking
- Total crop harvested within three weeks

As can be deduced from the table, the capital requirements involved in running a non lighted crop will be significantly higher than a lighted crop when it comes to harvesting and handling the crop. Apart from the greater capital expenditure, labour would only

be able to hone their skills for a three week period out of a one year cycle. Some of the labourers would have to be re taught causing a cost factor to be brought against management's time. Once the crop has been harvested the labour force would have to be sent home with only a few labourers remaining to weed and maintain the plantation until the next harvest.

FACTOR PER THREE WEEK PERIOD	LIGHTED CROP	NATURAL CROP
Trained Staff	20	80
Buckets Per Day	83	200
Transport Per Week	$22.5m^3$	$75m^3$
Cold Room Space Per Day	$17m^2$	$67m^2$
Secateurs For Picking	10	40
Boxes Shipped	250	1000
Stems Picked Per Week	50000	200000
Area Picked	$2500m^2$	$10000m^2$

Table 2.7. Comparison of the requirements needed to handle a lighted and non lighted crop.

Attempting to grow a non-lighted crop is not practical. The question remaining is how to light the crop in order to ensure sustained and extended picking.

2.7 Light Sources

Floriculture utilises a wide range of light sources for the lighting of crops. A distinction needs to be made between photoperiodic lighting and photosynthetic lighting. Photoperiodic lighting is applied to crops in order to extend day length whilst photosynthetic lighting is used to enable the plant to continue with the process of photosynthesis during periods of low-light levels when photosynthesis would not be possible. ***Hypericum*** cultivation requires photoperiodic lighting in order for the plants to flower during periods of short day lengths.

2.8 Lamps

Collecting data on lamps and luminaries was tedious, as most of the lighting engineers were loath to return phone calls, alternatively they said that they had no experience in the horticulture industry and that data was not available.

According to ESKOM the following lamp types contained in Table 2.8 are used in horticulture.

LAMP TYPE	ECONOMIC LIFE IN HOURS	RECOMMENDED APPLICATION
Incandescent	1000	Photoperiodism
Metal Halide	8000	Photosynthesis
High Pressure Sodium	12000	Photosynthesis
Fluorescent	7500	Photoperiodism
High Pressure Mercury	12000	Photosynthesis

Table 2.8. Radiation characteristics of lamps used in horticulture (ESKOM 1994).

Bartelsstek (2002) indicates that the lighting regime used during the vegetative stage of chrysanthemum production is sufficient for Hypericum production. Ball (1998) recommends the use of incandescent lights for extending day length when producing chrysanthemums. Table 2.9 gives the lighting arrangement for chrysanthemums.

Number of 1.2m beds	Bulb spacing (m)	Watts
1	4	60
2	6	100
3	6	150

Table 2.9. Lighting arrangement for Chrysanthemums Ball (1998).

The following factors apply to Table 2.9:

- All bulbs are 1.5m above the soil
- A single row of lights, irrespective of the number of beds

The lighting arrangement using 150W bulbs spaced 3.6m x 1.8m on a one hectare project would necessitate using 1544 bulbs. According to Ball(1998) the following characteristics are attributable to the following light sources:

2.8.1 Incandescent

- Incandescent lights emit light primarily in the far-red range
- 6.5 percent of electrical energy is converted to light energy
- They have a short life span of approximately 10 percent of the life of a fluorescent light
- Initial investment costs are low

Kroon (2003), indicated that 150W incandescent lamps spaced 7m x 2m resulted in trial plants of the Magical series flowering.

2.8.2 Fluorescent

- They have a better spectral balance than incandescent lights
- Lamp life is longer than incandescent
- The large fixtures cause shading problems
- Fluorescent lamps are significantly less efficient than high intensity discharge lamps. The growing efficiency being 0.83 per watt compoared to 1.77 for a 1000W high pressure sodium (HPS) lamp
- Lamp degredation is more than three times higher for fluorescent lamps than for HPS.

2.8.3 High Pressure Sodium

- Considered the best artificial light source as they supply more photosynthetic light per unit of electricity than other light sources
- These lamps degrade slowly, having a longer useful life than most other lamps
- The compact nature of the lamps results in fewer shading problems

From field days it was noticed that this was the lamp most commonly used with a total of 40 lamps and luminaries per hectare, raised approximately 10m above the ground. Figure 2.14. Shows an ***Hypericum*** field with HPS lamps using a High Bay luminary.

Figure 2.14. Hypericum field with High Bay HPS lamps.

2.8.4 Metal Halide

- White light similar to daylight is emitted
- These lamps provide the best spectral distribution of all lamp types with more reds, far-reds, and blues than HPS
- They are, however, less cost efficient being shorter lived than HPS
- These lamps have an energy conversion efficiency of 120 to 125 lumens per watt of electricity consumed as opposed to 135 to 140 lumens obtained by HPS

2.9 Cultivars

Numerous cultivars exist, the most important being ***Hypericum x hybrid*** Pinky Flair, and ***Hypericum x hybrid*** Excellent Flair. These cultivars were bred by van den Bosch in Holand. Other breeders in the Netherlands have begun showing an interest in breeding ***Hypericum*** cultivars. The Magical series by Kolster have recently been introduced to the market. Plant material of the new and existing varieties were planted into trials and only varieties that were available in South Africa were trialled. Other cultivars are available, apart from those listed. Obtaining plant material for these cultivars was not possible due to budgetary constraints.

Berry colouration, it was found, in the Magical series, was not consistent with the colours illustrated in the brochures from the breeders. Berry colouration in the brochures was more vibrant and rich. It is a known fact that cut flower crops produced in different continents sometimes produce colours that are not in keeping with the original colour as described by the breeder in the Northern Hemisphere. In some cases the colours are enhanced. According to Jeff Tarr, the rose Noblesse has the best colour in Africa and as a consequence most Noblesse production takes place in Africa. It would be foolish to plant an area to a single cultivar based on prices alone, as the variety may have the wrong colour, resulting in poor prices in the market place thus reducing the economic potential of the project. Table 2.10 lists the cultivars and the colours that they represent, at time of writing, that were available in South Africa.

CULTIVAR	COLOUR
Excellent Flair	Red/Brown
Pinky Flair	Pink
Magical Beauty	Creamy Pink
Magical Red	Red
Magical Pink	Pink
Magical Orange	Orange
Magical Giant	Deep Red/Brown

Table 2.10. Cultivars available in South Africa at the time of writing.

Lime green cultivars exist but they have poor growth habit and further breeding needs to be done in order to improve the characteristics of the product before it will be acceptable to the market.

Excellent flair plants were observed at Woodlyns Horticulture (Pty) Ltd located near Pietermaritzburg, as well as to plants grown on the premises of Casa Flora (Pty) Ltd. Plants at Woodlynns Horticulture were at various stages of growth, from newly transplanted plants to mature stems, ready for harvest. Casa Flora's plants were mostly newly transplanted with transplanting into the field position having commenced at the end of March 2003. Trial plants of the Magical series were observed on the premises of Casa Flora, having been transplanted to the trial house during the second week of February 2003. Plants were visually assessed with regards to growth and comments and observations reflect their growth on the premises of Casa Flora and do not necessarily reflect the true characteristics of the cultivar. It is felt that these observations are relevant as the trial plants were given the best possible treatment and consequently reflect the potential of the cultivars on the premises of Casa Flora. The following characteristics were found to be pertinent to the listed cultivars in table 2.10:

2.9.1 Excellent Flair

A very vigorous variety with red brown berries responds well to water and fertiliser by producing thick stems and large dark green leaves on long internodes. In the

propagation beds it was found to be susceptible to ***Rhizoctonia spp.*** This cultivar is susceptible to rust. This is the most planted variety after Pinky Flair, and preceded Pinky Flair. Excellent Flair is a free variety in that no royalties are payable on the marketed finished product and as a consequence, most growers who desire to plant Pinky Flair first have to master the art of growing Excellent Flair before they are given the opportunity of growing Pinky Flair. Table 2.11 indicates prices paid for various stem lengths of Excellent Flair in addition to the number of stems sold. Data is for the Naaldwijk Auction in Holland. Figure 2.15 shows Excellent Flair berries.

Stem Length	Stems Sold 2003	Average Price	Stems sold 2002	Average Price
0	8100	0.162	49.890	0.181
30			14.740	0.033
35			21.010	0.05
40	67.100	0.045	869.120	0.094
45	3.125	-0.006	74.065	0.086
50	372.675	0.074	3.358.070	0.128
55	16.400	0.059	130.755	0.129
60	917.705	0.078	3.880.235	0.154
65	8.900	0.078	102.175	0.162
70	554.365	0.1018	3.206.185	0.19
75	1.800	0.056	21.640	0.151
80	231.430	0.175	1.770.860	0.22
85			3.420	0.321
90	59.600	0.34	205.040	0.322
100			1.300	0.257
Total	2.241.200	0.101	13.708.505	0.163

Table 2.11. Sales data for Excellent Flair sold at Naaldwijk Auction 2003, 2002.

Figure 2.15. Choice Grade Excellent Flair berries.

2.9.2 Pinky Flair

This cultivar is the most in demand internationally as well as locally. This cultivar is a registered variety with royalties payable on the finished product. In Holland, this variety may only be sold through the Marginpar Group who have exclusive right to the variety. Any grower wishing to plant this variety needs to first grow Excellent Flair successfully before they will be allowed to grow Pinky Flair in order to maintain the finished product's quality to a uniform high standard. Excellent marketing, accompanied by strict control over the number of hectares planted to this cultivar, has resulted in demand outstripping supply. This pink variety remains the best pink cultivar available. Growth characteristics are similar to Excellent Flair. Table 2.12 gives sales data for Pinky Flair at Naaldwijk Auction 2003, 2002.

Stem Length	Stems Sold 2003	Average Price	Stems Sold 2002	Average Price
0			9.650	0.424
30			26.440	0.058
35			11.700	0.05
40	354.475	0.107	1.666.745	0.132
45			2.025	0.122
50	917.625	0.128	3.636.400	0.205
55			20.500	0.215
60	1.125.150	0.154	3.463.420	0.251
65	2.700	0.09	39.100	0.277
70	513.525	0.18	1.756.480	0.305
75			27.985	0.482
80	292.925	0.255	1.236.230	0.37
85			6.750	0.514
90	1800	0.292	210.100	0.389
TOTAL	3.208.200	0.155	12.113.525	0.243

Table 2.12. Pinky Flair Auction Data for Naaldwijk Auction 2003, 2002.

2.9.3 Magical Red

A promising cultivar, with the rust resistance found in Magical Beauty. This cultivar does not exhibit the same tendency to set flower as does Magical Beauty and as a consequence, stem lengths will be longer than those produced by Magical Beauty. This cultivar requires lighting to induce flowering. Lights were not installed as the plugs were transplanted into the field during the second week of February. As a consequence, no flowers were produced in the trial blocks. It would appear as though this cultivar is a moderate to strong grower with strong apical dominance resulting in little branching of the main stem. This is a definite advantage as labour requirements to groom the plants during flowering and berry set would be reduced. The colour is a deep red, making it unique in that this colour is not available from other breeders at this stage. Preliminary trials by the breeders reveal that this colour is in demand when

placed on the auctions and offered for sale to wholesalers. ***Rhizoctonia spp.*** does not appear to affect this cultivar as no plants were lost in the trial beds. Plants appeared to remain growing vigorously with healthy root systems even though some of the other trial beds showed disease symptoms. Table 2.13 gives prices and volumes on the Naaldwijk Auction.

Stem Length	Stems Sold	Average Price 2003	Stems Sold	Average Price 2002
20			700	0.051
25			1.440	0.06
30			4.800	0.069
35			5.220	0.106
40	7.200	0.035	3.220	0.121
45			1.110	0.242
50	2.700	0.108	4.980	0.229
60			1.760	0.504
70			5.400	0.248
80			12.600	0.212
Total	9.900		41.230	0.187

Table 2.13. Magical Red auction data from the Naaldwijk Auction.

2.9.4 Magical Pink

This is an attempt to introduce a pink variety to rival Pinky Flair. These plants did not perform well in the trials, suffering from root rot complex brought about by the presence of *Rhizoctonia spp.*. As a consequence, plant vigour was weak. Sporadic flowering occurred in the trial beds and certainty was not obtained if flower induction was brought about as a result of the stresses caused by the root rot complex, or as a result of a reliance on shorter days to induce flowering. The cymes produced were of a loose nature with elongated peduncles, giving the finished product a loose, rounded appearance. This is not a desirable characteristic as during picking, grading and packing, the peduncles become entangled, causing them to break off when separated,

causing the product to be downgraded as a result of too few berries per stem. Figure 2.16 shows a trial bed planted to Magical Pink. Table 2.14 gives auction data for Magical Pink on the Naaldwijk Auction.

Figure 2.16. Bed of Magical Pink, showing poor growth.

Stem Length	Stems Sold	Average Price 2003	Stems Sold	Average Price 2002
20			400	0.07
30			560	0.076
35			220	0.11
40	3.550	0.038		
50	4.800	0.046	3.750	0.116
60	2.700	0.053	2.350	0.155
70			1.750	0.244
80			725	0.236
Total	11.050	0.045	9.755	0.153

Table 2.14. Naaldwijk Auction Data for Magical Pink, 2003, 2002.

2.9.5 Magical Beauty

This is a variety that does not appear to be affected by day length. Trials conducted on this variety have revealed that this variety will flower regardless of day length. Plants were still forming buds during the first week of July but severe frost on 7 July 2003 halted bud and blossom formation. This might be a desirable characteristic in that the considerable expense of installing lighting might be side-stepped should one choose to grow this cultivar. The draw back is that the willingness of the cultivar to flower results in short stems being produced. Trial plants produced stems with an average length of 40cm during the months of March, April and May. In an effort to increase stem length, side shoots were pinched during the second week of May resulting in stem lengths of 50cm being obtained before flower buds were visible. Unfortunately blossoms and buds were scorched by frost. Consequently, finished stem lengths at the time of report writing were not available. Another factor that this cultivar has in its favour is rust resistance. Applying the same spray programme to the Magical and Flair series revealed that the Magical series developed no rust pustules whilst the Flair series developed rust pustules. The berries are a pearly white when they begin colouring and later develop a pinkish tinge as they mature. Figure 2.17 shows the vigorous nature of

Magical Beauty when compared to the other Magical series. Table 2.15 reflects sales data for Magical Beauty at Naaldwijk Auction.

Figure 2.17. The vigorous growth habit of Magical Beauty on the right hand side with Magical Red on the left.

Stem Length	Stems Sold	Average Price 2003	Stems Sold	Average Price 2002
0			20	0.17
30	2.100	0.02	9.300	0.041
35	900	0.06	300	0.177
40	19.025	0.103	5.320	0.088
45	2.100	0.069		
50	13.500	0.112	5.220	0.213
55	1.300	0.103		
60	4.700	0.15	9.570	0.143
65			500	0.198
70			28.550	0.208
80			9.690	0.254
Total	43.625	0.104	68.470	0.174

Table 2.15.Naaldwijk Auction Data for Magical Beauty 2003, 2002.

2.9.6 Magical Orange

Differing only from Magical Pink in that the cymes are not uniformly round but have an untidy spiky appearance, the growth habit and characteristics are identical to Magical Pink. However berry colour was disappointing and instead of a good clear orange, the berries were the colour of washed-out apricot. Although the agent representing these varieties indicated that this was some of the best colour she had seen on this variety of all the trials conducted to date. Table 2.16 gives auction data for Magical Orange.

Stem Length	Stems Sold 2003	Average Price	Stems Sold 2002	Average Price
60			300	0.103
70			4.750	0.16
80			3.100	0.165
Total			8.150	0.16

Table 2.16. Naaldwijk Auction Datta for Magical Orange 2003, 2003.

2.9.7 Magical Giant

Similar to Magical Red, the trials showed almost identical growth characteristics. Berries are supposed to be larger than Magical Red. Further trials and observations need to be conducted with this variety in order to ascertain the potential that this variety has to offer. Table 2.17 gives auction data for Magical Giant.

Stem Length	Stems Sold	Average Price 2003	Stems Sold	Average Price 2002
30			1.160	0.038
35			480	0.14
50			420	0.07
60			1.400	0.13
70			600	0.14
Total			4.940	0.087

Table 2.17. Data for Magical Giant at Naaldwijk Auction 2003, 2002.

Table 2.18 gives the prices and volumes of ***Hypericum*** stems sold on the Multiflora Flower Market.

Month	Stems	Average Price
January 2003	516.526	0.29
February 2003	438.676	0.44
March 2003	499.620	0.50
April 2003	46.684	0.45
May 2003	614.130	0.37
June 2003	NA	NA
July 2003	536.801	.40
August 2002	550.850	0.36
September 2002	201.070	0.62
October 2002	233.544	0.59
November 2002	301.654	0.50
December 2002	480.797	0.45
Average	265.349	0.45

Table 2.18. Market Statistics for *Hypericum* sold on Multiflora Flower Auction 2002/2003.

2.10 Market Data For The USA

Market data from the United States Department of Agriculture (2003) is summarised in Table 2.19. Data is for the week, 5 August 2003. Cultivars are not listed by name, only as ***Hypericum.*** The Southern Hemisphere is moving out of winter, with the Northern Hemisphere moving into winter, ***Hypericum*** prices quoted are mostly Californian grown products. From summer production, prices would be higher during the winter months due to the limited supply from domestic producers.

Market	Price per bunch US$
Boston Ornamental Terminal	7.5
Philadelphia Ornamental Terminal	6.25 - 6.50
San Francisco Ornamental Terminal	6.50 - 7.50
Seattle Ornamental Terminal	6.50 - 7.50

Table 2.19. Market prices of *Hypericum* at Markets as listed.

Vissers (2003) indicated that 40 percent of the prices in Table 2.19 need to be deducted, as these were the wholesale prices, and not the grower prices

According to the United States Statistical Services (2003) the wholesale value of cultivated greens grown in the United States was US$ 127.260.000.00 for 1999. The United States International Trade Comission (ITC) (2003) reports that the U.S. market for fresh cut flowers has been increasingly serviced by imports, especially from Colombia and Ecuador, as a result of strong demand and high disposable income. According to the ITC (2003), the total imports of cut greens into the United States amounted to US$ 65.442.000.00, of which South Africa supplied 0.1 percent.

2.11 Import Requirements For Cut Flowers Into the USA

The Animal and Plant Health Inspection Services (APHIS) is the body that governs the importation of plant material into the United States Of America. According to the United States Department of Agriculture Animal and Plant Inspection Services (2003), four genera and one species require written permits by APHIS before they may be imported into the United States. These plants are ***Rhododendron spp., Camellia spp., Gardenia spp., Rosa spp. and Syringa vulgaris.*** Prior to importation an importer must apply to the Plant Protection and Quarrantine Officers for an agricultural import permit.

According to the United States Department of Agriculture Animal and Plant Health Inspection Services (2003), " The Northeast region of the United States is the gateway for the Netherlands flower industry. Most of the flowers from the Netherlands, especially tulips in spring time pass through John F Kennedy International Airport (JFKIA), Israel, South Africa, Australia, New Zealand and Thailand also transport flowers through JFKIA." Inspections are carried out between 10 pm and 2 am in order to have the flowers at the flower vendors by 6 am. About half of these flowers go straight to New York City and the rest get distributed through the Northeast. 21.780 tons of flowers pass through JFKIA annually.

According to The African Growth And Opportunity Act (AGOA) White Paper (2003), "essentially all products of AGOA beneficiary countries may enter the United States duty free." ***Hypericum***, as classified by the U.S. International Trade Comission (2003), is able to enter the United States duty free.

2.12 Plant Breeders Right Act 15 OF 1976

The Plant Breeders' Rights (PBR) Act makes provision for all aspects surrounding the registration and subsequent protection of new plant varieties, whereby the rights of breeders relating to the plants that they register are recorded. According to the Act, subsection 2.(2)(ii)(bb), a breeder has four years in which to register a new variety in South Africa should they not reside within South Africa from the date of application, for registration in their home country. By failing to register the new variety within the four year period, the breeder loses the right to register the variety under the Plant Breeders' Rights Act 15 of 1976. Pinky Flair was not registered under the Act when it was introduced in 1998 and to date has not been registered. Registration is not possible at this stage under the PBR Act.

According to section 23.(1) " The effect of the protection given under this Act by the grant of a plant breeder's right shall be that prior authority shall during the currency of the plant breeder's right be obtained by way of licence under section 25 or 27 by any person intending to undertake -

(a) production or reproduction (multiplication);
(b) conditioning for the purpose of propagation;
(c) sale or any other form of marketing;
(d) exporting;
(e) importing;
(f) stocking for any of the purposes referred to in paragraphs (a)to(e),

of

(i) propagating material for the relevant variety; or
(ii) harvested material, including plants, which was obtained through the unauthorised use of propagating material of the relevant variety."

Failure to register a variety results in the variety passing into the public domain, with none of the rights accruing as listed in section 23 of the PBR Act. In South Africa, Pinky Flair may be propagated by any individual without obtaining a licence from the breeder.

The most popular cultivar is Pinky Flair and commands the highest prices. Marginpar, who are the registered holders of the licence for Pinky Flair, through excellent marketing techniques, have resulted in the demand for the product being larger than the supply. Plantation establishment of Pinky Flair is restricted with an agreement entered into with producers that no material may be supplied to any other third party. All production has to go through Marginpar who then place the product on the Dutch Auctions. During the October/ November period of 2002, Pinky Flair was sold on the Multiflora Flower Auction in Johannesburg. Propagating material was justly obtained from the Multiflora Flower Auction. Table 2.20 gives the volumes and average annual prices of some of ***Hypericum*** cultivars sold on the Dutch auctions.

Cultivar	**Number of stems sold 2002**	**Average Price per stem**
Pinky Flair	12.113.525	**0.243**
Excellent flair	13.708.505	0.163
Magical Pink	**9.755**	0.153
Magical Red	**41.230**	0.187
Magical Orange	**8.150**	0.16
Magical Beauty	68.470	0.017
Magical **Giant**	4.940	0.087

Table 2.20. Average prices paid per cultivar and number of stems sold per annum.

2.13 Constraints To The Development Of Floriculture In Kwa-Zulu Natal.

According to the Agricultural and Industrial Marketing Company the following factors contribute to hindering the development of the cut flower industry in KZN.

- Growers of horticultural crops have poor cohesion and communication amongst each other for fear of empowering their neighbours and increasing competition. Growers do not realise that their South African fellow farmers are not the competition: it is every other grower who grows floriculture crops outside of South Africa who is the competition.

- Volumes produced by individuals remain on the low side except for a few larger growers who manage to export their crops. In the case of the Uniflo rose group, three growers are located in KZN and form part of a group of 10 growers who combine their product to achieve the necessary volumes.

- Currently the exporting airport is Johannesburg. Consequently, the transport of produce to airports is a factor. Gerhard van Egmond of the company Vegemoflora, indicates that they have to absorb between R1.60 -R2.00 per kilogram in additional costs in order to get their product to Johannesburg. No direct flights exist from KZN directly to European destinations.

- Paul Munn from Kinetsu World Express indicates that limited cargo space results in naturally higher prices as a result of supply and demand. Freight space for fresh perishables from South Africa is limited.

- Dick van Egmond believes that growers are out of touch with the needs of their overseas clients. He believes that relationships need to be established with overseas clients with the main pillar of these relationships being a consistent and regular supplier.

- Floriculture is a specialised part of agriculture and as such, few specialist extension officers exist to serve the industry.

- Research into floricultural crops by the Department of agriculture is poor. This is exacerbated by poor support to floricultural research.

2.14 Product Marketing

Hypericum may be sold to the following consumers/ distributors:

- Retail florists
- Wholesale florists locally and internationally
- Local and international supermarket chains
- Local and international auctions

2.14.1 Retail Florists

Retail florists would **pay the highest price for the product** and accept the poorest quality relative to price. **Demand is limited in that only a few bu**nches of product would be required per week **by each florist. A standard flower box h**olds 500 - 700 stems of ***Hypericum*** depending on the grade and transport of the product to each retail florists would be a time consuming and expensive exercise. This problem could be solved by pooling a number of orders into a consignment and delivering it to a central florist from whom the other **florists would then collect** their **order**s. It would appear as though this system wo**rks well in Newcastle, as flo**rists **indicat**ed that this method of **distribution was** some**times used by a group of florist**s who operated in the Newcastle **area (Perry 2003)**. These florists used a courier service to t**ranspo**rt the flowers from the wholesalers to their premises. This would be advantageous as the cost of transport would be drastically re**duced**.

2.14.2 Local and International Wholesale Florists

This group of customers typically has access to flower auctions where they are able to purchase their requirements. As this group of clients sells several thousand stems per week, it would be advantageous if an agreement could be reached whereby a fixed quantity at a fixed price could be delivered per week to each prospective client. This should eliminate the auctions and the commissions associated with the auctions. Rene Vissers, of United Flower Trading, a Dutch based floral wholesaler, indicated that this method of distribution works well, resulting in maximum returns being achieved by growers and wholesalers. This group of clients, especially the overseas based ones, require the highest quality. Vissers indicated that they had built up a reputation for supplying only the highest quality to retail florists and subsequently demanded only the best product one has to offer. Steve Densem from Vale Flora indicated that they would be interested in negotiating fixed quantities, delivered at a fixed price.

2.14.3 Local and International Chainstores

Armstrong (2001) indicates that by 2005, more than 50 percent of flower sales in European countries will be sold through supermarkets with this figure possibly being as high as 60 percent in Switzerland and the United Kingdom. Dave Swart from Sunshine Flowers, indicates that product volumes have to be high, of an acceptable grade and of a low price in order to satisfy the requirements of this group of clients. This company services Woolworths and Pick n' Pay in KZN. Time constraints relating to the completion of this dissertation have not allowed the full exploration of this avenue other than the criteria listed.

2.14.4 Local and International Flower Auctions

The ***Hypericum*** project being investigated is affected mostly by the freight component of the listed restraints. ***Hypericum*** berries are not as susceptible to the same degree of degradation during transport as are other fresh flowers. The reason being that mature fruit is exported already at an optimum stage of development. Berries are quite tough

and are able to withstand the rigours of air freight handling unlike delicate flower blossoms, such as roses, which bruise easily and should be handled as little as possible.

Freight space according to SAA Cargo on the Johannesburg New York route was at a premium and not freely available, with preference being given to existing clients. Having contacted British Airways Cargo Division, it was indicated that freight space to New York via London would not be a problem. It is felt that the stop over in London would not result in degradation of the product, on condition that the product was kept in cold storage. According to Symondson (2003) freight space was available on the Johannesburg - Dubai - New York route.

2.15 Crop Fertilisation

Hypericum is a greedy feeder requiring high amounts of fertiliser, Armand (2003) reports that 30g of fertiliser per m^2 be applied per week to actively growing plants. Failure to supply adequate amounts of fertiliser results in the stems falling over as the crop begins to mature, resulting in bent unsaleable stems. Fertilisation affects flower and bud set. High fertility accompanied by good cultural practices will result in good flower bud formation with an accompanying high berry set. Figures 2.18 and 2.19 show good bud formation and berry setting. When berries are set, the stems become top heavy, which, if inadequately fertilised, results in the stems bending rendering them unsaleable. Generally prior to lighting the crop high levels of nitrogen are applied to the crop, calcium nitrate, potassium nitrate, magnesium nitrate and mono potassium phosphate are excellent fertilisers to use at this stage. Once lighting commences nitrogen levels are reduced accompanied by increasing potassium levels. Once the buds are visible nitrogen fertiliser is stopped completely with the plants receiving fertiliser high in potassium such as potassium sulphate. Applying nitrogen during the flowering and berry ripening stages results in adventitious growth along the stems below the berry trusses which needs to be pruned in order to maintain quality, this is an added cost. Bartels Stek (2003) indicate that target values as contained in Table 2.21 are to be aimed for. Values are obtained by doing a 2:1 extraction, that is two parts of distilled water per part of soil.

ELEMENT	m.mol/litre	mg/litre
NH_4	0.1	1.8
K	0.3	11.7
Na	0.3	6.9
Ca	0.4	16
Mg	0.3	7.4
NO_3	0.6	37.2
SO_4	0.4	38.4
H_2PO_4	0.05	4.9
Cl	0.3	10.7
PH	4.8 - 6.0	

Table 2.21. nutrient requirements using a 2:1 extractionh method (Bartels Stek 2003).

Figure 2.18. Excellent bud and cyme formation on Excellent Flairdue to high fertility levels available to the growing crop.

Figure 2.19. Good berry set due to high nutrient status in the soil.

2.16 Pests And Diseases

Pests and diseases affect the quality of the finished crop in addition to crop potential. Diseased portions on a finished crop may result in the crop being unsaleable, or of a low grade. Insects and pathogens affecting the crop during the growing stages places strain on the growing plant, preventing optimal plant growth through the disruption of the biological processes that occur within the growing plant. Pest and disease control is of utmost importance in order to realise maximum crop potential and returns on investment. Anon(d) 2002 indicates that the following phytosanitary certification or special requirements are applicable to ***Hyperiucum*** imported into the European Union:

- Phytosanitary certificates necessary if imported from non EU countries
- Must be free from ***Liriomyza huidobrensis*** and ***L. trifoli*** (Leaf miners)

- Must be free of ***Liriomyza bryoniae*** if imported into Ireland or Northern Ireland
- Must either originate in countries free of ***Bemesia tabaci***, or must be officially inspected before export and found to be free of this organism

According to Robert Emms from Avonrod Plant Protection, the following pests and diseases affect ***Hypericum spp.***

2.16.1 Insects

- Aphids
- Boll worms and Loopers
- Thrips
- White fly

2.16.2 Nematodes

- ***Meloidogine spp.***

2.16.3 Pathogens

- ***Rhizoctonia spp.***
- ***Septoria spp.***
- ***Puccinia spp.***
- ***Cercospora spp.***
- ***Cladosporium spp.***
- ***Botrytis spp.***
- ***Alternaria spp.***

Any pest or disease left untreated in a monoculture system is able to cause massive damage as a result of the vast quantities of food or suitable host material being available. Most of the pests and diseases listed are easily controlled. Table 26 gives a list of compounds that may be used to control the listed pests and diseases. Most of the agricultural preparations used in ornamental horticultural disease and insect control are

not registered for the ornamental crops on which they are used. Consequently, preparations that control similar diseases on crops that are planted on a large commercial scale are, through trial and error, found to be effective on horticultural crops. Some remedies are preventative, curative, or a combination of both.

Of particular interest and concern to ***Hypericum*** growers are Rust and Nematodes. These two organisms are able to ruin a plantation or crop in a relatively short space of time.

2.16.2.1 Nematodes

Hypericum has been found to be highly susceptible to nematode parasites (Armand 2003). According to Agrios (1988), root-knot nematodes are found throughout the world with greater numbers being found in areas that have warm or hot climates, and short or mild winters. Nematodes are able to complete their life cycle in 25 days at temperatures of 27°C, with a longer time period at higher or lower temperatures.

Nematodes infect the roots, causing them to swell and develop galls which prevent the efficient uptake of water and nutrients. Secondary infection by soil dwelling pathogens may penetrate the damaged area causing the death of the plant.

2.16.2.2 Nematode Control

Conradie (2003), Emms (2003), Armand (2003) and Kroon (2003), suggest that the best method of dealing with nematodes is to fumigate the soil using either Ethyldibromide (EDB) or methyl bromide, ensuring that the soil which is planted into is free of nematodes. Methyl bromide is expensive, and is not considered to be an environmentally friendly product most countries are banning the use of methyl bromide. EDB does not control weed seeds but only controls nematodes. Emms (2003) indicates that 25 - 50 litres is the applied per treatment which has to be ploughed in prior to planting. Emms (2003) suggests that three applications of curative control measures are applied per season, commencing in spring, mid summer and in

autumn. It is recommended that soil samples be taken to determine nematode populations, from which it may be decided on an appropriate form of action.

2.16.3.1 Rust

Agrios (1988) reports that the rusts are amongst the most destructive plant diseases, having caused famines and ruined the economies of large countries. Rusts normally attack leaves and stems. The symptoms are a yellow spot on the top of the leaf with orange to yellow coloured pustules on the lower leaf surface. See Figure 2.20 for an ***Hypericum*** leaf infected with rust.

Figure 2.20. *Hypericum* leaves infected with rust.

Rust spores are transmitted by a number of agents, the most common being wind and rain. Insects, animals and man may play a role in transmitting the disease from infected areas. According to Agrios (1998) rust spores may be transmitted for hundreds of kilometres and then washed out of the air by rain. Periods of prolonged moisture are favourable for the development of the disease. Overhead irrigation is therefore best done prior to sunset in order to allow the leaves to dry off, limiting the conditions

conducive to infection. Warm humid weather also favours the development of the disease. At the trial location with the low winter temperatures experienced, no spraying was done during the month of July, as no rust was evident. Rust was noted towards the end of July when it began to warm up. Even though no rust was noted during June, the spray programme should not have ceased, as the spores that were present were only noticed once they had begun to germinate, and once the damage had been done.

Rust is usually controlled in agricultural crops by the breeding and selecting of resistant cultivars. Breeding and selection of ***Hypericum*** for rust resistance is in progress, with the Magical series being rust resistant when compared to the Flair series. Fungicides for the control of rust are available and it is common practice to spray a systemic and non-systemic fungicide in combination, in order to prevent the build up of resistance. Spray programmes need to be aimed at covering the whole leaf surface with fungicide in order to gain effective control. High pressure mist-blowers have to distribute the fungicides in an effective manner, the turbulence caused by the blower results in the fungicide being blown onto the lower leaf surface. Rust spots are not acceptable on finished products. Mono Potassium Phosphate (MKP) has been found to inhibit and control rust and the fertiliser is usually incorporated at one percent concentration (Symondson 2003).

When spraying systemic fungicides, it is important not to spray when it is too hot, as the fungicides result in leaf scorch. Contact fungicides appear not to have the same burn effect on the leaves (Conradie 2003).

Compound	Disease/Pest	Action	Cost Per Application Per Hectare
Mancozeb	Rust	Preventative	R100.00
Bravo	Rust	Preventative	R256.00
Plantvax	Rust	Curative	R482.00
Stroby	Rust	Curative	R256.00
Streptomyces fungiciticus	Rust	Curative	R371.00
Denarin	Rust	Curative	R298.00
Bumper		Preventative	R91.00
Octave	Leafspots	Curative	R463.00
Topsinflo	Leaf Spots	Curative	R137.00
Oscar	Powdery Mildew	Curative	
Rovralflo	Botrytis	Curative	R508.00
Thiflo	Thrips		R65.00
Talstar	Thrips / Aphids		R270.00
Orthene	Aphids		R218.00
Curater	Nematodes	Curative	R743.00
Vydate	Nematodes	Curative	R800.00
Crop Guard	Nematodes	Curative	R1000.00
Nemablock 1 (Biological Agent)	Nematodes	Preventative / Curative	R212.00
Nemablock 2 (Biological Agent)	Nematodes	Preventative / Curative	R212.00
Trichoderma	Nematodes		R172.00
PL Plus	Nematodes		R496.00
Rugby	Nematodes	Curative	R2316.00

Table 2.22. Compounds used in disease and pest control in *Hypericum* plantations, with costs per application per hectare rounded off to nearest Rand.

2.17. Chapter Two Summary

Having dealt with pertinent considerations regarding ***Hypericum*** culture, it would have been noticed that the timing of the crop would depend on the illumination of the crop in order to ensure an 18 hour day for flower bud initiation to take place. Several options were considered, time constraints unfortunately have not allowed for the full exploration of the lighting options available.

Propagation of seedlings was evaluated, with the view of reducing the cost of seedling material. The success of a propagation unit depends on the quality of the plant material going into the unit, various observations revealed that the most suitable material is from the middle of the stems, this material giving the most consistent rooting and seedling development.

Plant patents are governed under the Plant Protection Act. Sections of this act governing the propagation of cultivars was evaluated insofar as is relevant to the cultivars mentioned.

Nutrition plays an integral role in the cultivation of a quality product, fertilizer, and fertilization regimes were looked at in order to ensure the cultivation of a high quality finished product. Good nutrition alone is not able to ensure success, pest and disease management were evaluated. Nematodes and rust are the two most destructive groups of organisms that affect ***Hypericum*** Fungicides and nematicides that control these agents were identified.

Having identified opportunities and restraints that would affect the profitable cultivation of ***Hypericum***, these opportunities and restraints need to be evaluated against business theories and principles. These will be discussed in Chapter Three.

CHAPTER THREE

3.1 Introduction

This chapter deals with business theory and practices which may be applied to the material in Chapter Two.

According to Ilkova & Donnelly (2000) "the primary objective of any firm is the creation of wealth for its owners, accompanied by maximisation of the firm's value." The investment decision influences the ability of the firm to generate future cash flows and undertaking projects that will lead to higher future cash flows that will result in maximisation of the firm's value. Capital expenditure by the firm is generally undertaken as a non-reversible decision in an attempt to realise profits from the programme into which the capital was invested. Increased revenue streams are usually accomplished by increasing the productive capacity of existing plants, or by expanding into a new venture.

Prior to committing capital to a project, an analysis needs to be conducted on the income that may be generated by the proposed new venture or expansion using discounted payback, Net Present Value (NPV), or the internal rate of return methods.

It has been decided to use the NPV method in determining the potential of growing ***Hypericum***, by Casa Flora. NPV is described as the difference between the cost of investment and the present value of cash flows generated by the operation. An investment should only be undertaken if the future cash flows exceed the capital outlay involved in the proposed venture (Ilkova & Donelly 2000).

3.2 Supply and Demand

Schiller (2000) indicates that economic interactions are necessitated by two constraints:

1. "Our inability as individuals to produce all the things we need or desire

2. The limited amount of time, energy and resources we have for producing those things we could make for ourselves"

Consequently two markets evolve, namely factor markets and product market. Of these two, product markets are the most relevant. This is where finished goods and services are bought and sold. A market is said to exist where or whenever an exchange takes place and is usually accompanied by an exchange of money for goods or services. This exchange of goods and money is affected by the supply and demand of money and goods.

The price that a consumer is willing to pay for goods is determined by the following forces:

- Tastes
- Income
- Other goods
- Expectations
- Number of buyers
- Substitute goods
- Complimentary goods

Schiller (2000 pg53) indicates "There is a law of supply that parallels the law of demand, this law says that larger quantities will be offered for sale at higher prices." The determinants of market supply are affected by:

- Factor costs
- Technology
- Profitability of alternative pursuits
- Expectations
- Number of sellers

In circumstances where the market price is set above or below the equilibrium price, a market shortage or surplus will emerge. Market shortages induce buyers to pay more

for the specific good or service that they desire. Shifts in the demand and supply curve will affect the price of goods and services offered for sale, changing the equilibrium price.

3.3 Product Life Cycle Theory

Bhowan & Lord (2002) state that the product life cycle may be utilised to analyse the following:

- Product category
- Product form
- Product
- Brand

Products usually pass through four distinct phases. The first phase is the introduction stage and during this stage the product is new on the market. The introductory stage is usually accompanied by slow sales coupled with intensive promotion. Consumers who purchase the product during the introductory stages are known as innovators. Early adopters are those consumers who copy the behaviour of the innovators (Bhowan & Lord 2002).

Following the introductory stage, the growth stage commences. Growth stages are usually accompanied by increasing sales as more consumers, termed the early majority, begin to purchase the product. During this stage competitors usually launch competing products, which may cut into sales and growth of established products.

Following the growth stage the maturity stage is reached. This phase in the product life cycle theory is characterised by extreme competition, with only the fittest surviving.

The decline stage is the last stage in a product's life cycle.

Normal product life cycle theory passes through the four stages already mentioned. Fads are usually accompanied by an intense demand for the product during the early

stages of introduction, followed by a sharp decline in demand. These life cycle curves usually resemble an inverted "v". Fashion life cycles are usually represented by an oscillating wave pattern as consumers revert to trends, causing a resurgence in the demand for products that have at some prior stage been introduced into the market place (Bhowan & Lord 2002).

3.4 PEST Analysis

A PEST analysis evaluates the effect that Political, Economic, Socio-Cultural and Technology have on the business environment in which an organisation operates. It is felt that this analysis may have a bearing on this case study.

3.4.1 Political /Legal Environment

This environment is characterised by laws that govern a country, and may create or inhibit business opportunities for an organisation. It is felt that the following factors will have a bearing on this study:

- International trade agreements under The African Growth And Opportunity Act have opened up markets which have the potential of consuming vast quantities of goods and services
- New labour legislation affecting the agricultural sector
- Government assistance concerned with the marketing and distribution of South African products internationally

3.4.2 Economic environment

Arbee & Naidu (2001) suggest that the most important factors to be considered in the economic environment are consumers' income and spending patterns. Societies with high income and disposable income should be targeted. Countries of the world may be divided into two categories: the developed industrialised nations and the developing

nations. Industrialised nations generally have a higher standard of living associated with higher levels disposable income.

- Inflation
- Interest rates
- Currency fluctuations and the exchange rate
- Input costs
- Industry development

3.4.3 Socio-Cultural Environment

Dealing with matters that affect society as a whole these matters may not necessarily be dealt with or be enforced by legislation, they do however have an impact on the business environment.

- Green issues
- AIDS
- Attitudes towards work

3.4.4 Technological Environment

Dealing with advances made using research and technology the issues dealt with under this heading affect the business environment in that competitive advantage may be gained or lost if attention is not paid to the technological environment within which a firm operates. The following may affect a firms competitive strategy or advantage:

- New products.
- Advances in research.

3.5 Porter's Five Forces Model

According to Thompson & Strickland (2003) Michael Porter has convincingly demonstrated that the state of competition within an industry is a composite of five competitive forces:

1. The rivalry among the competing sellers within the industry
2. The potential entry of new competitors into the industry
3. The market attempts of companies in their industries to win customers over to their own substitute products
4. The competitive pressure stemming from supplier-seller collaboration and bargaining
5. The competitive pressure stemming from seller-buyer collaboration and bargaining

Lynch (2000) evaluates the five forces as follows:

Every organisation has suppliers who supply raw materials or services which are used to produce the final goods and services. Porter suggests that the suppliers are more powerful under the following circumstances:

- A few suppliers would make it difficult to switch from one supplier to another once the supplier began exerting their influence
- Few substitutes for the product or service that they offer. This is particularly important if the supplies are for technical reasons: perhaps the service or product that they offer is important for the smooth running of the process
- If suppliers' prices form a large component of the total costs of the organisation any increase in price would affect the value added unless the organisation was able to raise its prices commensurately.

3.5.1 The Bargaining Power of Buyers

Under the following conditions buyers have more power:

- If buyers are concentrated and there are few of them then the organisation has little alternative option than to negotiate with the buyer due to the fact that there are fewer other buyers around and, the organisation is clearly in a weak position.
- If the product from the organisation is undifferentiated. If the organisation's product is much the same as other organisations' products, the buyer can easily shift

to the other supplier especially if the switch will not affect the quality of their product or services.

- Should backward integration be possible the buyer would be able to backward integrate and take over the role of the supplier.

3.5.2 The Threat of Potential New Entrants

When profit margins are attractive and the barriers to entry are low, new entrants to the market may be encouraged. Barriers to entry would then be the limiting factor such as:

- Economies of scale. Unit costs of production may decrease as the volume of units per time frame is increased. This means that new entrants into the market have to come in on a large scale in order to accomplish the low cost levels of those already in the industry. Such a large scale may be risky.
- Product differentiation. Branding and customer knowledge may cause barriers to entry forcing potential new entrants to spend more funds or simply take longer to be established in the market.
- Capital requirements. Entry into some markets may involve vast capital outlays in plant and equipment, distribution networks and technology. This outlay of capital may deter some companies.
- Switching costs. When a purchaser of a product or service is satisfied with the current supplier it, would naturally be difficult to switch that purchaser to a new entrant. Introducing an incentive to switch would be the responsibility of the new entrant and as such could be viewed as a barrier to entry.
- Access to distribution channels. Producing a quality product is no guarantee of success as the efficient distribution of this product to the consumers needs to be accomplished.
- Cost disadvantages independent of scale. When an organisation has an intimate knowledge of the business environment within which it operates, it has the support of most of the large buyers and has invested heavily in capital equipment and machinery, it may be a daunting prospect for a new entrant to enter the market.

- Government policy. Legislation by government to protect industries may prevent new entrants.

3.5.3 The Threat of Substitutes

Occasionally substitutes render a product redundant but most often the product is not eliminated entirely. The substitutes may, however, limit profits by keeping prices down. The following factors need to be analysed from a strategic point of view:

- The possible threat of obsolescence
- The ability of customers to switch to substitutes
- The costs of providing extra aspects of the service that will prevent switching
- The likely reduction in profit margin should the price come down

3.5.4 The Extent of Competitive Rivalry

Some markets are more competitive than others. Markets that are highly competitive usually result in the monitoring of key competitor strategies such as:

- Examining price changes and making adjustments where necessary
- Examining rival product changes and then bringing about similar changes

According to Lynch (2000) the Five Forces model has the following weaknesses:

- The analytical framework is essentially static whereas the competitive business environment is in a continuous state of flux. Forces may move from high to low or vice versa more rapidly than the model is able to indicate
- It assumes that the customer has no greater importance than any other aspect of the micro environment. Other commentators disagree, arguing that the customer is more important than other aspects of strategy development and is not to be treated as an equal aspect of such an analysis
- In general it is the starting point that the environment poses a threat to the organisation leading to the consideration of buyers and sellers as threats that need to be tackled. As pointed out above, some companies have found it useful to

engage in closer co-operation with suppliers. Such a strategy may be excluded if they are regarded purely as threats.

- Porter's analysis proceeds on the basis that once such an analysis has been undertaken, then the organisation can formulate a corporate strategy to handle the results which might be prescriptive rather than emergent

Thompson & Strickland indicate that in addition to the Five Forces model, the following strategic issues may be used when evaluating strategy:

- Is the present strategy adequate for protecting and improving the company's market position in light of the Five Forces competitive model, especially those that are expected to intensify in strength?
- Is the company vulnerable to the competitive efforts of one or more rivals?
- Should the present strategy be adjusted to better respond to the driving forces within the industry?
- Does the present strategy adequately capitalise on the company's resources and strengths?
- Does the company have a competitive advantage or must it work to offset competitive disadvantage?

3.6 Three Generic Competitive Strategies

Lynch (2000) lists the three competitive strategies as:

1. Cost leadership
2. Differentiation
3. Focus

It is intimated that each business needs to adopt one of these strategies in order to compete in the market place and gain a sustainable advantage. Looking at two aspects of the competitive environment will enable an understanding of the three strategies.

Firstly the source of the competitive advantage. Fundamentally only two sources of competitive advantage exist, namely the differentiation of products from competitors and low costs.

And secondly the competitive scope of the target market. Here it is possible to position the organisations products in such a manner as to target a broad target market, covering most of the market place, or alternatively choose a narrow target market and focus on niche markets within the targeted market.

3.6.1 Low Cost Leadership

This strategy entails maintaining plant, equipment, labour costs and working practice in such a manner that the lowest cost is delivered within the particular industry. This lowest cost gives the firm a competitive advantage over its rivals. These operators usually achieve their low cost status by eliminating any superfluous costs associated with the value chain. Fine attention to detail enables these companies to realise these cost savings.

3.6.2 Differentiation

Producing products that meet the needs of customers better than the opposition's leads to differentiation. Producers who are able to meet the needs of their customers in a specialised manner are able to charge a price that is higher than their competitors. Two problems are usually associated with differentiation namely:

- The difficulty of estimating whether the extra costs incurred due to differentiation can be recovered from the consumer.
- Successful differentiation may encourage competitors to copy the differentiated product and in so doing enter the market segment. Often there are costs involved in being the primary mover in a market segment. Once product acceptance has been gained, it is often cheaper for the competition to enter the segment as many of the

costs associated with introducing a product have been borne by the first mover (Lynch 20002).

3.6.3 Focus Strategy

Lynch (2000) intimates that according to Porter neither a low cost or a product differentiation strategy is possible for an organisation across the broad range of the market. This is illustrated by having to spend vast amounts of capital in order to attain low cost leadership and the unavailability of funds places constraints on utilising this approach. Differentiation costs while serving the mass market of customers may be high, especially if the differentiation involves quality. Should the differentiation involve quality, it may not be credible to offer high quality and cheap products under the same brand. A new brand has to be created with the necessary support in order to ensure the brand's survival.

A focused strategy results when an organisation focuses on a specific niche in the market place and develops a competitive strategy to meet the needs of the consumers within that niche. This strategy results in an organisation tailoring its strategy to meet the needs of a specific group of consumers, resulting in the exclusion of others. Organisations utilising this approach seek a competitive advantage in its target markets even though it does not have an overall competitive advantage. Competitive advantage may be sought using either a cost leadership approach or by differentiation.

The following problems may be encountered with the focus strategy:

- Niches are small and have limited long term growth potential.
- Niches are usually specialist by nature and may disappear over time

3.7 Chapter Three Summary

It was felt that supply and demand feature prominently in the success or failure of a product, consequently the characteristics that determine supply and demand were

evaluated. All products are affected by the product life cycle theory, this theory was evaluated looking at the components that make up this theory.

Businesses do not operate in isolation, instead they are part of a larger macro environment. A PEST analysis was looked at in an attempt o gain an understanding of the macro environment within which the successful cultivation and marketing of ***Hypericum*** would be possible. Porter's Five Forces Model was evaluated in the light of ***Hypericum*** cultivation and marketing.

Business theory is a bland set of observations and recommendations. As soon as one begins to integrate theory and practice a whole different picture emerges with the sterility and rigidity of the pure theory being removed once interpretations are made using real case studies. Chapter four attempts to integrate business theory with the material in Chapter Two.

CHAPTER FOUR

4.1 Introduction

This chapter attempts to integrate the business theories in chapter three with the observations and data contained in chapter two.

4.2 Market Selection

In order to realise the highest returns on the project, marketing the finished product plays an integral part in determining the profitability of the project. Table 4.1 indicates the prices at farm gate for the grower. The following assumptions are relevant to the data contained in Table 4.1:

- 7.50 ZAR = 1.00 USD
- 8.10 ZAR =1.00 Euro
- American market prices reduced by 50 percent allowing for wholesale mark up
- Marketing costs of 60 percent apply to exported prices
- 60cm + stems are exported
- Market prices for the USA are at their lowest as a result of summer.
- USA Market prices are for 10 stems per bunch
- 2002 Market data used for the Dutch Auction at Naaldwijk as this data set is complete.
- Prices in the table are ZAR.
- ***Hypericum*** sold on the USA markets is Excellent Flair.
- The marketing costs of 60 percent are not proportionally reduced as the price of the goods increase.
- 5 percent royalties have been deducted from Magical Red
- One is granted a licence and is able to sell Pinky Flair on the Dutch Auction

Location	Excellent Flair	Pinky Flair	Magical Red
Johannesburg	0.45		
USA	1.00		
Naaldwijk	0.64	1.19	0.99

Table 4.1. Average prices for different markets at farm gate.

The local markets in Johannesburg offer the least attractive prices. Unless one was able to market directly to an exporter or local wholesaler it would not be the most feasible option to market the bulk of one's product on the Multiflora Auction in Johannesburg. Should one take the next lowest price in the table, it will be noted that the local auction price is only 33 percent of the Excellent Flair price marketed on the Dutch Auction, and 20 percent of the Pinky Flair and Magical Red prices.

Assuming the following:

- 67 percent of a hectare is planted ie net planted area
- Two flushes at the project location per season
- 70 percent of the production is exported
- 100 stems produced per net square metre per flush
- The remaining 30 percent is totally unmarketable.
- Prices are similar to those as in 2002

Table 4.2 gives the following returns per annum per hectare per variety listed in Table 4.1.

Variety	Return Per Annum Per Hectare
Excellent Flair -Johannesburg	R422.100.00
Excellent Flair -Dutch Auction	R600.000.00
Pinky Flair -Dutch Auction	R1.116.220.00
Excellent Flair- USA Market	R938.000.00
Magical Red –Dutch Auction	R928.000.00

Table 4.2. Returns for the various cultivars on the various markets per annum.

The local market is clearly not an option when compared with the export markets. From Table 4.1 it will be noted that the best returns would be obtained from the American markets growing Excellent Flair, as the assumption is made that a licence is not granted to market Pinky Flair on the Dutch Aucctions. Should a licence not be granted to sell Pinky Flair on the Dutch Auction, similar returns would be realised selling Excellent Flair on the American markets, Magical Red would also be an option as the returns generated by this cultivar nearly rival those generated by Pinky Flair on the Dutch Auctions. the difference in return is 17 percent between the two varieties. Extrapolating the price trends on the Dutch markets onto the American markets assuming that cultivar demand is similar, would make Pinky Flair and Magical Red the cultivars of choice for this market, *ceteris paribus* .

4.3 NPV Calculation

Assuming the following:

- Product is sold into the USA at the rate in table 4.1 giving an annual income of R938.000.00
- A preventative spray programme is implemented costing R100.000.00 per annum
- 25 Full time labourers costing R300.000.00 per annum
- Capital expenditure of R150.000.00 in year one
- Fertiliser costs R60.000.00 per annum
- Miscellaneous expenses R100.000.00 per annum
- Discount rate of 35 percent per annum
- Capital is not borrowed for the project
- Marketing costs taken care of by the 60 percent deduction made in table 26
- Expenses are increased by a 20 percent inflation factor per annum with income remaining static

Should have the following effect on cash flows for the project as contained in Table 4.3

	Year 0	Year 1	Year 2	Year 3
Income		938.000.00	938.000.00	938.000.00
Expenses	150.000.00	560.000.00	672.000.00	806.400.00
Total	(150.000.00)	378.000.00	266.000.00	131.600.00
35% discount rate		0.7047	0.4966	0.3499
adjusted income	(150.000.00)	266.376.00	132.095.00	46.046.00

Table 4.3. Discounted cash flows for a one hectare project.

NPV = (R150.000.00)+R266.000.00+R132.095.00+R46.046.00

=R294.141.00

The positive NPV of R294.141.00 indicates that the project will be viable within the stated parameters.

4.4 Product Life Cycle

Hypericum has gained immense popularity within the cut flower market, as reflected by the phenomenal growth in sales. The question remaining is whether crop sales will continue growing, or has the crop begun its stagnation and decline phase? It is felt that the crop is still in the growth stage of the product life cycle for the following reasons:

- It is a versatile product having a wide application range within the florist industry
- Berries are visually appealing
- Berries are long lasting, giving value for money to the consumer
- Few substitutes exist within this category of cut flowers
- The product is becoming more affordable Consequently more people are able to buy the product
- Access to and availability of the product is improving
- New varieties with different colours are being introduced into the market place

Breeding companies, such as Kolster in Holland, are breeding new varieties which have characteristics that are different from the existing varieties. The most interesting aspect of the breeding for the consumer are the new colours that are being released. A greater array of colours will result in the product being able to be used for applications for which it was not traditionally possible. Principal hypericum colours are red/brown as well as pink. These are colours which are not traditionally associated with weddings and the introduction of pastel colours such as cream, apricots and greens will increase the versatility of the product within the bridal floral market. Growers are also benefiting from the breeding programmes, with improved characteristics such as resistance to disease.

Within the existing varieties, some may be nearing the maturity phase or be in the decline stage of their life cycles. Sales of Pinky Flair are increasing which may exceed those of Excellent Flair as Pinky Flair has berries which are visually more appealing than those of Excellent Flair. New varieties such as Magical Red may edge Excellent Flair out of the market as it is felt that the colour of Magical Red is superior to that of Excellent Flair These two varieties would essentially compete in the same colour category. Apart from colour, cultivation characteristics will result in older varieties being replaced with newer cultivars, as growers refrain from planting older cultivars that are more disease susceptible.

4.5 Supply and Demand

Demand for the product continues to grow with prices remaining at levels that justify the production of the crop by growers. Markets in the Northern Hemisphere have a strong desire to purchase this product, as is reflected by the 199 million stems sold in the Netherlands during 2000 at a price of 35 million Euro. Traditionally only supplied during the Northern Hemisphere's Summer/ Autumn, the product is now available all year round.

Hypericum berries lend a festive air during the Christmas period in Europe and other Northern Hemisphere countries when little else is available. Consumer demand for the

berries is traditionally higher during the Christmas period, reflecting the tastes of consumers.

Most of the countries in the Northern Hemisphere are first world countries with well-developed economies. The standard of living in these countries is generally much higher than the standard of living in developing countries. Consequently people have greater disposable incomes which they are able to spend on luxuries and other non essential items. Marketing ***Hypericum*** into these markets is a viable option as the consumers have disposable income which they are able to spend purchasing the product.

Few substitutes exist which compete with ***Hypericum.*** Products such as ***Rubus spp.*** and ***Symphriocarpus spp.*** are also berry crops used in floral work. The texture, shape, colours and general feel of these products is not the same as ***Hypericum*** and though berry bearing, it is felt, do not pose a significant threat to the demand for ***Hypericum.***

When ***Hypericum*** was introduced as a crop which would be available year round, the initial off season product was extremely expensive and was unaffordable to most consumers. With more growers producing the crop, prices have come down, making the product more affordable to a greater number of consumers.

Flowers and floral products being luxury products, compete with other luxury goods such as perfume, chocolate and alcohol. Certain functions and events such as weddings and funerals would not be the same without flowers and it is in these sectors where other luxury goods do not pose a significant risk to floral sales that When it comes to discretionary spending and a consumer has a limited budget and is confronted by an array of luxury goods, other goods pose a threat to floral sales, especially if the consumer has had a bad experience with floral products.

The modern floral industry has, at its disposal a vast array of products to choose from. Florists have access to tropical, alpine, desert and Mediterranean foliage and plant products from across the globe. Most floral products are complimentary and may be

combined in a variety of ways. The most important consideration is the look and feel of the finished product, be it a bouquet or a country bunch, ***Hypericum*** lend itself well to most applications from ultra modern to traditional florist work. The versatility of ***Hypericum*** should therefore ensure its continued demand.

Supply of ***Hypericum*** has increased substantially, showing a 349 percent increase from 1995 to 1999. Zimbabwe has traditionally been a large producer of ***Hypericum***. However, political turmoil within the country has led to a loss of production. Factor costs within developing countries are relatively inexpensive when compared to developed nations which makes this crop suited to production within developing countries.

Technological advances within the chemical industry may open windows of opportunity for the increased production of ***Hypericum.*** New fungicides are developed which are better able to combat the rust problem often experienced by growers. Technological advances in the breeding and selection field will result in cultivars that are more resistant to rust and nematodes. This should create possibilities of cultivating the crop by individuals who previously perceived the crop as a high risk. It needs to be borne in mind that companies that develop new varieties will limit the sale of these varieties in order to keep market prices high, as has been the case with Pinky Flair.

When market supply exceeds demand, prices will be reduced to a point where it is no longer economically viable to cultivate the crop or where cultivating alternative crops will give better returns on investment. It is anticipated that the cyclical nature of commodities will manifest itself with the cultivation of ***Hypericum***. As soon as the returns on the crop begin to decline, the number of growers should decrease limiting supply which should result in a price increase to the remaining growers. This crop being a "new" crop makes it difficult to determine the size of the market, or when the market will become saturated.

4.6 PEST Analysis

South Africa's political environment pertaining to business has changed considerably since the first democratic elections in1994. One of the most interesting developments is the establishment of the AGOA agreement, whereby African Countries have duty free access to American markets for most goods. Cut flowers are one of these goods. This enables South African products to compete effectively on American markets.

Labour legislation has changed significantly since the establishment of a democracy, making it a challenging environment in which to operate. The most significant impact, it is felt, is the introduction of a minimum wage. In a country where labour productivity is poor, this legislation may place a burden on employers, especially sectors such as floriculture that employ large numbers of labourers. Higher wages, unaccompanied by improvements in productivity, will result in the sector becoming uncompetitive and may discourage investors and subsequent growth of the industry. It is felt that floriculture projects are better able to withstand possible increases in minimum wages as opposed to traditional agricultural ventures due to of the higher revenue streams that are generated. Floriculture crops have a lower margin of error; making them riskier, which would demand a greater return to compensate for the additional risk.

The Department of Trade and Industry (DTI) encourages the development of the floriculture industry. Should one apply for assistance to attend international trade shows in New York, Birmingham and Holland, to exhibit product and attract prospective clients, the government has a programme whereby most of the expenses incurred in attending the trade show are born by the DTI.

The economic environment within South Africa appears to be improving. It would appear as though inflation is under control, resulting in input costs not rising at a rapid rate. Stable inflation bodes well for decreases in the interest rates making it a more viable option to borrow money for the establishment of new ventures, provided that the interest rates remain at stable levels. The current strength of the Rand relative to other international currencies has placed pressure on export earnings. Input costs in the

floriculture industry such as fertiliser, pesticides and fungicides are mostly imported. Increased earnings due to a weaker currency would be offset against an increase in the imported components used in production and transport. Air freight is charged in US$. A weaker Rand would, however, result in overall increased earnings for the company, in that Casa Flora's largest expense is labour. The cost of labour would not increase commensurately with a weakening currency as would input costs that are imported such as fertiliser and fungicides.

Compared to other flower exporting countries South Africa has an industry that is still in its infancy. As more role players begin to enter the market, costs such as freight, fertiliser and other input costs should come down as a result of greater competition.

The socio-cultural environment's biggest challenge, is AIDS. It is felt that the government does not fully understand the extent of the epidemic. As an employer, 13 percent of the Casa Flora's work force has died within the last year due to AIDS related symptoms, although the official report is that these individuals died of natural causes. Floriculture is reliant on large numbers of manual labourers A reduction in the labour pool will affect the potential of this industry as mechanisation alternatives are few.

Global trends are towards environmentally friendly products and processes. Floriculture is reliant on a number of factors such as pesticides, and fungicides for the effective production of crops that meet the exacting standards of consumers, few floriculture crops exist that can be produced organically. A concerted effort will have to be made to keep abreast of the latest developments pertaining to the development of biological or other environmentally production methods.

4.7 Porter's Five Forces Model

Rivalry among competing sellers within the floriculture industry in South Africa may be regarded as limited. With the industry still in its infancy, the existing sellers cater mostly for niche markets. Limited competition does exist with alternative suppliers being available. Often the suppliers are not close at hand making transport a factor to

be reckoned with when deciding which supplier one wishes to support. It is hoped that as the industry grows, growers in the more remote areas of the country will be able to form buying groups and negotiate better deals on products required during the growing process.

Increases in production costs would place constraints on the success of the project if price increases could not be passed on to consumers. Most of the chemical input costs are imported. Selling the finished product on the local market where resistance to increased prices would occur if growers had to in increase their prices in response to increased input costs, as a result of a weakening currency, would not augur well for a company's revenue streams. Selling the finished product internationally and negotiating a price in US$ or Euro, would negate a weakening currency, as a weakening currency would offset increases in input costs against higher returns for the product in Rand terms.

4.7.1 Buyer's Bargaining Power

Fortunately the floriculture industry has a number of outlets for finished products ranging from auctions to the retail florist. Collusion in an auction system is difficult, especially on the Dutch Auctions which represent the hub of world floral trade and where world floral prices are set.

The most sold variety of ***Hypericum*** is Excellent Flair, although Pinky Flair sales threaten to supersede those of Excellent Flair, because of the attractive colouring of its berries. As Pinky Flair becomes more widely available, buyers will turn increasingly to Pinky Flair, especially if the price comes down. Growers of Excellent Flair need to be aware of this as their markets could be lost to Pinky Flair sales.

4.7.2 The Threat of Potential New Entrants

Attractive profit margins with low barriers to entry will encourage more growers to plant ***Hypericum***. No significance may be placed on economies of scale, except when

negotiating with large international supermarket groups. Economies of scale cannot therefore be seen as an efficient barrier to entry for new growers.

An effective barrier to entry would be product differentiation and branding as is the case with Pinky Flair. Internationally, growers of Pinky Flair are limited by licence agreements which are concluded with the company holding the right to the cultivar. This is not the case in South Africa where the window of opportunity to register the cultivar and guarantee protection under legislation has been passed for the company holding the rights to Pinky Flair.

Capital costs in starting a ***Hypericum*** cut flower project are not excessive, especially if one is an existing land owner. Capital costs would not be seen as an effective barrier to entry in the ***Hypericum*** industry. Building a reliable clientele base is normally a time consuming process which is only accomplished after a period of time during which the trust relationship develops. One of the methods that could be used to gain clients would be to offer them a product that they desire but do not normally have access to. Most buyers of ***Hypericum*** are strongly desirous of purchasing Pinky Flair. Offering them Pinky Flair of high quality would definitely capture their attention resulting in subsequent orders. In South Africa legislation, does not prohibit the production and multiplication of Pinky Flair, thus legislation cannot be seen as a barrier to entry for prospective South African producers.

4.7.3 The Threat of Substitutes

Obsolescence is highly unlikely for ***Hypericum*** due to the versatility and nature of the product. Substitutes do exist in the form of other berry bearing crops but these crops are not as versatile as ***Hypericum*** and it is felt that these crops do not pose a significant threat for ***Hypericum***. Prices of ***Hypericum*** should not come under pressure from the increased availability of substitutes, due to the differentiated nature of the product.

4.7.4 Competitive Rivalry

Competitive rivalry exists between the various cultivars with Pinky Flair being the most desirable cultivar at the moment and it is foreseen that Pinky Flair will become the most dominant variety due to cultivar attributes. Reducing prices of competing cultivars may be an option in order to retain sales but profit margins would be reduced.

Competitive rivalry within ***Hypericum*** breeders is on the increase with the introduction of new cultivars which have different colours and growth characteristics. As a grower, it would be important to keep abreast of new cultivars on offer and attempt to obtain a licence to produce these new varieties.

4.8 Competitive Strategies

Of the three strategies, the focus strategy t would probably be the most significant. There is a definite desire amongst consumers to purchase Pinky Flair with legislation dictating that registered growers of Pinky Flair having to sell their product through one company on the Dutch Auctions, prices paid for the product are expensive as supply is limited and its demand is high. It is felt that selling Pinky Flair directly to selected buyers would be beneficial to both the grower and the buyer as some of the marketing costs such as handling and auction commission would be eliminated. Selling the product directly into the United States would eliminate the need for excessive handling of the product, resulting in the consumers having a fresher product as the product would not have been handled by a middleman. Buyers would save on freight charges from Holland to the United States and part of this saving in cost, it is hoped, could be added to the selling price.

Limitation in the focus strategy are believed to be negligible in this study, because of the increasedemand demand for the product. Should Pinky Flair pass into the public domain, the competitive advantage enjoyed would be lost.

4.9 Chapter Four Summary

A PEST analysis was conducted on the material in Chapter Two utilizing the model in Chapter Three. Porters five Forces model was evaluated in a similar manner. In an attempt to gain an understanding of the financial viability of the proposed venture a NPV calculation was made showing that he project would be financially viable.

The market ultimately determines if a product will succeed or not. Brands and cultivars were evaluated in an attempt at ensuring that the marketing strategy would be successful.

Having integrated theory and practice recommendations need to be made regarding the suitability of the proposed venture based on the material contained in Chapters Two through Four, Chapter Five deals with the recommendations relating to the material contained in the preceding chapters.

CHAPTER FIVE

5.1 Introduction

Having analysed and interpreted the data and observations in chapter four, the strategy that the company should follow in order to maximise the opportunities presented to it are contained in this chapter.

5.2 Recommendations

From a strategic point of view, cultivating ***Hypericum*** would eliminate the threats that Casa Flora faces on the local rose markets in the light of the 100 hectare rose project that Goldfields has planned.

With a positive NPV of R294.141.00 at a discount rate 35 percent, cultivating and marketing of ***Hypericum*** is a financially viable option for the time being as it would appear as though South Africa is headed for a period of lower inflation, accompanied by lower interest rates which would increase the NPV of the project. Factors which may affect the inflation rate and ultimately the interest rate as the Reserve Bank uses monetary policy to control inflation, include the following:

- Lower productivity
- Higher wage demands unaccompanied by an increase in productivity
- The weakening of the Rand against major trading partners
- Strengthening/weakening of commodity prices

Monitoring changes in the above mentioned factors should be able to give the company fair warning of interest rate hikes should they decide to borrow the money to finance the new venture.

In an attempt to keep costs to a minimum, it is advisable for the company to erect a simple propagation structure and propagate their own seedlings should they wish to propagate plant material during the heat of summer. This would enable them to control

the micro environment in which the seedlings are produced thus preventing the loss of cutting material due to heat scorch. The most cost effective method of propagation would, however, be the direct sticking of the cuttings into the field. This would save the capital costs associated with erecting a propagating structure. This strategy will only succeed during spring and autumn when ambient temperatures are low and so prevent the desiccation of the cuttings in the field.

From a cultivar point of view Pinky Flair is the variety most demanded locally and internationally, with Excellent Flair coming second. Magical Red, being a new cultivar, has not yet established a track record although sales data from the Dutch auctions indicate that the variety has potential. From a grower's point of view, the Flair series have similar growth habits and it would therefore make sense to grow the variety with the highest return per stem which is Pinky Flair. It is therefore recommended that Pinky Flair be planted instead of Excellent Flair. During the interim period, whilst the Pinky Flair numbers are being increased from their low base due to the limited availability of plant material, that Excellent Flair be planted with the view of pulling the plants up after their first year of production and replacing them with Pinky Flair which has a higher return per unit planted than Excellent Flair.

The company would be advised to bulk up their Magical Red plants in order to have enough stock plants from which to procure cutting material, as this variety has superior disease resistance as opposed to the Flair series. Should this variety prove to be acceptable to the company's clients, and giving a return similar to Pinky Flair, this would be the most preferred cultivar from a grower's perspective, as the reduction or elimination of disease pressure enables a more consistent production of high quality products to meet the needs of clients. Should Magical Red yield slightly lower returns per stem than Pinky Flair, it would still make sense to replace Pinky Flair with Magical Red as a result of the cost savings resulting from reduced spray costs and the smaller likelihood of a reduction in quality of the finished product. Bearing in mind that there is a global shift towards organic production and production methods that reduce the reliance on pesticides, fungicides and inorganic fertilisers, Magical Red would be a better cultivar to grow as one would use less fungicide per hectare than the Flair series. This could be used as a strategic marketing tool.

Taking into account that the project would be located in a hail belt, it would be strongly advised that a shade house be erected in order to protect the growing crop. Potential losses resulting from hail damage outweigh the capital savings that would be incurred should one choose not to erect a shade house. Apart from the economic loss due to the destruction of saleable stems, clients may be lost as a result of non-delivery of product at a critical time of year such as Valentine's Day.

In order to ensure production on a continuous basis it is advised to install a lighting system consisting of high pressure sodium lamps as these are the lamps used by existing growers. Until such time as a complete study has been done on the costing and the effect of other lamp types on plant growth it would be better to employ a system that appears to work, although some people do use incandescent and fluorescent lamps to light their crops.

From the data obtained regarding the various markets, it would appear as though the highest prices are obtained on the American markets followed by the Dutch Auctions, with the poorest prices being realised on the local auction in Johannesburg. It would be advisable to market the bulk of the product to the USA where the best prices would be obtained.

Initially the various flower markets located in San Francisco, Boston, Chicago and Philadelphia would be used to sell the product. As clients begin to familiarise themselves with the company's brand and begin enquiring about direct sales a move away from the flower markets to direct sales is envisaged as this would be advantageous to both buyer and seller as the middle man and the various commissions would be eliminated.

Credit checks would have to be done prior to engaging in business with direct clients in order to reduce the risk of bad debts. The Multiflora Flower Auction in Johannesburg would be used to sell the poorer quality products consisting of stems with a low berry count or having slight rust infection on the leaves which appear to be acceptable on the local auctions.

An alternative marketing strategy that may be pursued would be to target wholesale exporters in South Africa with Pinky Flair who would then be able to sell the product directly to retail clients in Europe thus bypassing the auction restrictions. This strategy would be useful as the costs and problems associated with freight would be eliminated. Wholesalers would benefit in that they would be able to purchase the product directly and ship it off to their clients without the delays of having to have the product handled on the auctions prior to them taking delivery.

It is felt that the most advisable marketing strategy would be the one that results in the greatest number of sales proceeds being left in foreign bank accounts in first world countries after production costs have been covered. This line of reasoning is followed in the light of the developments in Zimbabwe and other former colonial countries where the agricultural sector has been placed under severe pressure due to political developments within these countries.

Current South African tax legislation is based on residential status and may be utilised as a possible method of ensuring that money resulting from foreign sales remains abroad whilst being taxed in South Africa. Should the company open a sister company in the foreign country and sell the finished product to the sister company in Rands, who would then market the product in a first world currency with the proceeds going into a first world bank account. Transfer pricing may be an issue that needs to be investigated further.

5.3 Conclusions

In the light of the data collected, business theory and the integration of theory and practice it was shown that it is financially viable to cultivate Hypericum as a cut flower for the export market, especially that of the USA.

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