OPTIMIZATION OF THE PRODUCTION PLANNING AND TRADE OF LILY FLOWERS AT JAN DE WIT CO.

JAN DE WIT
LÍRIOS

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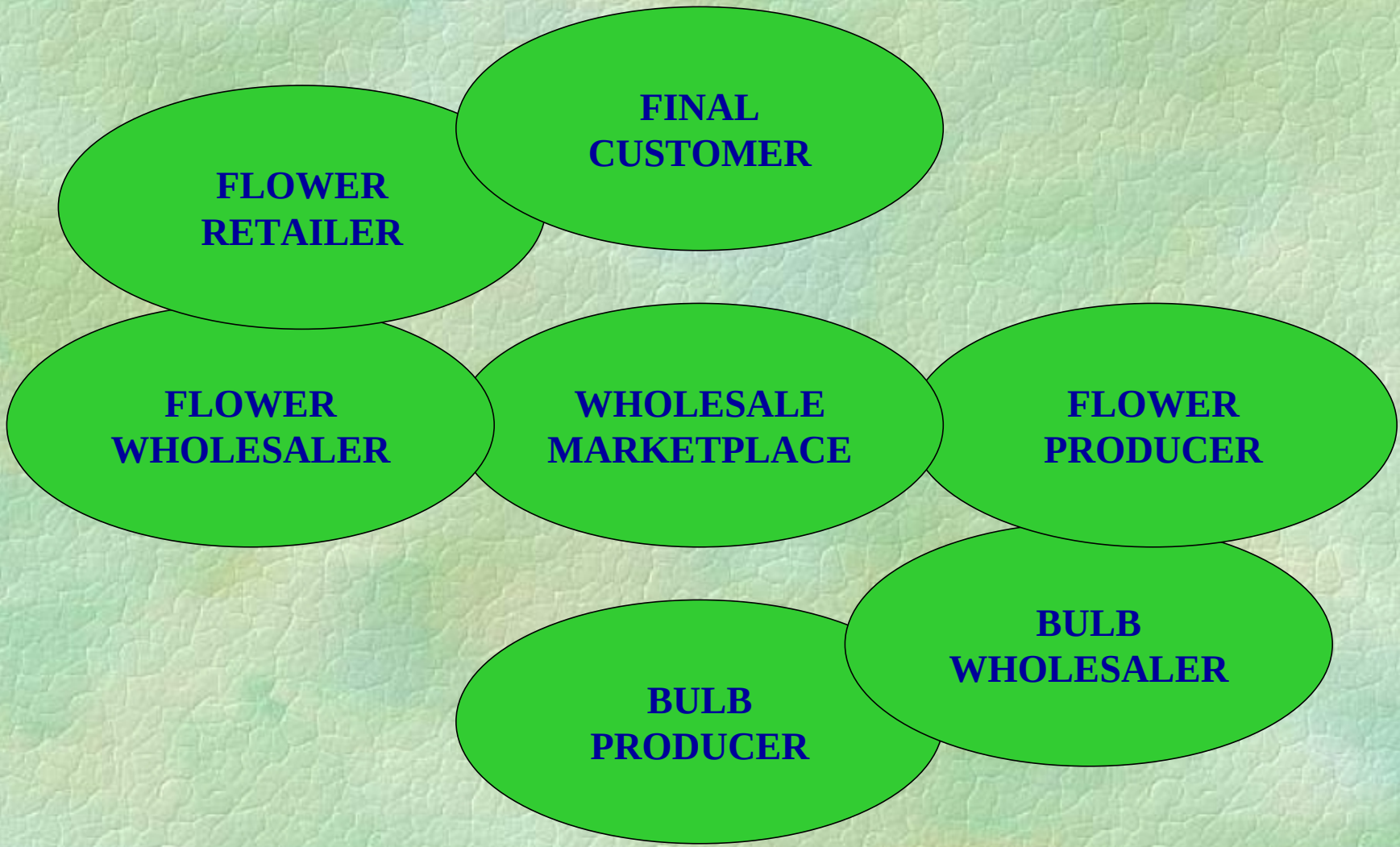
OUTLINE OF THIS PRESENTATION

- introducing Jan de Wit Co.
- understanding the lily business chain
- the main results obtained
- the DSS and the transferability issue
- testimonies: producer and competitors
- concluding remarks

LILY BUSINESS CHAIN

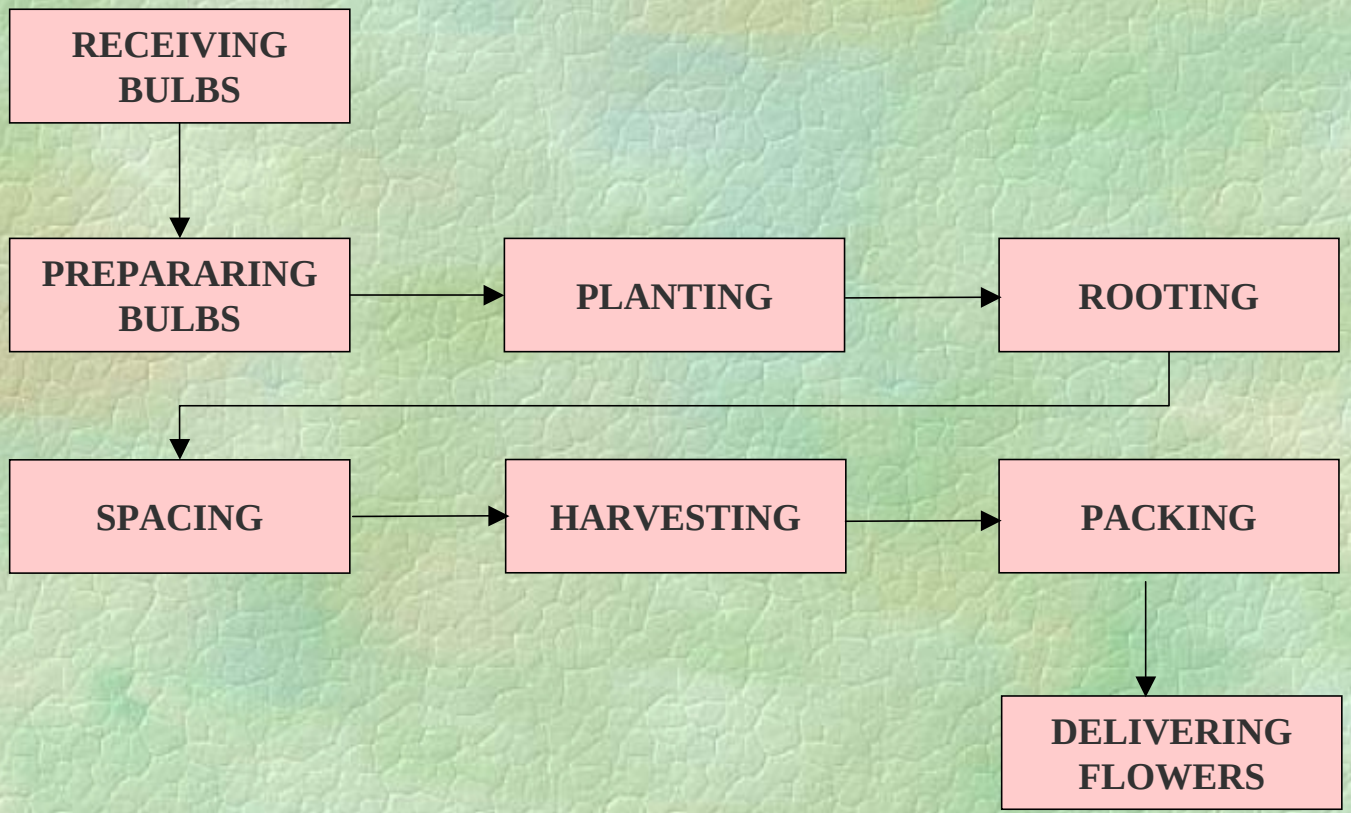


VEILING HOLAMBRA

- auction room -

PRODUCTION PROCESS

- from bulbs to flowers -



THE PROBLEM

- exploite market opportunities, respecting operational and technical restrictions;
- manage trade and production cycles: how to plan, do, check and respond;
- purchase the right bulbs: varieties, bulb sizes and quantities per size.

INCREASED FINANCIAL RESULTS

	1999	2000	Δ (%)
Income from operations (R$)	309,546	495,243	60%
Income from operat. (% of sales)	12.3%	15.5%	26%
Return on owners equity	15.1%	22.5%	50%

INCREASED FINANCIAL RESULTS

	1999	2000	Δ (%)
Pots			
Quantities (units)	422,208	484,722	14.8%
Revenue (R$)	1,432,875	1,643,558	14.7%
Unit average price (R$)	3.39	3.39	0%
Bundles			
Quantities (units)	220,469	285,088	29.3%
Revenue (R$)	1,133,925	1,585,984	39.9%
Unit average price (R$)	5.14	5.56	8.2%
Total Revenue (R$)	2,566,800	3,229,542	25.8%

INCREASED FINANCIAL RESULTS

	Δ (2000 / 1999)
Revenue	26%
Variable costs	23%
Contribution margin	32%
Fixed costs	18%
Income from operations	60%

STRUCTURE OF THE LP MODEL

OBJECTIVE :

- **maximization of the farm's "total contribution margin"**

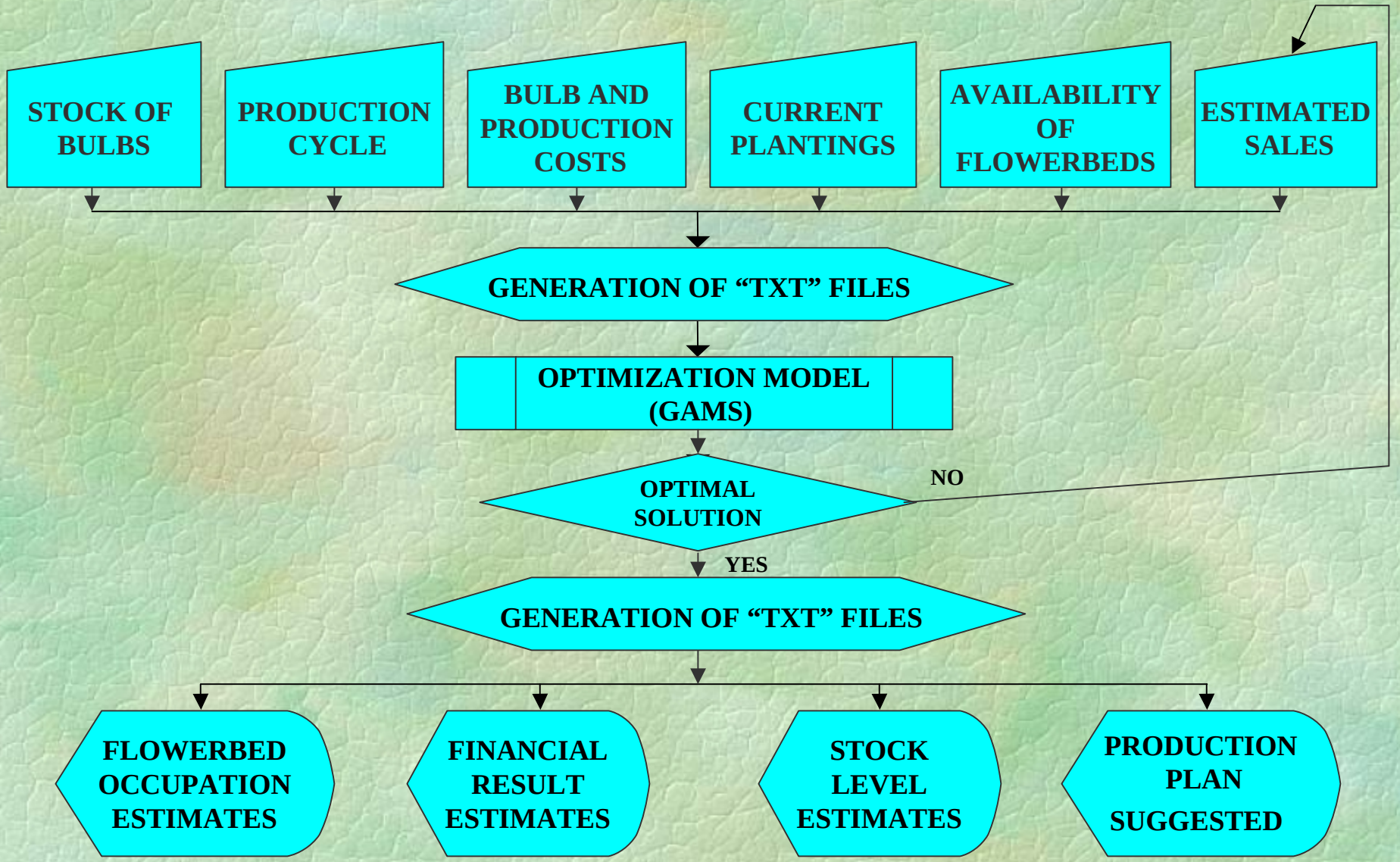
CONSTRAINTS TO BE CONSIDERED:

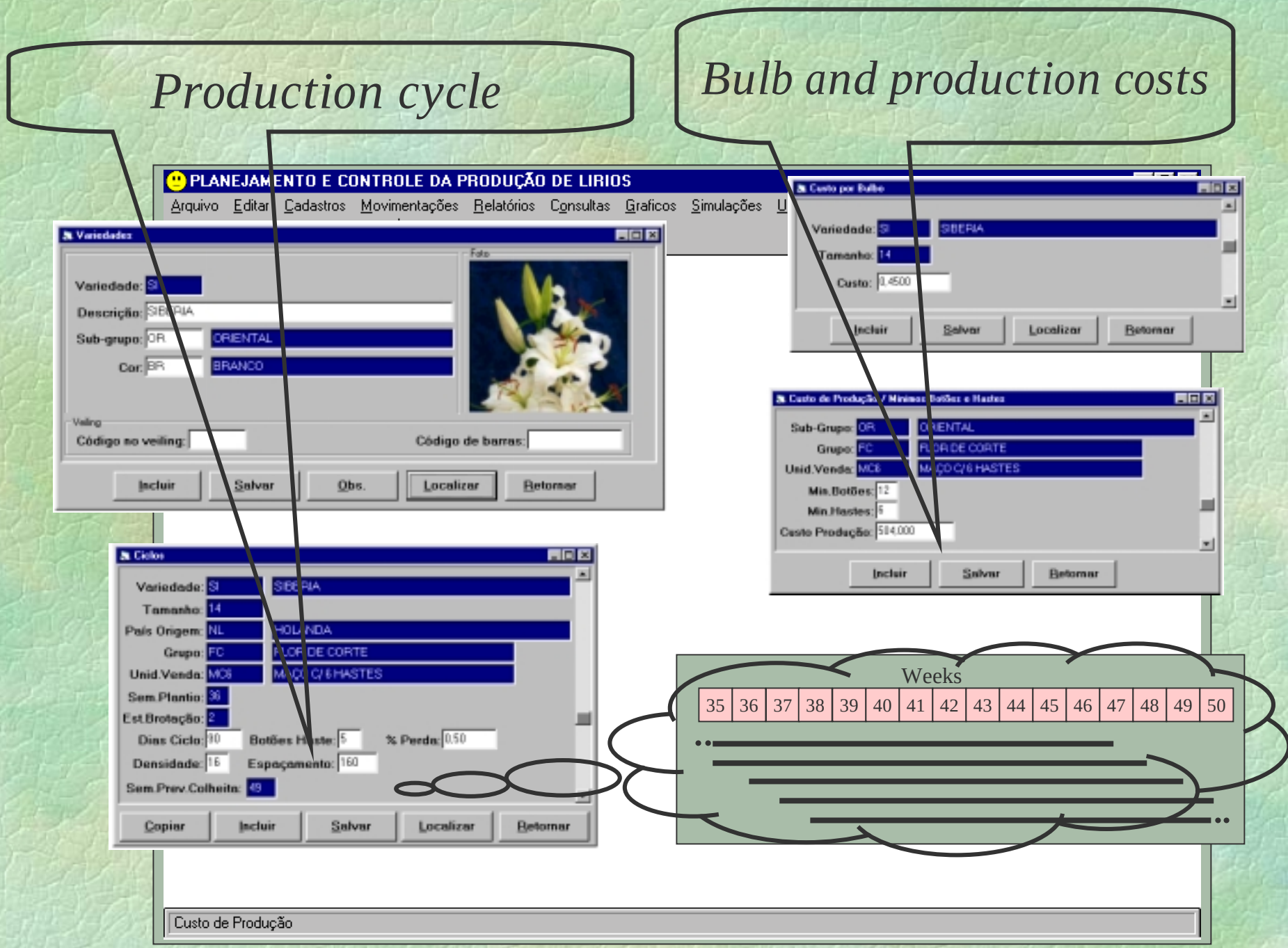
- **bulb inventory**
- **characteristics of the production cycle's duration**
- **technical requirements (number of bulbs per pot or box, spacing to be followed)**
- **usage limitations for each type of greenhouse**
- **market requirements (selling unit, minimum number of buds and minimum number of stems per bundle or pot)**
- **upper and lower market-defined sales' limits**

MAIN DECISION VARIABLE TO BE CALCULATED

$NUMCANT_{jvgil}$ = total of flowerbeds, in a specific greenhouse, originated from a specific bulb batch *j*, from a specific lily variety *v*, for a specific use *g* (e.g., potting flower or cutting flower), taking into consideration the pertinent planting week *i* and the expected harvesting week *l*.

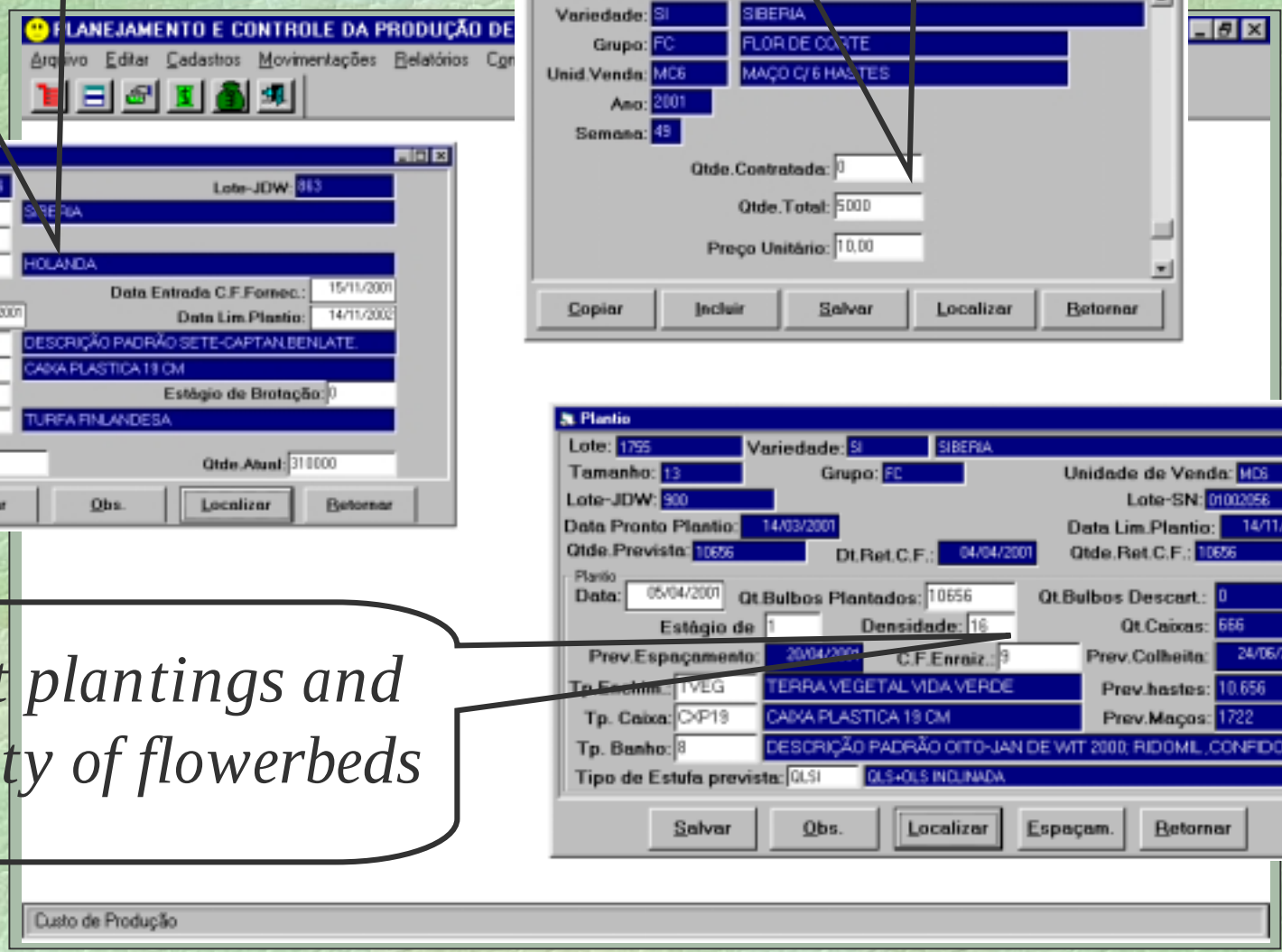
GENERAL STRUCTURE OF THE DECISION SUPPORT SYSTEM

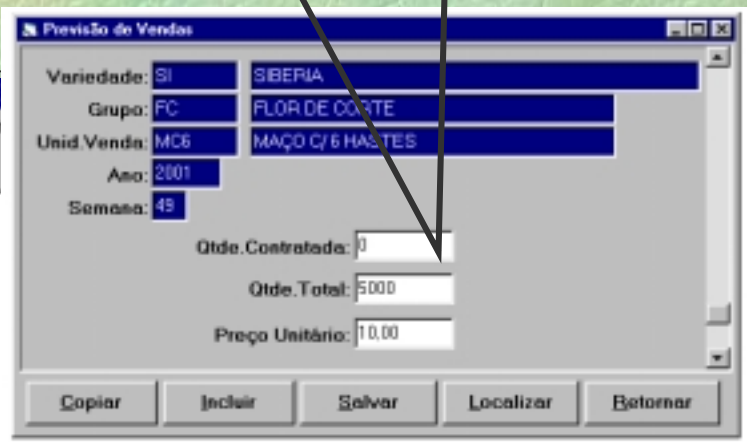



Production cycle
Bulb and production costs
PLANEJAMENTO E CONTROLE DA PRODUÇÃO DE LIRIOS
Arquivo Editar Cadastros Movimentações Relatórios Consultas Graficos Simulações
Variedades
Variedade: SI
Descrição: SIBERIA
Sub-grupo: OR ORIENTAL
Cor: BR BRANCO
Foto
Veiling
Código no veiling:
Código de barras:
Incluir Salvar Obs. Localizar Retornar
Custo por Bulbo
Variedade: SI SIBERIA
Tamanho: 14
Custo: 0,4500
Incluir Salvar Localizar Retornar
Custo de Produção / Mínimos Botões e Hastes
Sub-Grupo: OR ORIENTAL
Grupo: FC FLOR DE CORTE
Unid.Venda: MC6 MAÇO C/6 HASTES
Min.Botões: 12
Min.Hastes: 6
Custo Produção: 584,000
Incluir Salvar Retornar
Ciclos
Variedade: SI SIBERIA
Tamanho: 14
País Origem: NL HOLANDA
Grupo: FC FLOR DE CORTE
Unid.Venda: MC6 MAÇO C/6 HASTES
Sem.Plantio: 36
Est.Brotação: 2
Dias Ciclo: 110 Botões Haste: 5 % Perda: 0,50
Densidade: 16 Espaçamento: 160
Sem.Prev.Colheita: 49
Copiar Incluir Salvar Localizar Retornar
Weeks
35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
Custo de Produção

Stock of bulbs

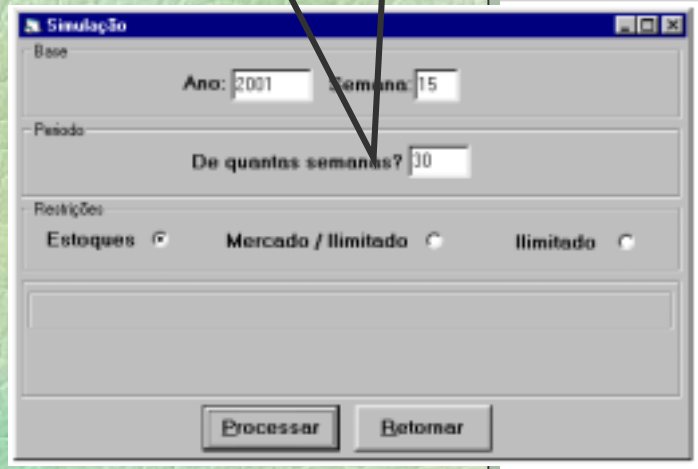
Estimated sales

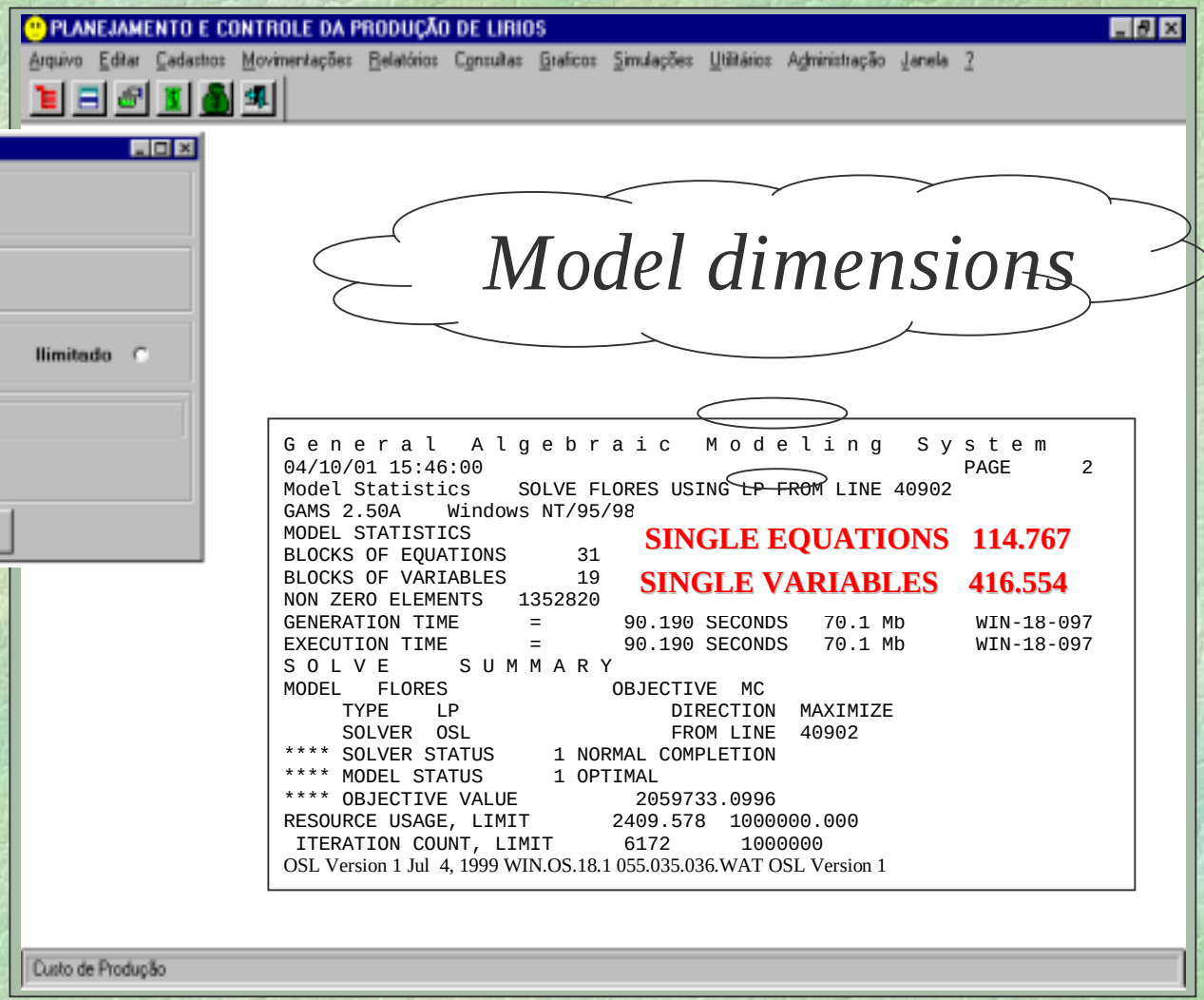




Current plantings and availabilty of flowerbeds

Planning horizon





Model dimensions

```
G e n e r a l   A l g e b r a i c   M o d e l i n g   S y s t e m
04/10/01 15:46:00                                          PAGE     2
Model Statistics    SOLVE FLORES USING LP FROM LINE 40902
GAMS 2.50A    Windows NT/95/98
MODEL STATISTICS
BLOCKS OF EQUATIONS      31
BLOCKS OF VARIABLES      19
NON ZERO ELEMENTS   1352820
GENERATION TIME      =       90.190 SECONDS   70.1 Mb      WIN-18-097
EXECUTION TIME       =       90.190 SECONDS   70.1 Mb      WIN-18-097
S O L V E      S U M M A R Y
MODEL   FLORES              OBJECTIVE  MC
     TYPE    LP                  DIRECTION  MAXIMIZE
     SOLVER  OSL                 FROM LINE  40902
**** SOLVER STATUS     1 NORMAL COMPLETION
**** MODEL STATUS      1 OPTIMAL
**** OBJECTIVE VALUE          2059733.0996
RESOURCE USAGE, LIMIT       2409.578  1000000.000
 ITERATION COUNT, LIMIT      6172      1000000
OSL Version 1 Jul  4, 1999 WIN.OS.18.1 055.035.036.WAT OSL Version 1
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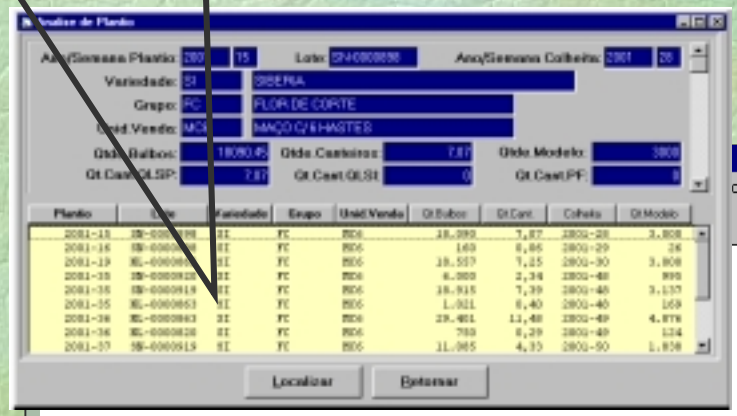
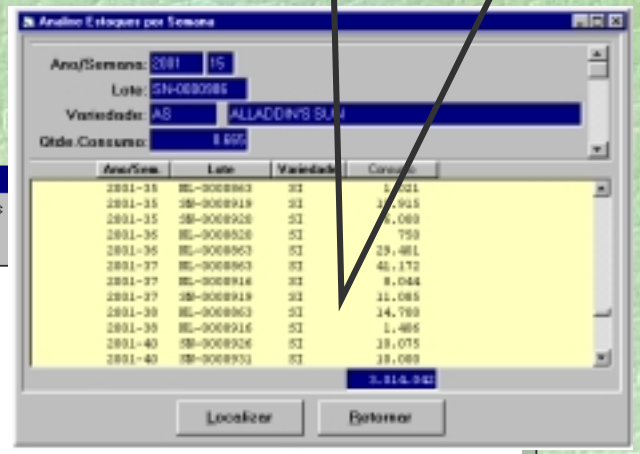
SINGLE EQUATIONS 114.767

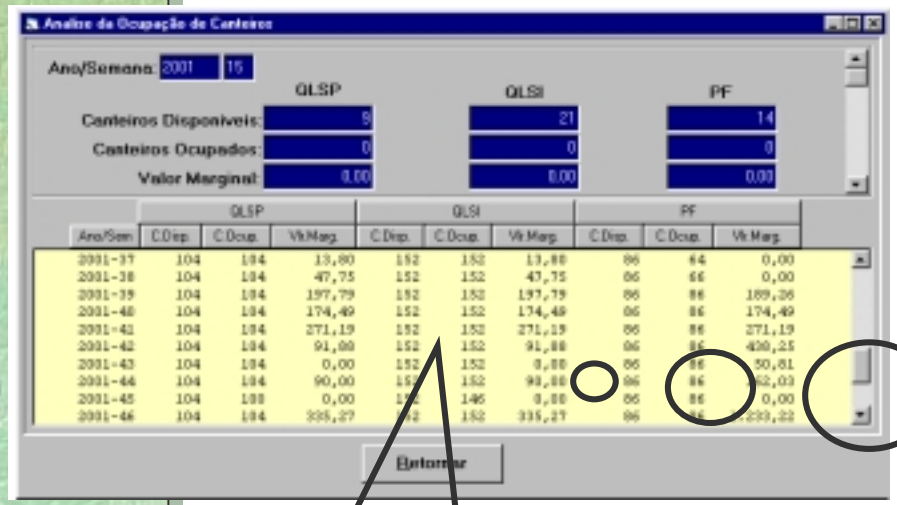
SINGLE VARIABLES 416.554

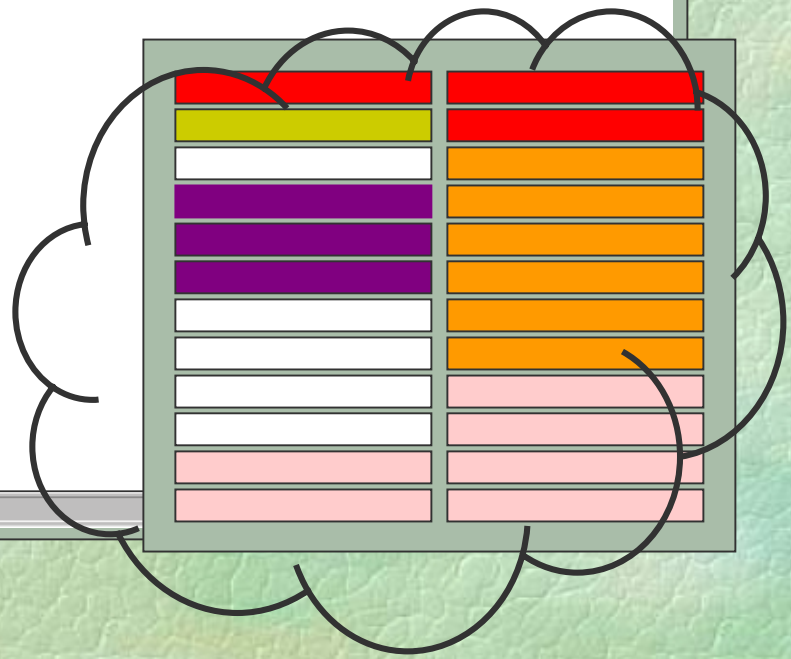
Production plan

Stock levels



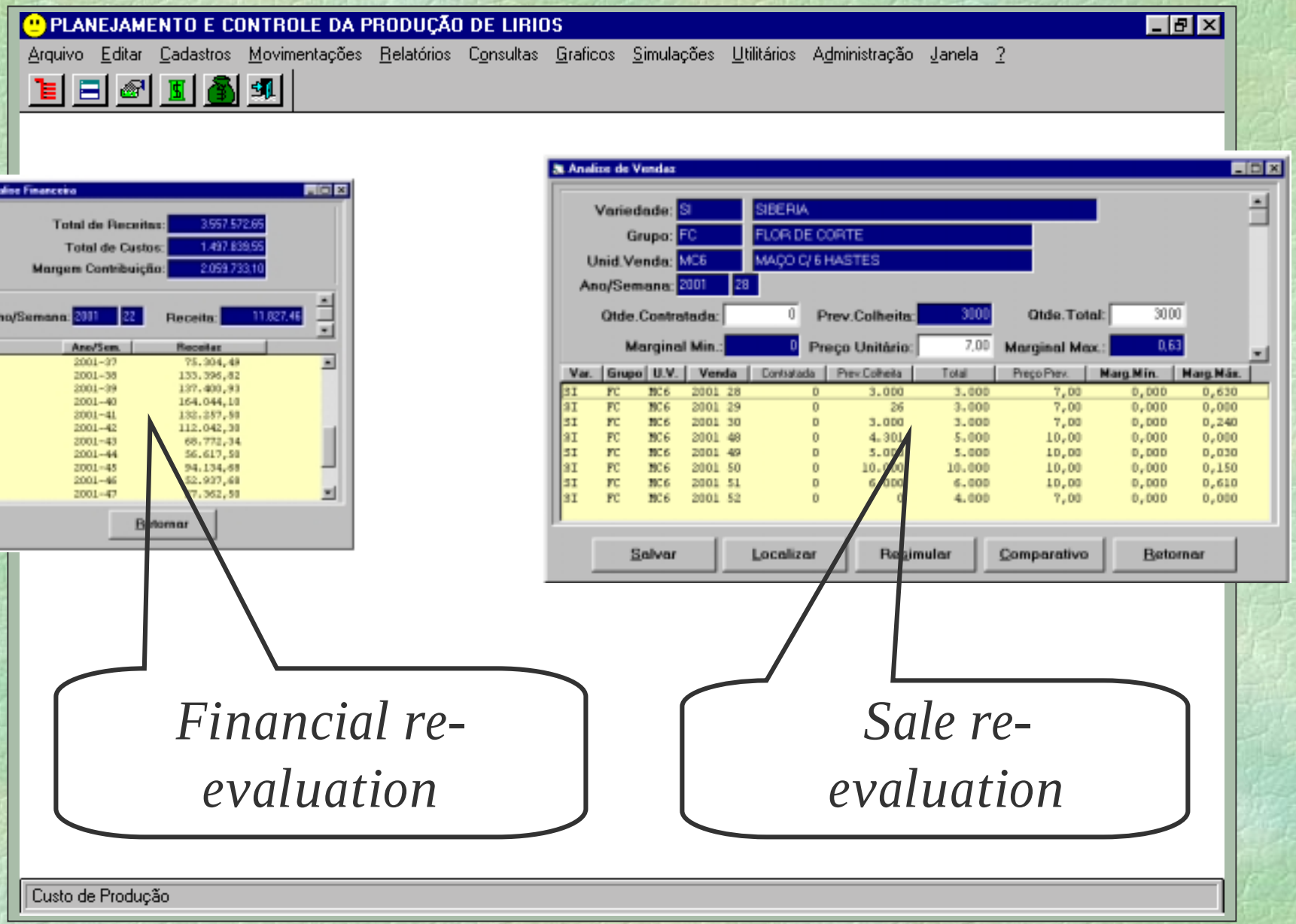






Custo de Produção

Flowerbed occupations



Financial re-evaluation

Sale re-evaluation

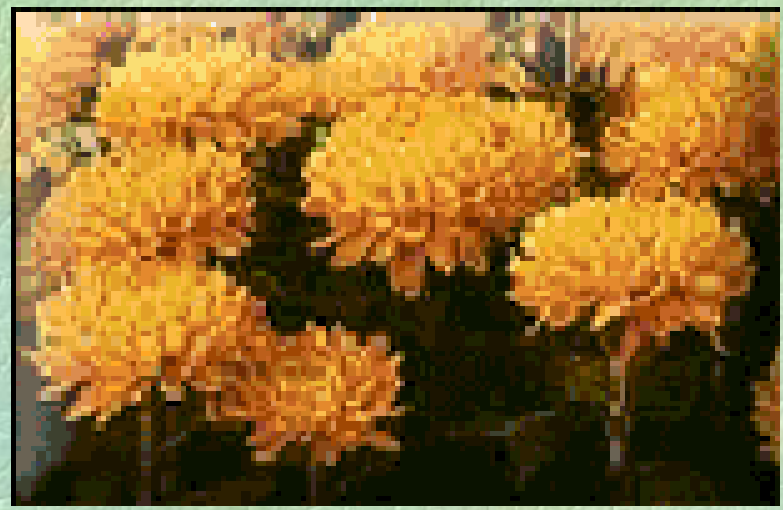
Linear Programming applied to the flower sector: a gladiolus bulb production case study

José Vicente Caixeta Filho

Jan Maarten van Swaay Neto

Ricardo Luis Lopes

OPTIMIZATION OF THE PRODUCTION PLANNING AND TRADE OF CHRYSANTHEMUM FLOWERS AT SCHOENMAKER CO.



José Vicente Caixeta-Filho

Jan Maarten van Swaay-Neto

Antonio Wagemaker

CONCLUDING REMARKS

- the still not very traditional environment

(= Agriculture) for an O.R. application

- the still not very traditional country

(= BRAZIL) for a well succeded O.R. application

- the size and specific type of business
- the use (and success) of an LP model
- the friendly interfaces of the DSS
- the quantifiable benefits
- the transferability potential
- the complete knowledge cycle

(classroom → business → Edelman → classroom)