

PRODUCTION OF CARNATIONS WITHOUT THE USE OF METHYL BROMIDE

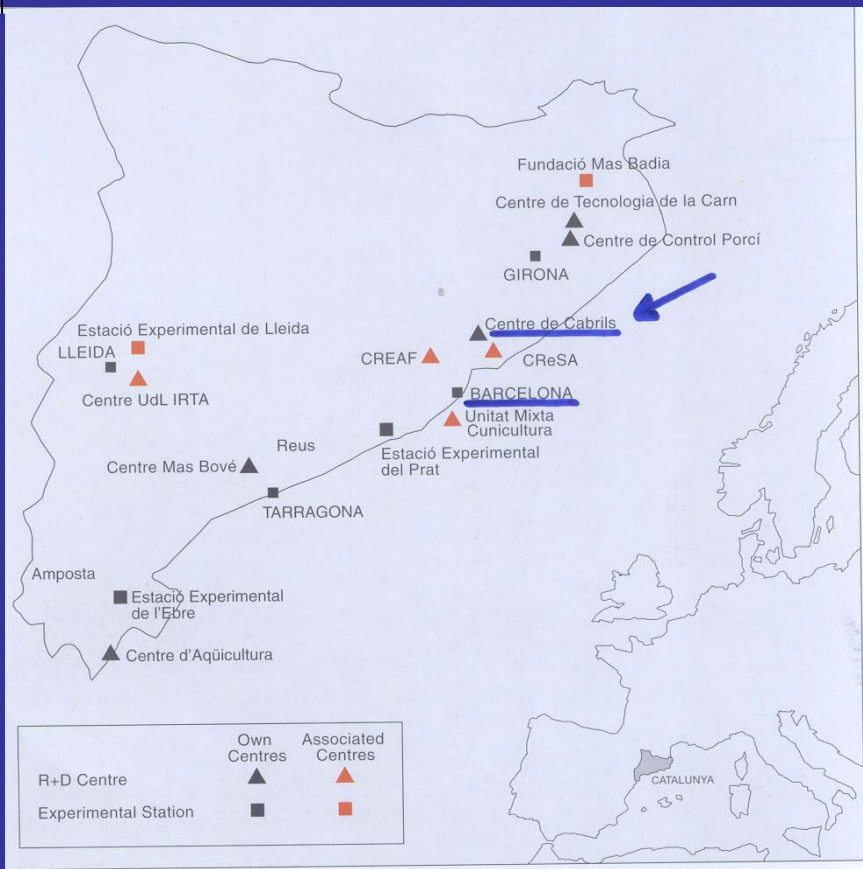
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IRTA



- ▲ **CENTRE DE CABRILS**
Cabrils (Barcelona) SPAIN
- Horticulture technology
 - Plant genetics
 - Plant pathology
 - Entomology



METHODS TO CONTROL *Fusarium* WILT ON CARNATION (*Dianthus caryophyllus* L.)

- CHEMICAL
- PHYSICAL
- BIOLOGICAL
- BREEDING: RESISTANT OR LESS SUSCEPTIBLE VARIETIES
 - ECONOMIC
 - ENVIRONMENT- FRIENDLY

BREEDING PROGRAM ON CARNATION

DEVELOP RESISTANT STANDARD VARIETIES TO
Fusarium oxysporum f.sp. dianthi (Fod)

***INSTITUTE FOR FOOD AND AGRICULTURAL
RESEARCH AND TECHNOLOGY (IRTA)
Barcelona (SPAIN)***

FINNANCIAL SUPPORT

- Mercat de la Flor i Planta Ornamental
de Catalunya (MFiPOC)***
- Spanish Government (INIA; CICYT)***

BREEDING METHODS

A.-CONVENTIONAL BREEDING PROGRAM TO OBTAIN NEW COMMERCIAL VARIETIES

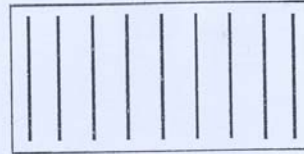
- ➡ ASEXUAL REPRODUCTIVE SYSTEM
- ➡ A LEVEL OF FERTILITY IS MAINTAINED

B.-SPECIFIC BREEDING PROGRAM FOR RESISTANCE

BREEDING PROGRAM

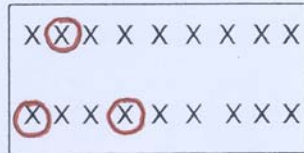
1st YEAR

CROSSES BETWEEN
SELECTED GENOTYPES
(20.000 TO 25.000 SEEDLINGS)



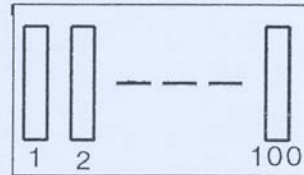
2nd YEAR

SELECTION OF THE BEST
100 INDIVIDUALS



3rd YEAR

PLOT EVALUATION AND
SELECTION OF THE BEST
10 LINES



4th and 5th
YEARS

FIELD TRIALS AND
SELECTION OF THE BEST
2-4 LINES



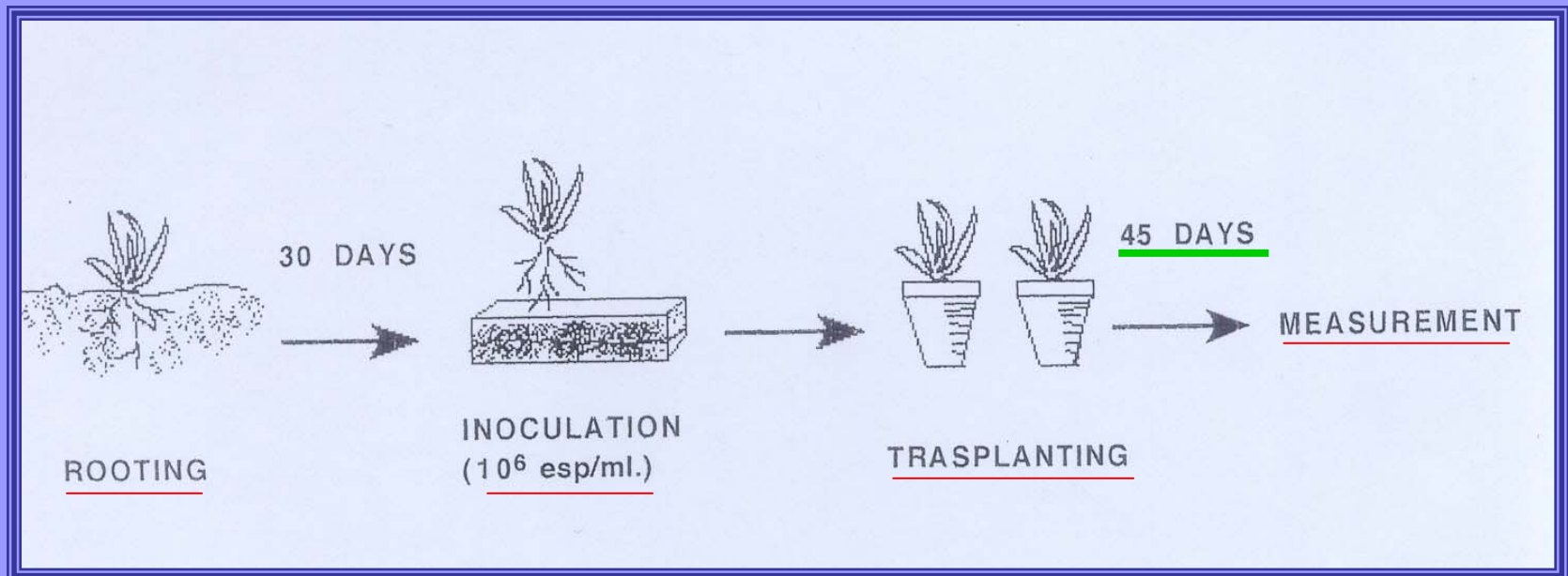
COMERCIAL VARIETIES

BREEDING PROGRAM FOR RESISTANCE

PREVIOUS KNOWLEDGE

- ➔ Intraespecific genetic variability
- ➔ Ability to distinguish between resistant and sensitive (Root deep method of Garibaldi)
- ➔ Genetic basis of resistance

ARTIFICIAL INOCULATION METHOD



THE GENETICS BASIS OF RESISTANCE

CROSSES: R x R R x S S x S
 ↓ ↓ ↓
 progeny progeny progeny
RATIO: R:S R:S R:S

HYPOTHETICAL GENETIC MODEL

GENES	1	2	3	4
ALLELES	R-	R-	R-	R-
(R,r)	rr	rr	rr	rr

R: dominant allele causing resistance
r: recessive allele causing susceptibility

THE GENETICS BASIS OF RESISTANCE

HOMOZYGOUS RESISTANT GENOTYPE

GENES	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
ALLELES	RR	RR	RR	RR

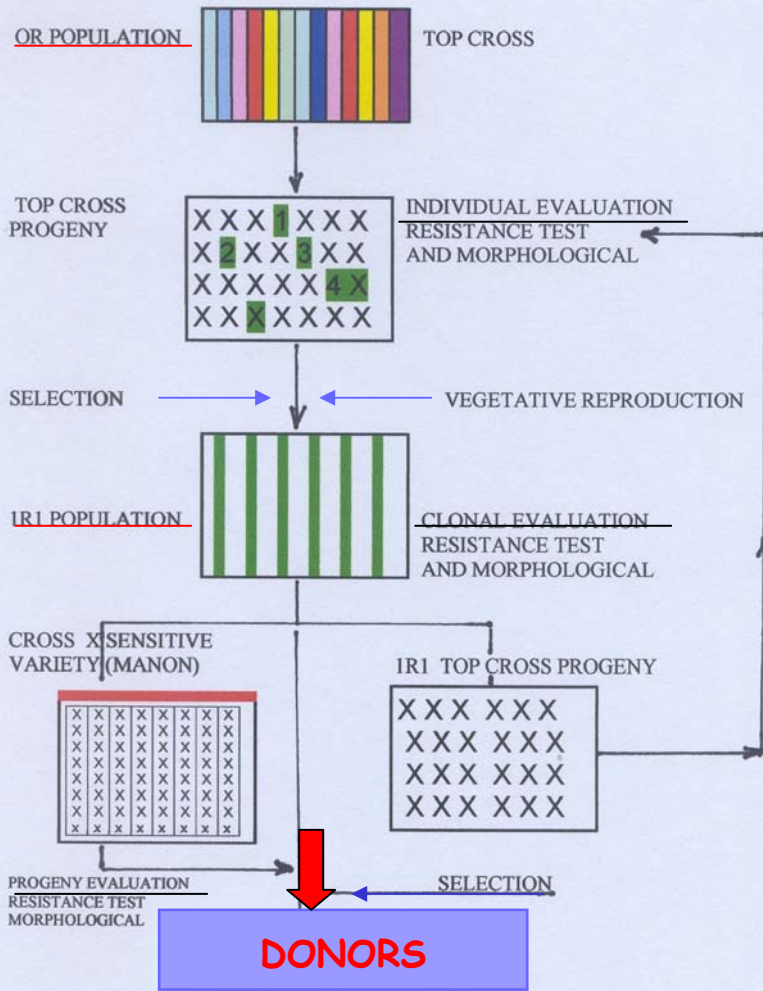
CROSSED BY ANY GENOTYPE

ALLELES	--	--	--	--	.
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RESISTANT PROGENY

ALLELES	R-	R-	R-	R-
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BREEDING PROGRAM FOR RESISTANCE

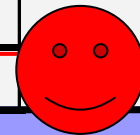


TESTING FOR INDIVIDUAL RESISTANCE IN THE PROGENYS



RESULTS OF BREEDING PROGRAM FOR RESISTANCE 2000-2003

YEAR	SELECTION CYCLE	N° TESTED GENOTYPES	N° DONORS	SELECTED DONORS
2000	1R1	12		
	1R2	51	17	2
	1R3	32	7	1
2001	1R1			
	1R2	12	3	1
	1R3	32	10	2
2002	1R1	14	1	1
	1R2	35	13	4
	1R3	24	6	2
2003	1R1	22	1	
	1R2	6	4	2
	1R3			
TOTAL		242	62	15



DONORS USED AS PROGENITORS

SELECTED DONORS		COLOUR	RESISTANT DESCENDENTS%
1	96-1R2-20	Red	100
2	97-1R2-56	Red	86
3	98-1R2-20	Cherry	100
4	98-1R2-50	Red	92
5	98-1R2-66	Cherry	100
6	98-1R2-71	Cherry	98
7	98-1R2-104	Red	89
8	99-1R2-24	White	100
9	99-1R2-27	Red	100
10	99-1R3-27	Red	100
11	99-1R3-96	Yellow	93
12	00-1R2-8	Cherry	91
13	00-1R2-10	Red	100
14	00-1R2-11	Pink	100
15	1145	Pink	100

CONCLUSIONS

- 1 CONSISTENT HYPOTHETICAL GENETIC MODEL
- 2 HIGHER DIFFERENCES OCCUR BETWEEN 1R1 AND 1R2 SELECTION CYCLE
- 3 CA DCREASSES IN SUCCESSIVE SELECTION CYCLES
- 4 SECOND CYCLE (=1R2) MEANS THE MAXIMUN CHANCE TO OBTAIN HOMOZYGOUS VALUABLE DONORS
- 5 USING HOMOZYGOUS SEL. DONORS AS PROGENITORS IS POSSIBLE TO OBTAIN RESISTANT COMERCIAL VARIETIES (QUALITY-YIELD)

RESISTANT VARIETIES CAN BE CONSIDERED AS AN
ALTERNATIVE TO MB

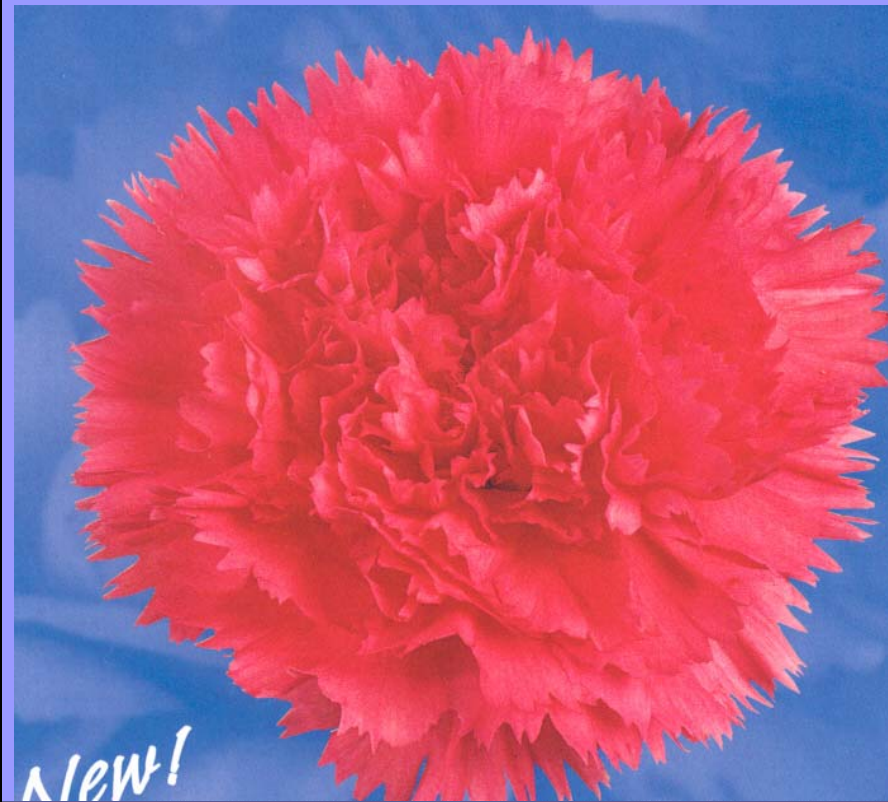
IRTA COMMERCIAL CATALOGUE

	Code	N	IV	Variety	Colour	RF	VL	PRD	Company
1	HH20		X	Greca	Yellow	4	A	A	FLORAMERICA
2	IA109		X	Gaudina	Red	1	B	A	HILVERDA
3	ID1	X	X	Rubesco	Cherry	2	A	B	HILVERDA
4	IE58	X	X		Pink	0	A	A	
5	IE87	X	X		Pink	0	B	A	
6	IE110		X		Cherry	0	B	B	
7	IF52		X		Pink	0	B	A	
8	IF69	X	X		Pink	4	A	A	
9	IG17	X	X		White	0	A	B	
10	IG73	X	X		Pink	1	A	B	
11	IH43	X			Pink	0	B	A	
12	IH23	X			Red	0	A	A	
13	IH63	X	X		Cherry	3	A	B	
14	II109	X			Pink	3	A	A	
15	IJ7	X			Pink	1	B	A	
16	IK10	X			Cherry	0	B	B	
17	IK26	X			Cherry	1	A	B	
18	JA6	X			Cherry	0	A	A	
19	JA9	X			Red	3	A	A	
20	JA14bis	X			Cherry	2	B	B	
21	JA20	X			Cherry	0	B	B	
22	JA26				Fantasia	0	A	B	
23	JA30	X			Yellow	0	A	B	
24	JA32	X			Cherry	1	B	B	
25	JA36	X			Pink	4	A	A	

IRTA VARIETIES



GAUDINA



RUBESCO

