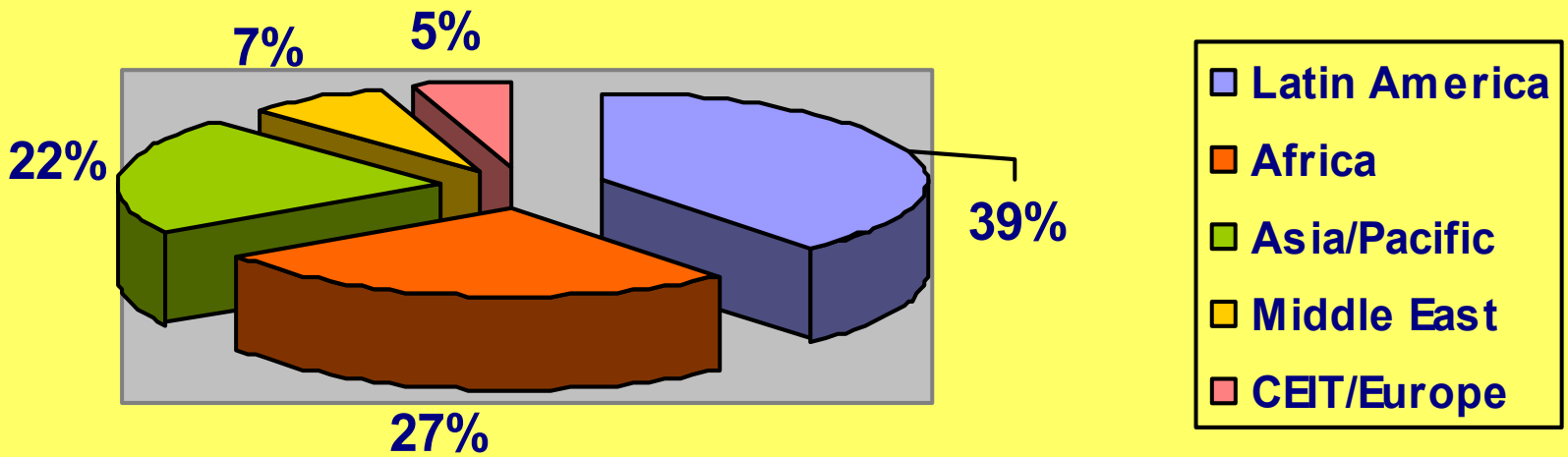
Alternatives to MB for the production of cut flowers and bulbs in developing countries

Marta Pizano
Bogotá, Colombia

MB consumption in developing countries

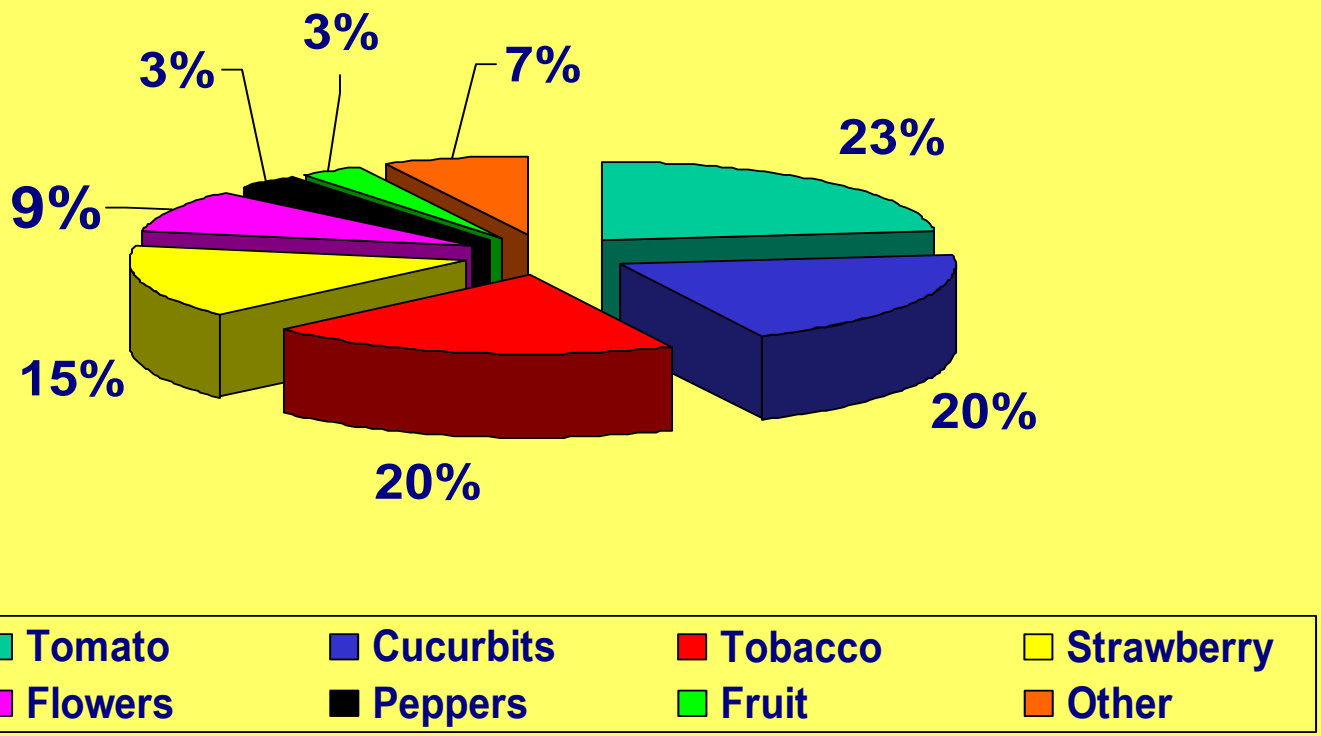
Developing countries account for - aprox. 34% of world consumption (about 15,750 T in 2000)



Source: MBTOC Assessment, 2002, Ozone Secretariat, 2001

Major crops using MB in developing countries (soil sector)

Aprox. 1420T of MB used for flowers



Source: MBTOC Assessment, 2002

World Cut Flower Trade

- Cut flower production has shifted significantly to developing countries that export to the industrialised world. They must comply with standards (e.g. eco-labels)
- Important exporters include Colombia, Ecuador and Costa Rica in Latin America; Kenya, Zimbabwe, Uganda and South Africa in Africa; Thailand and more recently China in Asia.
- Over 90% of production is generally exported.
- Colombia, the second cut flower exporter in the world after Holland does not use MB.

Floriculture projects in developing countries

- Implementing agencies of the Montreal Protocol have carried out demonstration projects in many countries with the aim of identifying and evaluating the most promising alternatives to MB.

- Various investment projects are now in place, which will conduct to early phase-out (2008) of a significant proportion of MB used in floriculture.

Demonstration and investment projects for the flower sector.

Geographical distribution and scope for MB reduction

Region	# demo	# inv.	# info	MB phase-out
Latin America	5	8		336.03
Africa	2	5		414.6
Asia/ Middle East	2	3		139.3
CEIT	-	1		3
Global	-	-	2	-
TOTAL	**9**	**17**	**2**	**892.9**

Source: Multilateral Fund data, 2004

Main alternatives tested in demo projects (floriculture) in developing countries

Alternatives	Countries
1- Non – chemical	
Biofumigation	Guatemala, Turkey
Compost, org. ammendments	Costa Rica, Kenya
Resistant varieties	Syria
Substrates	Dom. Republic, Guatemala, Kenya
Solarization	Mexico
Steam	Argentina, Costa Rica, Dom. Republic, Guatemala, Kenya, Syria, Turkey

Source: MBTOC 2002 Assessment

Main alternatives tested in demonstration projects (floriculture) in developing countries (cont.)

Alternatives	Countries
2 – Chemical	
Dazomet	Argentina, Costa Rica, Dominican Republic, Kenya, Mexico, Turkey
Metam Sodium	Argentina, Costa Rica, Dom. Republic, Kenya, Mexico
1,3 D	Mexico, Turkey
3 – Combined treatments	
Metam Na + 1,3 D/ Pic	Mexico
Biofumigation + solarization	Dominican Republic

Alternatives selected for investment projects (floriculture) and commercial adoption

Alternatives	Region
Steam	Africa, Asia, Latin America, Middle East
Substrates	Middle East, Latin America, Africa
Dazomet, 1,3- D, Metam sodium, other chemicals	Middle East, Africa
Solarisation	Africa

Source: MBTOC 2002 Assessment

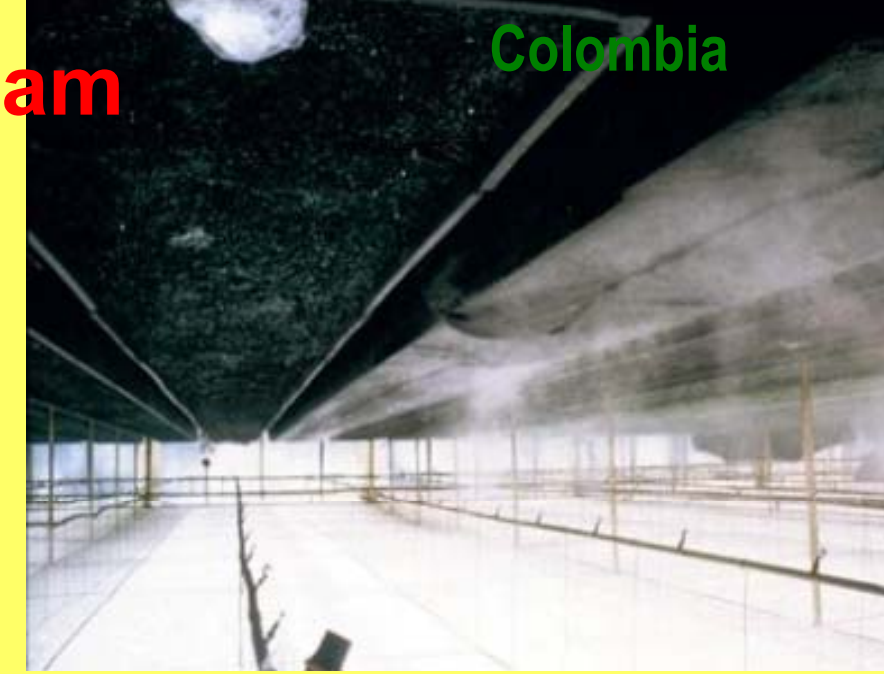
Commercial adoption of alternatives to MB for floriculture in developing countries

- **Steam**
- **Substrates**
- **Organic amendments (compost)**
- **Soil fumigants - 1,3 D/Pic, MS, Dazomet**

These alternatives are often combined and give best results when used as part of an IPM program


Zimbabwe – Plate steaming
2004 6 22

Steam


Colombia


Colombia- sheet steaming


Uganda
2004 4 22

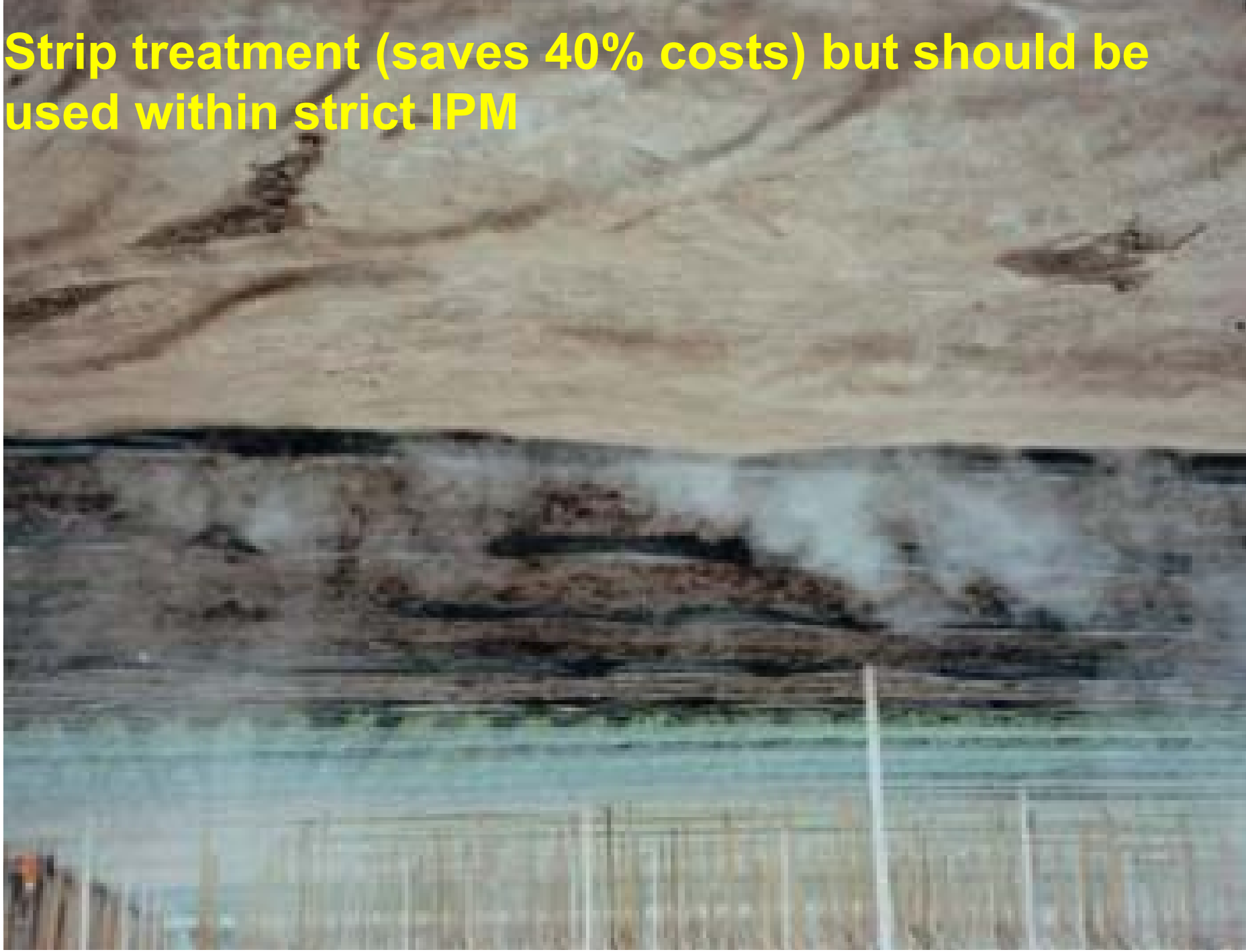
Boiler and fuel types

Zimbabwe

Brazil

Colombia

Argentina


Strip treatment (saves 40% costs) but should be used within strict IPM

Substrates

Economically feasible substrates include rice hulls, coco peat, composted pine bark, pumice

Roses in substrates

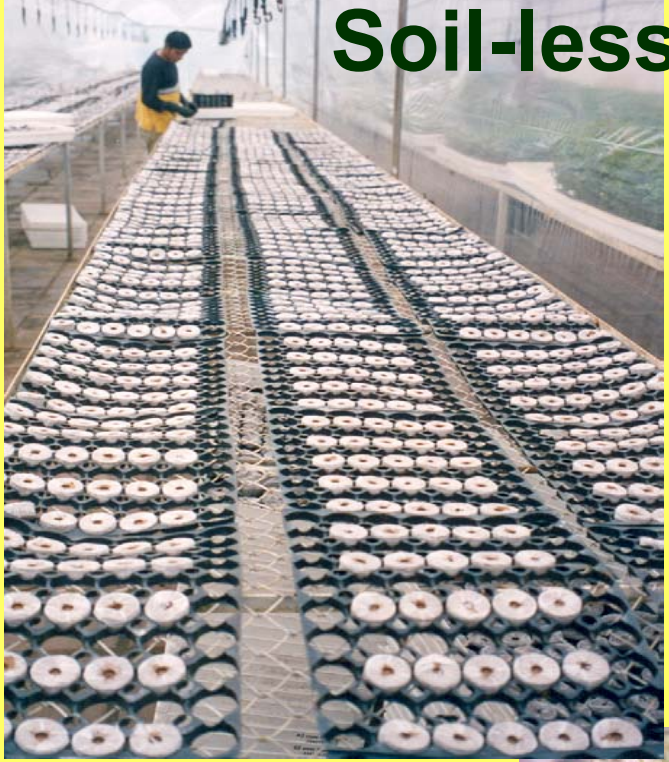
Carnations

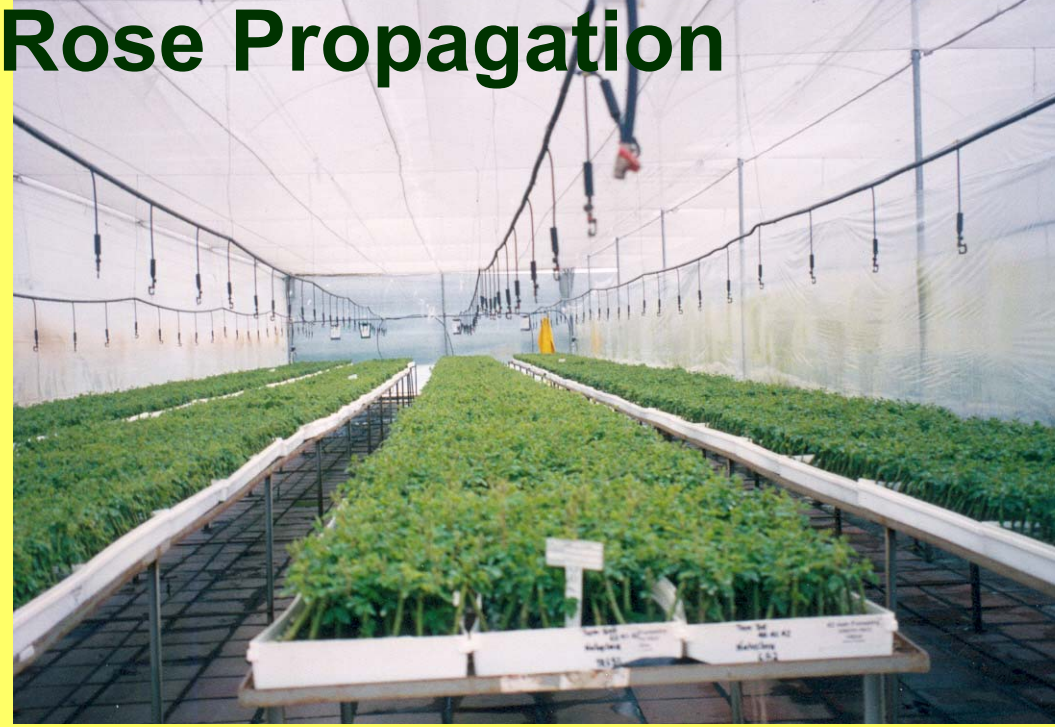
Colombia- Over 40% of carnations are presently grown in substrates

Kenya - Pumice

Colombia – Rice hulls

Soil-less Rose Propagation





30 million rootstocks or 8 million grafted “mini-plants” per hectare

Colombia - Ecuador – Kenya – Zimbabwe - Uganda

Compost

Brazil

Compost - Colombia

Compost application

To mature plants

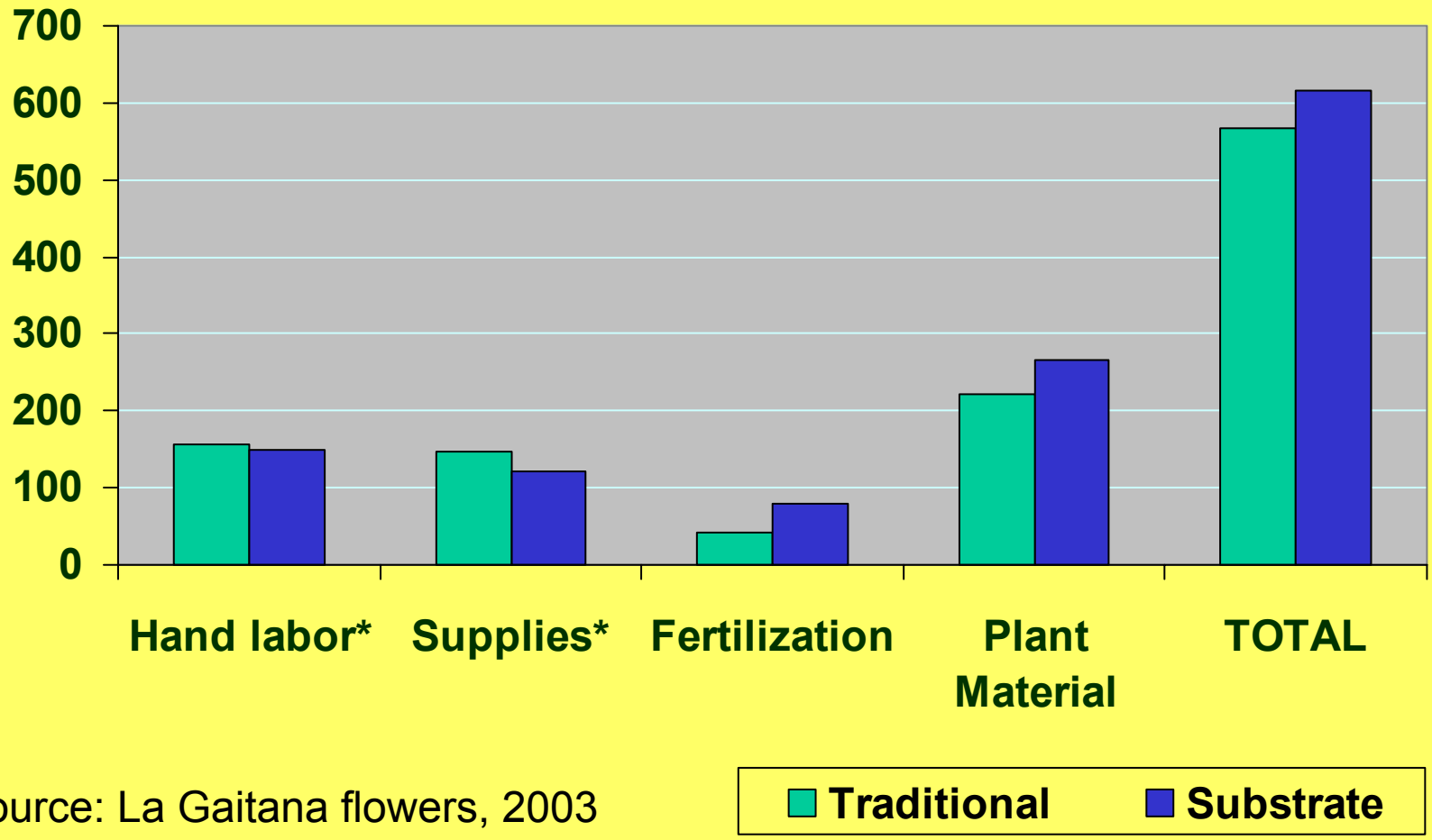
After steaming

During soil preparation

Beneficial organism cultures – applied to Compost or in drip lines

Carnation production costs: Traditional vs. Substrate (rice hulls). 2- year cycle

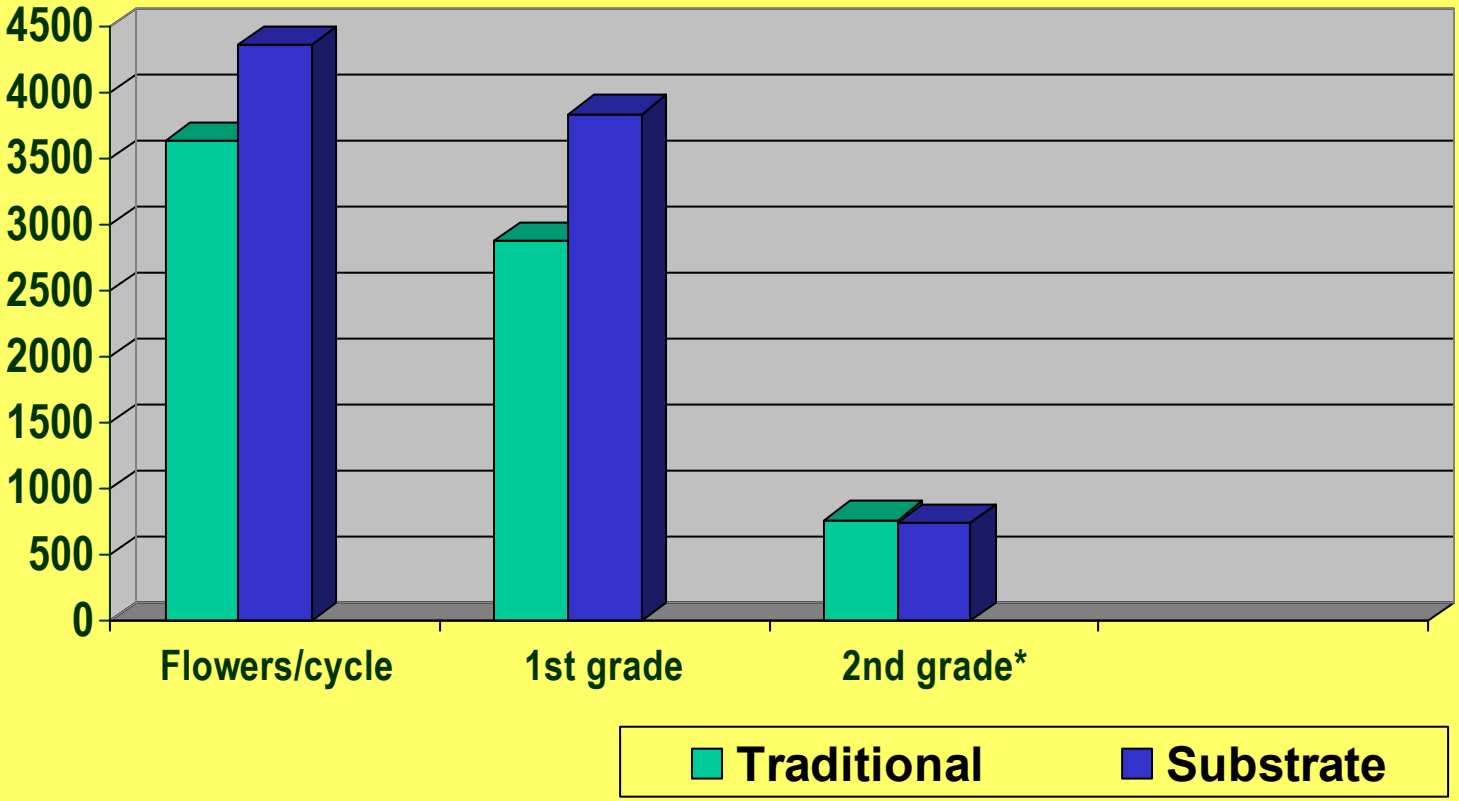
Per Ha. Figures in 100 USD. *Includes herbicide application and fumigation with Telone C-17.



Source: La Gaitana flowers, 2003

Carnation yield and quality: Traditional vs. Substrate (rice hulls)

Per Ha. Two year cycle. Figures in 1000 USD. *Includes non/exportable flowe



Source: La Gaitana Flowers, 2003

Source: FloresSagaró, 2002

Rose flower production - Soil vs. Rice hull substrate

	Ground beds	Substrate
Planting density	60,000 pl/ Ha	86,000 pl/ Ha
Setup cost/ 30 m^2 bed	U$ 57	US$ 80
Average yield	1.2 mil. flowers/ Ha/ year	1.5 mi. flowers/ Ha/ year
Production cycle	5 – 8 years	3 years

Plant health and nutrition management with compost in *Dendranthema*

Amount of compost applied: 20 - 30 Tons/Ha
Frequency of application: Pre-plant (every 16 weeks)
Beneficial organisms (suspension): 50 L/ 30m^2 bed
% Substitution of chemical fertilizer (in growing cycle): 50%
Water retention capacity: Increased by 30 - 40%
Soil sterilisation: None, except for sporadic disease outbreaks which are spot treated with steam.
Overall cost reduction: 15 - 20%
Estimated cost per Ha: USD $4950 (MB was estimated at $5600)

Source: Jaramillo, F. 2004. Jardines de los Andes, Bogotá, Colombia

Lessons learned from MB projects around the world

- Efficient alternatives to MB have been found in the vast majority of cases. These work best when used within an IPM framework.

- The capability to adapt to local conditions is essential to the success of any alternative

- Alternatives evaluated can be introduced to developing countries within periods of 2-3 years. In fact, demonstration projects have led larger or more technically prepared growers to adopt alternatives on their own initiative (e.g. Kenya, Costa Rica, Ecuador)