Plenary Session : Alternatives used for vegetables (Except Cucurbits)

Mohamed Besri (Morocco)
MBTOC Member
m.besri@iav.ac.ma

Oral presentations (12): session 3A

Crop (s)	Author/country	Geographic area
Tomato (3)	Miguel (Spain) Besri (Morocco) Santos et al (USA)	Mediterranean region Except USA USA
Vegetables (8)	Loumakis (Gr), Tognoni et al (It) Spotti (It), Leoni et al (It) Sanz et al (Spain) Runia et al (Holland+Israel) Haroutunian	Mediterranean region Italy Spain Holland Lebanon
Various (inc. vegetables (1)	Montesbravo (Cuba) Lieten, Belgium	Latin America Belgium

Posters presentations (4): session 3A

Crop (s)	Author/country	Geographic area
Tomato	Dos Santos (P) Slevin (Champon)	Portugal Chile
Pepper	Peiro (Spain)	Spain
Various (inc. vegetables	Tsakonas (Dow)	33 countries

Alternative fair (6): Various crops including vegetables

Company	Products
AQL	Agrocelhone (1,3 D + Pic)
Imants	Hot Air treatment
Sodium Azide	Broad spectrum pesticide
Champon	Dazitol
Agri Terra	Nematide
Mobil Vap	Steam equipment

Non Chemical Alternatives: General review (M.Besri)

Biofumigation	Chili, China, Guatemala, Lebanon, Macedonia, Morocco, Turkey, Uruguay, *France ,Greece, Italy, Portugal, Spain*
Grafting:	China, Cuba, Honduras, Lebanon, Morocco, Romania, Guatemala, *Belgium, France ,Greece, Italy, Portugal, Spain*
Solarisation	Argentina, Lebanon, Morocco, Syria, Turkey,Uruguay *France ,Greece, Italy, Portugal, Spain, USA*
Steam	Jordan, Lebanon, *Belgium, France ,Greece, Italy, Portugal, Spain*
Hot air	*Israel, Holland*
Biological control	Cuba, Jordan, Lebanon, Turkey, *France ,Greece, Italy, Portugal, Spain*
Soil less	Cuba, Morocco, Turkey, *Belgium, France ,Greece, Italy, Portugal, Spain*
Resistant varieties	Worldwide

Chemical Alternatives: General Review
M. Besri

Dazomet	Argentina,Chile, Guatemala, Lebanon, Turkey, Uruguay, *France ,Greece, Italy, Portugal, Spain, USA*
1,3 D	Morocco, Lebanon, Turkey, *Belgium, France , Greece, Italy, Portugal, Spain, USA*
Metam Na	Argentina, Guatemala ,Lebanon, Morocco, Turkey, Tunisia, Uruguay, *Belgium, France Greece, Italy, Portugal, Spain, USA*
Pic	*Belgium, Greece, Italy, Portugal, Spain, USA*
1,3D+Pic	Lebanon, Morocco, *Greece, Spain , USA*

Reported alternatives during the conference

Important Remark

The alternatives presented by the speakers do not reflect all the alternatives available in the region or the country

USA:Tomato (Santos)

➢Solarisation	6 weeks	Nutsedge
➢MeNa	Drip irrigation on raised beds	Nutsedge
➢Pic, MeNa	Delayed application of MeNa	Nutsedge
➢Pic, 1,3D	Delayed application of 1,3 D	Nutsedge
➢Pebulate + (1,3 D+Pic)	Pebulate deregistered	Nutsedge
➢1,3D+Pic		SBP+N
➢New products *Methyle iodide, Sodium Azide, Dimethyle disulfide*	Under investigation	SBP
➢IPM		SBP

SBP: Soil Borne Pathogens

Tomato, Pepper: Latin America (Eduardo Perez, Slevin)

➢Biofumigation	Inconsistent in Cuba
➢Biofumigation x Solarisation	Efficient on weeds, SBP
➢Solarisation	*Meloidogyne* spp,, *P.nicotianae*
➢Biological control	*Pythium* spp , *P.nicotianae (Trichoderma), M.incognita (Corynebacterium pauremetabolum, B.thuringiensis),*
➢Grafting (Tomato, pepper)	
➢Grafting x solarisation	
➢Grafting x biofumigation	Soil Borne Pathogens
➢Soil less (Peat + husk of rice, Zeolite)	
➢Dazomet, MeNa, Dazitol (Chile)	
➢Crop rotation	
➢IPM	

Vegetables Greece: Loumakis

➢Pic ➢1,3D ➢1,3D + Pic ➢Grafting (Tomato) ➢Solarisation + Grafting	Various soil borne pathogens (Nematodes, *Fusarium*, *Pyrenochaeta,* ..) and weeds

Various vegetables (Protected and covered), Holland: Runia

➢Resistant varieties ➢Steam ➢Soil less ➢Hot air (under experimentation) ➢Biological control ➢Soil rotavation and ploughing ➢Metam Sodium ➢IPM and Nematodes Control Strategy (NCS)	Various soil borne pathogens of potato, cabbage, carrots, leek, asparagus and other vegetables (tomato…)

Vegetables Italy (Spotti, Leoni, Tognoni)

➢Grafting (Tomato, eggplant) ➢Soil less culture Distillery Marc, Sea Straw (Posidinia oceanica) , Volcanic lapillus, perlite, peat, expanded clay, Rockwool ➢Resistant varieties ➢Solarisation ➢Telone EC ➢Tripicrine ➢1,3 D and Pic (separate application, one pass) ➢Combination of Alternatives	Various soil borne pathogens and weeds

Tomato Spain (Sanz, Peiro) and Mediterranean area (Miguel, Tsakonas)

➢Grafting (Tomato, Pepper): France, Italy, Greece, Jordan, Morocco, Spain	SBP SBP
➢Biofumigation (tomato, cucumber and pepper crop residues amended with chicken manure)	SBP and weeds (C.dactylon, C.rotundus)
➢Biofumigation x Solarisation	
➢1,3 D alone or in combination with Pic, MeNa, Solarisation, resistant varieties	SBP

Vegetables, Lebanon: Saad

➢Solarisation (80% of the farmers) ➢Biofumigation (5%) ➢Grafting (11,44%) ➢1,3 D (46 %) ➢Other chemicals: Cadusafos, Oxamyl ➢Combination: Solarisation+1,3D	Various vegetables Soil borne pathogens

Tomato Portugal (Vieira et al)

Biological control	*Meloidogyne javanica* (*Pochonia chlamydosporia*)

Main Constraints Reported

- Absence of identified alternatives: e.g. resistant cultivars and root stocks to a broad spectrum of pathogens
- Lack of approval by regulatory authorities: Pic in France, 1,3D+Pic in Italy
- Insufficient time to develop infrastructure: Commercial grafted plants nurseries
- Lack of training in the use of alternatives and adaptation of the process to local conditions: solarisation, grafting, biofumigation, drip irrigation, VIF, application of chemical alternatives (1,3 D+Pic, MeNa, …)
- Available alternatives not suitable for some local conditions: Solarisation, breakdown resistance by high temperature and salinity, new races..
- Longer time between fumigation and planting (Plant back)
- Available alternatives not economically viable
- Resistance of some food distribution companies to some alternatives e.g. Soil less

Main Conclusions

- Alternatives to MB for Vegetable production (Tomato, Pepper , Eggplant and other vegetables) are :
  - Technically available
  - Economically feasible
  - Environmentally safe
  - Accepted by the tomato growers
- Various constraints are limiting a wider adoption of alternatives.
- An IPM approach should be developed for each vegetable crop and cropping system

Thank you for tour attention