Workshop on non-chemical alternatives to replace methyl bromide as a soil fumigant

REPORT

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Workshop on non-chemical alternatives to replace methyl bromide as a soil fumigant

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Abbreviations

AITC	Allyl Isothiocyanates
CFU	Colony-Forming Units
EPA	United States Environmental Protection Agency
EU	European Union
FFS	Farmers Field School
FOL	Fusarium oxysporum f.sp lycopersici
FOM	Fusarium oxysporum f.sp melonis
ICM	Integrated Crop Management
INIA	Instituto Nacional de Investigaciones Agrarias
IPM	Integrated Pest Management
MAPA	Agriculture, Fisheries and Food
MB	Methyl Bromide
MBTOC	Methyl Bromide Technical Option Committee
MITC	Methyl Isothiocyanates
MMA	Ministries of the Environment
MNSV	Melon Necrotic Spot Virus
MYCPP	Multy Year Crop Protection Plan
NCS	Nematode Control Strategy
NFT	Nutrient Flow Technique
PCN	Potato cyst nematode
PE	Polyethylene (PE)
PPO –AGV	Applied Plant Research
TOT	Training of Trainers
UNEP	United Nations Environment Programme
USA	United States of America
VFA	Volatile fatty acids

Preface

Soil-borne pests are a major constraint to the production of various economically important crops, especially vegetables and ornamentals. Soil disinfection is a normal practice to combat several soil-borne plant pathogens, weeds and arthropods pests, and is currently implemented before planting to avoid any damage to the crops once they are planted.

Methyl bromide (MB) has been the main agent used for the control of soil-borne pests worldwide. However, the discovery of its ozone-depleting effect has prompted the parties of the Montreal Protocol to agree on a phase-out of its use and production. All country signatories to the Protocol have been identifying and validating new alternatives to replace MB. Significant progress has been made in this area: indeed, the Methyl Bromide Technical Option Committee (MBTOC) has asserted that every single crop can be produced successfully without its use.

The phasing out of MB provides an opportunity for farmers to be more innovative in their approach to pest management. Understanding the biology and host range of the economically important pests that pose risks to a given crop is an important element in the development of a new approach for soil pest control.

At present, there are several chemical fumigants already in use, but some new non-chemical alternatives have also been identified, most of them providing good soil-borne pest control if properly combined and integrated. These alternatives are more environmentally friendly than the routine use of other chemical fumigants, and their success will largely depend on regular pest monitoring and the use of all possible resources to reduce and prevent the incidence and effects of a given disease or pest.

In understanding the need for the development of environmentally viable approaches to soil pest management, FAO and the United Nations Environment Programme (UNEP) decided, jointly with the authorities of the Ministry of Environment in Hungary, to organize a Subregional Technical Workshop with the participation of several specialists from Bulgaria, Hungary and Poland, as well as from other parts of Europe. The Workshop, held in Budapest, 26–28 June 2007, aimed to exchange information and experiences on the non-chemical alternatives already validated in each of the above-mentioned countries and discuss possible ways of their future use in the countries.

The present document compiles most of the information presented and discussed at the Workshop, which may also be useful to scientists, extension workers and farmers in other regions of the world.

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INTRODUCTORY PAPERS

The phasing out of methyl bromide

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Summary

The historical consumption of MB is described as well as the efforts to identify and validate new alternatives for soil-borne pest control, such as the use of floating beds and substrates such as rockwool; the use of the fumigants such as dazomet, metam sodium, Nemathorin 10 G and Vydate 10 G (Oxamil); growing of resistant cultivars or grafting on resistant rootstocks, and the use of preparations based on microorganisms for biological control of soil-borne pest.

Introduction

MB has been used in Hungary since 1982 for soil fumigation only, in different vegetables under greenhouse and in the open field. Figure 1 clearly shows the use of the fumigant from 1998 to 2003. Figure 2 indicates that the main uses of MB have always been as a soil fumigant in vegetables, tobacco and other minor crops. Table 1 shows the main target pests for MB application, which were mainly soil diseases, including damping-off, nematodes and *Gryllotalpa gryllotalpa*, among others.

It is clear that once Hungary started to comply with the initial convention and the Montreal Protocol, the use of the fumigant was reduced year after year. Hungary signed the Vienna Convention in 1988, became a signatory of the Montreal Protocol in 1989, and later signed the amendments of London (1993), Copenhagen (1994), Montreal (1999) and Beijing (2002).

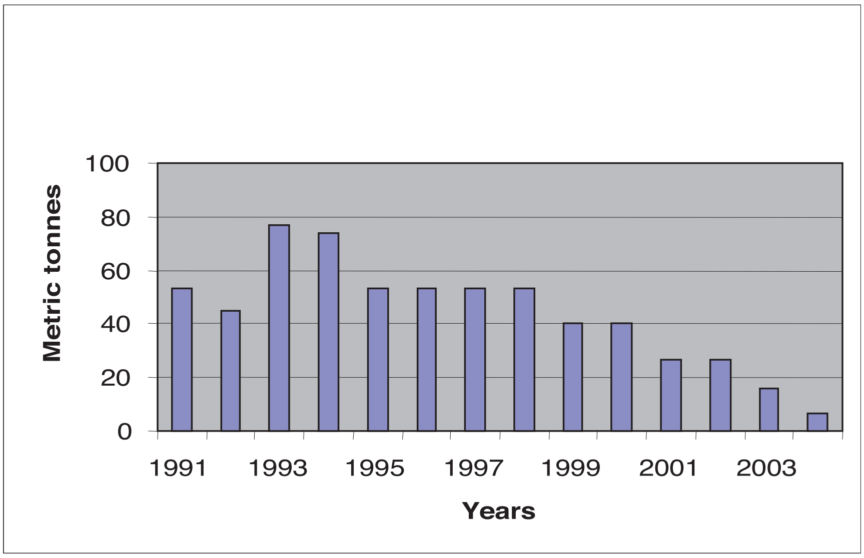

Figure 1: Consumption of MB in Hungary, 1991–2003

Hungary initiated a programme for identifying and validating new alternatives to replace the use of MB in different crops. As a result of this work, there are currently several alternatives already implemented and largely used by farmers: hydroponics, the use of floating beds and various substrates other than soil, e.g. rockwool; the use of other fumigants that are non-aggressive with the ozone layer, such as dazomet, metam sodium, Nemathorin 10 G and Vydate 10 G (Oxamil); growing of resistant cultivars or grafting on resistant rootstocks; and the use of preparations based on microorganisms for biological control of soil-borne pests.

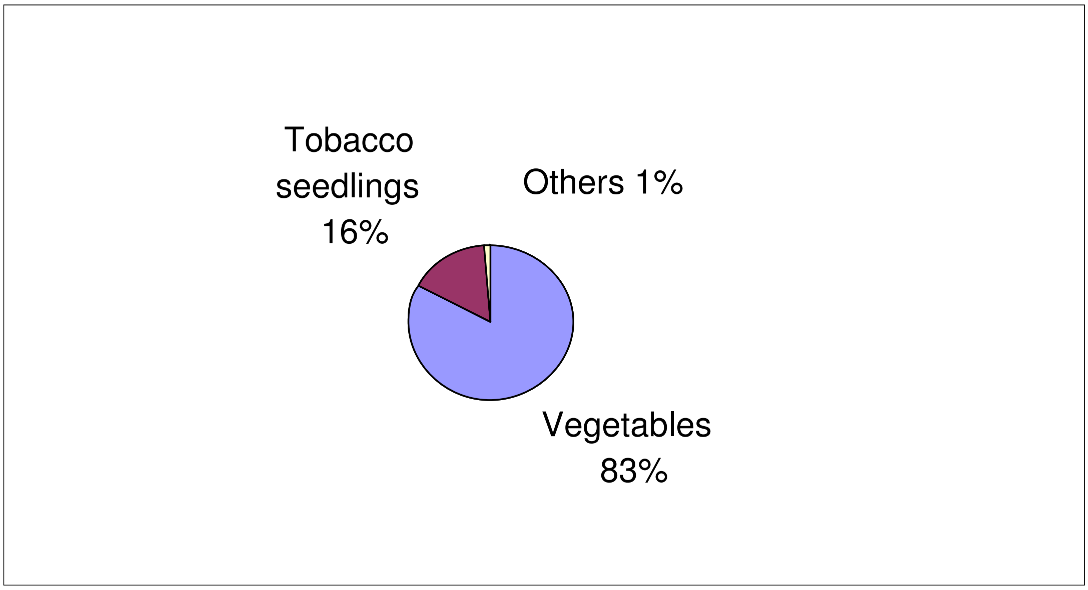

Figure 2: Pre-planting MB use in crops, 1995–98

Table 1: Main target pests for the control by methyl bromid

Crops	Pests
Vegetables: sweet pepper (paprika) tomatoes cucumber	Meloidogyne spp. (6 sp.) Fusarium oxisporum Sclerotinia spp. Bothrytis spp.
Tobacco seedling	*Pythium debarianum* *Fusarium sp.* *Gryllotalpa gryllotalpa* *Thrips tabaci*