

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

REPORT



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Edited by
R. Labrada

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TABLE OF CONTENTS

ABBREVIATIONS	VII
PREFACE	IX
INTRODUCTORY PAPERS	2
THE PHASING OUT OF METHYL BROMIDE	1
INTRODUCTION	1
NON-CHEMICAL ALTERNATIVES TO METHYL BROMIDE FOR SOIL-BORNE PEST CONTROL	3
INTRODUCTION	3
THE STATUS OF SOIL-BORNE PEST CONTROL AND INTEGRATED PEST MANAGEMENT (IPM)	4
AVAILABLE NON-CHEMICAL ALTERNATIVES FOR SOIL-BORNE PEST CONTROL	5
<i>Soilless substrates</i>	5
<i>Heating and steam</i>	6
<i>Biological control agents</i>	7
<i>Resistant cultivars and grafting</i>	8
<i>Organic amendments and biofumigation</i>	9
<i>Soil solarization</i>	9
<i>Use of plant covers</i>	10
COUNTRY REPORTS	15
NON-CHEMICAL ALTERNATIVES USED IN BULGARIA	17
HISTORY OF GREENHOUSES IN BULGARIA	17
NON-CHEMICAL ALTERNATIVES USED IN BULGARIA TO REPLACE MB AS A SOIL FUMIGANT	18
<i>Cultural practices</i>	18
<i>Physical methods</i>	18
<i>Biological control</i>	19
HYDROCULTURE IN HUNGARY	23
VEGETABLES PRODUCTION	23
ORNAMENTALS	24
GRAFTING AS AN ALTERNATIVE FOR VEGETABLE PRODUCTION IN HUNGARY	25
VEGETABLE PRODUCTION IN HUNGARY	25
GRAFTING	27
GROWING IN CONTAINERS IN HUNGARY	29
INTRODUCTION	29
AVAILABLE SUBSTRATES IN VEGETABLE PRODUCTION IN HUNGARY	29
<i>Bog-peat</i>	29
<i>Low moor peat</i>	30
<i>Coconut fibres</i>	30
<i>Perlite</i>	30
<i>Fired clay granules</i>	30
<i>Sand</i>	30
POTS APPLIED IN HUNGARY	30
<i>Buckets</i>	30
<i>Plastic containers</i>	31
<i>Other plastic pots and boxes</i>	31
<i>Polystyrene buckets and boxes</i>	32
<i>Polyethylene sacs</i>	32
BIOLOGICAL PEST CONTROL AT ARPAD-AGRAR	33

INTRODUCTION.....	33
PROBLEMS OF CHEMICAL CROP PROTECTION.....	34
FARMERS TRAINING ON ALTERNATIVES FOR SOIL-BORNE PEST CONTROL IN HUNGARY.....	37
CHARACTERISTICS OF TRAINING.....	37
CONCLUSIONS.....	39
NON-CHEMICAL ALTERNATIVES FOR SOIL USES ON HORTICULTURAL PRODUCTION IN POLAND.....	41
INTRODUCTION.....	41
PAST AND CURRENT ALTERNATIVE METHODS IN PROTECTED CULTIVATION IN POLAND.....	42
CULTURAL METHODS.....	42
<i>Use of grafted plants and resistant cultivars</i>	45
BIOLOGICAL CONTROL.....	45
FUNGI.....	46
ORGANIC AMENDMENTS AND NATURAL PRODUCTS.....	46
HEAT TREATMENT.....	48
COMBINED APPLICATION OF NON-CHEMICAL ALTERNATIVES WITH CHEMICAL ALTERNATIVES.....	48
NON-CHEMICAL ALTERNATIVES AND IMPLEMENTATION METHODS.....	51
NEMATODE CONTROL STRATEGY (NCS) AND PHYSICAL SOIL DISINFESTATION METHODS USED IN THE NETHERLANDS.....	53
INTRODUCTION.....	53
NEMATODE CONTROL STRATEGY.....	55
ADDITIONAL MEASURES.....	56
<i>Black fallow</i>	56
<i>Catch crops</i>	57
SOIL DISINFESTATION.....	57
<i>Anaerobic composting</i>	57
<i>Inundation</i>	57
<i>Steam sterilization</i>	57
<i>Hot air treatment (Cultivit®)</i>	58
<i>Chemical soil disinfestation</i>	58
CONCLUDING REMARKS.....	59
USE OF SOILLESS SUBSTRATES.....	61
INTRODUCTION.....	61
SOIL SOLARIZATION: AN ENVIRONMENTALLY-FRIENDLY ALTERNATIVE.....	71
INTRODUCTION.....	71
PRINCIPLES OF SOIL SOLARIZATION.....	72
BIOFUMIGATION.....	72
THE USE OF PLASTIC MULCH FOR SOIL SOLARIZATION.....	73
LIMITATIONS OF SOIL SOLARIZATION.....	74
CONCLUSIONS.....	74
INTRODUCTION.....	79
BIODISINFECTION: BIOFUMIGATION AND BIOSOLARIZATION.....	82
DISCUSSION AND CONCLUSION.....	83
THE USE OF GRAFTING IN SPAIN.....	87
INTRODUCTION.....	87
GRAFTING OF VEGETABLES AND FRUITS.....	88
TONGUE APPROACH GRAFT IN WATERMELON.....	90
TUBE GRAFT IN TOMATO.....	91
STATE OF DEVELOPMENT OF GRAFT TECHNOLOGIES IN SPAIN.....	91
GRAFTING ON WATERMELON.....	91
GRAFTING ON MELON.....	92

GRAFTING ON CUCUMBER	93
GRAFTING ON TOMATO.....	93
GRAFTING ON PEPPER	95
BIOLOGICAL AGENTS FOR THE CONTROL OF SOIL-BORNE PESTS.....	99
INTRODUCTION.....	99
IMPORTANT SOIL-BORNE DISEASES IN GREENHOUSE CROPS IN HUNGARY	99
BIOLOGICAL CONTROL OF DISEASES	100
FEASIBILITY OF THE USE OF MICROBIOLOGICAL AGENTS	100
MICROBIOLOGICAL AGENTS TESTED IN HUNGARY AGAINST DIFFERENT PATHOGENS.....	101
CONDITIONS FOR THE APPLICATION OF BIOLOGICAL CONTROL AGENTS	103
ALTERNATIVES TO METHYL BROMIDE IN PROTECTED HORTICULTURE WITH SPECIAL REFERENCE TO FLORICULTURE – THE IPM APPROACH	105
INTRODUCTION.....	105
INTEGRATED PEST MANAGEMENT (IPM)	106
STEAM STERILIZATION (PASTEURIZATION)	106
COMPOST.....	108
SOILLESS SUBSTRATES	110
SOLARIZATION	111
FUMIGANTS	111
INTEGRATED SOIL PEST MANAGEMENT IN PROTECTED ENVIRONMENTS.....	115
INTRODUCTION.....	115
<i>The biology and host range of soil pests in protected environments.....</i>	<i>115</i>
<i>Root-knot nematodes.....</i>	<i>115</i>
<i>Root lesion nematodes</i>	<i>116</i>
<i>Foliar nematodes</i>	<i>116</i>
<i>Damping-off fungi.....</i>	<i>116</i>
<i>Vascular wilts.....</i>	<i>117</i>
<i>Leaf blights</i>	<i>117</i>
<i>Root rots.....</i>	<i>118</i>
<i>Stem rots</i>	<i>118</i>
<i>Anthracnose</i>	<i>118</i>
<i>Bacterial wilt.....</i>	<i>119</i>
<i>Weeds.....</i>	<i>119</i>
<i>Sampling for soil nematodes.....</i>	<i>120</i>
<i>Sampling for soil pathogens.....</i>	<i>120</i>
INTEGRATED MANAGEMENT OF STRAWBERRY SOIL PESTS UNDER MOVEABLE POLY-TUNNELS.....	124
INTEGRATED MANAGEMENT OF TOMATO SOIL PESTS UNDER MOVEABLE POLY-TUNNELS	127
INTEGRATED MANAGEMENT OF GLASSHOUSE SOIL PESTS	129
CONCLUSION	130
TECHNICAL MEETING ON NON-CHEMICAL ALTERNATIVES FOR SOIL-BORNE PEST CONTROL	133
LIST OF PARTICIPANTS	135
TABLE 1: MAIN TARGET PESTS FOR THE CONTROL BY METHYL BROMID.....	2
TABLE 2: MAIN MICROORGANISMS USED FOR BIOLOGICAL CONTROL IN SOIL	7
TABLE 3: POST-ACTIVITY OF BIOACT WG AGAINST <i>MELOIDOGYNE ARENARIA</i> NEAL IN CUCUMBERS	22
TABLE 4: PEPPER PLANTS GRAFTED VS. OWN-ROOTED	27
TABLE 5: TOMATO PLANTS GRAFTED VS. OWN-ROOTED.....	27
TABLE 6 WATERMELON GRAFTED VS. OWN-ROOTED	28
TABLE 7: MIXED SUBSTRATE USED IN HUNGARY	31

TABLE 8: FFS CONCLUSIONS	39
TABLE 9: THE EFFICACY OF PREVENTIVE APPLICATION OF CHEMICAL AND BIOLOGICAL TREATMENTS IN GREENHOUSE CUCUMBER GROWN AS A FOURTH CROP ON RE-USED ROCKWOOL SLABS (AUTUMN CULTIVATION)	44
TABLE 10: COMMERCIALY AVAILABLE BIOCONTROL AGENTS IN POLAND	46
TABLE 11: COMMERCIALY AVAILABLE NATURAL PLANT PROTECTION PRODUCTS IN POLAND	47
TABLE 12: EFFECTIVENESS OF CHITOSAN IN THE CONTROL OF <i>F. OXYSPORUM</i> F.SP. DIANTHI TEN WEEKS AFTER PLANNING	48
TABLE 13: THE MOST IMPORTANT NEMATODE GROUPS IN DUTCH ARABLE FARMING AND FIELD PRODUCTION OF VEGETABLES	54
TABLE 14: PPO-AGV NEMATODE SCHEME FOR GREEN MANURE CROPS.	55
TABLE 15: VALUES FOR OPTIMAL WATER QUALITY FOR OPEN AND CLOSED HYDROPONICS SYSTEMS	63
TABLE 16: INFLUENCE OF BIOSOLARIZATION (B+S) ON WEEDS, ROOT-KNOT NEMATODES AND PEPPER PRODUCTION IN MURCIA (SPAIN)	83
TABLE 17: USE OF VEGETABLES GRAFTING IN SELECTED COUNTRIES.....	88
TABLE 18: THE GRAFTING PROCESS DURATION FOR CONDITIONS IN SOUTHEAST SPAIN (IN DAYS).....	90
TABLE 19: REGISTERED MICROBIOLOGICAL ACTIVE INGREDIENTS AGAINST PLANT PATHOGENS ACCORDING TO ANNEX I OF 91/414/EEC COUNCIL DIRECTIVE	102
TABLE 20: REGISTERED BIOLOGICAL AGENTS FOR SOIL-BORNE PEST CONTROL IN HUNGARY	102
TABLE 21: USE OF <i>TRICHODERMA</i> SPP. IN PEPPER, 1987.....	104
TABLE 22: THE MAIN COMPONENTS OF INTEGRATED PEST MANAGEMENT	107
TABLE 23: THE COMPOSTING PROCESS.....	109
TABLE 24: HEALTH AND NUTRITION MANAGEMENT OF CHRYSANTHEMUM PRODUCTION WITH COMPOST	109
TABLE 25: COMPARISON OF TRADITIONAL ROSE PRODUCTION IN GROUND BEDS WITH PRODUCTION IN RICE-HULL SUBSTRATE	111
TABLE 26: OPTIMUM CONDITIONS FOR RAPID BUILD-UP OF NEMATODE POPULATIONS.....	122
TABLE 27: OPTIMAL CONDITIONS FOR RAPID BUILD-UP OF SOIL PATHOGENS	123
TABLE 28: SEED TREATMENTS	129

FIGURES

FIGURE 1: CONSUMPTION OF MB IN HUNGARY, 1991–2003	1
FIGURE 2: PRE-PLANTING MB USE IN CROPS, 1995–98	2
FIGURE 3: GLASS GREENHOUSE AREA IN BULGARIA 1964–2004.....	17
FIGURE 4: PLASTIC GREENHOUSES IN BULGARIA	18
FIGURE 5: DIAGRAM OF THE TREATED PLOTS IN DKA APPLYING BOTH METHODS STARTING FROM 1999 TO THE PRESENT	20
FIGURE 6: ACTION OF BIOPRODUCT BIOACT WG COMPARED WITH VYDATE 10G	21
FIGURE 7: OUTDOOR VEGETABLE PRODUCTION IN HUNGARY, 2003–06	25
FIGURE 8: GREENHOUSE (GLASS + PLASTIC) VEGETABLE PRODUCTION IN HUNGARY, 2003–06.....	25
FIGURE 9: VEGETABLES PRODUCTION IN HUNGARY IN THE OPEN FIELD, 2003–06.....	26
FIGURE 10: VEGETABLES PRODUCTION IN HUNGARY IN GLASS AND PLASTIC GREENHOUSES.....	26

FIGURE 11: NO. AND GENDER OF PARTICIPANTS IN THE FFS	37
FIGURE 12: THE AGE OF FFS PARTICIPANTS	38
FIGURE 13: PARTICIPANTS IN THE FFS ACCORDING TO THEIR AREAS OF SPECIALIZATION	38
FIGURE 14: DISEASE PROGRESS OF VERTICILLUM WILT OF PEPPER GROWN IN SOIL TREATED WITH MB AND DIFFERENT ALTERNATIVES IN UNHEATED PLASTIC GREENHOUSES ON THE FARM AT GRABOWA	44
FIGURE 15: THE INFLUENCE OF CHEMICAL, BIOLOGICAL AND INTEGRATED CONTROL OF <i>VERTICILLUM</i> <i>DAHLIAE</i> ON FINAL DISEASE INCIDENTE IN BELL PEPPER PLANTS (MEAN OF SIX TRAILS)	49
FIGURE 16: NEMATODE CONTROL STRATEGY	56
FIGURE 17: SYSTEMS AVAILABLE FOR SOILLESS CULTIVATION	62
FIGURE 18: THE MATRIX FOR GOOD PLANT DEVELOPMENT IN HYDROPONICS.....	64
FIGURE 19: SET-UP OF SLOW FILTRATION ACCORDING TO WOHANKA.....	66
FIGURE 20: THE TECHNICAL INSTALLATION FOR THE RECIRCULATION OF NUTRIENT SOLUTIONS WITH MANUAL ADJUSTMENT NUTRIENTS ACCORDING TO MEASURED pH AND EC VALUES.....	67
FIGURE 21: THE USE OF BIOFUMIGATION IN SPAIN	81
FIGURE 22: DIFFERENT GRAFTING TECHNIQUES	89
FIGURE 23: <i>IN VITRO</i> EFFECT OF A <i>STREPTOMYCES GRISEOVIRIDIS</i> MICROBIOLOGICAL PREPARATION ON DIFFERENT PATHOGENS SOURCE: HÓDMEZŐVÁSÁRHELY, 2001	103
FIGURE 24: THE EFFECT OF MYCOSTOP AGAINST TOMATO SEEDLING DISEASES.....	103
FIGURE 25: CARNATION PRODUCTION COSTS: TRADITIONAL VS. SUBSTRATE (RICE HULLS). TWO-YEAR CYCLE PER HA.....	110
FIGURE 26: CARNATION YIELD AND QUALITY: TRADITIONAL VS. SUBSTRATE (RICE HULLS) PER HA: TWO- YEAR CYCLE.	110
FIGURE 27: INTEGRATED MANAGEMENT OF STRAWBERRY NEMATODE PESTS UNDER MOVEABLE POLY- TUNNELS.....	125
FIGURE 28 INTEGRATED MANAGEMENT OF STRAWBERRY SOIL PATHOGENS UNDER MOVEABLE POLY- TUNNELS.....	126
FIGURE 29 INTEGRATED MANAGEMENT OF TOMATO SOIL PESTS UNDER MOVEABLE POLY-TUNNELS	128

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).

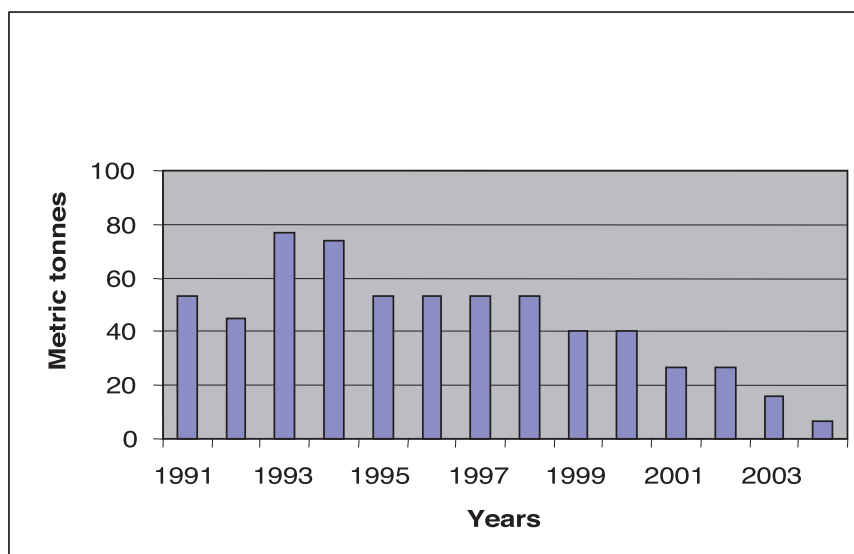


Figure 1: Consumption of MB in Hungary, 1991–2003

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.

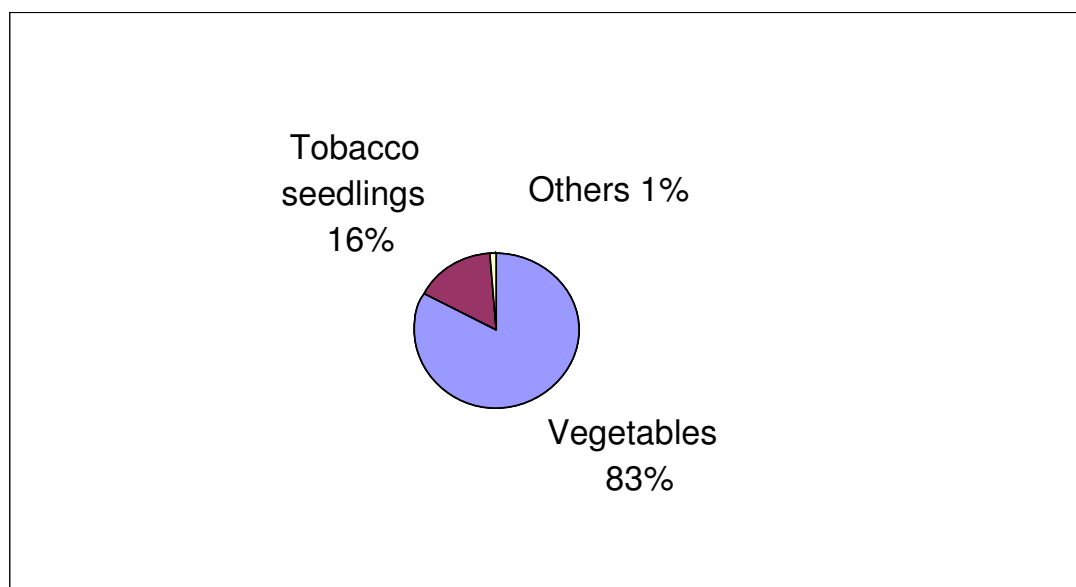


Figure 2: Pre-planting MB use in crops, 1995–98

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	<i>Pythium debarianum</i> <i>Fusarium sp.</i> <i>Gryllotalpa gryllotalpa</i> <i>Thrips tabaci</i>